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3rd Grade

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Welcome to **California Go Math!**, Grade 3! In this exciting mathematics program, there are hands-on activities to do and real-world problems to solve. Best of all, you will write your ideas and answers right in your book. In **California Go Math!**, writing and drawing on the pages helps you think deeply about what you are learning, and you will really understand math!

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Sincerely,

The Authors

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GO MATH!

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Whole Number Operations

Critical Area Developing understanding of multiplication and division and strategies for multiplication and division within 100

Project: Inventing Toys 2

1 Addition and Subtraction Within 1,000 3

Domains Operations and Algebraic Thinking
Number and Operations in Base Ten

CALIFORNIA COMMON CORE STANDARDS 3.OA.8, 3.OA.9, 3.NBT.1, 3.NBT.2

Show What You Know 3
Vocabulary Builder 4
1 Algebra • Number Patterns 5
2 Round to the Nearest Ten or Hundred 9
3 Estimate Sums 13
4 Mental Math Strategies for Addition 17
5 Algebra • Use Properties to Add 21
6 Use the Break Apart Strategy to Add 25
7 Use Place Value to Add 29
Mid-Chapter Checkpoint 33
8 Estimate Differences 35
9 Mental Math Strategies for Subtraction 39
10 Use Place Value to Subtract 43
11 Combine Place Values to Subtract 47
12 Problem Solving • Model Addition and Subtraction 51
Chapter 1 Review/Test 55

2 Represent and Interpret Data 61

Domain Measurement and Data

CALIFORNIA COMMON CORE STANDARDS 3.MD.3, 3.MD.4

Show What You Know 61
Vocabulary Builder 62
1 Problem Solving • Organize Data 63
2 Use Picture Graphs 67
3 Make Picture Graphs 71
Mid-Chapter Checkpoint 75
4 Use Bar Graphs 77
5 Make Bar Graphs 81
6 Solve Problems Using Data 85
7 Use and Make Line Plots 89
Chapter 2 Review/Test 93

Critical Area

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Chapter 1 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you add and subtract whole numbers and decide if an answer is reasonable?
- How do you know when an estimate will be close to an exact answer?
- When do you regroup to add or subtract whole numbers?
- How might you decide which strategy to use to add or subtract?

Chapter 2 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you represent and interpret data?
- What are some ways to organize data so it is easy to use?
- How can analyzing data in graphs help you solve problems?

Chapter 3 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you use multiplication to find how many in all?
- What models can help you multiply?
- How can you use skip counting to help you multiply?
- How can multiplication properties help you find products?
- What types of problems can be solved by using multiplication?

Chapter 4 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- What strategies can you use to multiply?
- How are patterns and multiplication related?
- How can multiplication properties help you find products?
- What types of problems can be solved by using multiplication?

3 Understand Multiplication 99

Domain Operations and Algebraic Thinking

CALIFORNIA COMMON CORE STANDARDS 3.OA.1, 3.OA.3, 3.OA.5, 3.OA.8

Show What You Know 99
Vocabulary Builder 100
1 Count Equal Groups 101
2 Algebra • Relate Addition and Multiplication 105
3 Skip Count on a Number Line 109
Mid-Chapter Checkpoint 113
4 Problem Solving • Model Multiplication 115
5 Model with Arrays 119
6 Algebra • Commutative Property of Multiplication 123
7 Algebra • Multiply with 1 and 0 127
Chapter 3 Review/Test 131

4 Multiplication Facts and Strategies 137

Domain Operations and Algebraic Thinking

CALIFORNIA COMMON CORE STANDARDS 3.OA.3, 3.OA.5, 3.OA.7, 3.OA.8, 3.OA.9

Show What You Know 137
Vocabulary Builder 138
1 Multiply with 2 and 4 139
2 Multiply with 5 and 10 143
3 Multiply with 3 and 6 147
4 Algebra • Distributive Property 151
5 Multiply with 7 155
Mid-Chapter Checkpoint 159
6 Algebra • Associative Property of Multiplication 161
7 Algebra • Patterns on the Multiplication Table 165
8 Multiply with 8 169
9 Multiply with 9 173
10 Problem Solving • Multiplication 177
Chapter 4 Review/Test 181

5 Use Multiplication Facts 187

Domains Operations and Algebraic Thinking
Number and Operations in Base Ten

CALIFORNIA COMMON CORE STANDARDS 3.OA.4, 3.OA.9, 3.NBT.3

Show What You Know 187
Vocabulary Builder 188
1 Algebra • Describe Patterns 189
2 Algebra • Find Unknown Numbers 193
Mid-Chapter Checkpoint 197
3 Problem Solving • Use the Distributive Property 199
4 Multiplication Strategies with Multiples of 10 203
5 Multiply 1-Digit Numbers by Multiples of 10 207
Chapter 5 Review/Test 211

Chapter 5 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you use multiplication facts, place value, and properties to solve multiplication problems?
- How are patterns and multiplication related?
- How can multiplication properties help you find products?
- What types of problems can be solved by using multiplication?

6 Understand Division 217

Domain Operations and Algebraic Thinking

CALIFORNIA COMMON CORE STANDARDS 3.OA.2, 3.OA.3, 3.OA.5, 3.OA.6, 3.OA.7

Show What You Know 217
Vocabulary Builder 218
1 Problem Solving • Model Division 219
2 Size of Equal Groups 223
3 Number of Equal Groups 227
4 Model with Bar Models 231
5 Algebra • Relate Subtraction and Division 235
Mid-Chapter Checkpoint 239
6 Investigate • Model with Arrays 241
7 Algebra • Relate Multiplication and Division 245
8 Algebra • Write Related Facts 249
9 Algebra • Division Rules for 1 and 0 253
Chapter 6 Review/Test 257

Chapter 6 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you use division to find how many in each group or how many equal groups?
- How are multiplication and division related?
- What models can help you divide?
- How can subtraction help you divide?

Chapter 7 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- What strategies can you use to divide?
- How can you use a related multiplication fact to divide?
- How can you use factors to divide?
- What types of problems can be solved by using division?

7 Division Facts and Strategies 263

Domain Operations and Algebraic Thinking

CALIFORNIA COMMON CORE STANDARDS 3.OA.3, 3.OA.4, 3.OA.7, 3.OA.8

Show What You Know 263
Vocabulary Builder 264
1 Divide by 2 265
2 Divide by 10 269
3 Divide by 5 273
4 Divide by 3 277
5 Divide by 4 281
6 Divide by 6 285
Mid-Chapter Checkpoint 289
7 Divide by 7 291
8 Divide by 8 295
9 Divide by 9 299
10 Problem Solving • Two-Step Problems 303
11 Investigate • Order of Operations 307
Chapter 7 Review/Test 311

Fractions

Critical Area Developing understanding of fractions, especially unit fractions (fractions with numerator 1)

Project: Coins in the U.S. 318

8 Understand Fractions 319

Domain Number and Operations–Fractions

CALIFORNIA COMMON CORE STANDARDS 3.NF.1, 3.NF.2a, 3.NF.2b, 3.NF.3c

Show What You Know 319
Vocabulary Builder 320
1 Equal Parts of a Whole 321
2 Equal Shares 325
3 Unit Fractions of a Whole 329
4 Fractions of a Whole. 333
5 Fractions on a Number Line 337
Mid-Chapter Checkpoint 341
6 Relate Fractions and Whole Numbers 343
7 Fractions of a Group. 347
8 Find Part of a Group Using Unit Fractions 351
9 Problem Solving • Find the Whole Group Using Unit Fractions 355
Chapter 8 Review/Test 359

9 Compare Fractions 365

Domain Number and Operations–Fractions

CALIFORNIA COMMON CORE STANDARDS 3.NF.3a, 3.NF.3b, 3.NF.3d

Show What You Know 365
Vocabulary Builder 366
1 Problem Solving • Compare Fractions 367
2 Compare Fractions with the Same Denominator 371
3 Compare Fractions with the Same Numerator 375
4 Compare Fractions 379
Mid-Chapter Checkpoint 383
5 Compare and Order Fractions 385
6 Investigate • Model Equivalent Fractions 389
7 Equivalent Fractions 393
Chapter 9 Review/Test 397

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Chapter 8 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you use fractions to describe how much or how many?
- Why do you need to have equal parts for fractions?
- How can you solve problems that involve fractions?

Chapter 9 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you compare fractions?
- What models can help you compare and order fractions?
- How can you use the size of the pieces to help you compare and order fractions?
- How can you find equivalent fractions?

Measurement

Critical Area

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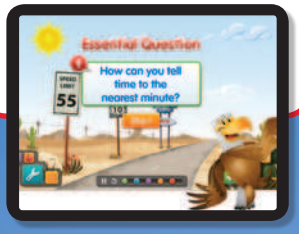

Chapter 10 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you tell time and use measurement to describe the size of something?
- How can you tell time and find the elapsed time, starting time, or ending time of an event?
- How can you measure the length of an object to the nearest half or fourth inch?

Chapter 11 Overview

In this chapter, you will explore and discover answers to the following **Essential Questions**:

- How can you solve problems involving perimeter and area?
- How can you find perimeter?
- How can you find area?
- What might you need to estimate or measure perimeter and area?

COMMON CORE **Critical Area** Developing understanding of the structure of rectangular arrays and of area

Project: Plan a Playground 404

10 Time, Length, Liquid Volume, and Mass 405

Domain Measurement and Data

CALIFORNIA COMMON CORE STANDARDS 3.MD.1, 3.MD.2, 3.MD.4

Show What You Know 405
Vocabulary Builder 406
1 Time to the Minute 407
2 A.M. and P.M. 411
3 Measure Time Intervals 415
4 Use Time Intervals 419
5 Problem Solving • Time Intervals 423
Mid-Chapter Checkpoint 427
6 Measure Length 429
7 Estimate and Measure Liquid Volume 433
8 Estimate and Measure Mass 437
9 Solve Problems About Liquid Volume and Mass 441
Chapter 10 Review/Test 445

11 Perimeter and Area 451

Domain Measurement and Data

CALIFORNIA COMMON CORE STANDARDS 3.MD.5, 3.MD.5a, 3.MD.5b, 3.MD.6, 3.MD.7, 3.MD.7a, 3.MD.7b, 3.MD.7c, 3.MD.7d, 3.MD.8

Show What You Know 451
Vocabulary Builder 452
1 Investigate • Model Perimeter 453
2 Find Perimeter 457
3 Algebra • Find Unknown Side Lengths 461
4 Understand Area 465
5 Measure Area 469
6 Use Area Models 473
Mid-Chapter Checkpoint 477
7 Problem Solving • Area of Rectangles 479
8 Area of Combined Rectangles 483
9 Same Perimeter, Different Areas 487
10 Same Area, Different Perimeters 491
Chapter 11 Review/Test 495

Geometry

COMMON CORE **Critical Area** Describing and analyzing two-dimensional shapes

Project: Make a Mosaic 502

12 Two-Dimensional Shapes 503

Domain Geometry

CALIFORNIA COMMON CORE STANDARDS 3.G.1, 3.G.2

Show What You Know 503
Vocabulary Builder 504
1 Describe Plane Shapes 505
2 Describe Angles in Plane Shapes 509
3 Identify Polygons. 513
4 Describe Sides of Polygons 517
Mid-Chapter Checkpoint 521
5 Classify Quadrilaterals 523
6 Draw Quadrilaterals. 527
7 Describe Triangles. 531
8 Problem Solving • Classify Plane Shapes. 535
9 Investigate • Relate Shapes, Fractions, and Area 539
Chapter 12 Review/Test 543

Glossary H1
California Common Core State Standards H13
Index H21
Table of Measures H39

Critical Area

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Chapter 12 Overview

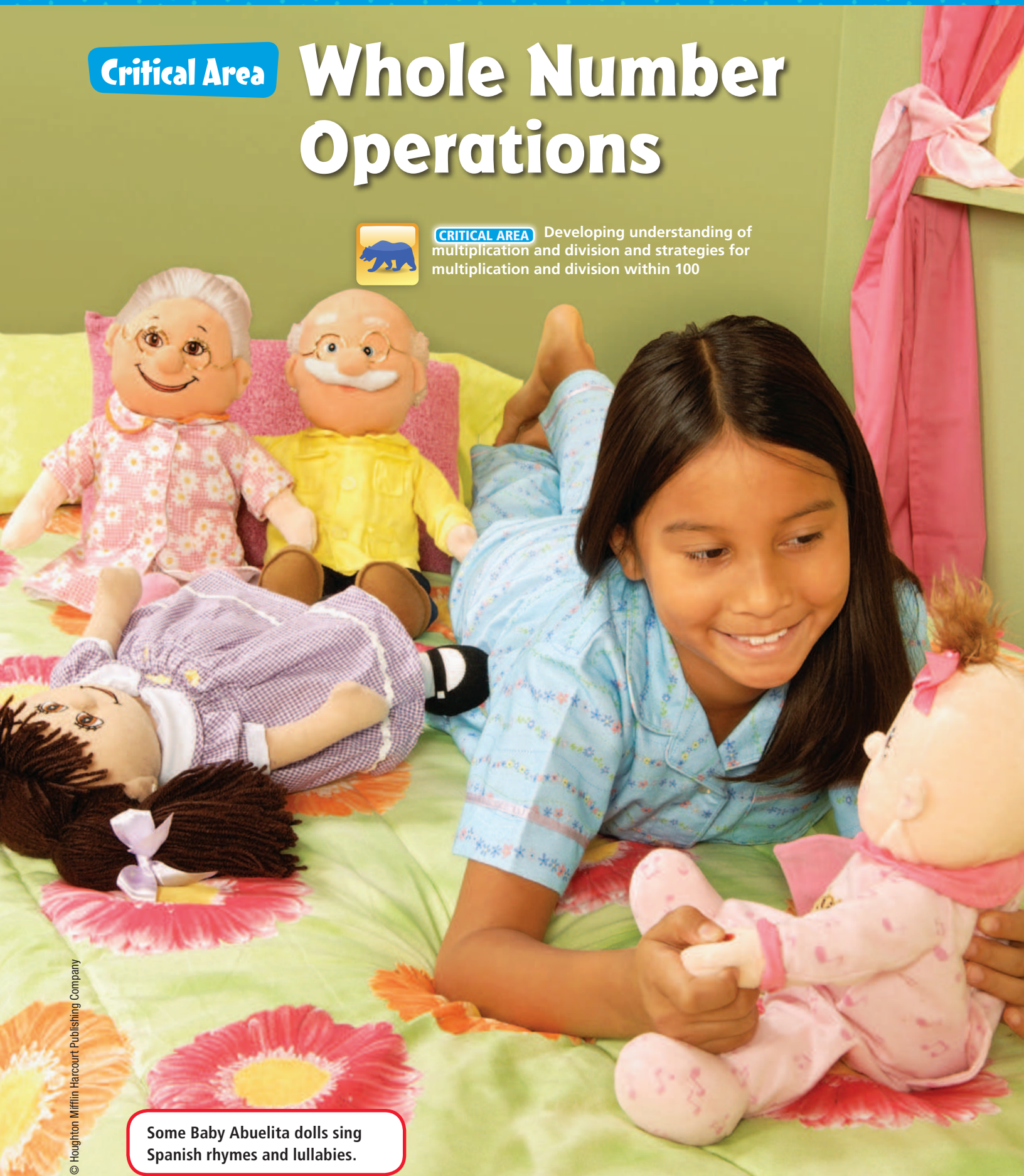
In this chapter, you will explore and discover answers to the following **Essential Questions**:

- What are some ways to describe and classify two-dimensional shapes?
- How can you describe the angles and sides in polygons?
- How can you use sides and angles to describe quadrilaterals and triangles?
- How can you use properties of shapes to classify them?
- How can you divide shapes into equal parts and use unit fractions to describe the parts?

Critical Area

Whole Number Operations

CRITICAL AREA Developing understanding of multiplication and division and strategies for multiplication and division within 100



Some Baby Abuelita dolls sing Spanish rhymes and lullabies.

Project

Inventing Toys

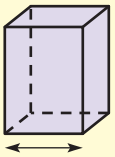
The dolls in the picture are called Abuelitos. Some of them are grandmother and grandfather dolls that were designed to sing lullabies. They and the grandchildren dolls have music boxes inside them. You squeeze their hands to start them singing!

Get Started

Suppose you and a partner work in a toy store. You want to order enough dolls to fill two shelves in the store. Each shelf is 72 inches long. How many cartons of dolls will fill the two shelves? Use the Important Facts to help you.

Important Facts

- Each Abuelita doll comes in a box that is 8 inches wide.
- There are 4 boxes in 1 carton.



- Abuelita Rosa sings 6 songs.
- Abuelito Pancho sings 4 songs.
- Javier sings 5 songs.
- Baby Andrea and Baby Tita each sing 5 songs.
- Baby Mimi plays music but does not sing.

Completed by _____

Chapter 1

Addition and Subtraction Within 1,000

Show What You Know

Check your understanding of important skills.

Name _____

Think Addition to Subtract

Write the missing numbers.

1. $9 - 4 = \square$

Think: $4 + \square = 9$

$4 + \_\_\_\_ = 9$

So, $9 - 4 = \_\_\_\_$.

2. $13 - 7 = \square$

Think: $7 + \square = 13$

$7 + \_\_\_\_ = 13$

So, $13 - 7 = \_\_\_\_$.

3. $17 - 9 = \square$

Think: $9 + \square = 17$

$9 + \_\_\_\_ = 17$

So, $17 - 9 = \_\_\_\_$.

Addition Facts

Find the sum.

4. $\begin{array}{r} 4 \\ +\ 3 \\ \hline \end{array}$

5. $\begin{array}{r} 2 \\ +\ 7 \\ \hline \end{array}$

6. $\begin{array}{r} 8 \\ +\ 6 \\ \hline \end{array}$

7. $\begin{array}{r} 9 \\ +\ 4 \\ \hline \end{array}$

8. $\begin{array}{r} 7 \\ +\ 9 \\ \hline \end{array}$

Subtraction Facts

Find the difference.

9. $\begin{array}{r} 8 \\ -\ 5 \\ \hline \end{array}$

10. $\begin{array}{r} 11 \\ -\ 2 \\ \hline \end{array}$

11. $\begin{array}{r} 10 \\ -\ 6 \\ \hline \end{array}$

12. $\begin{array}{r} 18 \\ -\ 9 \\ \hline \end{array}$

13. $\begin{array}{r} 15 \\ -\ 7 \\ \hline \end{array}$

Math Detective

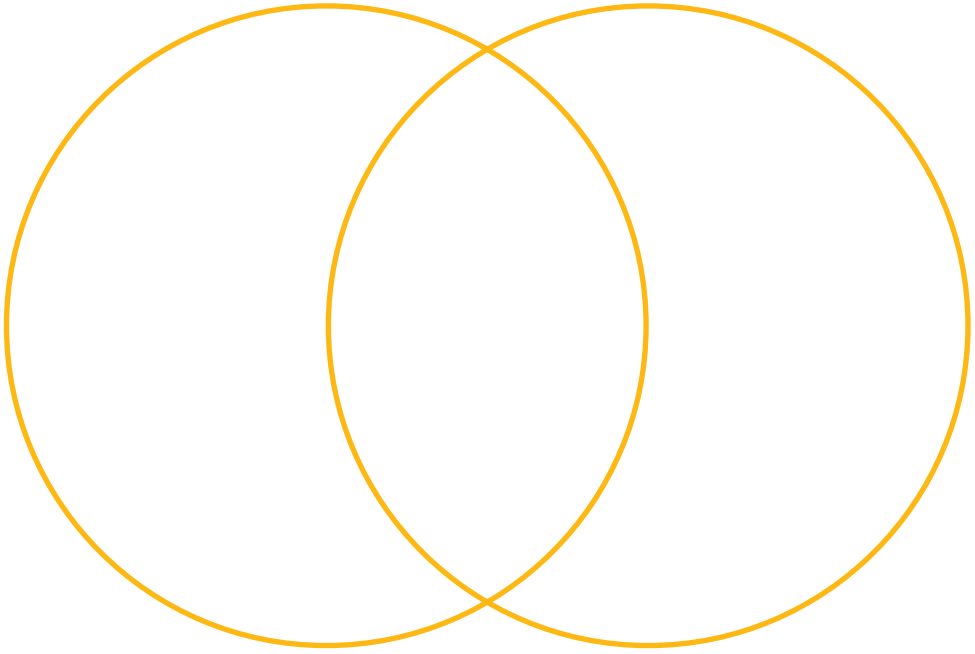
Manuel's puppy chewed part of this homework paper. Two of the digits in his math problem are missing. Be a Math Detective to help Manuel figure out the missing digits. What digits are missing?

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Sort the review words with a ✓ into the Venn diagram.



Addition Words **Subtraction Words**

Review Words

- ✓ add
- ✓ difference
- even
- ✓ hundreds
- odd
- ✓ ones
- ✓ regroup
- ✓ subtract
- ✓ sum
- ✓ tens

Preview Words

- Associative Property of Addition
- Commutative Property of Addition
- compatible numbers
- estimate
- Identity Property of Addition
- pattern
- round

Understand Vocabulary

Complete the sentences by using preview words.

1. A number close to an exact number is called an _____.
2. You can _____ a number to the nearest ten or hundred to find a number that tells *about* how much or *about* how many.
3. _____ are numbers that are easy to compute mentally.
4. The _____ states that you can add two or more numbers in any order and get the same sum.

Name _____

Number Patterns

Essential Question How can you use properties to explain patterns on the addition table?

Operations and Algebraic Thinking—3.OA.9

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.7

Unlock the Problem

Hands On

A **pattern** is an ordered set of numbers or objects. The order helps you predict what will come next.

You can use the addition table to explore patterns.

+	0	1	2	3	4	5	6	7	8	9	10
0	0	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10	11
2	2	3	4	5	6	7	8	9	10	11	12
3	3	4	5	6	7	8	9	10	11	12	13
4	4	5	6	7	8	9	10	11	12	13	14
5	5	6	7	8	9	10	11	12	13	14	15
6	6	7	8	9	10	11	12	13	14	15	16
7	7	8	9	10	11	12	13	14	15	16	17
8	8	9	10	11	12	13	14	15	16	17	18
9	9	10	11	12	13	14	15	16	17	18	19
10	10	11	12	13	14	15	16	17	18	19	20

Activity 1

Materials ■ orange and green crayons

- Look across each row and down each column. What pattern do you see?

_____

_____

- Shade the row and column orange for the addend 0. Compare the shaded squares to the yellow row and the blue column. What pattern do you see?

_____

What happens when you add 0 to a number?

_____

- Shade the row and column green for the addend 1. What pattern do you see?

_____

What happens when you add 1 to a number?

_____

_____

The **Identity Property of Addition** states that the sum of any number and zero is that number.

$7 + 0 = 7$

Math Talk **Mathematical Practices**

What other patterns can you find in the addition table?

Activity 2

Materials ■ orange crayon

+	0	1	2	3	4	5	6	7	8	9	10
0	0	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10	11
2	2	3	4	5	6	7	8	9	10	11	12
3	3	4	5	6	7	8	9	10	11	12	13
4	4	5	6	7	8	9	10	11	12	13	14
5	5	6	7	8	9	10	11	12	13	14	15
6	6	7	8	9	10	11	12	13	14	15	16
7	7	8	9	10	11	12	13	14	15	16	17
8	8	9	10	11	12	13	14	15	16	17	18
9	9	10	11	12	13	14	15	16	17	18	19
10	10	11	12	13	14	15	16	17	18	19	20

- Shade all the sums of 5 orange. What pattern do you see?

_____

_____

- Write two addition sentences for each sum of 5. The first two are started for you.

5 + 0 = _____ and 0 + 5 = _____

_____ + _____ = _____ and _____ + _____ = _____

_____ + _____ = _____ and _____ + _____ = _____

- What pattern do you see?

_____

_____

The **Commutative Property of Addition** states that you can add two or more numbers in any order and get the same sum.

$3 + 4 = 4 + 3$

$7 = 7$

Activity 3

Materials ■ orange and green crayons

- Shade a diagonal from left to right orange. Start with a square for 1. What pattern do you see?

_____

- Shade a diagonal from left to right green. Start with a square for 2. What pattern do you see?

_____

- Write addition sentences for the shaded boxes. Write *even* or *odd* under each addend.

Remember

Even numbers end in 0, 2, 4, 6, or 8. Odd numbers end in 1, 3, 5, 7, or 9.

Math Talk **Mathematical Practices**

Explain how you know when the sum of two numbers will be odd.

_____ + _____ = 6 ↑ ↑ ↑ _____ + _____ = even

_____ + _____ = 7 ↑ ↑ ↑ _____ + _____ = odd

_____ + _____ = 8 ↑ ↑ ↑ _____ + _____ = even

Name _____

Share and Show

MATH BOARD

Use the addition table on page 6 for 1–15.

1. Complete the addition sentences to show the Commutative Property of Addition.

$3 + \_\_\_\_ = \_\_\_\_$ $4 + \_\_\_\_ = \_\_\_\_$

Math Talk — **Mathematical Practices**

Explain why you can use the Commutative Property of Addition to write a related addition sentence.

Find the sum. Then use the Commutative Property of Addition to write the related addition sentence.

2. $8 + 5 = \_\_\_\_$

$\_\_\_\_ + \_\_\_\_ = \_\_\_\_$

3. $7 + 9 = \_\_\_\_$

$\_\_\_\_ + \_\_\_\_ = \_\_\_\_$

4. $10 + 4 = \_\_\_\_$

$\_\_\_\_ + \_\_\_\_ = \_\_\_\_$

Is the sum even or odd? Write *even* or *odd*.

5. $8 + 1$ _____

6. $3 + 9$ _____

7. $4 + 8$ _____

Problem Solving • Applications

Real World

8. THINK SMARTER Look back at the shaded diagonals in Activity 2. Why does the orange diagonal show only odd numbers? Explain.

_____

_____

9. GO DEEPER Find the sum $15 + 0$. Then write the name of the property that you used to find the sum.

_____

10. THINK SMARTER Select the number sentences that show the Commutative Property of Addition. Mark all that apply.

Ⓐ $27 + 4 = 31$

Ⓑ $27 + 4 = 4 + 27$

Ⓒ $27 + 0 = 0 + 27$

Ⓓ $27 + (4 + 0) = (27 + 4) + 0$

Sense or Nonsense?

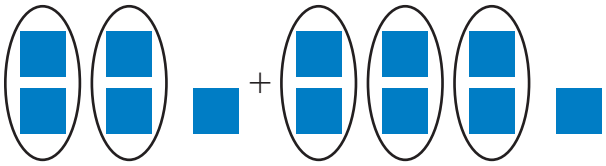
11. MATHEMATICAL PRACTICE 3 **Make Arguments** Whose statement makes sense? Whose statement is nonsense? Explain your reasoning.

The sum of an odd number and an odd number is odd.

Joey's Work

odd + odd = odd

5 + 7



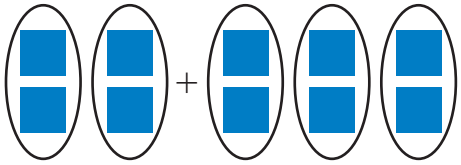
I can circle pairs of tiles in each addend and there is 1 left over in each addend. So, the sum will be odd.

The sum of an even number and an even number is even.

Kayley's Work

even + even = even

4 + 6



I can circle pairs of tiles with no tiles left over. So, the sum is even.

- For the statement that is nonsense, correct the statement.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Round to the Nearest Ten or Hundred

Essential Question How can you round numbers?

Number and Operations in Base Ten—3.NBT.1

MATHEMATICAL PRACTICES
MP.5, MP.7, MP.8

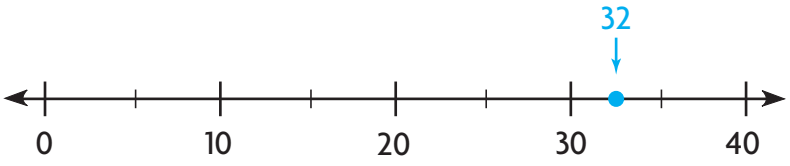
Unlock the Problem

When you **round** a number, you find a number that tells you *about* how much or *about* how many.

Mia's baseball bat is 32 inches long. What is its length rounded to the nearest ten inches?

One Way Use a number line to round.

A Round 32 to the nearest ten.



Find which tens the number is between.

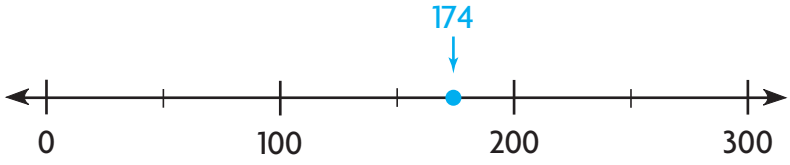
32 is between _____ and _____.

32 is closer to _____ than it is to _____.

32 rounded to the nearest ten is _____.

So, the length of Mia's bat rounded to the nearest ten inches is _____ inches.

B Round 174 to the nearest hundred.



Find which hundreds the number is between.

174 is between _____ and _____.

174 is closer to _____ than it is to _____.

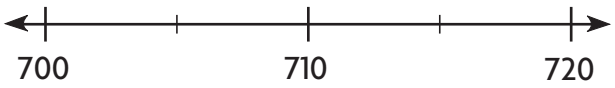
So, 174 rounded to the nearest hundred is _____.

Math Talk **Mathematical Practices**

Name three other numbers that round to 30 when rounded to the nearest ten. **Explain.**

Try This! **Round 718 to the nearest ten and hundred. Locate and label 718 on the number lines.**

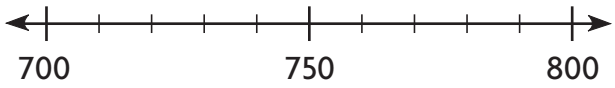
A **Nearest Ten**



718 is closer to _____ than it is to _____.

So, 718 rounds to _____.

B **Nearest Hundred**



718 is closer to _____ than it is to _____.

So, 718 rounds to _____.

Another Way Use place value.

A **Round 63 to the nearest ten.**

Think: The digit in the ones place tells if the number is closer to 60 or 70.

3 ◯ 5

63
↑

So, the tens digit stays the same. Write 6 as the tens digit.

Write zero as the ones digit.

So, 63 rounded to the nearest ten is _____.

- Find the place to which you want to round.
- Look at the digit to the right.
- If the digit is less than 5, the digit in the rounding place stays the same.
- If the digit is 5 or greater, the digit in the rounding place increases by one.
- Write zeros for the digits to the right of the rounding place.

B **Round 457 to the nearest hundred.**

Think: The digit in the tens place tells if the number is closer to 400 or 500.

5 ◯ 5

457
↑

So, the hundreds digit increases by one. Write 5 as the hundreds digit.

Write zeros as the tens and ones digits.

So, 457 rounded to the nearest hundred is _____.

Math Talk **Mathematical Practices**

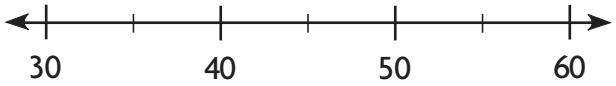
Explain how using place value is similar to using a number line.

Name _____

Share and Show

MATH BOARD

Locate and label 46 on the number line.
Round to the nearest ten.



1. 46 is between _____ and _____.

2. 46 is closer to _____ than it is to _____.

3. 46 rounded to the nearest ten is _____.

Round to the nearest ten.

4. 19 _____

5. 66 _____

6. 51 _____

Round to the nearest hundred.

7. 463 _____

8. 202 _____

9. 658 _____

Math Talk — **Mathematical Practices**

What is the greatest number that rounds to 50 when rounded to the nearest ten? What is the least number? **Explain.**

On Your Own

Locate and label 548 on the number line.
Round to the nearest hundred.

10. 548 is between _____ and _____.

11. 548 is closer to _____ than it is to _____.

12. 548 rounded to the nearest hundred is _____.

Round to the nearest ten and hundred.

13. 576 _____ _____

14. 298 _____ _____

15. 844 _____ _____

Problem Solving • Applications Real World

Use the table for 16–18.

Visitors to the Giraffe Exhibit	
Day	**Number of Visitors**
Sunday	894
Monday	793
Tuesday	438
Wednesday	362
Thursday	839
Friday	725
Saturday	598

16. On which day did about 900 visitors come to the giraffe exhibit?

17. To the nearest ten, how many visitors came to the giraffe exhibit on Sunday?

18. GO DEEPER On which two days did about 800 visitors come to the giraffe exhibit each day?

19. MATHEMATICAL PRACTICE 3 **Make Arguments** Cole said that 555 rounded to the nearest ten is 600. What is Cole's error? Explain.

WRITE Math • Show Your Work

20. THINK SMARTER Write five numbers that round to 360 when rounded to the nearest ten.

21. THINK SMARTER Select the numbers that round to 100. Select all that apply.

Ⓐ 38 Ⓒ 109

Ⓑ 162 Ⓓ 83

FOR MORE PRACTICE: Standards Practice Book

Name _____

Estimate Sums

Essential Question How can you use compatible numbers and rounding to estimate sums?

Number and Operations in Base Ten—3.NBT.1 *Also 3.NBT.2*

MATHEMATICAL PRACTICES
MP.1, MP.5, MP.6, MP.7

Unlock the Problem

The table shows how many dogs went to Pine Lake Dog Park during the summer months. About how many dogs went to the park during June and August?

Pine Lake Dog Park

Month	Number of Dogs
June	432
July	317
August	489

You can estimate to find *about* how many or *about* how much. An **estimate** is a number close to an exact amount.

One Way Use compatible numbers.

Compatible numbers are numbers that are easy to compute mentally and are close to the real numbers.

$$\begin{array}{rcr} 432 & \rightarrow & 425 \\ +\ 489 & \rightarrow & +\ 475 \\ \hline & & \end{array}$$

So, about _____ dogs went to Pine Lake Dog Park during June and August.

Math Talk **Mathematical Practices**

Will the sum of the compatible numbers 425 and 475 be greater than or less than the exact sum? **Explain.**

1. What other compatible numbers could you have used?

_____

2. About how many dogs went to the park during July and August? What compatible numbers could you use to estimate?

_____

Another Way Use place value to round.

$432 + 489 = \square$

First, find the place to which you want to round. Round both numbers to the same place. The greatest place value of 432 and 489 is hundreds. So, round to the nearest hundred.

Remember

When you round a number, you find a number that tells *about* how many or *about* how much.

STEP 1 Round 432 to the nearest hundred.

- Look at the digit to the right of the hundreds place.
- Since $3 < 5$, the digit 4 stays the same.
- Write zeros for the tens and ones digits.

4 3 2
↑

4 3 2 → ☐
+ 4 8 9 + ☐

STEP 2 Round 489 to the nearest hundred.

- Look at the digit to the right of the hundreds place.
- Since $8 > 5$, the digit 4 increases by one.
- Write zeros for the tens and ones digits.

4 8 9
↑

4 3 2 → 4 0 0
+ 4 8 9 → + ☐

STEP 3 Find the sum of the rounded numbers.

4 3 2 → 4 0 0
+ 4 8 9 → + 5 0 0
☐

So, 432 + 489 is about _____.

Math Talk Mathematical Practices

How would you round 432 and 489 to the nearest ten? What would be the estimated sum? **Explain.**

Try This! Estimate the sum.

A Use compatible numbers.

47 → ☐
+ 23 → + 25
☐

B Use rounding.

304 → 300
+ 494 → + ☐
☐

Name _____

Share and Show

MATH BOARD

1. Use compatible numbers to complete the problem. Then estimate the sum.

$$\begin{array}{rcl} 428 & \rightarrow & \square \\ +286 & \rightarrow & +\ \square \\ \hline & & \square \end{array}$$

Math Talk — **Mathematical Practices**

What other compatible numbers could you use for 428 and 286?

Use rounding or compatible numbers to estimate the sum.

2. $\begin{array}{r} 65 \\ +23 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

3. $\begin{array}{r} 421 \\ +218 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

4. $\begin{array}{r} 369 \\ +480 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

On Your Own

Use rounding or compatible numbers to estimate the sum.

5. $\begin{array}{r} 19 \\ +54 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

6. $\begin{array}{r} 39 \\ +42 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

7. $\begin{array}{r} 327 \\ +581 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

8. $\begin{array}{r} 27 \\ +78 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

9. $\begin{array}{r} 267 \\ +517 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

10. $\begin{array}{r} 465 \\ +478 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

11. $\begin{array}{r} 186 \\ +460 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

12. $\begin{array}{r} 817 \\ +118 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

13. $\begin{array}{r} 632 \\ +244 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

14. $278 + 369$

$\square + \square = \square$

15. $523 + 195$

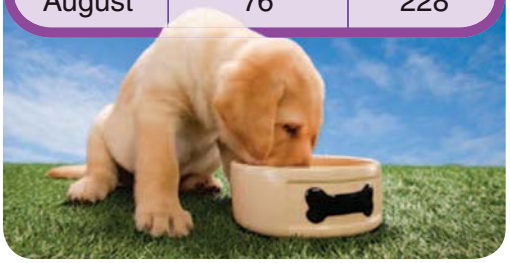
$\square + \square = \square$

Problem Solving • Applications

Use the table for 16–18.

Dan's Pet Supplies Sold

Month	Pet Bowls	Bags of Pet Food
June	91	419
July	57	370
August	76	228



16. MATHEMATICAL PRACTICE 2 **Use Reasoning** About how many pet bowls were sold in June and July altogether?

17. GO DEEPER Would you estimate there were more pet bowls sold in June or in July and August combined? Explain.

18. THINK SMARTER Dan estimated the lowest monthly sales of both pet bowls and bags of pet food to be about 300. What month had the lowest sales? Explain.

19. THINK SMARTER Write each number sentence in the box below the better estimate of the sum.

$263 + 189 = \blacksquare$ $305 + 72 = \blacksquare$ $195 + 238 = \blacksquare$ $215 + 289 = \blacksquare$

400	500

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mental Math Strategies for Addition

Essential Question What mental math strategies can you use to find sums?

Number and Operations in Base Ten—3.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Real World

The table shows how many musicians are in each section of a symphony orchestra. How many musicians play either string or woodwind instruments?

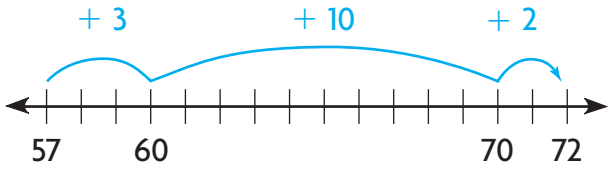
Orchestra Musicians

Section	Number
Brass	12
Percussion	13
String	57
Woodwind	15

One Way Count by tens and ones to find 57 + 15.

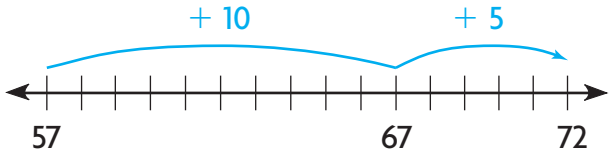
A Count on to the nearest ten. Then count by tens and ones.

Think: 3 + ■ = 15



B Count by tens. Then count by ones.

Think: 10 + 5 = 15



57 + 15 = _____

So, _____ musicians play either string or woodwind instruments.

Math Idea
Count on from the greater addend, 57.

Try This! **Find 43 + 28. Draw jumps and label the number line to show your thinking.**

So, 43 + 28 = _____.

Math Talk **Mathematical Practices**

Explain another way you can draw the jumps.

Other Ways

A **Use compatible numbers to find 178 + 227.**

STEP 1 Break apart the addends to make them compatible.

Think: 178 = 175 + 3
227 = 225 + 2

175 and 225 are compatible numbers.

Remember
Compatible numbers are easy to compute mentally and are close to the real numbers.

STEP 2 Find the sums.

$$\begin{array}{r} 178 \\ +\,227 \\ \hline \end{array} \quad \rightarrow \quad \begin{array}{r} 175 \\ 225 \\ \hline \square \end{array} \quad + \quad \begin{array}{r} 3 \\ 2 \\ \hline \square \end{array}$$

STEP 3 Add the sums. _____ + _____ = _____

So, 178 + 227 = _____.

Math Talk **Mathematical Practices**
Describe another way to use friendly numbers to find the sum.

B **Use friendly numbers and adjust to find 38 + 56.**

STEP 1 Make a friendly number. 38 + 2 = _____

Think: Add to 38 to make a number with 0 ones.

STEP 2 Since you added 2 to 38, you have to subtract 2 from 56. 56 − 2 = _____

STEP 3 Find the sum. _____ + _____ = _____

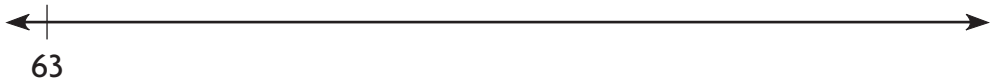
So, 38 + 56 = _____.

Share and Show

MATH BOARD

1. Count by tens and ones to find 63 + 27. Draw jumps and label the number line to show your thinking.

Think: Count by tens and ones from 63.



63 + 27 = _____

Name _____

2. Use compatible numbers to find 26 + 53.

Think: 26 = 25 + 1
53 = 50 + 3

26 + 53 = _____

Math Talk **Mathematical Practices**

Explain how you could use friendly numbers to find 26 + 53.

Count by tens and ones to find the sum.
Use the number line to show your thinking.

3. 34 + 18 = _____

4. 22 + 49 = _____

On Your Own

Use mental math to find the sum.
Draw or describe the strategy you use.

5. 116 + 203 = _____

6. 18 + 57 = _____

7. MATHEMATICAL PRACTICE 6 **Explain a Method** On Friday, 376 people attended the school concert. On Saturday, 427 people attended. Explain how can you use mental math to find how many people attended the concert.

_____

_____

_____

8. THINK SMARTER There are 14 more girls than boys in the school orchestra. There are 19 boys. How many students are in the school orchestra?

_____

Problem Solving • Applications Real World

Use the table for 9–12

Harrison School Attendance

Day	Boys	Girls
Monday	92	104
Tuesday	101	96
Wednesday	105	93
Thursday	99	102
Friday	97	103

9. MATHEMATICAL PRACTICE 1 **Analyze** How many girls attended school on Monday and Tuesday?

10. **What's the Question?** The answer is 201 students.

11. THINK SMARTER How many students attended school on Tuesday and Wednesday? Explain how you can find your answer.

12. GO DEEPER On which day did the most students attend school?

13. THINK SMARTER On Monday, 46 boys and 38 girls bought lunch at school. How many students bought lunch? Explain one way to solve the problem.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Use Properties to Add

Essential Question How can you add more than two addends?

Number and Operations in Base Ten—3.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

CONNECT You have learned the Commutative Property of Addition. You can add two or more numbers in any order and get the same sum.

$$16 + 9 = 9 + 16$$

The **Associative Property of Addition** states that you can group addends in different ways and still get the same sum. It is also called the Grouping Property.

$$(16 + 7) + 23 = 16 + (7 + 23)$$

Math Idea

You can change the order or the grouping of the addends to make combinations that are easy to add.

- Will the sum be closer to 90 or 100?

_____

Unlock the Problem

Real World

Mrs. Gomez sold 23 cucumbers, 38 tomatoes, and 42 peppers at the Farmers' Market. How many vegetables did she sell in all?

Find 23 + 38 + 42.

Look for an easy way to add.

STEP 1 Line up the numbers by place value.

$$\begin{array}{r} 23 \\ 38 \\ +\ 42 \\ \hline \end{array}$$

STEP 2 Group the ones to make them easy to add.

Think: Make a ten.

$$\begin{array}{r} {\scriptstyle 1} \\ 23 \\ 38 \\ +\ 42 \\ \hline 3 \end{array} \quad \rangle\ 10$$

STEP 3 Group the tens to make them easy to add.

Think: Make doubles.

$$\begin{array}{r} {\scriptstyle 1} \\ 23 \\ 38 \\ +\ 42 \\ \hline 103 \end{array} \qquad 5 < 5$$

23 + 38 + 42 = _____

So, Mrs. Gomez sold _____ vegetables in all.

Math Talk **Mathematical Practices**

Explain how to group the digits to make them easy to add.

Example Use properties to find 36 + 37 + 51.

STEP 1 Line up the numbers by place value.

$$\begin{array}{r} 36 \\ 37 \\ +\ 51 \\ \hline \end{array}$$

STEP 2 Change the grouping.

Think: Adding 37 + 51 first would be easy because there is no regrouping needed.

$$\begin{array}{r} 36 \\ 37 \\ +\ 51 \\ \hline \end{array} \quad 37 + 51 = 88$$

STEP 3 Add.

$$\begin{array}{r} \square \\ 36 \\ +\ 88 \\ \hline \square \end{array}$$

So, 36 + 37 + 51 = ________.

Try This! Use properties to add.

A Find 11 + 16 + 19 + 14.

Think: Use the Commutative Property of Addition to change the order.

$$\begin{array}{r} 11 \\ 16 \\ 19 \\ +\ 14 \\ \hline \end{array} \rightarrow \begin{array}{r} 11 \\ 19 \\ 16 \\ +\ 14 \\ \hline \square \end{array} \quad \begin{array}{l} 1 + 9 = 10 \\ 6 + 4 = 10 \end{array}$$

B Find 17 + (33 + 45).

Think: Use the Associative Property of Addition to change the grouping.

$$\begin{array}{r} 17 \\ 33 \\ +\ 45 \\ \hline \end{array} \quad 17 + 33 = 50 \rightarrow \begin{array}{r} 50 \\ +\ 45 \\ \hline \square \end{array}$$

Math Talk **Mathematical Practices**

Explain how the Commutative and Associative Properties of Addition are alike and how they are different.

Share and Show

MATH BOARD

1. Find the sum. Write the addition property you used.

STEP 1

$$\begin{array}{r} 46 \\ 55 \\ +\ 24 \\ \hline \end{array}$$

STEP 2

$$\begin{array}{r} 55 \\ \square \\ +\ 24 \\ \hline \end{array}$$

________ Property of Addition

STEP 3

$$\begin{array}{r} 55 \\ 46 \\ +\ 24 \\ \hline \end{array} \quad 46 + 24 = \square$$

STEP 4

$$\begin{array}{r} 55 \\ +\ 70 \\ \hline \square \end{array}$$

________ Property of Addition

Name _____

Use addition properties and strategies to find the sum.

2. $13 + 26 + 54 =$ _____

3. $57 + 62 + 56 + 43 =$ _____

On Your Own

Use addition properties and strategies to find the sum.

4. $18 + 39 + 32 =$ _____

5. $13 + 49 + 87 =$ _____

6. $15 + 76 + 125 =$ _____

7. $33 + 71 + 56 + 29 =$ _____

8. Change the order and the grouping of the addends so that you can use mental math to find the sum. Then find the sum.

$43 + 39 + 43 + 11 =$ _____

_____ + _____ + _____ + _____ = _____

Problem Solving • Applications Real World

9. GO DEEPER Mr. Arnez bought 32 potatoes, 29 onions, 31 tomatoes, and 28 peppers to make salads for his deli. How many vegetables did he buy?

_____

10. Ms. Chang is baking for the school bake sale. She bought 16 apples, 29 peaches, and 11 bananas at the Farmers' Market. How many pieces of fruit did she buy?

_____

11. MATHEMATICAL PRACTICE 2 **Reason Abstractly** What is the unknown number? Which property did you use?

$(\blacksquare + 8) + 32 = 49$

_____

12. THINK SMARTER Change the order or grouping to find the sum. Explain how you used properties to find the sum.

$63 + 86 + 77$

_____

_____

_____

13. THINK SMARTER For numbers 13a–13d, choose Yes or No to tell whether the number sentence shows the Associative Property of Addition.

13a. $(86 + 7) + 93 = 86 + (7 + 93)$ ○ Yes ○ No

13b. $86 + 7 = 7 + 86$ ○ Yes ○ No

13c. $86 + 0 = 86$ ○ Yes ○ No

13d. $86 = 80 + 6$ ○ Yes ○ No

FOR MORE PRACTICE: Standards Practice Book

Name _____

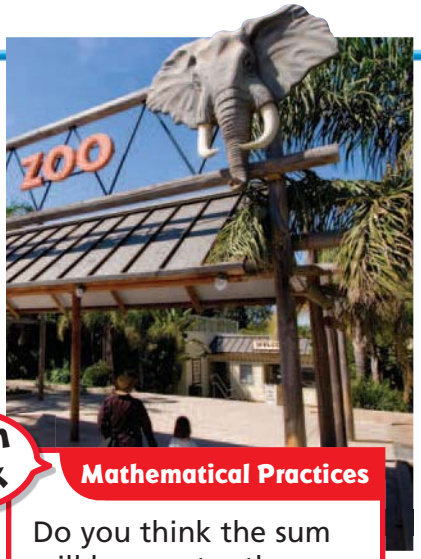
Use the Break Apart Strategy to Add

Essential Question How can you use the break apart strategy to add 3-digit numbers?

Number and Operations in Base Ten—3.NBT.2 *Also 3.NBT.1, 3.OA.8*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem



There are more zoos in Germany than in any other country. At one time, there were 355 zoos in the United States and 414 zoos in Germany. How many zoos were there in the United States and Germany altogether?

You can use the break apart strategy to find sums.

Math Talk **Mathematical Practices**

Do you think the sum will be greater than or less than 800? **Explain**.

Example 1 Add. 355 + 414

STEP 1 Estimate. 400 + 400 = _____

STEP 2 Break apart the addends.
Start with the hundreds.
Then add each place value.

$$\begin{array}{rcl} 355 & = & 300 + \square + 5 \\ +\ 414 & = & \square + 10 + 4 \\ \hline & & 700 + 60 + 9 \end{array}$$

STEP 3 Add the sums.

700 + 60 + 9 = _____

So, there were _____ zoos in the United States and Germany altogether.

Example 2 Add. 467 + 208

STEP 1 Estimate. 500 + 200 = _____

STEP 2 Break apart the addends.
Start with the hundreds.
Then add each place value.

$$\begin{array}{rcl} 467 & = & 400 + \square + \square \\ +\ 208 & = & \square + 0 + 8 \\ \hline & & 600 + 60 + 15 \end{array}$$

STEP 3 Add the sums.

600 + 60 + 15 = _____

So, 467 + 208 = _____.

Try This! **Use the break apart strategy to find 343 + 259.**

Estimate. 300 + 300 = _____

$$\begin{array}{rcl} 343 & = & 300 + \square + \square \\ +\ 259 & = & \underline{\square + \square + \square} \\ & & \square + \square + \square = \square \end{array}$$

1. MATHEMATICAL PRACTICE 6 **Explain** why there is a zero in the tens place in the sum.

_____

_____

_____

_____

2. How do you know your answer is reasonable?

_____

_____

Share and Show

MATH BOARD

1. Complete.

Estimate: 400 + 400 = _____

$$\begin{array}{rcl} 425 & = & 400 + \square + 5 \\ +\ 362 & = & \underline{\square + 60 + \square} \\ & & 700 + \square + 7 = \square \end{array}$$

So, 425 + 362 = _____.

2. Write the numbers the break apart strategy shows.

$$\begin{array}{rcl} \square & = & 100 + 30 + 4 \\ +\ \square & = & \underline{200 + 40 + 9} \\ \square & = & 300 + 70 + 13 \end{array}$$

Math Talk

Mathematical Practices

Explain how the break apart strategy uses expanded forms of numbers.

Name _____

Estimate. Then use the break apart strategy to find the sum.

3. Estimate: _____

142 =
+ 436 =

4. Estimate: _____

459 =
+ 213 =

5. Estimate: _____

291 =
+ 420 =

6. Estimate: _____

654 =
+ 243 =

On Your Own

Estimate. Then use the break apart strategy to find the sum.

7. Estimate: _____

435 =
+ 312 =

8. Estimate: _____

163 =
+ 205 =

9. Estimate: _____

634 =
+ 251 =

10. Estimate: _____

526 =
+ 357 =

Practice: Copy and Solve **Estimate. Then solve.**

11. 163 + 205

12. 543 + 215

13. 213 + 328

14. 372 + 431

15. 152 + 304

16. 268 + 351

17. 413 + 257

18. 495 + 312

Problem Solving • Applications Real World

Use the table for 19–20.

Number of Students

School	Number
Harrison	304
Montgomery	290
Bryant	421

19. GO DEEPER Which two schools together have fewer than 600 students? Explain.

20. THINK SMARTER The number of students in Collins School is more than double the number of students in Montgomery School. What is the least number of students that could attend Collins School?

21. What's the Error? Lexi used the break apart strategy to find 145 + 203. Describe her error. What is the correct sum?

$$\begin{array}{r} 100 + 40 + 5 \\ +\ 200 + 30 + 0 \\ \hline 300 + 70 + 5 = 375 \end{array}$$

22. MATHEMATICAL PRACTICE 5 **Communicate** Is the sum of 425 and 390 less than or greater than 800? How do you know?

23. THINK SMARTER What is the sum of 421 and 332? Show your work.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Use Place Value to Add

Essential Question How can you use place value to add 3-digit numbers?

Number and Operations in Base Ten—3.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Real World

Dante is planning a trip to Illinois. His airplane leaves from Dallas, Texas, and stops in Tulsa, Oklahoma. Then it flies from Tulsa to Chicago, Illinois. How many miles does Dante fly?

Use place value to add two addends.

Add. 236 + 585

Estimate. 200 + 600 = _____

STEP 1

Add the ones. Regroup the ones as tens and ones.

$$\begin{array}{r} {\scriptstyle 1} \\ 236 \\ +\ 585 \\ \hline \square \end{array}$$

STEP 2

Add the tens. Regroup the tens as hundreds and tens.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 236 \\ +\ 585 \\ \hline \square 1 \end{array}$$

STEP 3

Add the hundreds.

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 236 \\ +\ 585 \\ \hline \square 21 \end{array}$$

236 + 585 = _____

So, Dante flies _____ miles.

Since _____ is close to the estimate of _____, the answer is reasonable.

ERROR Alert

Remember to add the regrouped ten and hundred.

- You can also use the Commutative Property of Addition to check your work. Change the order of the addends and find the sum.

$$\begin{array}{r} 585 \\ +236 \\ \hline \square \end{array}$$

Try This! **Find 563 + 48 in two ways.**

Estimate. 550 + 50 = _____

A **Use the break apart strategy.**

563 = 500 + ☐ + ☐
+ 48 = 40 + ☐
☐ + ☐ + ☐ = ☐

B **Use place value.**

563
+ 48
☐

Use place value to add three addends.

A **Add.** 140 + 457 + 301

Estimate. 150 + 450 + 300 = _____

STEP 1 Add the ones.

1 4 0
4 5 7
+ 3 0 1
☐

STEP 2 Add the tens.

1 4 0
4 5 7
+ 3 0 1
☐8

STEP 3 Add the hundreds.

1 4 0
4 5 7
+ 3 0 1
☐98

So, 140 + 457 + 301 = _____.

B **Add.** 173 + 102 + 328

Estimate. 200 + 100 + 300 + _____

STEP 1 Add the ones. Regroup the ones as tens and ones.

1
1 7 3
1 0 2
+ 3 2 8
☐

STEP 2 Add the tens. Regroup the tens as hundreds and tens.

1 1
1 7 3
1 0 2
+ 3 2 8
☐3

STEP 3 Add the hundreds.

1 1
1 7 3
1 0 2
+ 3 2 8
☐03

So, 173 + 102 + 328 = _____.

Name _____

Share and Show

MATH BOARD

1. **Circle the problem in which you need to regroup. Use the strategy that is easier to find the sum.**

   a. 496 + 284

   b. 482 + 506

Estimate. Then find the sum.

2. Estimate: _____

$$\begin{array}{r} 251 \\ +\,345 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 479 \\ +\,395 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 686 \\ +\,314 \\ \hline \end{array}$$

5. Estimate: _____

$$\begin{array}{r} 231 \\ 410 \\ +\,158 \\ \hline \end{array}$$

Math Talk **Mathematical Practices**

Explain how you can compute 403 + 201 mentally.

On Your Own

Practice: Copy and Solve **Estimate. Then solve.**

6. 253 + 376

7. 654 + 263

8. 321 + 439 + 112

9. 182 + 321

10. 701 + 108

11. 543 + 372 + 280

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Find the unknown digits.**

12.

$$\begin{array}{r} 1\square 4 \\ +\,\square 3\square \\ \hline 257 \end{array}$$

13.

$$\begin{array}{r} \square 7\square \\ +\,6\square 4 \\ \hline 986 \end{array}$$

14.

$$\begin{array}{r} 2\square\square \\ +\,\square 29 \\ \hline 682 \end{array}$$

15.

$$\begin{array}{r} 3\square\square \\ +\,\square 17 \\ \hline 903 \end{array}$$

16. GO DEEPER There are 431 crayons in a box and 204 crayons on the floor. About how many fewer than 1,000 crayons are there? Estimate. Then solve.

_____

Unlock the Problem Real World

17. THINK SMARTER A plane flew 187 miles from New York City, New York, to Boston, Massachusetts. It then flew 273 miles from Boston to Philadelphia, Pennsylvania. The plane flew the same distance on the return trip. How many miles did the plane fly?

a. What do you need to find?

_____

b. What is an estimate of the total distance?

_____

c. Show the steps you used to solve the problem.

d. How do you know your answer is reasonable?

_____

_____

e. The total distance is _____ miles round trip.

18. THINK SMARTER Help Max find the sum of the problem.

$$\begin{array}{r} 451 \\ 246 \\ +\ 222 \\ \hline \end{array}$$

For numbers 18a–18d, choose Yes or No to tell if Max should regroup.

18a. Regroup the ones. ○ Yes ○ No

18b. Add the regrouped ten. ○ Yes ○ No

18c. Regroup the tens. ○ Yes ○ No

18d. Add the regrouped hundred. ○ Yes ○ No

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

1. A _____ is an ordered set of numbers or objects in which the order helps you predict what comes next. (p. 5)

2. The _____ states that when you add zero to any number, the sum is that number. (p. 5)

Vocabulary
Commutative Property of Addition
compatible numbers
Identity Property of Addition
pattern

Concepts and Skills

Is the sum even or odd? Write *even* or *odd*. (3.OA.9)

3. $8 + 5$ _____

4. $9 + 7$ _____

5. $4 + 6$ _____

Use rounding or compatible numbers to estimate the sum. (3.NBT.1)

6. $\begin{array}{r} 56 \\ +\,32 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

7. $\begin{array}{r} 271 \\ +\,425 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

8. $\begin{array}{r} 328 \\ +\,127 \\ \hline \end{array}$ $\begin{array}{r} \square \\ +\ \square \\ \hline \square \end{array}$

Use mental math to find the sum. (3.NBT.2)

9. $46 + 14 +$ _____

10. $39 + 243 +$ _____

11. $326 + 402 +$ _____

Estimate. Then find the sum. (3.NBT.2)

12. Estimate: _____

$\begin{array}{r} 356 \\ +\,442 \\ \hline \end{array}$

13. Estimate: _____

$\begin{array}{r} 164 \\ +\,230 \\ \hline \end{array}$

14. Estimate: _____

$\begin{array}{r} 545 \\ +\,139 \\ \hline \end{array}$

15. Estimate: _____

$\begin{array}{r} 437 \\ +\,184 \\ \hline \end{array}$

16. Nancy planted 77 daisies, 48 roses, and 39 tulips. About how many more roses and tulips did she plant than daisies? (3.NBT.1)

17. Tomas collected 139 cans for recycling on Monday, and twice that number on Tuesday. How many cans did he collect on Tuesday? (3.NBT.2)

18. There are 294 boys and 332 girls in the Hill School. How many students are in the school? (3.NBT.2)

19. On Monday, 76 students played soccer. On Tuesday, 62 students played soccer. On Wednesday, 68 students played soccer. How many more students played soccer on Tuesday and Wednesday combined than on Monday? (3.NBT.2)

Name _____

Estimate Differences

Essential Question How can you use compatible numbers and rounding to estimate differences?

Number and Operations in Base Ten—3.NBT.1 *Also 3.NBT.2*

MATHEMATICAL PRACTICES
MP.5, MP.7, MP.8

Unlock the Problem

The largest yellowfin tuna caught by fishers weighed 387 pounds. The largest grouper caught weighed 436 pounds. About how much more did the grouper weigh than the yellowfin tuna?

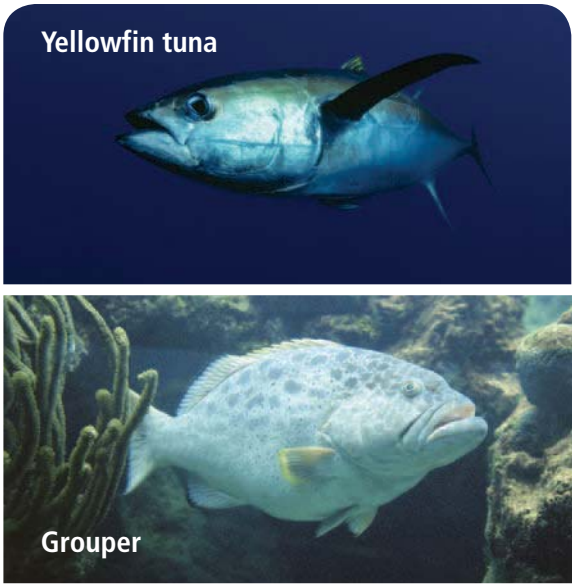
- Does the question ask for an exact answer? How do you know?

_____

_____

- Circle the numbers you need to use.

You can estimate to find *about* how much more.



One Way Use compatible numbers.

Think: Compatible numbers are numbers that are easy to compute mentally and are close to the real numbers.

$$\begin{array}{r} 436 \\ -\ 387 \\ \hline \end{array} \rightarrow \begin{array}{r} 425 \\ -\ 375 \\ \hline \square \end{array}$$

So, the grouper weighed about

_____ pounds more than the yellowfin tuna.

- What other compatible numbers could you have used?

_____

Try This! Estimate. Use compatible numbers.

A

$$\begin{array}{r} 73 \\ -\ 22 \\ \hline \end{array} \rightarrow \begin{array}{r} 75 \\ -\ \square \\ \hline \square \end{array}$$

B

$$\begin{array}{r} 376 \\ -\ 148 \\ \hline \end{array} \rightarrow \begin{array}{r} \square \\ -150 \\ \hline \square \end{array}$$

Another Way Use place value to round.

436 − 387 = ☐

STEP 1 Round 436 to the nearest ten.

Think: Find the place to which you want to round. Look at the digit to the right.

- Look at the digit in the ones place.
- Since 6 > 5, the digit 3 increases by one.
- Write a zero for the ones place.

436 → ☐
− 387 → −

STEP 2 Round 387 to the nearest ten.

- Look at the digit in the ones place.
- Since 7 > 5, the digit 8 increases by one.
- Write a zero for the ones place.

436 → 440
387 → − ☐

STEP 3 Find the difference of the rounded numbers.

436 → 440
− 387 → − 390
☐

So, 436 − 387 is about _____.

Try This! Estimate. Use place value to round.

A

761 → 800
−528 → − ☐
☐

Think: Round both numbers to the same place value.

B

642 → ☐
−287 → −300
☐

Math Talk Mathematical Practices

Explain a different way you can round each number in Example B to find another estimate.

Name _____

Share and Show

MATH BOARD

1. Use compatible numbers to complete the problem. Then estimate the difference.

546 → 550
−209 → − ☐
☐

Math Talk **Mathematical Practices**

Explain another way you can estimate 546 − 209.

Use rounding or compatible numbers to estimate the difference.

2. 57 − 21 = ☐ − ☐ = ☐

3. 642 − 137 = ☐ − ☐ = ☐

4. 374 − 252 = ☐ − ☐ = ☐

On Your Own

Use rounding or compatible numbers to estimate the difference.

5. 67 − 24 = ☐ − ☐ = ☐

6. 81 − 39 = ☐ − ☐ = ☐

7. 936 − 421 = ☐ − ☐ = ☐

8. 804 − 259 = ☐ − ☐ = ☐

9. 584 − 208 = ☐ − ☐ = ☐

10. 442 − 36 = ☐ − ☐ = ☐

11. 429 − 51

☐ − ☐ = ☐

12. 491 − 270

☐ − ☐ = ☐

13. GO DEEPER There are 262 students in the 2nd grade and 298 students in the 3rd grade. If 227 students take the bus to school, about how many students do not take the bus?

_____

Problem Solving • Applications

Use the table for 14–16.

14. MATHEMATICAL PRACTICE 3 **Use Counterexamples** Melissa said the estimated difference between the weight of the Pacific halibut and the yellowfin tuna is zero. Do you agree or disagree? Explain.

_____

_____

_____

Largest Saltwater Fish Caught

Type of Fish	Weight in Pounds
Pacific Halibut	459
Conger	133
Yellowfin Tuna	387

15. What's the Question? The answer is about 500 pounds.

WRITE Math • Show Your Work

_____

_____

16. THINK SMARTER About how much more is the total weight of the Pacific halibut and conger than the weight of the yellowfin tuna? Explain.

_____

_____

_____

_____

Personal Math Trainer

17. THINK SMARTER + A total of 907 people went to a fishing tournament. Of these people, 626 arrived before noon. Alina estimates that fewer than 300 people arrived in the afternoon. How did she estimate? Explain.

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mental Math Strategies for Subtraction

Essential Question What mental math strategies can you use to find differences?

Number and Operations in Base Ten—3.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

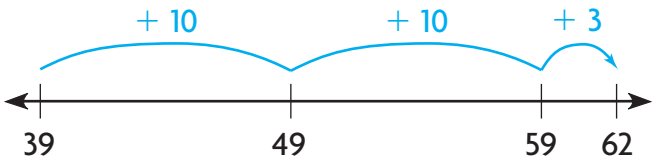
Unlock the Problem

A sunflower can grow to be very tall. Dylan is 39 inches tall. She watered a sunflower that grew to be 62 inches tall. How many inches shorter was Dylan than the sunflower?

One Way Use a number line to find 62 − 39.

A Count up by tens and then ones.

Think: Start at 39. Count up to 62.



Add the lengths of the jumps to find the difference.

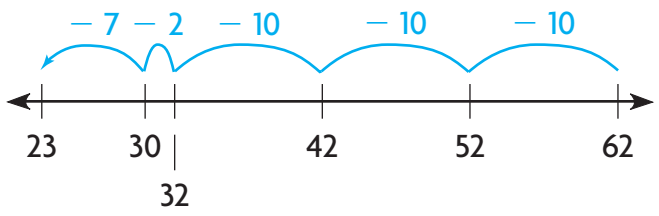
10 + 10 + 3 = _____

62 − 39 = _____

So, Dylan was _____ inches shorter than the sunflower.

B Take away tens and ones.

Think: Start at 62. Count back 39.



Take away lengths of jumps to end on the difference.

Math Talk **Mathematical Practices**

Compare the number lines. **Explain** where the answer is on each one.

Other Ways

A Use friendly numbers and adjust to find 74 − 28.

STEP 1 Make the number you subtract a friendly number.

28 + 2 = _____

Think: Add to 28 to make a number with 0 ones.

STEP 2 Since you added 2 to 28, you have to add 2 to 74.

74 + 2 = _____

STEP 3 Find the difference.

_____ − _____ = _____

So, 74 − 28 = _____.

Try This! **Use friendly numbers to subtract 9 and 99.**

- **Find 36 – 9.**

  Think: 9 is 1 less than 10.

  Subtract 10. 36 – 10 = _____

  Then add 1. _____ + 1 = _____

  So, 36 – 9 = _____.

- **Find 423 – 99.**

  Think: 99 is 1 less than 100.

  Subtract 100. 423 – 100 = _____

  Then add 1. _____ + 1 = _____

  So, 423 – 99 = _____.

B **Use the break apart strategy to find 458 – 136.**

STEP 1 Subtract the hundreds. 400 – 100 = _____

STEP 2 Subtract the tens. 50 – 30 = _____

STEP 3 Subtract the ones. 8 – 6 = _____

STEP 4 Add the differences. _____ + _____ + _____ = _____

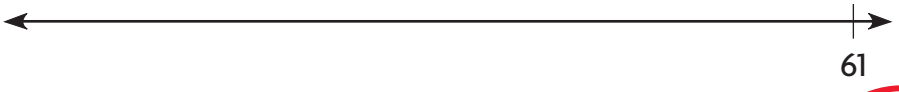
So, 458 – 136 = _____.

Share and Show

MATH BOARD

1. Find 61 – 24. Draw jumps and label the number line to show your thinking.

   Think: Take away tens and ones.



   61 – 24 = _____

2. Use friendly numbers to find the difference.

   86 – 42 = _____ **Think:** 42 – 2 = 40
   86 – 2 = 84

Math Talk **Mathematical Practices**

Explain how you can use the break apart strategy to find 86 – 42.

Name _____

Use mental math to find the difference.
Draw or describe the strategy you use.

3. $56 - 38 =$ _____

4. $435 - 121 =$ _____

Problem Solving • Applications Real World

5. MATHEMATICAL PRACTICE 3 **Make Arguments** Erica used friendly numbers to find 43 − 19. She added 1 to 19 and subtracted 1 from 43. What is Erica's error? Explain.

_____

_____

6. THINK SMARTER The farm shop had 68 small bags of bird treats and 39 large bags of bird treats on a shelf. If Jill buys 5 small bags and 1 large bag, how many more small bags than large bags of bird treats are left on the shelf?

_____

_____

_____

_____

7. THINK SMARTER There were 87 sunflowers at the flower shop in the morning. There were 56 sunflowers left at the end of the day. How many sunflowers were sold? Explain a way to solve the problem.

_____

_____

Connect to Reading

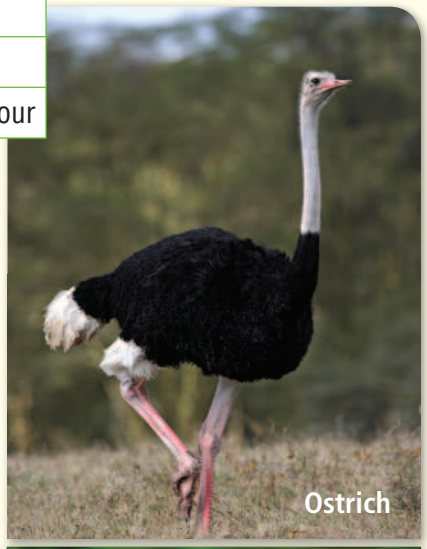
Compare and Contrast

Emus and ostriches are the world's largest birds. They are alike in many ways and different in others.

When you compare things, you decide how they are alike. When you contrast things, you decide how they are different.

The table shows some facts about emus and ostriches. Use the information on this page to compare and contrast the birds.

Facts About Emus and Ostriches		
	Emus	Ostriches
Can they fly?	No	No
Where do they live?	Australia	Africa
How much do they weigh?	About 120 pounds	About 300 pounds
How tall are they?	About 72 inches	About 108 inches
How fast can they run?	About 40 miles per hour	About 40 miles per hour


Ostrich


Emu

8. How are emus and ostriches alike? How are they different?

Alike: 1. _____

2. _____

Different: 1. _____

2. _____

3. _____

9. GO DEEPER What if two emus weigh 117 pounds and 123 pounds, and an ostrich weighs 338 pounds. How much more does the ostrich weigh than the two emus?

_____

FOR MORE PRACTICE: Standards Practice Book

Name ____________________

Use Place Value to Subtract

Essential Question How can you use place value to subtract 3-digit numbers?

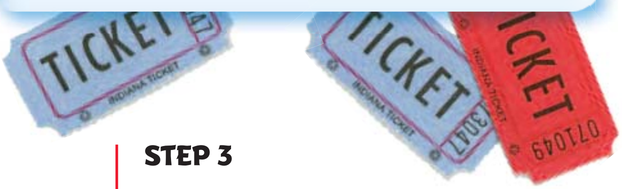
Number and Operations in Base Ten—3.NBT.2 *Also 3.NBT.1*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem — Real World

Ava sold 473 tickets for the school play. Kim sold 294 tickets. How many more tickets did Ava sell than Kim?

- Do you need to combine or compare the number of tickets sold? ____________
- Circle the numbers you will need to use.



Use place value to subtract.

Subtract. 473 − 294

Estimate. 475 − 300 = ________

STEP 1

Subtract the ones.
3 < 4, so regroup.

7 tens 3 ones =

6 tens ______ ones

```
   6 13
  4 7 3
− 2 9 4
-------
     □
```

STEP 2

Subtract the tens.
6 < 9, so regroup.

4 hundreds 6 tens =

3 hundreds ______ tens

```
   16
 3  6 13
 4  7 3
− 2 9 4
-------
  □  9
```

STEP 3

Subtract the hundreds.
Add to check your answer.

```
   16
 3  6 13          1 1
 4  7 3           1 7 9
− 2 9 4         + 2 9 4
-------         -------
 □  7 9           4 7 3
```

So, Ava sold ________ more tickets than Kim.

Since ________ is close to the estimate of ________, the answer is reasonable.

Math Idea

Addition and subtraction undo each other. So you can use addition to check subtraction.

Try This! **Use place value to subtract. Use addition to check your work.**

```
  6 3 1            □
− 2 5 8          + □
-------          -----
    □              □
```

Example Use place value to find 890 − 765.

Estimate. 900 − 750 = _____

STEP 1

Subtract the ones.
Regroup the tens as tens and ones.

$$\begin{array}{r} {}^{8}\,{}^{10} \\ 8\,\not{9}\,\not{0} \\ -\,7\,6\,5 \\ \hline \end{array}$$

STEP 2

Subtract the tens.

$$\begin{array}{r} {}^{8}\,{}^{10} \\ 8\,\not{9}\,\not{0} \\ -\,7\,6\,5 \\ \hline \quad\;\; 5 \end{array}$$

STEP 3

Subtract the hundreds.
Add to check your answer.

$$\begin{array}{r} {}^{8}\,{}^{10} \\ 8\,\not{9}\,\not{0} \\ -\,7\,6\,5 \\ \hline \quad 2\,5 \end{array} \qquad \begin{array}{r} 1\,2\,5 \\ +\,7\,6\,5 \\ \hline \end{array}$$

So, 890 − 765 = _____.

Math Talk Mathematical Practices

Explain how you know your answer is reasonable.

Try This! **Circle the problem in which you need to regroup. Find the difference.**

A

$$\begin{array}{r} 8\,9\,4 \\ -\,5\,8\,3 \\ \hline \end{array}$$

B

$$\begin{array}{r} 5\,2\,1 \\ -\,3\,0\,1 \\ \hline \end{array}$$

C

$$\begin{array}{r} 9\,1\,8 \\ -\,4\,2\,7 \\ \hline \end{array}$$

Share and Show

MATH BOARD

1. Estimate. Then use place value to find 627 − 384. Add to check your answer.

Estimate. _____ − _____ = _____

$$\begin{array}{r} 6\,2\,7 \\ -\,3\,8\,4 \\ \hline \end{array} \qquad \begin{array}{r} \\ +\,3\,8\,4 \\ \hline \end{array}$$

Math Talk Mathematical Practices

Did you need to regroup to find the difference? **Explain**.

Since _____ is close to the estimate of _____, the answer is reasonable.

Name _____

Estimate. Then find the difference.

2. Estimate: _____

386
− 123

3. Estimate: _____

519
− 205

4. Estimate: _____

456
− 217

5. Estimate: _____

642
− 159

6. Estimate: _____

242
− 220

7. Estimate: _____

870
− 492

8. Estimate: _____

654
− 263

9. Estimate: _____

937
− 618

Math Talk **Mathematical Practices**

Which exercises can you compute mentally? **Explain** why.

On Your Own

Estimate. Then find the difference.

10. Estimate: _____

435
− 312

11. Estimate: _____

617
− 501

12. Estimate: _____

893
− 268

13. Estimate: _____

750
− 276

Practice: Copy and Solve

Estimate. Then solve.

14. 568 − 276

15. 761 − 435

16. 829 − 765

17. 974 − 285

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Find the unknown number.**

18. 86 − ☐ = 62

19. 372 − ☐ = 240

20. 537 − ☐ = 172

21. 629 − ☐ = 335

Problem Solving • Applications

Use the table for 22–23.

School Play Tickets Sold	
Student	**Number of Tickets**
Jenna	282
Matt	178
Sonja	331

22. THINK SMARTER Alicia sold 59 fewer tickets than Jenna and Matt sold together. How many tickets did Alicia sell? Explain.

23. GO DEEPER How many more tickets would each student need to sell so that each student sells 350 tickets?

24. Nina says to check subtraction, add the difference to the number you subtracted from. Does this statement make sense? Explain.

25. MATHEMATICAL PRACTICE 5 **Communicate** Do you have to regroup to find 523 − 141? Explain. Then solve.

Personal Math Trainer

26. THINK SMARTER + Students want to sell 400 tickets to the school talent show. They have sold 214 tickets. How many more tickets do they need to sell to reach their goal? Show your work.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Combine Place Values to Subtract

Essential Question How can you use the combine place values strategy to subtract 3-digit numbers?

Number and Operations in Base Ten—3.NBT.2 *Also 3.NBT.1, 3.OA.8*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Elena collected 431 bottles for recycling. Pete collected 227 fewer bottles than Elena. How many bottles did Pete collect?

- What do you need to find?

_____

- Circle the numbers you need to use.

Combine place values to find the difference.

A **Subtract.** 431 − 227

Estimate. 400 − 200 = _____

STEP 1 Look at the ones place. Since 7 > 1, combine place values. Combine the tens and ones places.There are 31 ones and 27 ones. Subtract the ones. Write 0 for the tens.

$$\begin{array}{r} 4\,\boxed{3\,1} \\ -\,2\,2\,7 \\ \hline \end{array}$$

Think: 31 − 27

STEP 2 Subtract the hundreds.

$$\begin{array}{r} 431 \\ -227 \\ \hline 04 \end{array}$$

So, Pete collected _____ bottles.

Since _____ is close to the estimate of _____, the answer is reasonable.

Math Talk **Mathematical Practices**

Explain why there is a zero in the tens place.

B **Subtract.** 513 − 482

Estimate. 510 − 480 = _____

STEP 1 Subtract the ones.

$$\begin{array}{r} 5\,1\,3 \\ -\,4\,8\,2 \\ \hline \end{array}$$

STEP 2 Look at the tens place. Since 8 > 1, combine place values. Combine the hundreds and tens places. There are 51 tens and 48 tens. Subtract the tens.

$$\begin{array}{r} \boxed{5\,1}\,3 \\ -\,4\,8\,2 \\ \hline 1 \end{array}$$

Think: 51 − 48

So, 513 − 482 = _____.

Example Combine place values to find 500 – 173.

Estimate. 500 – 175 = _____

STEP 1 Look at the ones and tens places. Since 3 > 0 and 7 > 0 , combine the hundreds and tens.

There are 50 tens. Regroup 50 tens as 49 tens 10 ones.

$$\begin{array}{r} {\scriptstyle 4\ 9\ 10} \\ 5\,\not{0}\,\not{0} \\ -\ 1\ 7\ 3 \\ \hline \end{array}$$

STEP 2 Subtract the ones.

Think: 10 – 3

$$\begin{array}{r} {\scriptstyle 4\ 9\ 10} \\ 5\,\not{0}\,\not{0} \\ -\ 1\ 7\ 3 \\ \hline \quad\quad 7 \end{array}$$

STEP 3 Subtract the tens.

Think: 49 – 17

$$\begin{array}{r} {\scriptstyle 4\ 9\ 10} \\ 5\,\not{0}\,\not{0} \\ -\ 1\ 7\ 3 \\ \hline \quad\quad 7 \end{array}$$

So, 500 – 173 = _____.

Math Talk **Mathematical Practices**

Explain why you combined the hundreds and tens.

Try This! Find 851 – 448 in two ways.

Estimate. 850 – 450 = _____

A **Use place value.**

$$\begin{array}{r} 851 \\ -\ 448 \\ \hline \quad\quad \end{array}$$

B **Combine place values.**

$$\begin{array}{r} 851 \\ -\ 448 \\ \hline \quad\quad \end{array}$$

Think: Combine tens and ones.

1. When does the combine place values strategy make it easier to find the difference? Explain.

_____

_____

_____

2. Which strategy would you use to find 431 – 249? Explain.

_____

_____

Name _____

Share and Show

1. Combine place values to find 406 − 274.

$$\begin{array}{r} 406 \\ -\,274 \\ \hline \end{array}$$

Think: Subtract the ones. Then combine the hundreds and tens places.

Math Talk — **Mathematical Practices**

Explain how to combine place values.

Estimate. Then find the difference.

2. Estimate: _____

$$\begin{array}{r} 595 \\ -\,286 \\ \hline \end{array}$$

3. Estimate: _____

$$\begin{array}{r} 728 \\ -\,515 \\ \hline \end{array}$$

4. Estimate: _____

$$\begin{array}{r} 543 \\ -\,307 \\ \hline \end{array}$$

5. Estimate: _____

$$\begin{array}{r} 600 \\ -\,453 \\ \hline \end{array}$$

On Your Own

Estimate. Then find the difference.

6. Estimate: _____

$$\begin{array}{r} 438 \\ -\,257 \\ \hline \end{array}$$

7. Estimate: _____

$$\begin{array}{r} 706 \\ -\,681 \\ \hline \end{array}$$

8. Estimate: _____

$$\begin{array}{r} 839 \\ -\,754 \\ \hline \end{array}$$

9. Estimate: _____

$$\begin{array}{r} 916 \\ -\,558 \\ \hline \end{array}$$

10. Estimate: _____

$$\begin{array}{r} 537 \\ -\,428 \\ \hline \end{array}$$

11. Estimate: _____

$$\begin{array}{r} 528 \\ -\,297 \\ \hline \end{array}$$

12. Estimate: _____

$$\begin{array}{r} 734 \\ -\,327 \\ \hline \end{array}$$

13. Estimate: _____

$$\begin{array}{r} 800 \\ -\,789 \\ \hline \end{array}$$

Practice: Copy and Solve

Estimate. Then solve.

14. 457 − 364

15. 652 − 341

16. 700 − 648

17. 963 − 256

Problem Solving • Applications (Real World)

Use the table for 18–20.

Roller Coaster Heights

Roller Coaster	State	Height in Feet
Titan	Texas	245
Kingda Ka	New Jersey	456
Intimidator 305	Virginia	305
Top Thrill Dragster	Ohio	420

18. MATHEMATICAL PRACTICE 5 **Use Appropriate Tools** The table shows the heights of some roller coasters in the United States. How much taller is Kingda Ka than Titan?

19. GO DEEPER Jason rode two roller coasters with a difference in height of 115 feet. Which roller coasters did Jason ride?

WRITE Math • Show Your Work

20. THINK SMARTER What if another roller coaster was 500 feet tall? Which roller coaster would be 195 feet shorter?

21. THINK SMARTER Owen solves this problem. He says the difference is 127. Explain the mistake Owen made. What is the correct difference?

$$\begin{array}{r} 335 \\ -218 \\ \hline \end{array}$$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Model Addition and Subtraction

Essential Question How can you use the strategy *draw a diagram* to solve one- and two-step addition and subtraction problems?

Operations and Algebraic Thinking—
3.OA.8 *Also 3.NBT.2*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5

Unlock the Problem

Real World

Sami scored 84 points in the first round of a new computer game. He scored 21 more points in the second round than in the first round. What was Sami's total score?

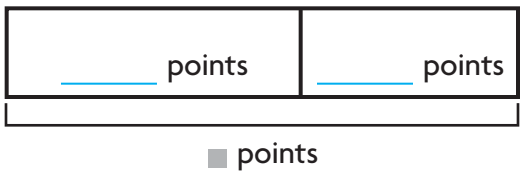
You can use a bar model to solve the problem.

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?
I need to find _____.	Sami scored _____ points in the first round. He scored _____ more points than that in the second round.	I will draw a bar model to show the number of points Sami scored in each round. Then I will use the bar model to decide which operation to use.

Solve the Problem

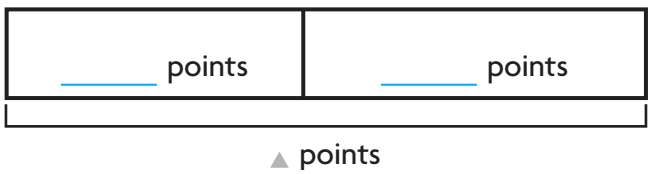
- Complete the bar model to show the number of points Sami scored in the second round.



_____ + _____ = ■

_____ = ■

- Complete another bar model to show Sami's total score.



_____ + _____ = ▲

_____ = ▲

1. How many points did Sami score in the second round? _____

2. What was Sami's total score? _____

Try Another Problem

Anna scored 265 points in a computer game. Greg scored 142 points. How many more points did Anna score than Greg?

You can use a bar model to solve the problem.

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?

Solve the Problem

Record the steps you used to solve the problem.

Anna _____ points

Greg _____ points

■ points

3. How many more points did Anna score than Greg?

_____

4. How do you know your answer is reasonable?

_____

_____

_____

5. How did your drawing help you solve the problem?

_____

_____

Math Talk

Mathematical Practices

Explain how the length of each bar in the model would change if Greg scored more points than Anna but the totals remained the same.

Name _____

Share and Show

MATH BOARD

1. Sara received 73 votes in the school election. Ben received 25 fewer votes than Sara. How many students voted?

First, find how many students voted for Ben.

Think: 73 − 25 = ■

Write the numbers in the bar model.

So, Ben received _____ votes.

Next, find the total number of votes.

Think: 73 + 48 = ▲

Write the numbers in the bar model.

So, _____ students voted.

Unlock the Problem

- Use the problem solving MathBoard.
- Choose a strategy you know.

Sara _____ votes

Ben ■ votes _____ votes

■ = _____ votes

_____ votes _____ votes

▲ votes

▲ = _____ votes

2. If Ben received 73 votes and Sara received 25 fewer votes than Ben, how would your bar models change? Would the total votes be the same? Explain.

_____

_____

_____

On Your Own

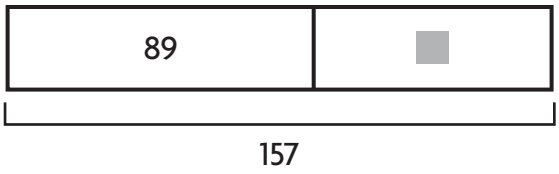
3. THINK SMARTER What if there were 3 students in another election and the total number of votes was the same? What would the bar model for the total number of votes look like? How many votes might each student get?

_____

_____

_____

4. **Pose a Problem** Use the bar model at the right. Write a problem to match it.



5. Solve your problem. Will you add or subtract?

6. Tony's Tech Store had a big sale. The store had 142 computers in stock. During the sale, 91 computers were sold. How many computers were not sold?

7. The number of computer games sold during the sale was 257. This is 162 more than the number sold the week before the sale. How many computer games were sold the week before the sale?

8. GO DEEPER In one week, 128 cell phones were sold. The following week, 37 more cell phones were sold than the week before. How many cell phones were sold in those two weeks?

9. MATHEMATICAL PRACTICE 6 On Monday, the number of customers in the store, rounded to the nearest hundred, was 400. What is the greatest number of customers that could have been in the store? **Explain**.

10. THINK SMARTER There are 306 people at the fair on Saturday. There are 124 fewer people on Sunday. How many people are at the fair on the two days?

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 1 Review/Test

1. For numbers 1a–1d, choose Yes or No to tell whether the sum is even.

1a.	$5 + 8$	○ Yes	○ No
1b.	$9 + 3$	○ Yes	○ No
1c.	$6 + 7$	○ Yes	○ No
1d.	$9 + 5$	○ Yes	○ No

2. Select the number sentences that show the Commutative Property of Addition. Mark all that apply.

- (A) $14 + 8 = 22$
- (B) $8 + 14 = 14 + 8$
- (C) $8 + (13 + 1) = (8 + 13) + 1$
- (D) $(5 + 9) + 8 = (9 + 5) + 8$

3. Select the numbers that round to 300 when rounded to the nearest hundred. Mark all that apply.

- (A) 238
- (B) 250
- (C) 283
- (D) 342
- (E) 359

4. There are 486 books in the classroom library. Complete the chart to show 486 rounded to the nearest 10.

Hundreds	Tens	Ones

GO DIGITAL Assessment Options
Chapter Test

5. Write each number sentence in the box below the better estimate of the sum.

$393 + 225 =$ ▢ $481 + 215 =$ ▢

$352 + 328 =$ ▢ $309 + 335 =$ ▢

600	700

6. Diana sold 336 muffins at the bake sale. Bob sold 287 muffins. Bob estimates that he sold 50 fewer muffins than Diana. How did he estimate? Explain.

7. The table shows how many books each class read.

Reading Contest	
Class	**Number of Books**
Mr. Lopez	273
Ms. Martin	402
Mrs. Wang	247

For numbers 7a–7d, select True or False for each statement.

7a. Ms. Martin's class read about 100 more books than Mr. Lopez's class. ○ True ○ False

7b. The 3 classes read over 900 books altogether. ○ True ○ False

7c. Mrs. Wang's class read about 50 fewer books than Mr. Lopez's class. ○ True ○ False

7d. Ms. Martin's and Mrs. Wang's class read about 700 books. ○ True ○ False

Name _____

8. Janna buys 2 bags of dog food for her dogs. One bag weighs 37 pounds. The other bag weighs 15 pounds. How many pounds do both bags weigh? Explain how you solved the problem.

9. Choose the property that makes the statement true.

The [Identity / Commutative / Associative] Property of addition states that you can group addends in different ways and get the same sum.

Use the table for 10–12.

Susie's Sweater Shop	
Month	**Number of Sweaters Sold**
January	402
February	298
March	171

10. The table shows the number of sweaters sold online in three months. How many sweaters were sold in January and February?

_____ sweaters

11. How many more sweaters were sold in January than March?

_____ sweaters

12. How many more sweaters were sold in February and March than in January?

_____ sweaters

13. Help Dana find the sum.

$$\begin{array}{r} 346 \\ 421 \\ +\ 152 \\ \hline \end{array}$$

For numbers 13a–13d, select Yes or No to tell Dana when to regroup.

13a.	Regroup the ones.	○ Yes	○ No
13b.	Add the regrouped ten.	○ Yes	○ No
13c.	Regroup the tens.	○ Yes	○ No
13d.	Add the regrouped hundred.	○ Yes	○ No

14. Alexandra has 78 emails in her inbox. She deletes 47 emails. How many emails are left in her inbox? Draw jumps and label the number line to show your thinking.

_____ emails

15. Daniel has 402 pieces in a building set. He uses 186 pieces to build a house. How many pieces does he have left? Show your work.

Name _____

16. Luke solves this problem. He says the difference is 214. Explain the mistake Luke made. What is the correct difference?

$$\begin{array}{r} 352 \\ -\ 148 \\ \hline \end{array}$$

17. Sunnyday Elementary School is having its annual Read-a-thon. The third graders have read 573 books so far. Their goal is to read more than 900 books. What is the least number of books they need to read to reach their goal? Explain.

18. There are 318 fiction books in the class library. The number of nonfiction books is 47 less than the number of fiction books.

Part A

About how many nonfiction books are there in the class library? Explain.

Part B

How many fiction and nonfiction books are there in the class library altogether? Show your work.

19. Alia used $67 + 38 = 105$ to check her subtraction. Which math problem could she be checking? Mark all that apply.

- (A) $67 - 38 =$ ☐
- (B) $105 - 67 =$ ☐
- (C) $105 + 38 =$ ☐
- (D) $105 - 38 =$ ☐

20. Alex and Erika collect shells. The tables show the kinds of shells they collected.

Alex's Shells	
Shell	**Number of Shells**
Scallop	36
Jingle	95
Clam	115

Erika's Shells	
Shell	**Number of Shells**
Scallop	82
Clam	108
Whelk	28

Part A

Who collected more shells? How many did she collect? About how many more is that? Explain how you solved the problem.

Part B

Alex and Erika have the greatest number of what kind of shell? How many shells of that kind do they have? Show your work.

Chapter 2

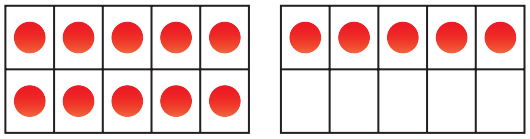
Represent and Interpret Data

Show What You Know

Check your understanding of important skills.

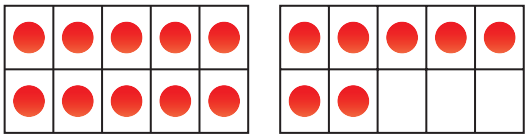
Name _____

Numbers to 20 Circle the number word. Write the number.

1. 

fourteen ____

fifteen

2. 

seventeen ____

eighteen

Skip Count Skip count to find the missing numbers.

3. Count by twos. 2, 4, ____, ____, 10, ____, ____, 16

4. Count by fives. 5, 10, ____, ____, ____, 30, ____

Addition and Subtraction Facts Find the sum or difference.

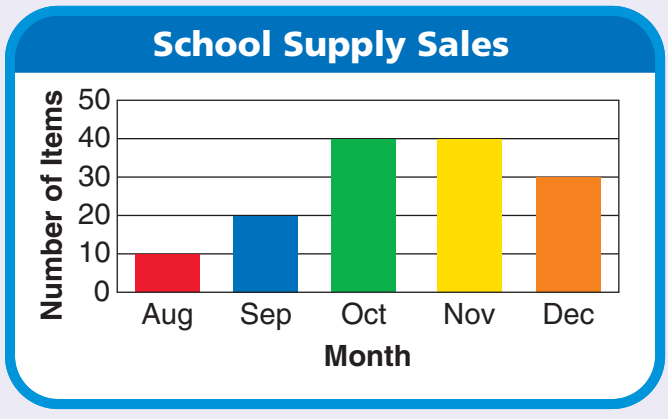
5. $12 - 4 =$ ____

6. $9 + 8 =$ ____

7. $11 - 7 =$ ____

Math Detective

Paige helps to sell supplies in the school store. Each month she totals all the sales and makes a bar graph. The graph shows sales through December. Be a Math Detective to find the month during which the hundredth sale was made.

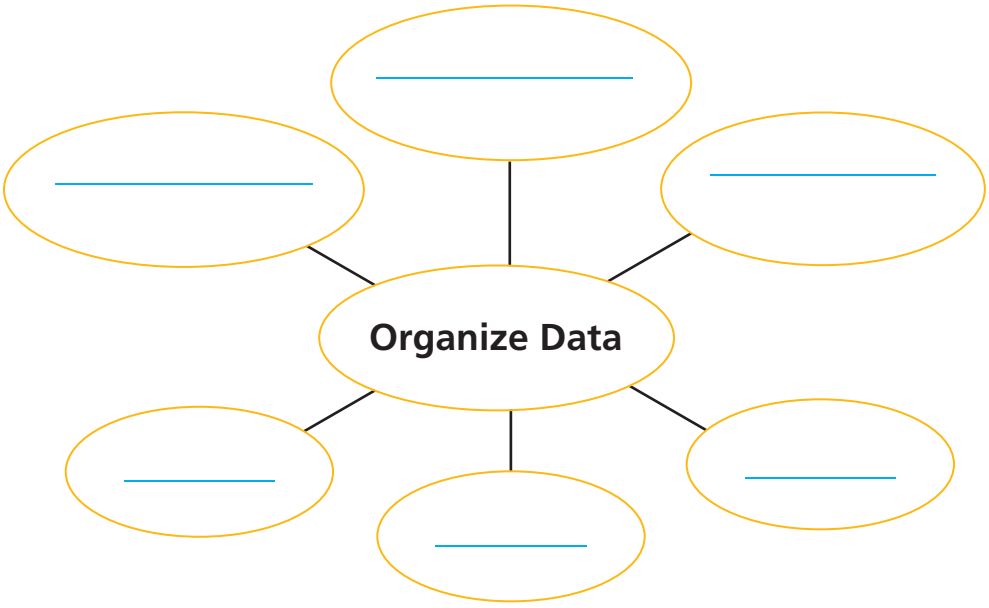


Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Complete the bubble map by using the words with a ✓.



Review Words

compare
data
fewer
more
survey
✓ tally table

Preview Words

✓ frequency table
✓ horizontal bar graph
key
✓ line plot
✓ picture graph
scale
✓ vertical bar graph

Understand Vocabulary

Write the review word or preview word that answers the riddle.

1. I am a graph that records each piece of data above a number line. _____
2. I am the numbers that are placed at fixed distances on a graph to help label the graph. _____
3. I am the part of a map or graph that explains the symbols. _____
4. I am a graph that uses pictures to show and compare information. _____
5. I am a table that uses numbers to record data. _____

Name _____

Problem Solving • Organize Data

Essential Question How can you use the strategy *make a table* to organize data and solve problems?

Measurement and Data—3.MD.3
Also 3.NBT.2

MATHEMATICAL PRACTICES
MP.1, MP.5, MP.6

Unlock the Problem

The students in Alicia's class voted for their favorite yogurt flavor. They organized the data in this tally table. How many more students chose chocolate than strawberry?

Another way to show the data is in a frequency table. A **frequency table** uses numbers to record data.

Favorite Yogurt Flavor	
Flavor	**Tally**
Vanilla	𝍸 ||
Chocolate	𝍸 |||
Strawberry	||||

Read the Problem

What do I need to find?

How many more students chose

_____ than _____ yogurt as their favorite?

What information do I need to use?

the data about favorite _____ in the tally table

How will I use the information?

I will count the _____. Then I will put the numbers in a frequency table and compare the number of students

who chose _____ to the number of

students who chose _____.

Solve the Problem

Favorite Yogurt Flavor	
Flavor	**Number**
Vanilla	

Count the tally marks. Record _____ for vanilla. Write the other flavors and record the number of tally marks.

To compare the number of students who chose strawberry and the number of students who chose chocolate, subtract.

_____ − _____ = _____

So, _____ more students chose chocolate as their favorite flavor.

Math Talk **Mathematical Practices**

Explain why you would record data in a frequency table.

Try Another Problem

Two classes in Carter's school grew bean plants for a science project. The heights of the plants after six weeks are shown in the tally table. The plants were measured to the nearest inch. How many fewer bean plants were 9 inches tall than 7 inches and 8 inches combined?

Bean Plant Heights

Height in Inches	Tally
7	𝍸 ||||
8	𝍸 |||
9	𝍸 𝍸 ||
10	𝍸 ||||

Read the Problem	Solve the Problem
What do I need to find?	**Record the steps you used to solve the problem.**
What information do I need to use?	
How will I use the information?	

- Suppose the number of 3-inch plants was half the number of 8-inch plants. How many 3-inch bean plants were there?

_____

Math Talk **Mathematical Practices**

Explain another strategy you could use to solve the problem.

Name _____

Share and Show

MATH BOARD

Use the Shoe Lengths table for 1–3.

Shoe Lengths		
Length in Centimeters	Tally	
	Boys	Girls
18	𝍸 |	||||
19	𝍸	||||
20	𝍸 |||	𝍸 ||||
21	𝍸 ||	𝍸
22	𝍸 ||||	𝍸 ||

1. The students in three third-grade classes recorded the lengths of their shoes to the nearest centimeter. The data are in the tally table. How many more shoes were 18 or 22 centimeters long combined than 20 centimeters long?

First, count the tally marks and record the data in a frequency table.

Shoe Lengths		
Length in Centimeters	Number	
	Boys	Girls
18		
19		
20		
21		
22		

To find the number of shoes that were 18 or 22 centimeters long, add

6 + _____ + _____ + _____ = _____.

To find the number of shoes that were

20 centimeters long, add _____ + _____ = _____.

To find the difference between the shoes that were 18 or 22 centimeters long and the shoes that were 20 centimeters long, subtract the sums.

_____ − _____ = _____

So, _____ more shoes were 18 or 22 centimeters long than 20 centimeters long.

2. How many fewer girls' shoes than boys' shoes were measured? _____

On Your Own

3. THINK SMARTER What if the length of 5 more boys' shoes measured 21 centimeters? Explain how the table would change.

_____

_____

4. MATHEMATICAL PRACTICE 2 **Use Reasoning** Isabel is thinking of an even number between 234 and 250. The sum of the digits is double the digit in the ones place. What is Isabel's number?

5. GO DEEPER Heather has 6 dimes and 10 pennies. Jason has 3 quarters. Who has more money? Explain your answer.

6. THINK SMARTER Andrew has 10 more goldfish than Todd. Together, they have 50 goldfish. How many goldfish does each boy have?

7. THINK SMARTER Jade made this tally table to record how many students have different types of pets.

Students' Pets

Type of Pet	Tally
Dog	𝍸 𝍸 ||||
Rabbit	|||
Hamster	𝍸
Cat	𝍸 ||

For numbers 7a–7d, select True or False for each statement.

7a. Nine fewer students have hamsters than have dogs. ○ True ○ False

7b. Seven students have cats. ○ True ○ False

7c. Fewer students have cats than hamsters. ○ True ○ False

7d. More students have dogs than other animals combined. ○ True ○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Use Picture Graphs

Essential Question How can you read and interpret data in a picture graph?

Measurement and Data—3.MD.3
Also 3.NBT.2

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4, MP.8

Unlock the Problem

A **picture graph** uses small pictures or symbols to show and compare information.

Nick has a picture graph that shows how some students get to school. How many students ride the bus?

- Underline the words that tell you where to find the information to answer the question.
- How many ☺ are shown for Bus?

_____

Each row has a label that names one way students get to school.

How We Get to School

Walk	☺ ☺ ☺
Bike	☺ ☺ ☺ ☺
Bus	☺ ☺ ☺ ☺ ☺ ☺ ☺ ☺
Car	☺ ☺ ☺ ☺ ☺ ☺

Key: Each ☺ = 10 students.

The title says that the picture graph is about how some students get to school.

The **key** tells that each picture or symbol stands for the way 10 students get to school.

To find the number of students who ride the bus, count each ☺ as 10 students.

10, 20, _____, _____, _____, _____, _____, _____

So, _____ students ride the bus to school.

1. How many fewer students walk than ride the bus? _____

2. How many students were surveyed? _____

3. What if the symbol stands for 5 students? How many symbols will you need to show the number of students who walk to school? _____

Use a Half Symbol

How many students chose an orange as their favorite fruit?

Math Idea

Half of the picture stands for half the value of the whole picture.

☺ = 2 students

◔ = 1 student

Our Favorite Fruit	
Banana	☺ ☺ ☺ ☺ ☺
Apple	☺ ☺ ☺
Pear	☺ ☺
Orange	☺ ☺ ☺ ☺ ◔

Key: Each ☺ = 2 students.

Count the ☺ in the orange row by twos. Then add 1 for the half symbol.

2, 4, _____, _____ _____ + _____ = _____

So, _____ students chose an orange as their favorite fruit.

Share and Show

MATH BOARD

Use the Number of Books Students Read picture graph for 1–3.

Number of Books Students Read	
September	📖 📖 📖 📖
October	📖 📖 📖 📖 📖 📖
November	📖 📖 📖 📖

Key: Each 📖 = 2 books.

1. What does 📖 stand for?
   Think: Half of 2 is 1.

   _____

2. How many books did the students read in September?

   _____

3. How many more books did the students read in October than in November?

   _____

Math Talk — **Mathematical Practices**

Explain how to find the number of books the students read.

Name _____

On Your Own

Use the Favorite Game picture graph for 4–10.

Favorite Game	
Puzzles	5
Card Games	3½
Board Games	6

Key: Each = 4 students.

4. How many students chose puzzles?

_____

5. How many fewer students chose card games than board games?

_____

6. MATHEMATICAL PRACTICE 8 **Draw Conclusions** Which two types of games did a total of 34 students choose?

_____

7. GO DEEPER How many students were surveyed?

_____

8. How many students did not choose card games?

_____

9. WRITE Math **What's the Error?** Jacob said one more student chose board games than puzzles. Explain his error.

_____

_____

_____

10. GO DEEPER What if computer games were added as a choice and more students chose it than puzzles, but fewer students chose it than board games? How many students would choose computer games?

_____

Unlock the Problem Real World

Use the picture graph for 11–12.

Favorite Camp Activity	
Biking	☀ ☀ ☀ ☀
Hiking	☀ ☀ ☀ ☀
Boating	☀ ☀ ☀
Fishing	☀ ☀

Key: Each ☀ = 6 students.

11. THINK SMARTER The students who went to summer camp voted for their favorite activity. Which two activities received a total of 39 votes?

a. What do you need to find?

_____

b. What steps will you use to solve the problem?

_____

c. Show the steps you used to solve the problem.

d. Complete the sentences.

Each ☀ = _____ students.

Each ☀ = _____ students.

votes for biking + hiking = _____

votes for hiking + boating = _____

votes for biking + boating = _____

votes for fishing + hiking = _____

So, _____ received a total of 39 votes.

Personal Math Trainer

12. THINK SMARTER + Choose the word from each box that makes the sentence true.

Fifteen fewer students voted for [hiking / boating / fishing] than for [hiking / boating / fishing].

FOR MORE PRACTICE: Standards Practice Book

Name _____

Make Picture Graphs

Essential Question How can you draw a picture graph to show data in a table?

Measurement and Data—3.MD.3
Also 3.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Unlock the Problem

Real World

Hands On

Delia made the table at the right. She used it to record the places the third grade classes would like to go during a field trip. How can you show the data in a picture graph?

Field Trip Choices

Place	Number
Museum	6
Science Center	15
Aquarium	12
Zoo	9

Make a picture graph.

STEP 1

Write the title at the top of the picture graph. Write the name of a place in each row.

STEP 2

Look at the numbers in the table. Choose a picture for the key, and tell how many students each picture represents. Write the key at the bottom of the graph.

STEP 3

Draw the correct number of pictures for each field trip choice.

Museum	

Key: Each ____ = ____ students.

- How did you decide how many pictures to draw for the Science Center?

_____

_____

Try This! Make a picture graph from data you collect. Take a survey or observe a subject that interests you. Collect and record the data in a frequency table. Then make a picture graph. Decide on a symbol and a key. Include a title and labels.

Key:

Share and Show

MATH BOARD

Hands On

Jeremy pulled marbles from a bag one at a time, recorded their color, and then put them back. Make a picture graph of the data. Use this key:

Each ◯ = 2 marbles.

Jeremy's Marble Experiment

Color	Number
Blue	4
Green	11
Red	8

Key:

Use your picture graph above for 1–2.

1. How many more times did Jeremy pull out a red marble than a blue marble?

2. How many fewer times did Jeremy pull out green marbles than blue and red marbles combined?

Math Talk **Mathematical Practices**

Explain how you knew how many pictures to draw for green.

Name _____

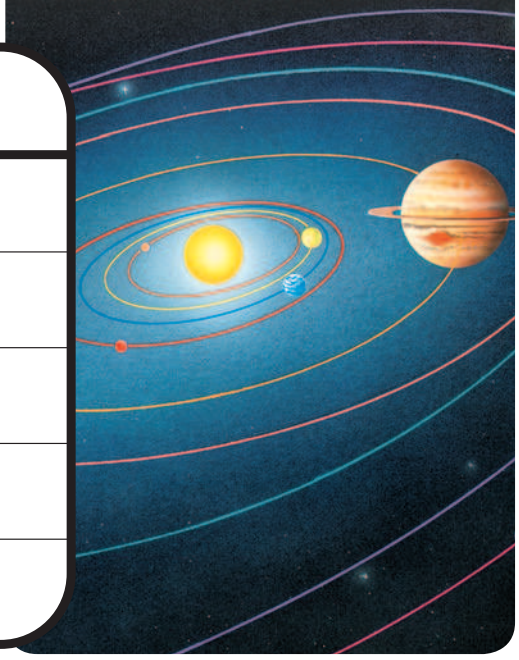
On Your Own

3. Two classes from Delia's school visited the Science Center. They recorded their favorite exhibit in the tally table. Use the data in the table to make a picture graph. Use this key:

Each ☼ = 4 votes.

Favorite Exhibit

Exhibit	Tally
Nature	𝍸 |
Solar System	𝍸 |||
Light and Sound	𝍸 𝍸 ||||
Human Body	𝍸 |||



Key:

Use your picture graph above for 4–6.

4. Which exhibits received the same number of votes?

_____

5. MATHEMATICAL PRACTICE 4 **Model Mathematics** What if a weather exhibit received 22 votes? Explain how many pictures you would draw.

_____

6. THINK SMARTER What if the Solar System exhibit received 15 votes? Would it make sense to use the key Each ☼ = 4 votes to represent 15 votes? Explain.

_____

Problem Solving • Applications

Teeth in Mammals

Animal	Number
Hamster	16
Cat	30
Dog	42
Cow	32

7. While at the Science Center, Delia's classmates learned how many teeth some mammals have. Use the data in the table to make a picture graph. Use this key:

Each △ = 4 teeth.

Key:

Use your picture graph above for 8–10.

8. THINK SMARTER **Pose a Problem** Write a problem that can be solved by using the data in your picture graph. Then solve the problem.

9. GO DEEPER How many fewer teeth do cats and hamsters have combined than dogs and cows combined?

10. THINK SMARTER How many pictures would you draw for Cat if each △ = 5 teeth? Explain your reasoning.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

Vocabulary
frequency table
key
picture graph

1. A _____ uses numbers to record data. (p. 63)
2. A _____ uses small pictures or symbols to show and compare information. (p. 67)

Concepts and Skills

Use the Favorite Season table for 3–6. (3.MD.3)

Favorite Season	
Season	**Number**
Spring	19
Summer	28
Fall	14
Winter	22

3. Which season got the most votes?

_____

4. Which season got 3 fewer votes than winter?

_____

5. How many more students chose summer than fall?

_____

6. How many students chose a favorite season?

_____

Use the Our Pets picture graph for 7–9. (3.MD.3)

Our Pets	
Bird	🐾 🐾 🐾 🐾
Cat	🐾 🐾 🐾 🐾 🐾
Dog	🐾 🐾 🐾 🐾 🐾 🐾 🐾
Fish	🐾 🐾 🐾

Key: Each 🐾 = 2 students.

7. How many students have cats as pets?

_____

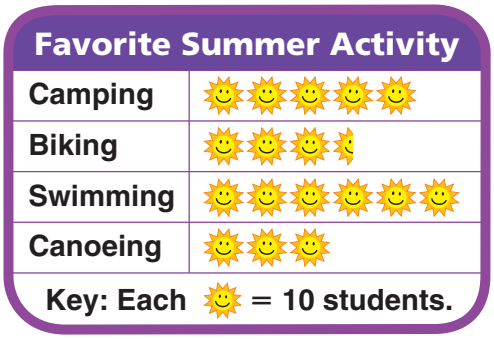
8. Five more students have dogs than which other pet? _____

9. How many pets in all do students have?

_____

Use the Favorite Summer Activity picture graph for 10–14.

10. Some students in Brooke's school chose their favorite summer activity. The results are in the picture graph at the right. How many students chose camping? (3.MD.3)



11. How many more students chose swimming than canoeing? (3.MD.3)

12. Which activity did 15 fewer students choose than camping? (3.MD.3)

13. How many pictures would you draw for biking if each = 5 students? (3.MD.3)

14. How many more students chose biking and canoeing combined than swimming? (3.MD.3)

Name _____

Use Bar Graphs

Essential Question How can you read and interpret data in a bar graph?

Measurement and Data—3.MD.3
Also 3.NBT.2

MATHEMATICAL PRACTICES
MP.1, MP.6, MP.7

Unlock the Problem

A **bar graph** uses bars to show data. A **scale** of equally spaced numbers helps you read the number each bar shows.

The students in the reading group made a bar graph to record the number of books they read in October. How many books did Seth read?

- Underline the words that tell you where to find the information to answer the question.

The title tells what the bar graph is about.

The length of a bar tells how many books each student read.

The scale is 0–16 by twos.

Each bar is labeled with a student's name.

Math Talk **Mathematical Practices**

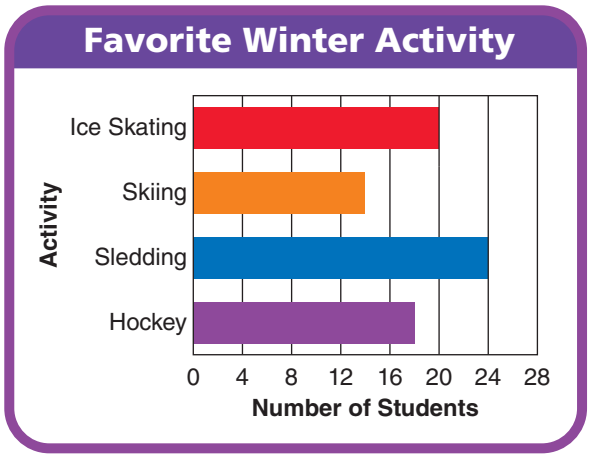
Explain how to read the bar that tells how many books Amy read.

Find the bar for Seth. It ends at _____.

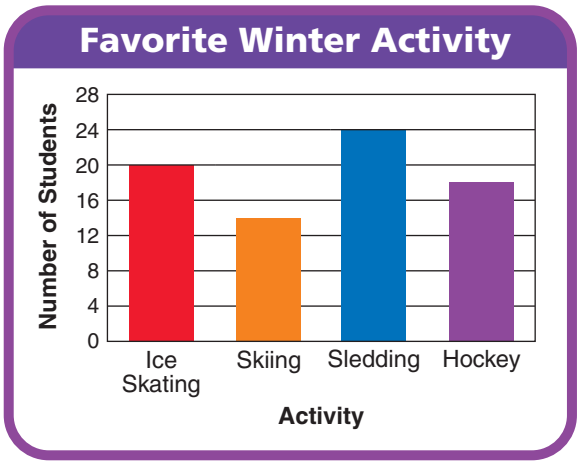
So, Seth read _____ books in October.

1. How many books did Max read? _____
2. Who read 4 fewer books than Kate? _____
3. What if Amy read 5 more books? How many books did Amy read? Shade the graph to show how many she read. _____

More Examples These bar graphs show the same data.



In a **horizontal bar graph**, the bars go across from left to right. The length of the bar shows the number.



In a **vertical bar graph**, the bars go up from the bottom. The height of the bar shows the number.

4. What does each space between two numbers represent?

_____

5. Why do you think the scale in the graphs is 0 to 28 by fours instead of 0 to 28 by ones? What other scale could you use?

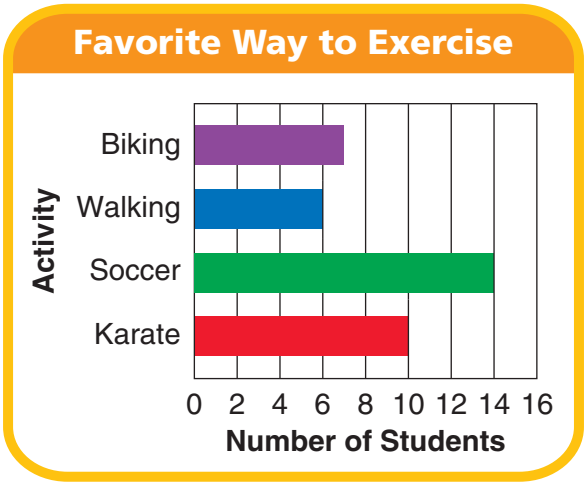
_____

_____

Share and Show

MATH BOARD

Use the Favorite Way to Exercise bar graph for 1–3.



1. Which activity did the most students choose?

Think: Which bar is the longest?

_____

2. How many students answered the survey? _____

3. Which activity received 7 fewer votes than soccer? _____

Math Talk **Mathematical Practices**

What can you tell just by comparing the lengths of the bars in the graph? **Explain.**

Name _____

Problem Solving • Applications (Real World)

Use the Favorite Kind of Book bar graph for 4–8.

4. Which kind of book was chosen by half the number of students as books about animals?

_____

5. GO DEEPER Which two kinds of books combined were chosen as often as books about sports?

_____

6. MATHEMATICAL PRACTICE 4 **Use Graphs** Write and solve a problem that matches the data in the graph.

_____

_____

7. THINK SMARTER What if 10 more students were asked and they chose books about animals? Describe what the bar graph would look like.

_____

_____

8. THINK SMARTER For numbers 8a–8d, select True or False for each statement.

8a. More students chose books about sports than any other kind of book. ○ True ○ False

8b. Five more students chose books about puzzles than books about space. ○ True ○ False

8c. Thirty more students chose books about animals than books about nature. ○ True ○ False

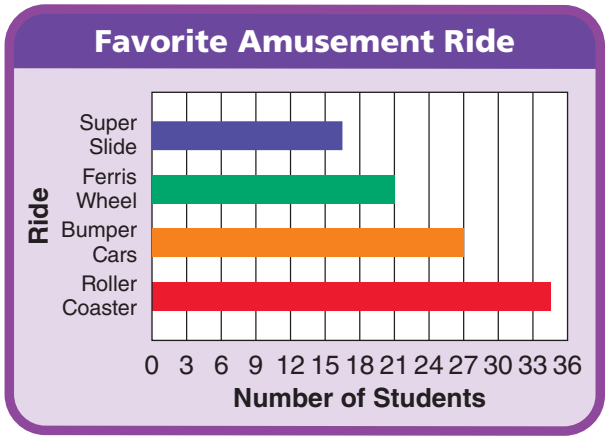
8d. Fifteen fewer students chose books about puzzles than books about sports. ○ True ○ False

Sense or Nonsense?

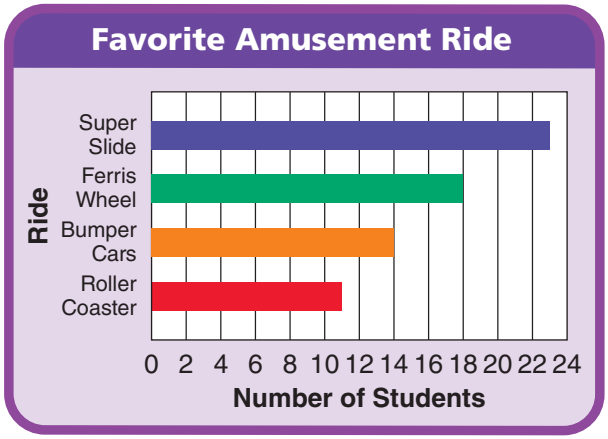
9. THINK SMARTER The table shows data about some students' favorite amusement park rides. Four students graphed the data. Which student's bar graph makes sense?

Favorite Amusement Ride

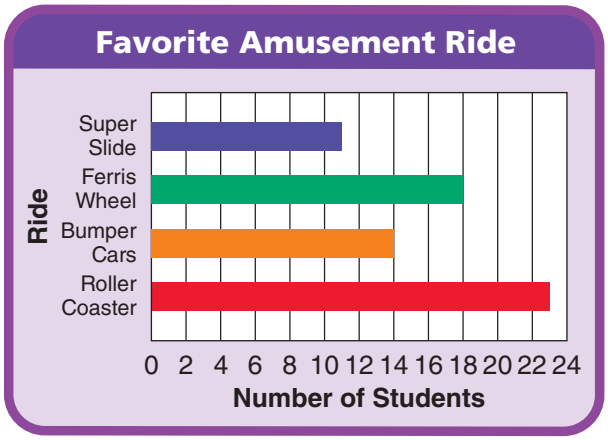
Ride	Number of Students
Super Slide	11
Ferris Wheel	14
Bumper Cars	18
Roller Coaster	23



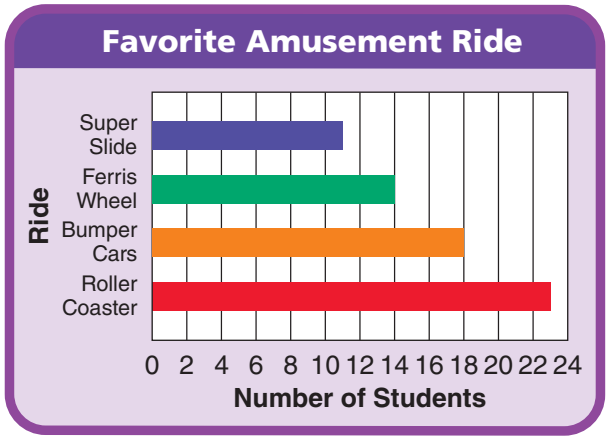
Alicia



Spencer



Tyler



Kate

- Explain why the other bar graphs do not make sense.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Make Bar Graphs

Essential Question How can you draw a bar graph to show data in a table or picture graph?

Measurement and Data—3.MD.3
Also 3.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5

Unlock the Problem

Real World

Hands On

Jordan took a survey of his classmates' favorite team sports. He recorded the results in the table at the right. How can he show the results in a bar graph?

Favorite Team Sport

Sport	Tally
Soccer	𝍸 𝍸 ||
Basketball	||||
Baseball	𝍸 𝍸 ||||
Football	𝍸 ||||

Make a bar graph.

STEP 1

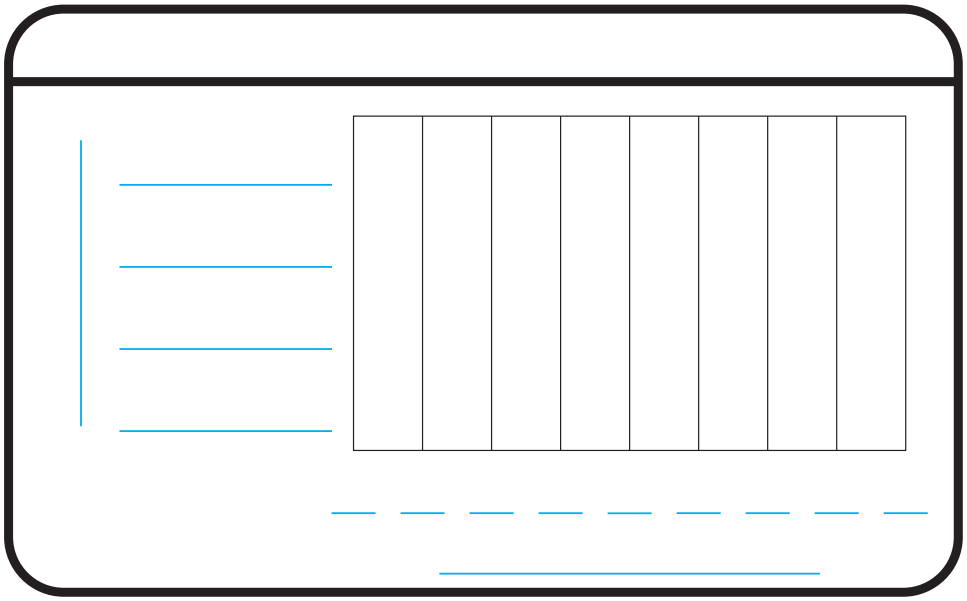
Write a title at the top to tell what the graph is about. Label the side of the graph to tell about the bars. Label the bottom of the graph to explain what the numbers tell.

STEP 2

Choose numbers for the bottom of the graph so that most of the bars will end on a line. Since the least number is 4 and the greatest number is 14, make the scale 0–16. Mark the scale by twos.

STEP 3

Draw and shade a bar to show the number for each sport.



Math Talk Mathematical Practices

How did you know how long to draw the bar for football?

Share and Show

MATH BOARD

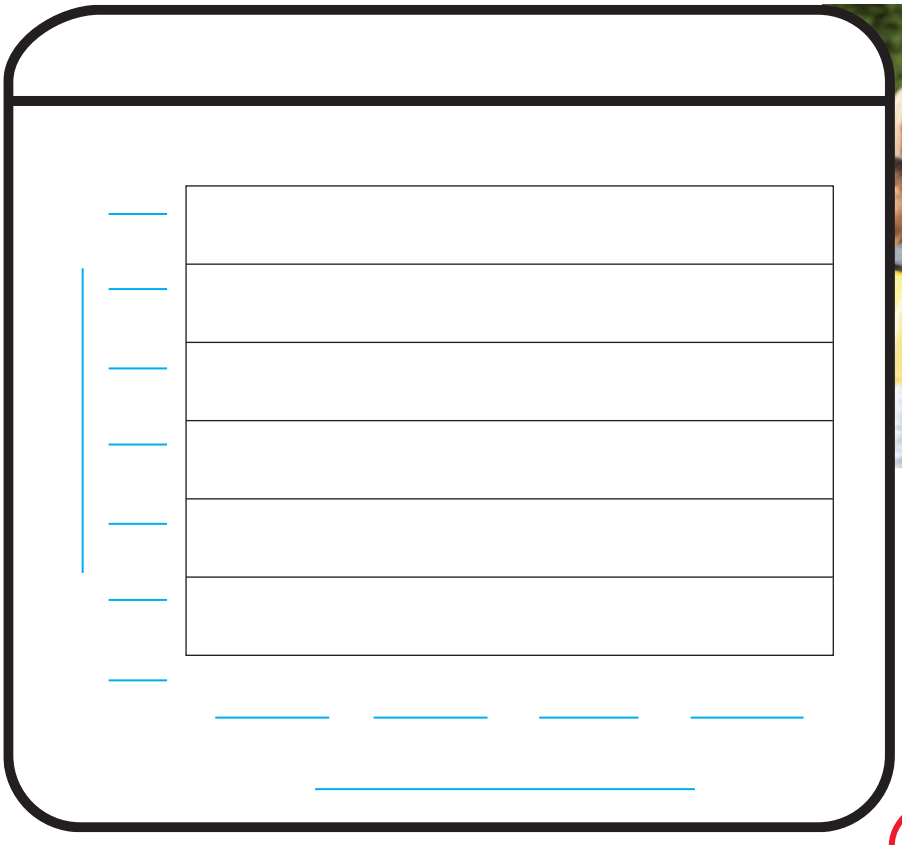
Hands On

Matt's school is having a walk-a-thon to raise money for the school library. Matt made a picture graph to show the number of miles some students walked. Make a bar graph of Matt's data. Use a scale of 0–_____, and mark the scale by _____.

School Walk-a-Thon

Sam	5
Matt	2 and 1
Ben	1
Erica	4

Key: Each = 2 miles.



Use your bar graph for 1–4.

1. Which student walked the most miles? _____

   Think: Which student's bar is the tallest?

2. How many more miles would Matt have had to walk to equal the number of miles Erica walked? _____

3. How many miles did the students walk? _____

4. Write the number of miles the students walked in order from greatest to least. _____

Math Talk — **Mathematical Practices**

Explain how the graph would have to change if another student, Daniel, walked double the number of miles Erica walked.

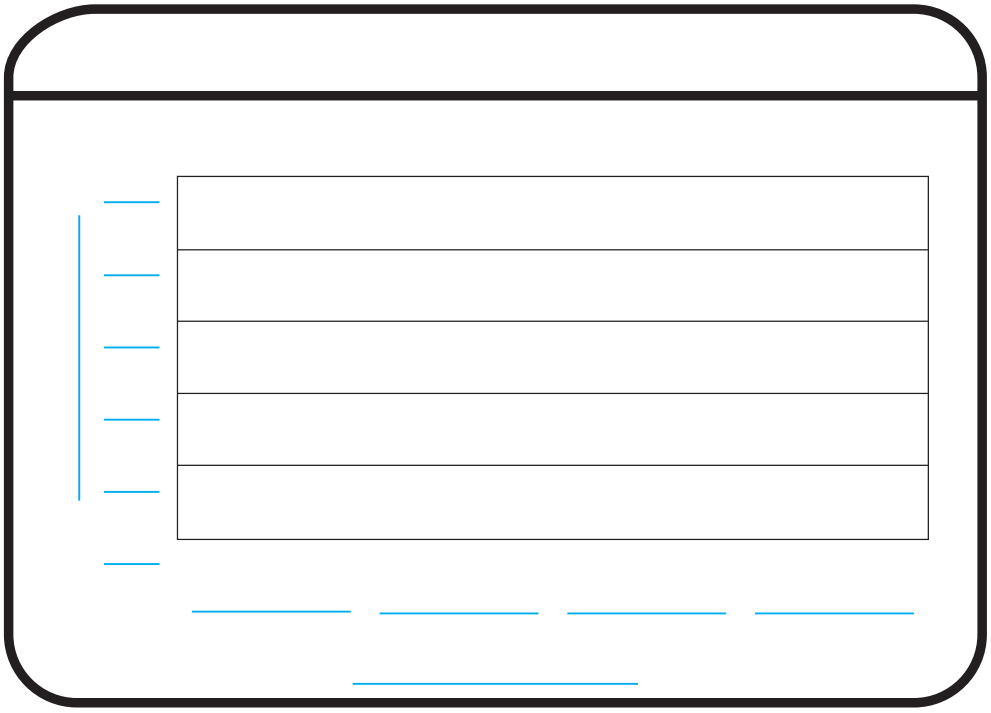
Name _____

On Your Own

5. Lydia and Joey did an experiment with a spinner. Lydia recorded the result of each spin in the table at the right. Use the data in the table to make a bar graph. Choose numbers and a scale and decide how to mark your graph.

Spinner Results

Color	Tally
Red	𝍸 𝍸 𝍸 |
Yellow	𝍸 |||
Blue	𝍸 𝍸 ||
Green	𝍸 𝍸



ERROR Alert

Be sure to draw the bars correctly when you transfer data from a table.

Use your bar graph for 6–8.

6. The pointer stopped on _____ half the number of times that it stopped on _____.

7. The pointer stopped on green _____ fewer times than it stopped on blue.

8. MATHEMATICAL PRACTICE 6 **Explain** why you chose the scale you did.

_____

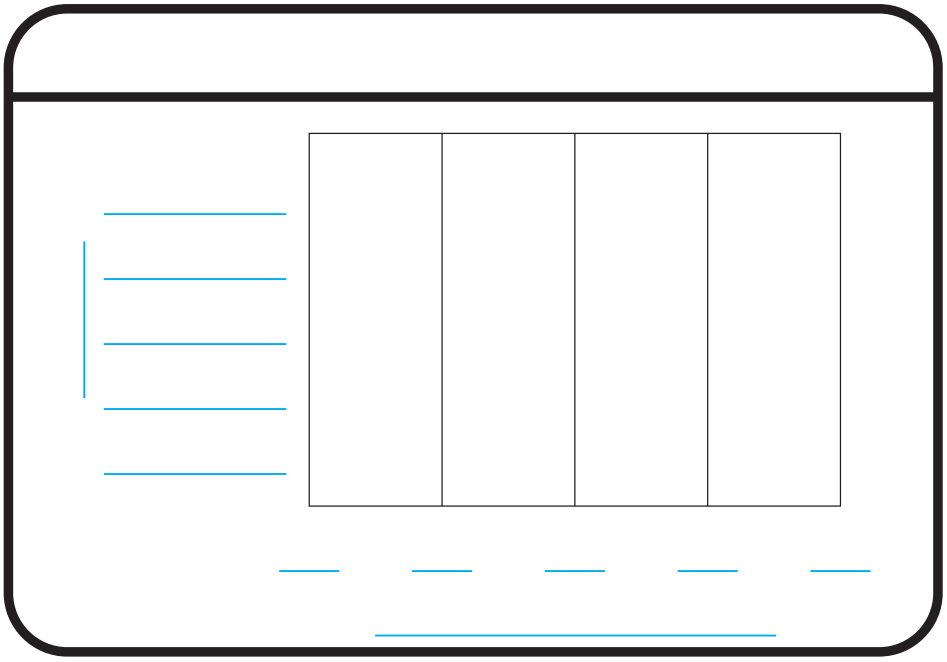
_____

Problem Solving • Applications

9. MATHEMATICAL PRACTICE 4 **Use Graphs** Susie recorded the number of points some basketball players scored. Use the data in the table to make a bar graph. Choose numbers so that most of the bars will end on a line.

Points Scored

Player	Number of Points
Billy	10
Dwight	30
James	15
Raul	25
Sean	10



Use your bar graph for 10–12.

10. GO DEEPER Which player scored more points than James but fewer points than Dwight? _____

11. THINK SMARTER Write and solve a new question that matches the data in your bar graph.

_____

_____

12. THINK SMARTER Which player scored 10 more points than James?

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Solve Problems Using Data

Essential Question How can you solve problems using data represented in bar graphs?

Measurement and Data—3.MD.3
Also 3.NBT.2, 3.OA.8

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.7

Unlock the Problem

CONNECT Answering questions about data helps you better understand the information.

Derek's class voted on a topic for the school bulletin board. The bar graph shows the results. How many more votes did computers receive than space?

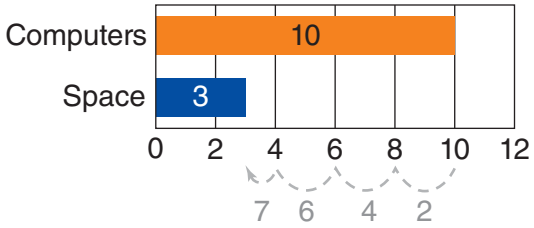
- How do you know you need to subtract?

_____

_____

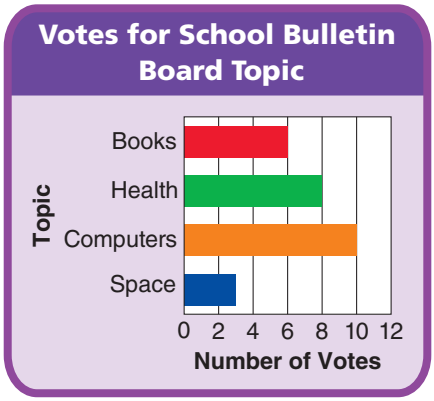
One Way Use a model.

Count back along the scale to find the difference between the bars.



Count back from 10 to 3.
Skip count by twos.

The difference is _____ votes.



Math Talk **Mathematical Practices**

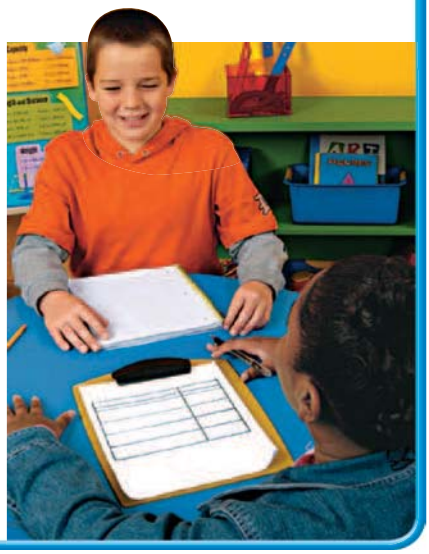
Explain another way you can skip count to find the difference.

Another Way Write a number sentence.

Think: There are 10 votes for computers. There are 3 votes for space. Subtract to compare the number of votes.

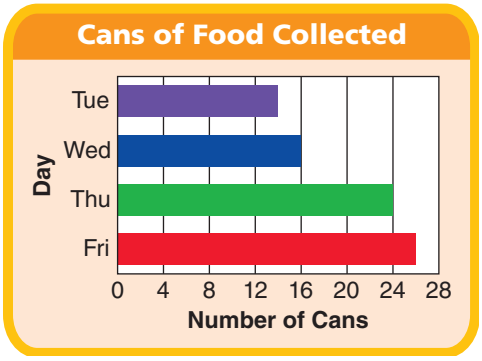
_____

So, computers received _____ more votes than space.



Example

Brooke's school collected cans of food. The bar graph at the right shows the number of cans. How many fewer cans were collected on Tuesday than on Thursday and Friday combined?



STEP 1 Find the total for Thursday and Friday.

STEP 2 Subtract to compare the total for Thursday and Friday to Tuesday and to find the difference.

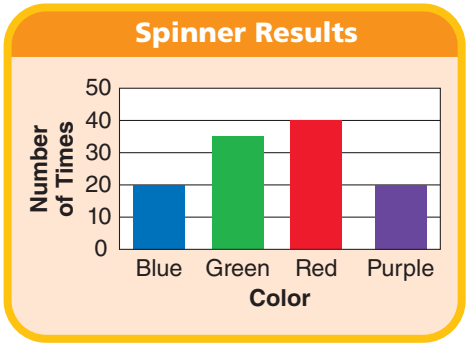
So, _____ fewer cans were collected on Tuesday than on Thursday and Friday combined.

- What if 4 fewer cans were collected on Monday than on Tuesday? How many cans were collected on Monday? Explain.

Share and Show

MATH BOARD

Use the Spinner Results bar graph for 1–3.



1. How many more times did the pointer stop on green than on purple?

   _____ more times

2. How many fewer times did the pointer stop on blue than on red and green combined?

   _____ fewer times

3. What if there were 15 more spins and the pointer stopped 10 more times on green and 5 more times on blue? How many more times did the pointer stop on green than blue?

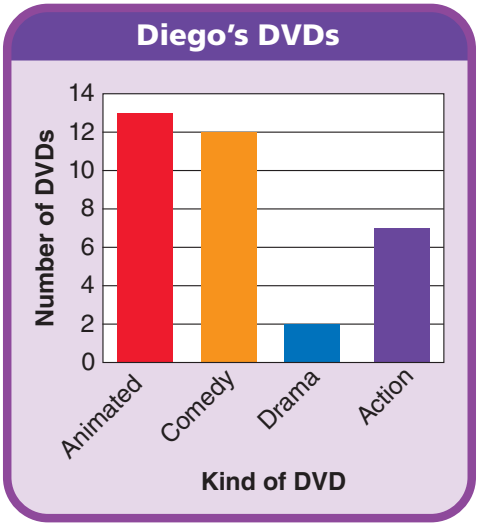
Math Talk **Mathematical Practices**

What can you tell just by comparing the lengths of the bars in the graphs? Explain.

Name _____

On Your Own

Use the Diego's DVDs bar graph for 4–6.



4. Diego has 5 fewer of this kind of DVD than comedy. Which kind of DVD is this?

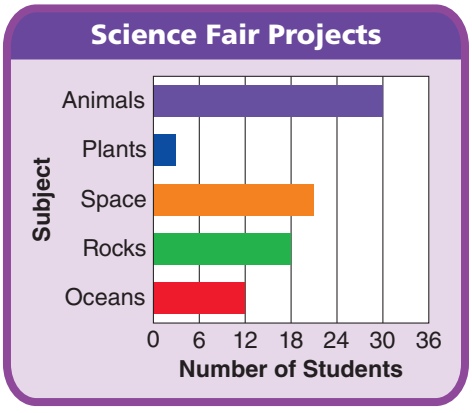
5. Is the number of comedy and action DVDs greater than or less than the number of animated and drama DVDs? Explain.

6. THINK SMARTER How many DVDs does Diego have that are NOT comedy DVDs?

Problem Solving • Applications

Real World

Use the Science Fair Projects bar graph for 7–9.



7. How many more students would have to do a project on plants to equal the number of projects on space?

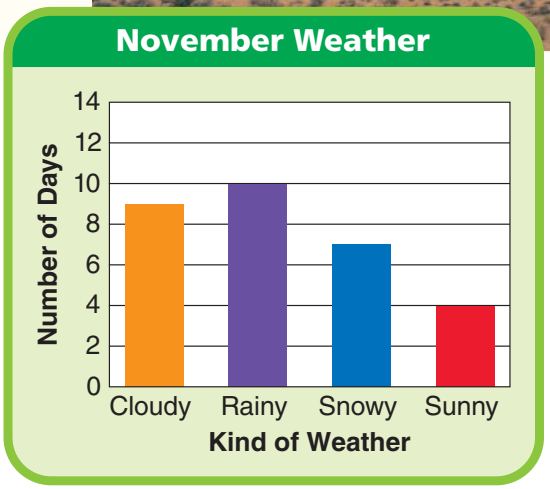
8. WRITE Math **What's the Question?** The answer is animals, space, rocks, oceans, and plants.

9. MATHEMATICAL PRACTICE 1 What if 3 fewer students did a project on weather than did a project on rocks? **Describe** what the bar graph would look like.

Unlock the Problem Real World

Use the November Weather bar graph for 10–12.

10. GO DEEPER Lacey's class recorded the kinds of weather during the month of November in a bar graph. Were there more cloudy and sunny days or more rainy and snowy days?



a. What do you need to find?

_____

_____

b. What operation will you use to find the answer?

_____

c. Show the steps you used to find the answer.

d. Complete the sentences.

_____ cloudy days +

_____ sunny days = _____ days

_____ rainy days +

_____ snowy days = _____ days

_____ > _____

So, there were more _____ days.

11. How many days in November were NOT cloudy?

Think: There are 30 days in November.

_____

Personal Math Trainer

12. THINK SMARTER + Is the number of cloudy and snowy days greater than or less than the number of rainy and sunny days? Explain.

_____

_____

FOR MORE PRACTICE: Standards Practice Book

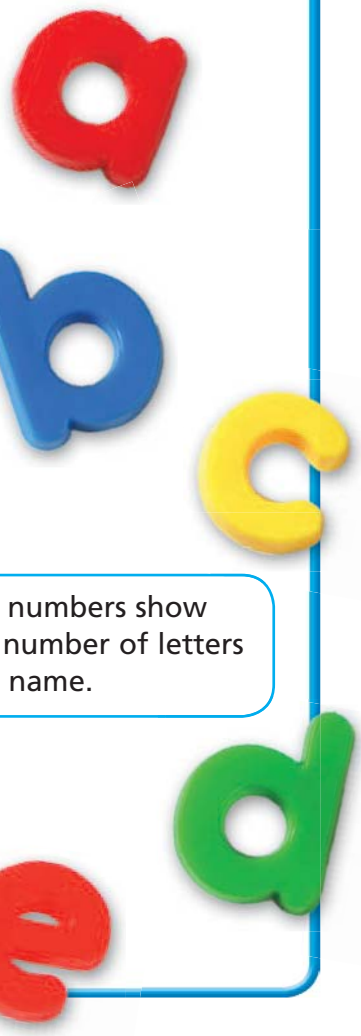
Name _____

Use and Make Line Plots

Essential Question How can you read and interpret data in a line plot and use data to make a line plot?

Measurement and Data—3.MD.4
Also 3.NBT.2
MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.6

Unlock the Problem

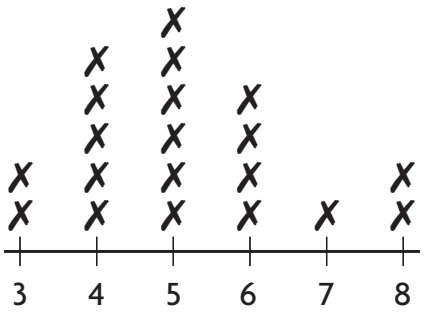


A **line plot** uses marks to record each piece of data above a number line. It helps you see groups in the data.

Some students took a survey of the number of letters in their first names. Then they recorded the data in a line plot.

How many students have 6 letters in their first names?

Each ✗ stands for 1 student. →



Number of Letters in Our First Names

← The numbers show the number of letters in a name.

Find 6 on the number line. The 6 stands for 6 _____.

There are _____ ✗s above the 6.

So, _____ students have 6 letters in their first names.

1. Which number of letters was found most often? _____

2. Write a sentence to describe the data. _____

_____

3. How many letters are in your first name? _____

4. Put an ✗ above the number of letters in your first name.

Math Talk **Mathematical Practices**
What does the shape of the data show you?

Activity Make a line plot.

Materials ■ ruler ■ measuring tape

Measure the height of four classmates to the nearest inch. Combine your data with other groups. Make a line plot to show the data you collected.

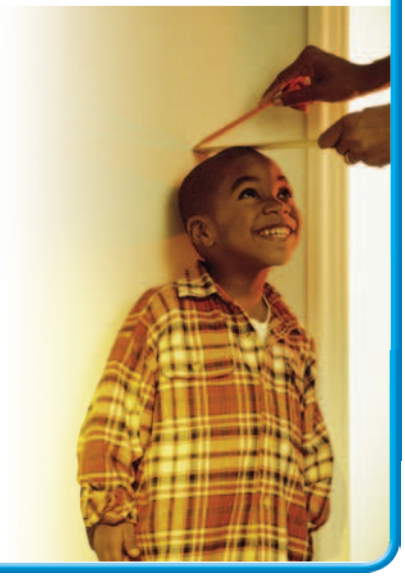
STEP 1 Record the heights in the table.

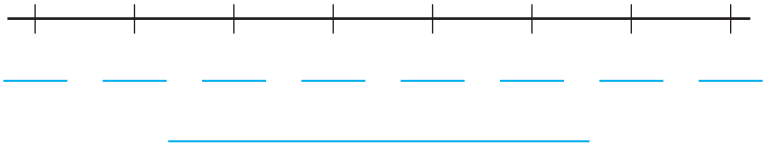
STEP 2 Write a title below the number line to describe your line plot.

STEP 3 Write the number of inches in order from left to right above the title.

STEP 4 Draw ✗s above the number line to show each student's height.

Heights in Inches	
Number of Inches	Tally





5. Which height appears most often? _____

Think: Which height has the most ✗s?

6. Which height appears least often? _____

7. Complete the sentence. Most of the students in the class are _____ inches tall or taller.

8. THINK SMARTER Is there any height for which there are no data? Explain.

_____

_____

Math Talk **Mathematical Practices**

Explain what the shape of the data tells you.

Name _____

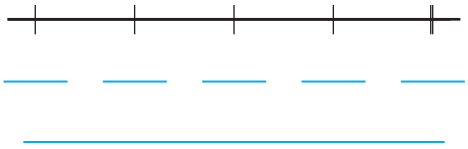
Share and Show

MATH BOARD

1. Measure the length of three drawing tools from your desk to the nearest inch. Combine your data with several other classmates. Record the lengths in the table.

Lengths in Inches	
Number of Inches	Tally

2. Make a line plot to show the data you collected.

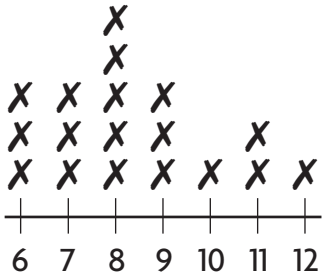


3. Which length appears most often? _____

Problem Solving • Applications

Real World

Use the line plot at the right for 4–6.



Height of Avocado Plants (in Inches)

4. MATHEMATICAL PRACTICE 5 **Use Appropriate Tools** Garden club members recorded the height of their avocado plants to the nearest inch in a line plot. Write a sentence to describe what the line plot shows.

_____

_____

5. THINK SMARTER How many more plants are 8 or 9 inches tall than are 6 or 7 inches tall? Explain.

_____

_____

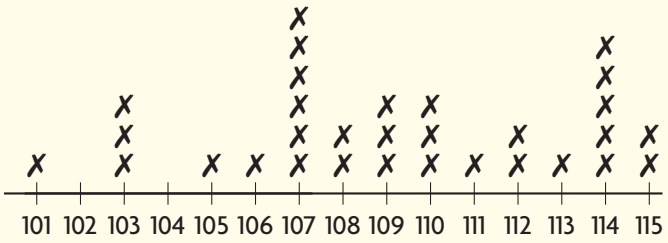
6. THINK SMARTER How many plants are taller than 8 inches?

_____ plants

Connect to Reading

GO DEEPER Make an Inference

Addison made the line plot below to show the high temperature every day for one month. What *inference* can you make about what season this is?



Daily High Temperatures (in Degrees F)

Remember

The Four Seasons

spring

summer

fall

winter

When you combine what you see with what you already know to come up with an idea, you are making an inference.

You can use what you know about weather and the data in the line plot to make an inference about the season.

You know that the numbers in the line plot are the high temperatures recorded during the month.

The highest temperature recorded was _____.

The lowest temperature recorded was _____.

The temperature recorded most often was _____.

Since all the high temperatures are greater than 100, you know the days were hot. This will help you make an inference about the season.

So, you can infer that the season is _____.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Chapter 2 Review/Test

1. Mia made a tally table to record the different types of birds she saw at the bird feeder in the garden.

Birds at the Feeder	
Name	**Tally**
Jay	𝍸
Sparrow	𝍸 𝍸 ||
Finch	𝍸 |||
Blackbird	𝍸 |

For numbers 1a–1c, select True or False for each statement.

1a. Mia saw twice as many sparrows as blackbirds. ○ True ○ False

1b. Mia saw 8 finches. ○ True ○ False

1c. Mia saw 4 fewer jays than blackbirds. ○ True ○ False

2. Jake asked 25 students in his class how close they live to school. The frequency table shows the results.

Miles to School		
	Boys	**Girls**
about 1 mile	4	5
about 2 miles		4
about 3 miles	3	2

Part A

Complete the table and explain how you found the answer.

Part B

How many more students live about 2 miles or less from school than students who live about 3 miles from school? Show your work.

GO DIGITAL Assessment Options
Chapter Test

Use the picture graph for 3–6.

Students at Barnes School are performing in a play. The picture graph shows the number of tickets each class has sold so far.

Number of Tickets Sold

Ms. Brown's Class	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Mrs. Gold's Class	✓ ✓ ✓ ✓ ✓
Mr. Castro's Class	✓ ✓ ✓ ✓ ✓ ✓

Key: Each ✓ = 5 tickets.

3. How many tickets were sold altogether? Explain how you found the total.

4. Choose the name from each box that makes the sentence true.

Five fewer tickets were sold by [Ms. Brown's / Mrs. Gold's / Mr. Castro's] class than [Ms. Brown's / Mrs. Gold's / Mr. Castro's] class.

5. How many more tickets were sold by Ms. Brown's class than Mr. Castro's class?

_____ tickets

6. What if Mrs. Gold's class sold 20 more tickets? Draw a picture to show how the graph would change.

Name _____

Use the frequency table for 7–8.

7. The Pet Shop keeps track of the number of fish it has for sale. The frequency table shows how many fish are in three tanks.

Fish in Tanks	
Tank	**Number of Fish**
Tank 1	16
Tank 2	9
Tank 3	12

Part A

Use the data in the table to complete the picture graph.

Tank 1	◯◯

Key: Each ◯ = 2 fish.

Part B

How many pictures did you draw for Tank 2? Explain.

8. Each tank can hold up to 20 fish. How many more fish can the Pet Shop put in the three tanks?

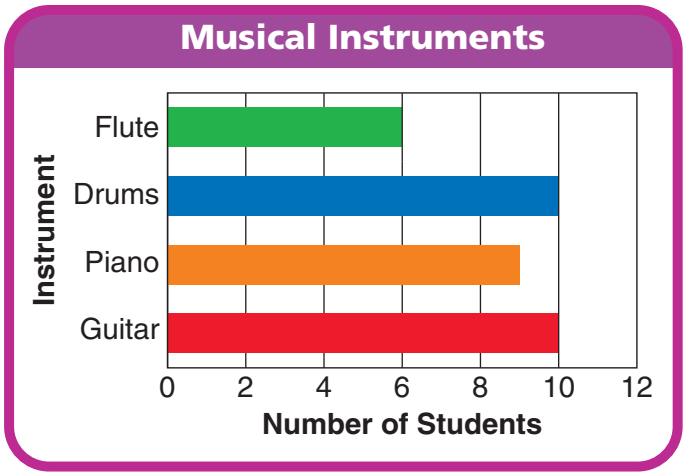
Ⓐ 60 fish

Ⓑ 23 fish

Ⓒ 20 fish

Ⓓ 33 fish

Use the bar graph for 9–12.



9. Three more students play piano than which other instrument?

_____

10. The same number of students play which two instruments?

_____

11. For numbers 11a–11d, select True or False for each statement.

11a. Ten more students play guitar than play flute. ○ True ○ False

11b. Nine students play piano. ○ True ○ False

11c. Six fewer students play flute and piano combined than play drums and guitar combined. ○ True ○ False

11d. Nine more students play piano and guitar combined than play drums. ○ True ○ False

12. There are more students who play the trumpet than play the flute, but fewer students than play the guitar. Explain how you would change the bar graph to show the number of students who play the trumpet.

Name _____

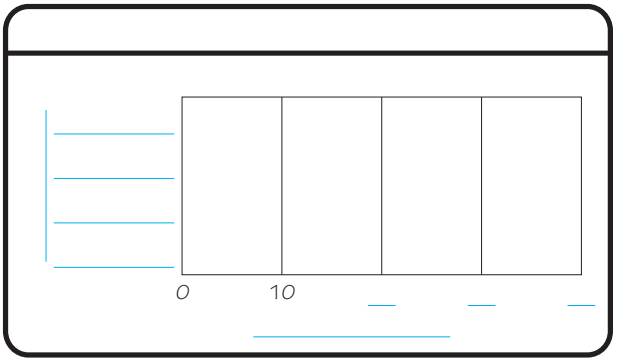
Use the frequency table for 13–14.

13. Karen asks students what vegetables they would like to have in the school cafeteria. The table shows the results of her survey.

Favorite Vegetables	
Vegetable	**Number of Votes**
broccoli	15
carrots	40
corn	20
green beans	10

Part A

Use the data in the table to complete the bar graph.



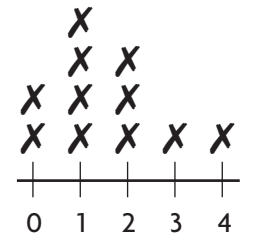
Part B

How do you know how long to make the bars on your graph? How did you show 15 votes for broccoli? Explain.

14. How many more votes did the two most popular vegetables get than the two least popular vegetables? Explain how you solved the problem.

Use the line plot for 15–16.

The line plot shows the number of goals the players on Scot's team scored.



Number of Goals Scored

15. For numbers 15a–15d, select True or False for each statement.

15a. Three players scored 2 goals. ○ True ○ False

15b. Six players scored fewer than 2 goals. ○ True ○ False

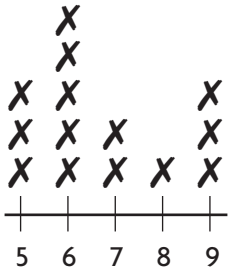
15c. There are 8 players on the team. ○ True ○ False

15d. Five players scored more than 1 goal. ○ True ○ False

16. What if two more people played and each scored 3 goals? Describe what the line plot would look like.

Use the line plot for 17–18.

Robin collected shells during her vacation. She measured the length of each shell to the nearest inch and recorded the data in a line plot.



Length of Shells in Inches

17. How many shells were 6 inches long or longer?

_____ shells

18. How many more shells did Robin collect that were 5 inches long than 8 inches long?

_____ shells

Chapter 3

Understand Multiplication

Show What You Know

Check your understanding of important skills.

Name _____

▶ Count On to Add

Use the number line. Write the sum.

1. $6 + 2 =$ _____

2. $3 + 7 =$ _____

▶ Skip Count by Twos and Fives

Skip count. Write the missing numbers.

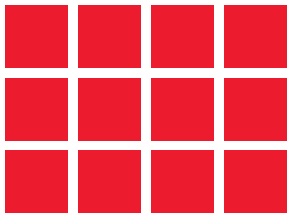
3. 2, 4, 6, _____, _____, _____

4. 5, 10, 15, _____, _____, _____

▶ Model with Arrays

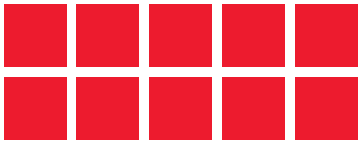
Use the array. Complete.

5.

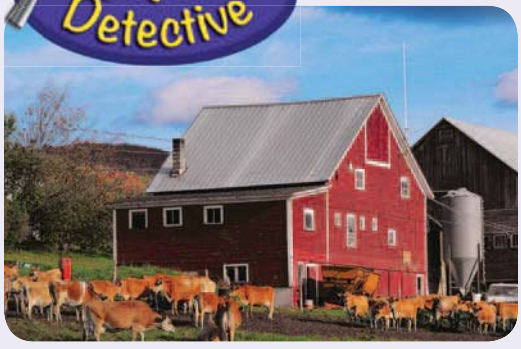


_____ + _____ + _____ = _____

6.



_____ + _____ = _____



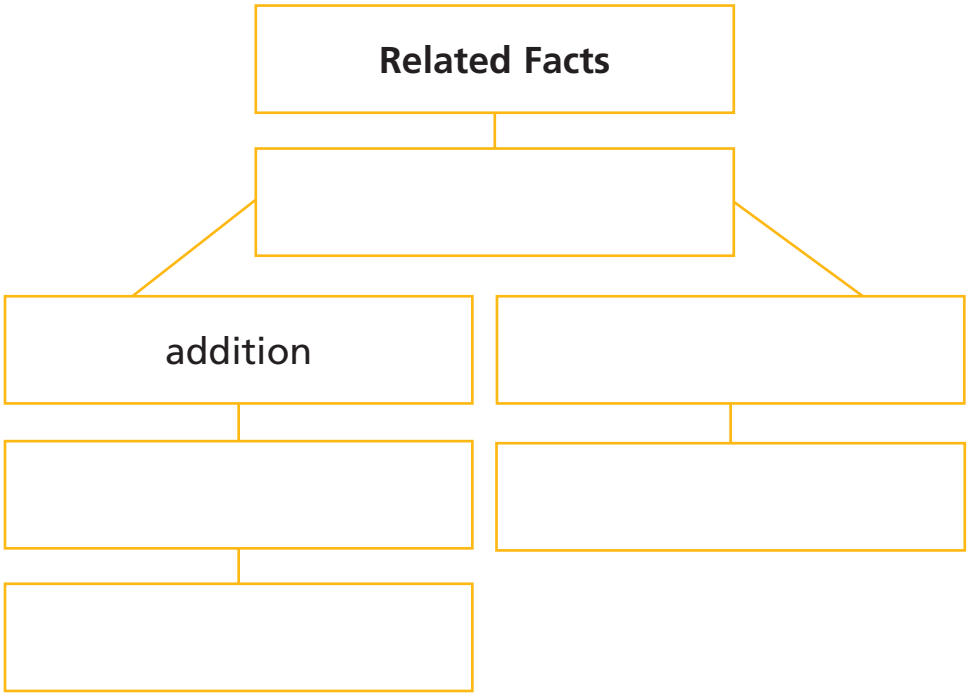
Ryan's class went on a field trip to a farm. They saw 5 cows and 6 chickens. Be a Math Detective to find how many legs were on all the animals they saw.

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Complete the tree map by using the review words.



Review Words

addend
addition
difference
number sentences
related facts
subtraction
sum

Preview Words

array
equal groups
factor
multiply
product

Understand Vocabulary

Read the definition. Write the preview word that matches it.

1. A set of objects arranged in rows and columns _____

2. The answer in a multiplication problem _____

3. When you combine equal groups to find how many in all _____

4. A number that is multiplied by another number to find a product _____

Name _____

Count Equal Groups

Essential Question How can you use equal groups to find how many in all?

Operations and Algebraic Thinking—
3.OA.1 *Also 3.OA.3*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5

Unlock the Problem

Real World

Hands On

Equal groups have the same number of objects in each group.

Tim has 6 toy cars. Each car has 4 wheels. How many wheels are there in all?

- How many wheels are on each car?

- How many equal groups of wheels are there?

- How can you find how many wheels in all?

Activity Use counters to model the equal groups.

Materials ■ counters

STEP 1 Draw 4 counters in each group.

STEP 2 Skip count to find how many wheels in all.
Skip count by 4s until you say 6 numbers.

number of equal groups →	1	2	3	4	5	6
	4,	_____,	12,	_____,	_____,	_____

There are _____ groups with _____ wheels in each group.

So, there are _____ wheels in all.

Math Talk **Mathematical Practices**

What if Tim had 8 cars? How could you find the total number of wheels?

Example Count equal groups to find the total.

Hands On

Sam, Kyla, and Tia each have 5 pennies.
How many pennies do they have in all?

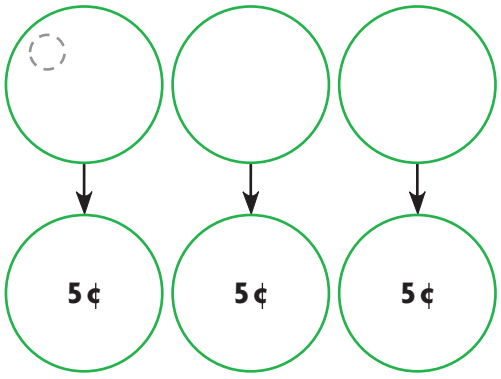
How many pennies does each person have? _____

How many equal groups of pennies are there? _____

Draw 5 counters in each group.

Think: There are _____ groups of 5 pennies.

Think: There are _____ fives.



Skip count to find how many pennies.

_____, _____, _____

So, they have _____ pennies.

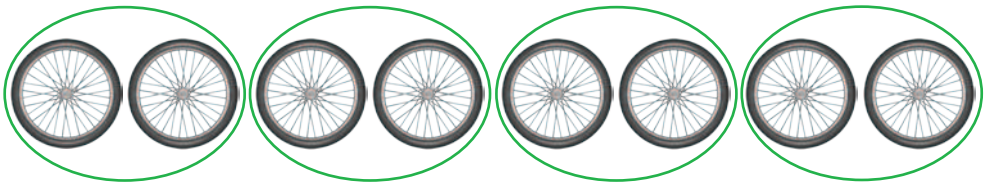
- THINK SMARTER Explain why you can skip count by 5s to find how many.

_____

Share and Show

MATH BOARD

1. Complete. Use the picture. Skip count to find how many wheels in all.



_____ groups of 2

_____ twos

Skip count by 2s. 2, 4, _____, _____

So, there are _____ wheels.

Math Talk Mathematical Practices

What if there were 2 groups of 4 wheels? Would your answers change? If so, how?

Name _____

Draw equal groups. Skip count to find how many.

2. 2 groups of 6 _____

3. 3 groups of 2 _____

Count equal groups to find how many.

4.

_____ groups of _____

_____ in all

5.

_____ groups of _____

_____ in all

On Your Own

Draw equal groups. Skip count to find how many.

6. 3 groups of 3 _____

7. 2 groups of 9 _____

8. GO DEEPER A toy car costs $3. A toy truck costs $4. Which costs more—4 cars or 3 trucks? Explain.

_____

_____

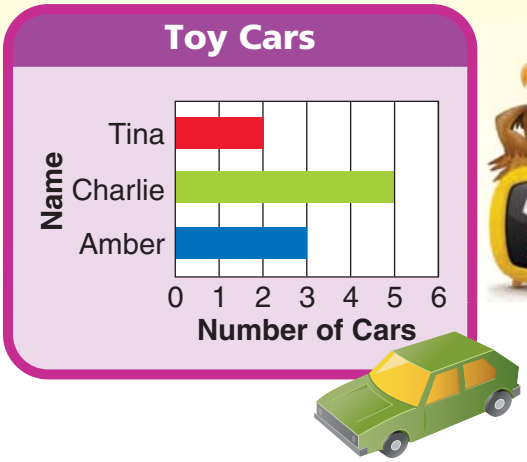
9. MATHEMATICAL PRACTICE 3 **Make Arguments** Elliott has a collection of 20 toy cars. Will he be able to put an equal number of toy cars on 3 shelves? Explain your answer.

_____

_____

Unlock the Problem Real World

10. THINK SMARTER Tina, Charlie, and Amber have toy cars. Each car has 4 wheels. How many wheels do their cars have altogether?



a. What do you need to find?

_____

b. What information will you use from the graph to solve the problem?

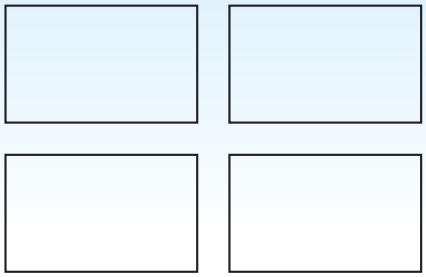
_____

c. Show the steps you used to solve the problem.

d. So, the cars have _____ wheels.

11. THINK SMARTER A bookcase has 4 shelves. Each shelf holds 5 books. How many books are in the bookcase?

Draw counters to model the problem. Then explain how you solved the problem.



_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Relate Addition and Multiplication

Essential Question How is multiplication like addition? How is it different?

Operations and Algebraic Thinking—
3.OA.1 *Also 3.OA.3, 3.OA.7, 3.NBT.2*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7

Unlock the Problem

Real World

Hands On

Tomeka needs 3 apples to make one loaf of apple bread. Each loaf has the same number of apples. How many apples does Tomeka need to make 4 loaves?

- How many loaves is Tomeka making?

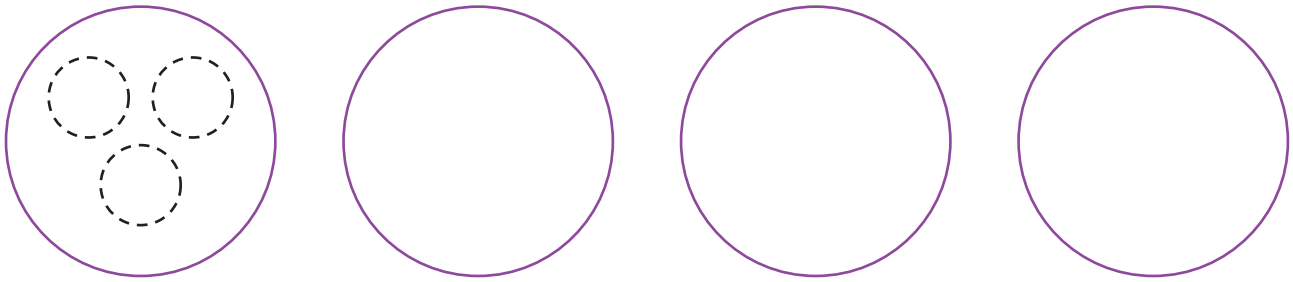
- How many apples are in each loaf?

- How can you solve the problem?

One Way Add equal groups.

Use the 4 circles to show the 4 loaves.

Draw 3 counters in each circle to show the apples Tomeka needs for each loaf.



Find the number of counters.
Complete the addition sentence.

3 + _____ + _____ + _____ = _____

So, Tomeka needs _____ apples to make _____ loaves of apple bread.

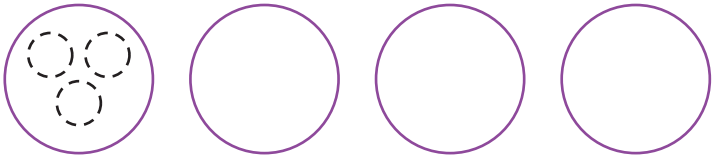
Math Talk **Mathematical Practices**

How is the picture you drew like the addition sentence you wrote?

Another Way Multiply.

When you combine equal groups, you can **multiply** to find how many in all.

Think: 4 groups of 3



Draw 3 counters in each circle.

Since there are the same number of counters in each circle, you can multiply to find how many in all.

Multiplication is another way to find how many there are altogether in equal groups.

Write: $4 \times 3 = 12$ or

4	← factor
× 3	← factor
12	← product

4 ↑ factor; 3 ↑ factor; 12 ↑ product

Read: Four times three equals twelve.

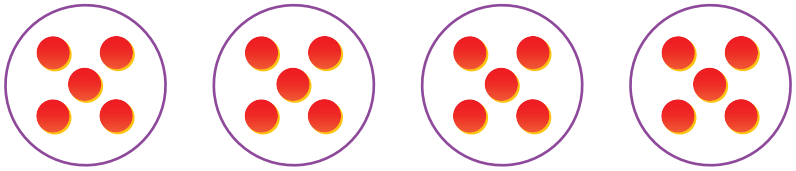
The **factors** are the numbers multiplied.

The **product** is the answer to a multiplication problem.

Share and Show

MATH BOARD

1. Write related addition and multiplication sentences for the model.



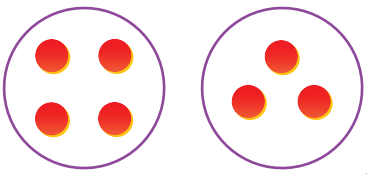
_____ + _____ + _____ + _____ = _____

_____ × _____ = _____

Math Talk

Mathematical Practices

How would you change this model so you could write a multiplication sentence to match it?



Name _____

Draw a quick picture to show the equal groups. Then write related addition and multiplication sentences.

2. 3 groups of 6

___ + ___ + ___ = ___

___ × ___ = ___

3. 2 groups of 3

___ + ___ = ___

___ × ___ = ___

On Your Own

Draw a quick picture to show the equal groups. Then write related addition and multiplication sentences.

4. 4 groups of 2

___ + ___ + ___ + ___ = ___

___ × ___ = ___

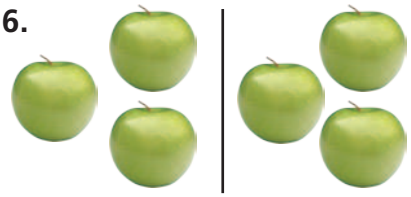
5. 5 groups of 4

___ + ___ + ___ + ___ + ___ = _____

___ × ___ = _____

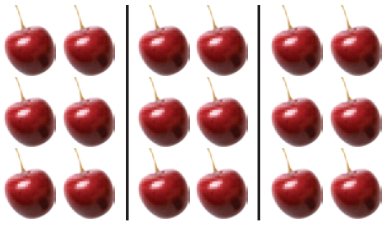
Complete. Write a multiplication sentence.

6.



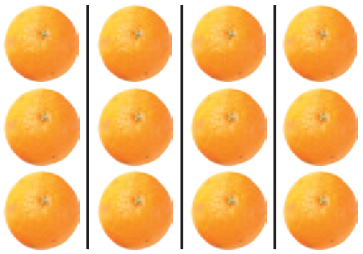
___ × ___ = ___

7.



___ × ___ = ___

8.



___ × ___ = ___

9. 2 + 2 + 2 + 2 = ___

___ × ___ = ___

10. 4 + 4 + 4 + 4 = _____

___ × ___ = _____

11. 9 + 9 + 9 = _____

___ × ___ = _____

Problem Solving • Applications Real World

Use the table for 12–13.

Average Weight of Fruits

Fruit	Weight in Ounces
Apple	6
Orange	5
Peach	3
Banana	4

12. Morris bought 4 peaches. How much do the peaches weigh? Write a multiplication sentence to find the weight of the peaches.

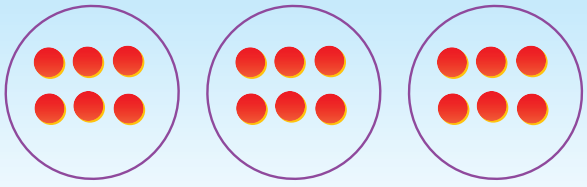
_____ × _____ = _____ ounces

13. THINK SMARTER Thomas bought 2 apples. Sydney bought 4 bananas. Which weighed more—the 2 apples or the 4 bananas? How much more? Explain how you know.

14. MATHEMATICAL PRACTICE 3 **Make Arguments** Shane said that he could write related multiplication and addition sentences for 6 + 4 + 3. Does Shane's statement make sense? Explain.

15. GO DEEPER Write a word problem that can be solved using 3 × 4. Solve the problem.

16. THINK SMARTER Select the number sentences that represent the model at the right. Mark all that apply.



Ⓐ 3 + 6 = 9

Ⓑ 6 + 6 + 6 = 18

Ⓒ 3 × 6 = 18

Ⓓ 6 + 3 = 9

FOR MORE PRACTICE: Standards Practice Book

Name _____

Skip Count on a Number Line

Essential Question How can you use a number line to skip count and find how many in all?

Operations and Algebraic Thinking—
3.OA.3 *Also 3.OA.1*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7

Unlock the Problem

Real World

Caleb wants to make 3 balls of yarn for his cat to play with. He uses 6 feet of yarn to make each ball. How many feet of yarn does Caleb need in all?

- How many equal groups of yarn will Caleb make?

- How many feet of yarn will be in each group?

- What do you need to find?

Use a number line to count equal groups.

How many feet of yarn does Caleb need for each ball? _____

How many equal lengths of yarn does he need? _____

Begin at 0. Skip count by 6s by drawing jumps on the number line.

How many jumps did you make? _____

How long is each jump? _____

Multiply. $3 \times 6 =$ _____

So, Caleb needs _____ feet of yarn in all.

Math Talk **Mathematical Practices**

What if Caleb made 4 balls of yarn with 5 feet of yarn in each ball? What would you do differently to find the total number of feet of yarn needed?

- MATHEMATICAL PRACTICE 1 **Analyze** Why did you jump by 6s on the number line?

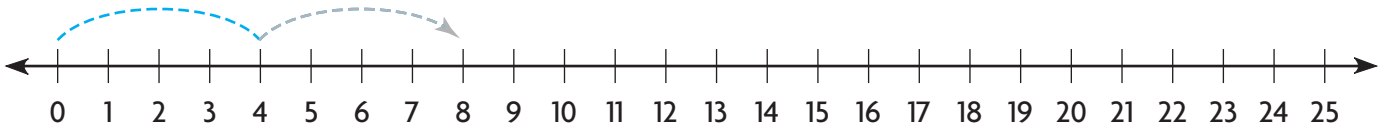
_____

Share and Show

MATH BOARD

1. Skip count by drawing jumps on the number line. Find how many in 5 jumps of 4. Then write the product.

Think: 1 jump of 4 shows 1 group of 4.



$5 \times 4 =$ _____

Draw jumps on the number line to show equal groups. Find the product.

2. 3 groups of 8

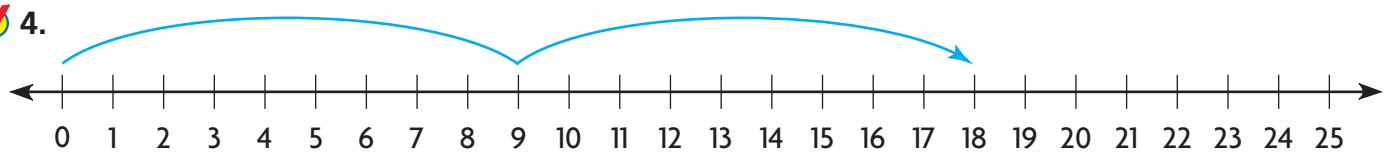
$3 \times 8 =$ _____

3. 8 groups of 3

$8 \times 3 =$ _____

Write the multiplication sentence shown by the number line.

4.



_____ × _____ = _____

Math Talk **Mathematical Practices**

How do equal jumps on the number line show equal groups?

Name _____

On Your Own

Draw jumps on the number line to show equal groups. Find the product.

5. 6 groups of 4

$6 \times 4 =$ _____

6. 7 groups of 3

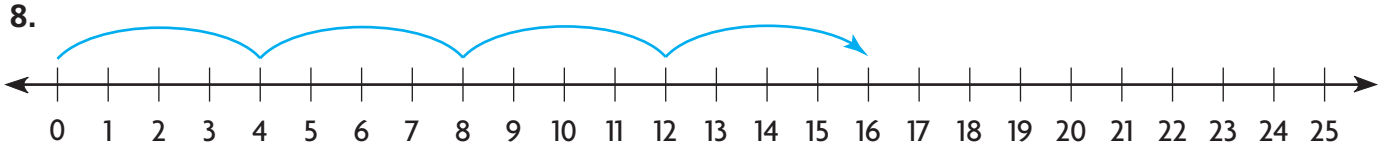
$7 \times 3 =$ _____

7. 2 groups of 10

$2 \times 10 =$ _____

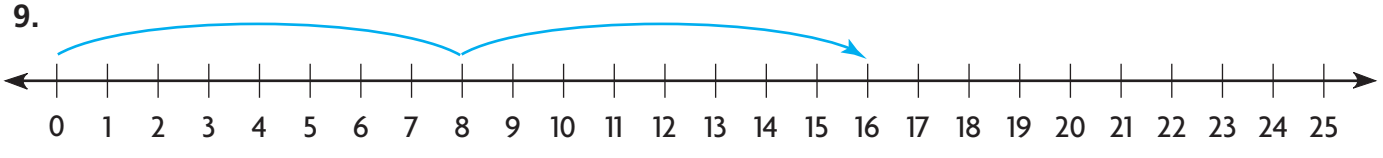
Write the multiplication sentence shown by the number lines.

8.



_____ × _____ = _____

9.



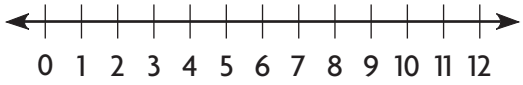
_____ × _____ = _____

Problem Solving • Applications Real World

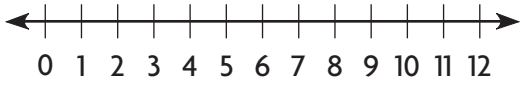
10. GO DEEPER Erin displays her toy cat collection on 3 shelves. She puts 8 cats on each shelf. If she collects 3 more cats, how many cats will she have?

_____

11. THINK SMARTER Write two multiplication sentences that have a product of 12. Draw jumps on the number line to show the multiplication.



_____ × _____ = _____



_____ × _____ = _____

12. MATHEMATICAL PRACTICE 7 **Identify Relationships** Write a problem that can be solved by finding 8 groups of 5. Write a multiplication sentence to solve the problem. Then solve.

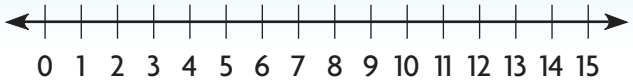
_____

_____

Personal Math Trainer

13. THINK SMARTER + Rebecca practices piano for 3 hours each week. How many hours does she practice in 4 weeks?

Draw jumps and label the number line to show your thinking.



_____

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

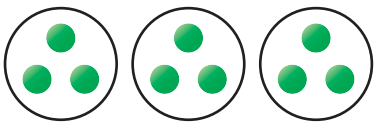
Choose the best term from the box.

Vocabulary
equal groups
factors
multiply
product

1. When you combine equal groups, you can _____ to find how many in all. (p. 106)
2. The answer in a multiplication problem is called the _____. (p. 106)
3. The numbers you multiply are called the _____. (p. 106)

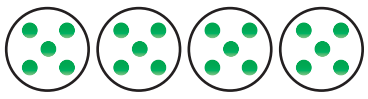
Concepts and Skills

Count equal groups to find how many. (3.OA.1)

4. 

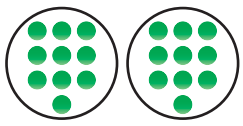
___ groups of ___

___ in all

5. 

___ groups of ___

___ in all

6. 

___ groups of ___

___ in all

Write related addition and multiplication sentences. (3.OA.1)

7. 3 groups of 9

___ + ___ + ___ = ___

___ × ___ = ___

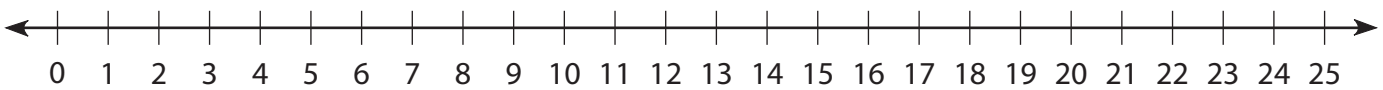
8. 5 groups of 7

___ + ___ + ___ + ___ + ___ = ___

___ × ___ = ___

Draw jumps on the number line to show equal groups. Find the product. (3.OA.3)

9. 6 groups of 3

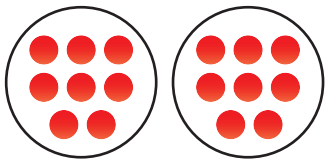


_____ × _____ = _____

10. Beth's mother cut some melons into equal slices. She put 4 slices each on 8 plates. Write a multiplication sentence to show the total number of melon slices she put on the plates. (3.OA.1)

11. Avery had 125 animal stickers. She gave 5 animal stickers to each of her 10 friends. How many animal stickers did she have left? What number sentences did you use to solve? (3.OA.3)

12. Matt made 2 equal groups of marbles. Write a multiplication sentence to show the total number of marbles. (3.OA.1)



13. Lindsey has 10 inches of ribbon. She buys another 3 lengths of ribbon, each 5 inches long. How much ribbon does she have now? (3.OA.3)

14. Jack's birthday is in 4 weeks. How many days is it until Jack's birthday? Describe how you could use a number line to solve. (3.OA.3)

Name _____

Problem Solving • Model Multiplication

Essential Question How can you use the strategy *draw a diagram* to solve one- and two-step problems?

Operations and Algebraic Thinking—
3.OA.8 *Also 3.OA.1, 3.OA.3*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.6

Unlock the Problem

Real World

Three groups of students are taking drum lessons. There are 8 students in each group. How many students are taking drum lessons?

Read the Problem

What do I need to find?

I need to find how many _____

are taking drum lessons.

What information do I need to use?

There are _____ groups of students taking drum lessons. There are _____ students in each group.

How will I use the information?

I will draw a bar model to help me see

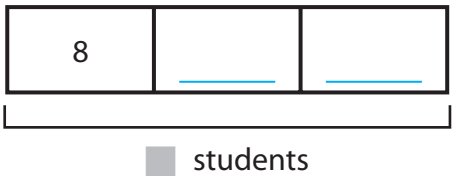
_____

_____.

Solve the Problem

Complete the bar model to show the drummers.

Write 8 in each box to show the 8 students in each of the 3 groups.



Since there are equal groups, I can multiply to find the number of students taking drum lessons.

_____ × _____ = ■

_____ = ■

So, there are _____ students in all.

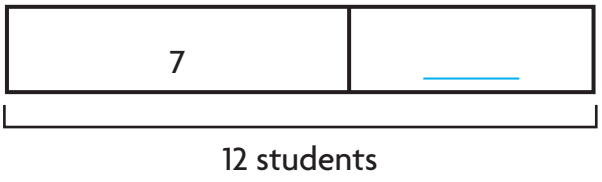
Math Talk — **Mathematical Practices**

How would the bar model change if there were 6 groups of 4 students? Solve.

Try Another Problem

Twelve students in Mrs. Taylor's class want to start a band. Seven students each made a drum. The rest of the students made 2 shakers each. How many shakers were made?

Read the Problem	Solve the Problem
What do I need to find?	**Record the steps you used to solve the problem.**
What information do I need to use?	
How will I use the information?	



1. How many shakers in all did the students make? _____

2. How do you know your answer is reasonable? _____

Math Talk — **Mathematical Practices**

Why wouldn't you draw 2 boxes and write 5 in each box?

Name _____

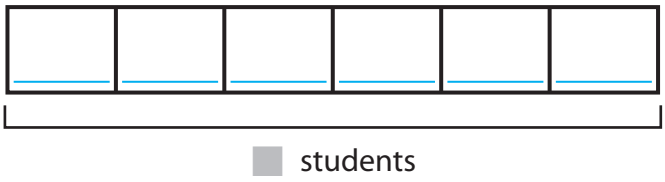
Share and Show

MATH BOARD

1. There are 6 groups of 4 students who play the trumpet in the marching band. How many students play the trumpet in the band?

First, draw a bar model to show each group of students.

Draw _____ boxes and write _____ in each box.



■ students

Then, multiply to find the total number of trumpet players.

_____ × _____ = ■

_____ = ■

So, _____ students play the trumpet in the marching band.

2. What if there are 4 groups of 7 students who play the saxophone? How many students play the saxophone or trumpet?

_____

On Your Own

3. There are 3 rows of flute players in the marching band. There are 7 students in each row. How many flute players are in the marching band?

_____

4. THINK SMARTER Suppose there are 5 groups of 4 trumpet players. In front of the trumpet players are 18 saxophone players. How many students play the trumpet or saxophone?

_____

Use the picture graph for 5–7.

Favorite Instrument Survey	
Flute	☺☺
Trumpet	☺☺☺
Guitar	☺☺☺☺☺
Drum	☺☺☺☺

Key: Each ☺ = 2 votes.

5. The picture graph shows how students in Jillian's class voted for their favorite instrument. How many students voted for the guitar?

_____

6. GO DEEPER On the day of the survey, two students were absent. The picture graph shows the votes of all the other students in the class, including Jillian. How many students are in the class? Explain your answer.

_____

_____

_____

7. THINK SMARTER Jillian added the number of votes for two instruments and got a total of 12 votes. For which two instruments did she add the votes?

_____ and _____

8. MATHEMATICAL PRACTICE 8 **Use Repeated Reasoning** The flute was invented 26 years after the harmonica. The electric guitar was invented 84 years after the flute. How many years was the electric guitar invented after the harmonica?

_____

Personal Math Trainer

9. THINK SMARTER + Raul buys 4 packages of apple juice and 3 packages of grape juice. There are 6 drink boxes in each package. How many drink boxes does Raul buy? Show your work.

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Model with Arrays

Essential Question How can you use arrays to model multiplication and find factors?

Operations and Algebraic Thinking—
3.OA.3 *Also 3.OA.1*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4, MP.6

Unlock the Problem

Hands On

Many people grow tomatoes in their gardens. Lee plants 3 rows of tomato plants with 6 plants in each row. How many tomato plants are there?

▲ Tomatoes are a great source of vitamins.

Activity 1

Materials ■ square tiles ■ MathBoard

- You make an **array** by placing the same number of tiles in each row. Make an array with 3 rows of 6 tiles to show the tomato plants.
- Now draw the array you made.

- Find the total number of tiles.

Multiply. $3 \times 6 = \_\_\_\_$

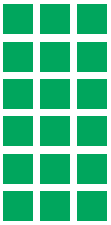
3 ↑ number of rows

6 ↑ number in each row

So, there are _____ tomato plants.

Math Talk **Mathematical Practices**

Does the number of tiles change if you turn the array to show 6 rows of 3? **Explain.**



Activity 2 Materials ■ square tiles ■ MathBoard

Hands On

Use 8 tiles. Make as many different arrays as you can, using all 8 tiles. Draw the arrays. The first one is done for you.

A ☐☐☐☐☐☐☐☐

1 row of 8

$1 \times 8 = 8$

B

8 rows of _____

$8 \times$ _____ $= 8$

C

_____ rows of _____

_____ $\times$ _____ $= 8$

D

_____ rows of _____

_____ $\times$ _____ $= 8$

You can make _____ different arrays using 8 tiles.

Share and Show

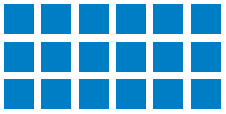
MATH BOARD

1. Complete. Use the array.

_____ rows of _____ = _____

_____ × _____ = _____

Write a multiplication sentence for the array.

2. 

_____

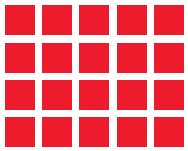
3. 

_____

Name _____

On Your Own

Write a multiplication sentence for the array.

4. 

_____

5. 

_____

Draw an array to find the product.

6. $3 \times 6 =$ _____

7. $4 \times 7 =$ _____

8. $3 \times 5 =$ _____

9. $4 \times 4 =$ _____

10. GO DEEPER Use 6 tiles. Make as many different arrays as you can using all the tiles. Draw the arrays. Then write a multiplication sentence for each array.

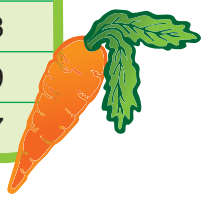
_____

_____

Problem Solving • Applications Real World

Use the table to solve 11–12.

Mr. Bloom's Garden	
Vegetable	**Planted In**
Beans	4 rows of 6
Carrots	2 rows of 8
Corn	5 rows of 9
Beets	4 rows of 7



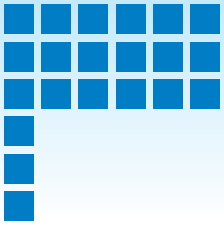
11. MATHEMATICAL PRACTICE 4 **Use Models** Mr. Bloom grows vegetables in his garden. Draw an array and write the multiplication sentence to show how many corn plants Mr. Bloom has in his garden.

12. THINK SMARTER Could Mr. Bloom have planted his carrots in equal rows of 4? If so, how many rows could he have planted? Explain.

13. MATHEMATICAL PRACTICE 5 **Communicate** Mr. Bloom has 12 strawberry plants. Describe all of the different arrays that Mr. Bloom could make using all of his strawberry plants. The first one is done for you.

2 rows of 6;

14. THINK SMARTER Elizabeth ran 3 miles each day for 5 days. How many miles did she run in all? Shade the array to represent the problem. Then solve.



FOR MORE PRACTICE: Standards Practice Book

Name _____

Commutative Property of Multiplication

Essential Question How can you use the Commutative Property of Multiplication to find products?

Operations and Algebraic Thinking—
3.OA.5 *Also 3.OA.1, 3.OA.3, 3.OA.7*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.7, MP.8

Unlock the Problem

Real World

Hands On

Dave works at the Bird Store. He arranges 15 boxes of birdseed in rows on the shelf. What are two ways he can arrange the boxes in equal rows?

- Circle the number that is the product.

Activity Make an array.

Materials ■ square tiles ■ MathBoard

Arrange 15 tiles in 5 equal rows.
Draw a quick picture of your array.

How many tiles are in each row? _____

What multiplication sentence does your array show? _____

Suppose Dave arranges the boxes in 3 equal rows.
Draw a quick picture of your array.

How many tiles are in each row? _____

What multiplication sentence does your array show? _____

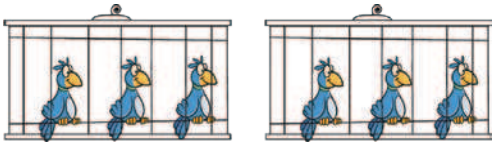
So, two ways Dave can arrange the 15 boxes are

in _____ rows of 3 or in 3 rows of _____.

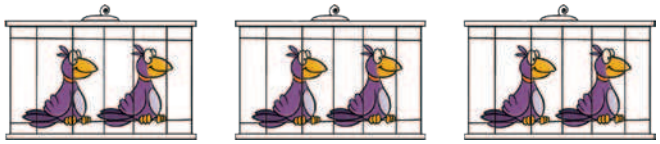
Math Talk **Mathematical Practices**

Why do 5 rows of 3 and 3 rows of 5 both equal the same number?

Multiplication Property The **Commutative Property of Multiplication** states that when you change the order of the factors, the product stays the same. You can think of it as the Order Property of Multiplication.



$2 \times \_\_\_\_ = \_\_\_\_$



$3 \times \_\_\_\_ = \_\_\_\_$

Math Idea

Facts that show the Commutative Property of Multiplication have the same factors in a different order.

$2 \times 3 = 6$ and $3 \times 2 = 6$

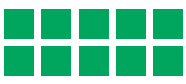
So, $2 \times \_\_\_\_ = 3 \times \_\_\_\_$.

- Explain how the models are alike and how they are different.

Try This! **Draw a quick picture on the right that shows the Commutative Property of Multiplication. Then complete the multiplication sentences.**

A 

$\_\_\_\_ \times 4 = \_\_\_\_$ $\_\_\_\_ \times 3 = \_\_\_\_$

B 

$2 \times \_\_\_\_ = \_\_\_\_$ $5 \times \_\_\_\_ = \_\_\_\_$

Name _____

Share and Show

MATH BOARD

1. Write a multiplication sentence for the array.

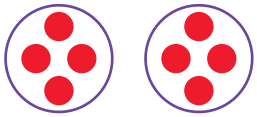
_____ _____

Math Talk **Mathematical Practices**

Explain what the factor 2 means in each multiplication sentence.

Write a multiplication sentence for the model. Then use the Commutative Property of Multiplication to write a related multiplication sentence.

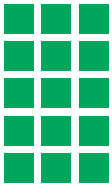
2.



_____ × _____ = _____

_____ × _____ = _____

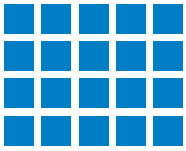
3.



_____ × _____ = _____

_____ × _____ = _____

4.



_____ × _____ = _____

_____ × _____ = _____

On Your Own

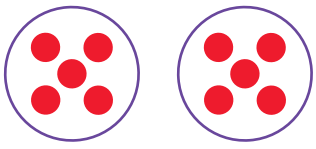
Write a multiplication sentence for the model. Then use the Commutative Property of Multiplication to write a related multiplication sentence.

5.

_____ × _____ = _____

_____ × _____ = _____

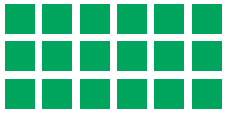
6.



_____ × _____ = _____

_____ × _____ = _____

7.



_____ × _____ = _____

_____ × _____ = _____

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Write the unknown factor.**

8. $3 \times 7 =$ _____ $\times 3$

9. $4 \times 5 = 10 \times$ _____

10. $3 \times 6 =$ _____ $\times 9$

11. $6 \times$ _____ $= 4 \times 9$

12. _____ $\times 8 = 4 \times 6$

13. $5 \times 8 = 8 \times$ _____

Problem Solving • Applications Real World

14. Jenna used pinecones to make 18 peanut butter bird feeders. She hung the same number of feeders in each of 6 trees. Draw an array to show how many feeders she put in each tree.

She put _____ bird feeders in each tree.

15. What if Jenna hung the same number of feeders in each of 9 trees? How many feeders would she put in each tree?

_____

16. GO DEEPER Write two different word problems about 12 birds to show 2×6 and 6×2. Solve each problem.

_____

_____

_____

17. THINK SMARTER There are 4 rows of 6 bird stickers in Don's sticker album. There are 7 rows of 5 bird stickers in Lindsey's album. How many bird stickers do they have?

_____

18. THINK SMARTER Write the letter for each multiplication sentence on the left next to the multiplication sentence on the right that has the same value.

A	$5 \times 7 =$ ■	☐	$6 \times 3 =$ ■
B	$8 \times 2 =$ ■	☐	$2 \times 8 =$ ■
C	$3 \times 6 =$ ■	☐	$4 \times 9 =$ ■
D	$9 \times 4 =$ ■	☐	$7 \times 5 =$ ■

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply with 1 and 0

Essential Question What happens when you multiply a number by 0 or 1?

Operations and Algebraic Thinking—
3.OA.5 *Also 3.OA.1, 3.OA.3, 3.OA.7*

MATHEMATICAL PRACTICES
MP.2, MP.3, MP.7, MP.8

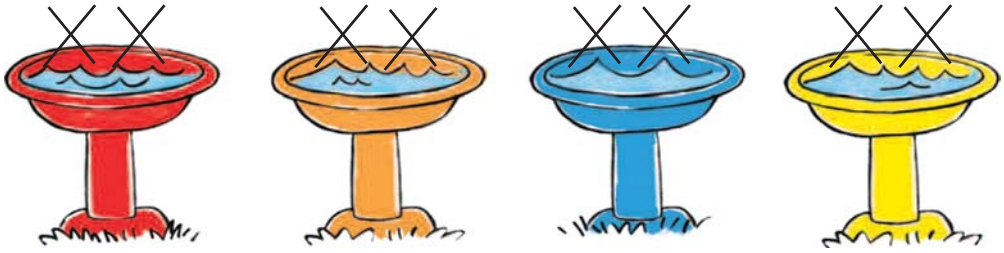
Unlock the Problem

Real World

Luke sees 4 birdbaths. Each birdbath has 2 birds in it. What multiplication sentence tells how many birds there are?

- How many birdbaths are there? _____
- How many birds does Luke see in each birdbath? _____

Draw a quick picture to show the birds in the birdbaths.



_____ × _____ = _____

One bird flies away from each birdbath. Cross out 1 bird in each birdbath above. What multiplication sentence shows the total number of birds now?

_____	×	_____	=	_____
↑		↑		↑
birdbaths		bird in each birdbath now		total number of birds

Now cross out another bird in each birdbath. What multiplication sentence shows the total number of birds in the birdbaths now?

_____	×	_____	=	_____
↑		↑		↑
birdbaths		birds in each birdbath now		total number of birds

- How do the birdbaths look now? _____

Math Talk **Mathematical Practices**

What if there were 5 birdbaths with 0 birds in each of them? What would be the product? **Explain.**

Example

Jenny has 2 pages of bird stickers. There are 4 stickers on each page. How many stickers does she have in all?

$2 \times 4 =$ _____ **Think:** 2 groups of 4

So, Jenny has _____ stickers in all.

Suppose Jenny uses 1 page of the stickers. What fact shows how many stickers she has now?

_____ × _____ = _____ **Think:** 1 group of 4

So, Jenny has _____ stickers now.

Then, Jenny uses the rest of the stickers. What fact shows how many stickers Jenny has now?

_____ × _____ = _____ **Think:** 0 groups of 4

So, Jenny has _____ stickers now.

ERROR Alert

A 0 in a multiplication sentence means 0 groups or 0 things in a group, so the product is always 0.

- What does each number in $0 \times 4 = 0$ tell you?

_____

_____

1. What pattern do you see when you multiply numbers with 1 as a factor?

Think: $1 \times 2 = 2$ $1 \times 3 = 3$ $1 \times 4 = 4$

_____

_____

The **Identity Property of Multiplication** states that the product of any number and 1 is that number.

$7 \times 1 = 7$ $6 \times 1 = 6$

$1 \times 7 = 7$ $1 \times 6 = 6$

2. What pattern do you see when you multiply numbers with 0 as a factor?

Think: $0 \times 1 = 0$ $0 \times 2 = 0$ $0 \times 5 = 0$

_____

_____

The **Zero Property of Multiplication** states that the product of zero and any number is zero.

$0 \times 5 = 0$ $0 \times 8 = 0$

$5 \times 0 = 0$ $8 \times 0 = 0$

Name _____

Share and Show

MATH BOARD

1. What multiplication sentence matches this picture? Find the product.

_____

Find the product.

2. $5 \times 1 =$ ____
3. $0 \times 2 =$ ____
4. $4 \times 0 =$ ____
5. $1 \times 6 =$ ____
6. $3 \times 0 =$ ____
7. $1 \times 2 =$ ____
8. $0 \times 6 =$ ____
9. $8 \times 1 =$ ____

Math Talk — **Mathematical Practices**

Explain how 3×1 and $3 + 1$ are different.

On Your Own

Find the product.

10. $3 \times 1 =$ ____
11. $8 \times 0 =$ ____
12. $1 \times 9 =$ ____
13. $0 \times 7 =$ ____
14. $0 \times 4 =$ ____
15. $10 \times 1 =$ ____
16. $1 \times 3 =$ ____
17. $6 \times 1 =$ ____
18. $1 \times 0 =$ ____
19. $1 \times 7 =$ ____
20. $6 \times 0 =$ ____
21. $1 \times 4 =$ ____

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Complete the multiplication sentence.**

22. ____ $\times 1 = 15$
23. $1 \times 28 =$ ____
24. $0 \times 46 =$ ____
25. $36 \times 0 =$ ____
26. ____ $\times 5 = 5$
27. $19 \times$ ____ $= 0$
28. ____ $\times 0 = 0$
29. $7 \times$ ____ $= 7$

30. GO DEEPER Each box holds 6 black markers and 4 red markers. Derek has 0 boxes of markers. Write a number sentence that shows how many markers Derek has. Explain how you found your answer.

_____

_____

Problem Solving • Applications Real World

Use the table for 31–33.

Circus Vehicles	
Type of Vehicle	**Number of Wheels**
Car	4
Tricycle	3
Bicycle	2
Unicycle	1

31. At the circus Jon saw 5 unicycles. How many wheels are on the 5 unicycles? Write a multiplication sentence.

____ × ____ = _____

32. **What's the Question?** Julia used multiplication with 1 and the information in the table. The answer is 3.

_____

_____

33. THINK SMARTER Brian saw some circus vehicles. He saw 17 wheels in all. If 2 of the vehicles are cars, how many vehicles are bicycles and tricycles?

_____

34. WRITE Math Write a word problem that uses multiplying with 1 or 0. Show how to solve your problem.

_____

_____

35. THINK SMARTER For numbers 35a–35d, select True or False for each multiplication sentence.

35a. $6 \times 0 = 0$ ○ True ○ False

35b. $0 \times 9 = 9 \times 0$ ○ True ○ False

35c. $1 \times 0 = 1$ ○ True ○ False

35d. $3 \times 1 = 3$ ○ True ○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 3 Review/Test

1. There are 3 boats on the lake. Six people ride in each boat. How many people ride in the boats? Draw circles to model the problem and explain how to solve it.

_____ people

2. Nadia has 4 sheets of stickers. There are 8 stickers on each sheet. She wrote this number sentence to represent the total number of stickers.

$$4 \times 8 = 32$$

What is a related number sentence that also represents the total number of stickers she has?

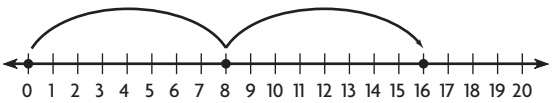
Ⓐ $8 + 4 = \square$

Ⓑ $4 + 4 + 4 + 4 = \square$

Ⓒ $8 \times 8 = \square$

Ⓓ $8 \times 4 = \square$

3. Lindsay went hiking for two days in Yellowstone National Park. The first jump on the number line shows how many birds she saw the first day. She saw the same number of birds the next day.



Write the multiplication sentence that is shown on the number line.

_____ × _____ = _____

GO DIGITAL Assessment Options
Chapter Test

4. Paco drew an array to show the number of desks in his classroom.

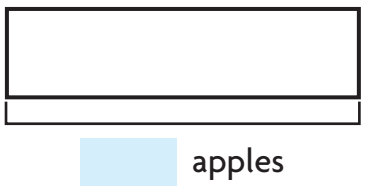
Write a multiplication sentence for the array.

5. Alondra makes 4 necklaces. She uses 5 beads on each necklace.

For numbers 5a–5d, choose Yes or No to tell if the number sentence could be used to find the number of beads Alondra uses.

5a.	$4 \times 5 =$ ☐	○ Yes	○ No
5b.	$4 + 4 + 4 + 4 =$ ☐	○ Yes	○ No
5c.	$5 + 5 + 5 + 5 =$ ☐	○ Yes	○ No
5d.	$5 + 4 =$ ☐	○ Yes	○ No

6. John sold 3 baskets of apples at the market. Each basket contained 9 apples. How many apples did John sell? Make a bar model to solve the problem.



Name _____

7. Select the number sentences that show the Commutative Property of Multiplication. Mark all that apply.

(A) $3 \times 2 = 2 \times 3$

(B) $4 \times 9 = 4 \times 9$

(C) $5 \times 0 = 0$

(D) $6 \times 1 = 1 \times 6$

(E) $7 \times 2 = 14 \times 1$

8. A waiter carried 6 baskets with 5 dinner rolls in each basket. How many dinner rolls did he carry? Show your work.

_____ dinner rolls

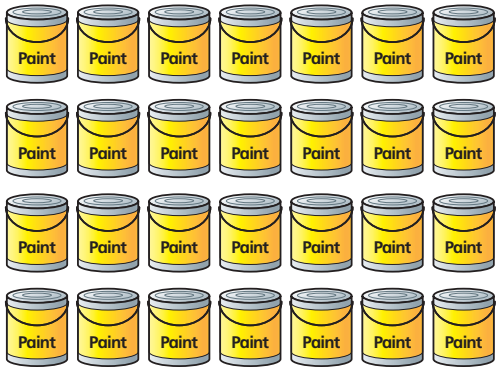
9. Sonya needs 3 equal lengths of wire to make 3 bracelets. The jump on the number line shows the length of one wire in inches. How many inches of wire will Sonya need to make the 3 bracelets?

_____ inches

10. Josh has 4 dogs. Each dog gets 2 dog biscuits every day. How many biscuits will Josh need for all of his dogs for Saturday and Sunday?

_____ biscuits

11. Jorge displayed 28 cans of paint on a shelf in his store.



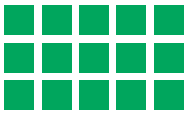
Select other ways Jorge could arrange the same number of cans. Mark all that apply.

- (A) 2 rows of 14
- (B) 1 row of 28
- (C) 6 rows of 5
- (D) 8 rows of 3
- (E) 7 rows of 4

12. Choose the number that makes the statement true.

The product of any number and | 0 / 1 / 10 | is zero.

13. James made this array to show that $3 \times 5 = 15$.



Part A

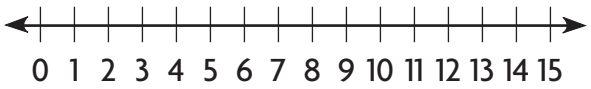
James says that $5 \times 3 = 15$. Is James correct? Draw an array to explain your answer.

Part B

Which number property supports your answer?

Name _____

14. Julio has a collection of coins. He puts the coins in 2 equal groups. There are 6 coins in each group. How many coins does Julio have? Use the number line to show your work.



_____ coins

15. Landon collects trading cards.

Part A

Yesterday, Landon sorted his trading cards into 4 groups. Each group had 7 cards. Draw a bar model to show Landon's cards. How many cards does he have?

Part B _____ trading cards

Landon buys 3 more packs of trading cards today. Each pack has 8 cards. Write a multiplication sentence to show how many cards Landon buys today. Then find how many cards Landon has now. Show your work.

_____

16. A unicycle has only 1 wheel. Write a multiplication sentence to show how many wheels there are on 9 unicycles.

_____ × _____ = _____

17. Carlos spent 5 minutes working on each of 8 math problems. He can use 8×5 to find the total amount of time he spent on the problems.

For numbers 17a–17d, choose Yes or No to show which are equal to 8×5.

17a.	$8 + 5$	○ Yes	○ No
17b.	$5 + 5 + 5 + 5 + 5$	○ Yes	○ No
17c.	$8 + 8 + 8 + 8 + 8$	○ Yes	○ No
17d.	$5 + 5 + 5 + 5 + 5 + 5 + 5 + 5$	○ Yes	○ No

18. Lucy and her mother made tacos. They put 2 tacos on each of 7 plates.

Select the number sentences that show all the tacos Lucy and her mother made. Mark all that apply.

(A) $2 + 2 + 2 + 2 + 2 + 2 + 2 = 14$

(B) $2 + 7 = 9$

(C) $7 + 7 = 14$

(D) $8 + 6 = 14$

(E) $2 \times 7 = 14$

19. Jayson is making 5 sock puppets. He glues 2 buttons on each puppet for its eyes. He glues 1 pompom on each puppet for its nose.

Part A

Write the total number of buttons and pompoms he uses. Write a multiplication sentence for each.

Eyes

_____ buttons

_____ × _____ = _____

Noses

_____ pompoms

_____ × _____ = _____

Part B

After making 5 puppets, Jayson has 4 buttons and 3 pompoms left. What is the greatest number of puppets he can make with those items if he wants all his puppets to look the same? Draw models and use them to explain.

At most, he can make _____ more puppets.

Chapter 4

Multiplication Facts and Strategies

Show What You Know

Check your understanding of important skills.

Name _____

▶ Doubles and Doubles Plus One

Write the doubles and doubles plus one facts.

1. 

___ + ___ = ___

___ + ___ = ___

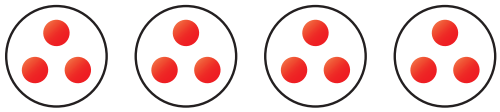
2. 

___ + ___ = ___

___ + ___ = ___

▶ Equal Groups

Complete.

3. 

___ groups of ___

___ in all

4. 

___ groups of ___

___ in all

Math Detective

Stephen needs to use these clues to find a buried time capsule.

- **Start with a number that is the product of 3 and 4.**
- **Double the product and go to that number.**
- **Add 2 tens and find the number that is 1 less than the sum.**

Be a Math Detective to help Stephen find the time capsule.

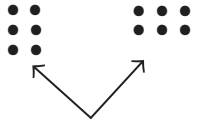
Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Complete the tree map by using the words with a ✓.

Multiplication Properties

_____ Property of Multiplication	_____ Property of Multiplication	_____ Property of Multiplication
$1 \times 4 = 4$  _____ _____	$(4 \times 2) \times 3 = 4 \times (2 \times 3)$	$3 \times 2 = 2 \times 3$  _____

Review Words

- ✓ arrays
- ✓ Commutative Property of Multiplication
- even
- ✓ factors
- ✓ Identity Property of Multiplication
- odd
- ✓ product

Preview Words

- ✓ Associative Property of Multiplication
- Distributive Property
- multiple

Understand Vocabulary

Complete the sentences by using the preview words.

1. The _____ Property of Multiplication states that when the grouping of factors is changed, the product is the same.

2. A _____ of 5 is any product that has 5 as one of its factors.

3. The _____ Property states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products.

   Example: $2 \times 8 = 2 \times (4 + 4)$
   $2 \times 8 = (2 \times 4) + (2 \times 4)$
   $2 \times 8 = 8 + 8$
   $2 \times 8 = 16$

Name _____

Multiply with 2 and 4

Essential Question How can you multiply with 2 and 4?

Operations and Algebraic Thinking—3.OA.3
Also 3.OA.1, 3.OA.7

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.7

Unlock the Problem

Real World

Hands On

Two students are in a play. Each of the students has 3 costumes. How many costumes do they have in all?

- What does the word "each" tell you?

_____

- How can you find the number of costumes the 2 students have?

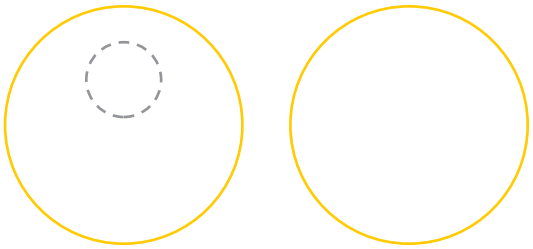
_____

Multiplying when there are two equal groups is like adding doubles.

Find 2 × 3.

MODEL

Draw counters to show the costumes.



THINK

2 groups of 3

3 + 3

6

RECORD

2 × 3 = 6

↑ how many groups

↑ how many in each group

↑ how many in all

So, the 2 students have ____ costumes in all.

Try This!

$2 \times 1 = 1 + 1 = 2$

$2 \times 2 = 2 + 2 = 4$

$2 \times \_\_\_\_ = 3 + \_\_\_\_ = 6$

$2 \times \_\_\_\_ = 4 + \_\_\_\_ = 8$

$2 \times \_\_\_\_ = 5 + \_\_\_\_ = \_\_\_\_$

$2 \times \_\_\_\_ = 6 + \_\_\_\_ = \_\_\_\_$

$2 \times \_\_\_\_ = 7 + \_\_\_\_ = \_\_\_\_$

$2 \times \_\_\_\_ = 8 + \_\_\_\_ = \_\_\_\_$

$2 \times \_\_\_\_ = 9 + \_\_\_\_ = \_\_\_\_$

Math Talk **Mathematical Practices**

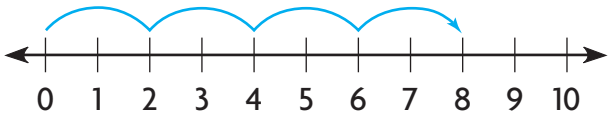
What do you notice about the product when you multiply by 2?

Count by 2s.

When there are 2 in each group, you can count by 2s to find how many there are in all.

There are 4 students with 2 costumes each. How many costumes do they have in all?

Skip count by drawing the jumps on the number line.



So, the 4 students have _____ in all.

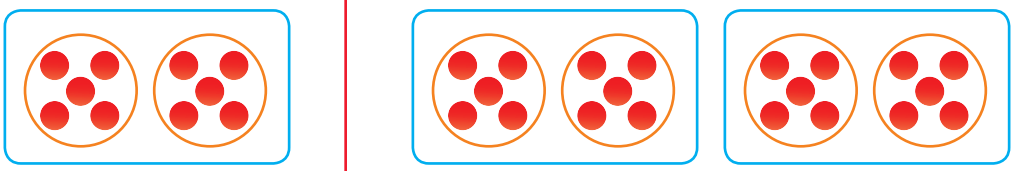
- How can you decide whether to count by 2s or double?

_____

Example Use doubles to find 4 × 5.

When you multiply with 4, you can multiply with 2 and then double the product.

4×5	MULTIPLY WITH 2	DOUBLE THE PRODUCT
	$2 \times 5 = 10$	$10 + 10 = 20$

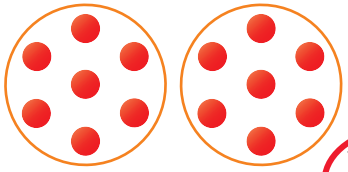


So, $4 \times 5 =$ ____.

Share and Show

MATH BOARD

1. Double 2×7 to find 4×7.



Multiply with 2. $2 \times 7 =$ ____

Double the product. $14 + 14 =$ ____

So, $4 \times 7 =$ ____.

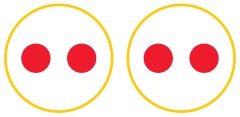
Math Talk Mathematical Practices

Explain how knowing the product for 2×8 helps you find the product for 4×8.

Name _____

Write a multiplication sentence for the model.

2.



____ × ____ = ____

3.

____ × ____ = ____

Find the product.

4. 6 × 2

5. 9 × 4

6. 2 × 7

7. 8 × 4

8. 5 × 2

Find the product. Use your MathBoard.

9. 10 × 4

10. 2 × 9

11. 4 × 6

12. 7 × 2

13. 2 × 0

14. 4 × 3

15. 2 × 8

16. 4 × 4

17. 10 × 2

18. 4 × 5

MATHEMATICAL PRACTICE 7 **Look for Structure** **Algebra** **Complete the table for the factors 2 and 4.**

	×	1	2	3	4	5	6	7	8	9	10
19.	2										
20.	4										

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** **Write the unknown number.**

21. $4 \times 8 = 16 + \_\_\_\_$

22. $20 = 2 \times \_\_\_\_$

23. $8 \times 2 = 10 + \_\_\_\_$

24. THINK SMARTER Lindsey, Louis, Sally, and Matt each brought 5 guests to the school play. How many guests were at the school play? Explain.

_____

Unlock the Problem Real World

25. GO DEEPER Ms. Peterson's class sold tickets for the class play. How many tickets in all did Brandon and Haylie sell?

Play Tickets	
Brandon	
Haylie	
Elizabeth	

Key: Each = 2 tickets sold.

a. What do you need to find?

_____

_____

b. Why should you multiply to find the number of tickets shown? Explain.

_____

_____

c. Show the steps you used to solve the problem.

d. Complete the sentences.

Brandon sold _____ tickets. Haylie sold _____ tickets. So, Brandon and Haylie sold _____ tickets.

26. MATHEMATICAL PRACTICE 1 **Analyze** Suppose Sam sold 20 tickets to the school play. How many tickets should be on the picture graph above to show his sales? Explain.

_____

_____

27. THINK SMARTER Alex exchanges some dollar bills for quarters at the bank. He receives 4 quarters for each dollar bill. Select the numbers of quarters that Alex could receive. Mark all that apply.

(A) 16
(B) 18
(C) 24
(D) 32
(E) 50

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply with 5 and 10

Essential Question How can you multiply with 5 and 10?

Operations and Algebraic Thinking—3.OA.3
Also 3.OA.1, 3.OA.7

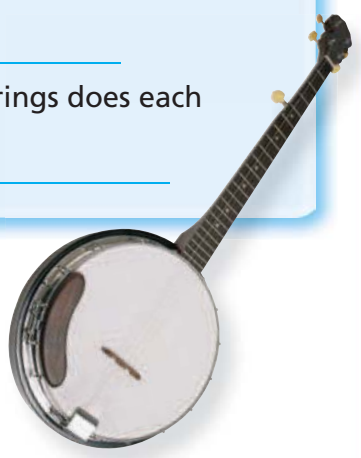
MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7

Unlock the Problem

Real World

Marcel is making 6 toy banjos. He needs 5 strings for each banjo. How many strings does he need in all?

- How many banjos is Marcel making? _____
- How many strings does each banjo have? _____



Use skip counting.

Skip count by 5s until you say 6 numbers.

5, _____, _____, _____, _____, _____

$6 \times 5 =$ _____

So, Marcel needs _____ strings in all.

Example 1 Use a number line.

Each string is 10 inches long. How many inches of string will Marcel use for each banjo?

Think: 1 jump = 10 inches

- Draw 5 jumps for the 5 strings. Jump 10 spaces at a time for the length of each string.
- You land on 10, _____, _____, _____, and _____. $5 \times 10 =$ _____

The numbers 10, 20, 30, 40, and 50 are multiples of 10.

So, Marcel will use _____ inches of string for each banjo.

A **multiple** of 10 is any product that has 10 as one of its factors.

Math Talk **Mathematical Practices**

What do you notice about the multiples of 10?

Example 2 Use a bar model.

Marcel bought 3 packages of strings. Each package cost 10¢. How much did the packages cost in all?

MODEL

10¢	10¢	10¢

THINK

1 unit → 10¢

3 units → _____ × _____

RECORD

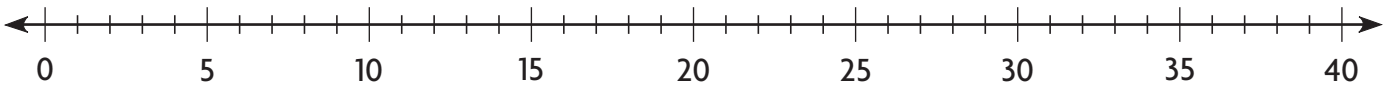
_____ × _____ = _____

So, the packages of strings cost _____ in all.

Share and Show

MATH BOARD

1. How can you use this number line to find 8 × 5?



_____

_____

Math Talk Mathematical Practices

Explain how knowing 4 × 5 can help you find 4 × 10.

Find the product.

2. 2 × 5 = _____

3. _____ = 6 × 10

4. _____ = 5 × 5

5. 10 × 7 = _____

6. $\begin{array}{r} 10 \\ \times\ 4 \\ \hline \end{array}$

7. $\begin{array}{r} 5 \\ \times 6 \\ \hline \end{array}$

8. $\begin{array}{r} 10 \\ \times\ 0 \\ \hline \end{array}$

9. $\begin{array}{r} 5 \\ \times 3 \\ \hline \end{array}$

10. $\begin{array}{r} 7 \\ \times 5 \\ \hline \end{array}$

11. $\begin{array}{r} 5 \\ \times 10 \\ \hline \end{array}$

12. $\begin{array}{r} 4 \\ \times 5 \\ \hline \end{array}$

13. $\begin{array}{r} 9 \\ \times 10 \\ \hline \end{array}$

Name _____

On Your Own

Find the product.

14. $5 \times 1 =$ ____

15. ____ $= 10 \times 2$

16. ____ $= 4 \times 5$

17. $10 \times 10 =$ ____

18. $10 \times 0 =$ ____

19. $10 \times 5 =$ ____

20. ____ $= 1 \times 5$

21. ____ $= 5 \times 9$

22. $\begin{array}{r} 3 \\ \times 4 \\ \hline \end{array}$

23. $\begin{array}{r} 5 \\ \times 0 \\ \hline \end{array}$

24. $\begin{array}{r} 4 \\ \times 8 \\ \hline \end{array}$

25. $\begin{array}{r} 10 \\ \times 5 \\ \hline \end{array}$

26. $\begin{array}{r} 10 \\ \times 9 \\ \hline \end{array}$

27. $\begin{array}{r} 10 \\ \times 1 \\ \hline \end{array}$

28. $\begin{array}{r} 10 \\ \times 8 \\ \hline \end{array}$

29. $\begin{array}{r} 9 \\ \times 2 \\ \hline \end{array}$

30. $\begin{array}{r} 4 \\ \times 10 \\ \hline \end{array}$

31. $\begin{array}{r} 5 \\ \times 9 \\ \hline \end{array}$

32. $\begin{array}{r} 5 \\ \times 0 \\ \hline \end{array}$

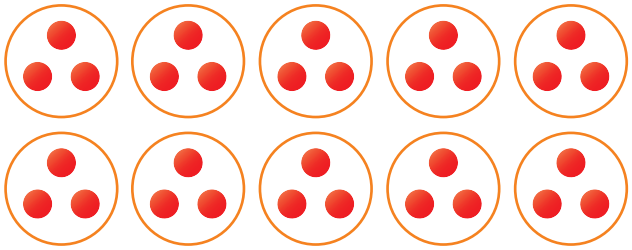
33. $\begin{array}{r} 5 \\ \times 7 \\ \hline \end{array}$

MATHEMATICAL PRACTICE 7 **Identify Relationships** **Algebra** **Use the pictures to find the unknown numbers.**

34.

$3 \times$ ____ = ____

35.



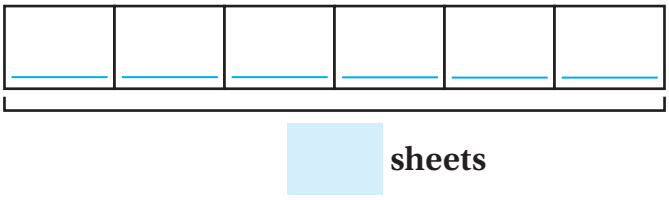
____ $\times 3 =$ ____

MATHEMATICAL PRACTICE 4 **Use a Diagram** **Complete the bar model to solve.**

36. Marcel played 5 songs on the banjo. If each song lasted 8 minutes, how long did he play?

____ **minutes**

37. There are 6 banjo players. If each player needs 10 sheets of music, how many sheets of music are needed?



____ **sheets**

Problem Solving • Applications Real World

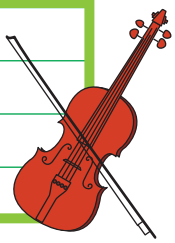
Use the table for 38–40.

38. John and his dad own 7 banjos. They want to replace the strings on all of them. How many strings should they buy? Write a multiplication sentence to solve.

_____

Stringed Instruments

Instrument	Strings
Guitar	6
Banjo	5
Mandolin	8
Violin	4



39. GO DEEPER Mr. Lemke has 5 guitars, 4 banjos, and 2 mandolins. What is the total number of strings on Mr. Lemke's instruments?

_____

40. THINK SMARTER The orchestra has 5 violins and 3 guitars that need new strings. What is the total number of strings that need to be replaced? Explain.

_____

_____

_____

41. WRITE Math **What's the Error?** Mr. James has 3 banjos. Mr. Lewis has 5 times the number of banjos Mr. James has. Riley says Mr. Lewis has 12 banjos. Describe her error.

_____

_____

42. THINK SMARTER Circle the number that makes the multiplication sentence true.

$5 \times \begin{bmatrix} 7 \\ 8 \\ 9 \end{bmatrix} = 45$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply with 3 and 6

Essential Question What are some ways to multiply with 3 and 6?

Operations and Algebraic Thinking—3.OA.3 *Also 3.OA.1, 3.OA.7, 3.OA.9*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.6, MP.7

Unlock the Problem

Real World

Sabrina is making triangles with toothpicks. She uses 3 toothpicks for each triangle. She makes 4 triangles.
How many toothpicks does Sabrina use?

- Why does Sabrina need 3 toothpicks for each triangle?

_____

_____

Draw a picture.

Hands On

STEP 1

Complete the 4 triangles.

STEP 2

Skip count by the number of sides. _____, _____, _____, _____

How many triangles are there in all? _____

How many toothpicks are in each triangle? _____

How many toothpicks are there in all?

4 × _____ = _____

4 triangles have _____ toothpicks.

So, Sabrina uses _____ toothpicks.

Math Talk **Mathematical Practices**

How can you use what you know about the number of toothpicks needed for 4 triangles to find the number of toothpicks needed for 8 triangles? **Explain**.

Try This! Find the number of toothpicks needed for 6 triangles.

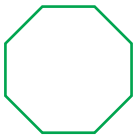
Draw a quick picture to help you.
How did you find the answer?

_____

_____

_____

Jessica is using craft sticks to make 6 octagons.
How many craft sticks will she use?



▲ An octagon has 8 sides.

One Way Use 5s facts and addition.

To multiply a factor by 6, multiply the factor by 5, and then add the factor.

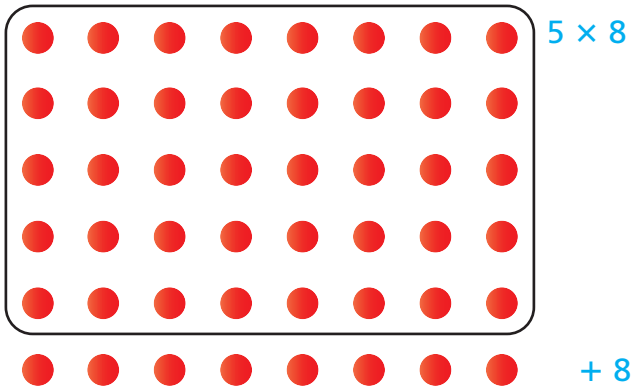
$6 \times 7 = 5 \times 7 + 7 = 42$

$6 \times 6 = 5 \times 6 + \_\_\_\_\_ = \_\_\_\_\_$

$6 \times 8 = 5 \times \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_$

$6 \times 9 = \_\_\_\_\_ \times \_\_\_\_\_ + \_\_\_\_\_ = \_\_\_\_\_$

So, Jessica will use _____ craft sticks.



Other Ways

A Use doubles.

When at least one factor is an even number, you can use doubles.

First multiply with half of an even number.

After you multiply, double the product.

$6 \times 8 = \square$

$3 \times 8 = \_\_\_\_\_$

$\_\_\_\_\_ + 24 = \_\_\_\_\_$

$6 \times 8 = \_\_\_\_\_$

B Use a multiplication table.

Find the product 6×8 where row 6 and column 8 meet.

$6 \times 8 = \_\_\_\_\_$

- Shade the row for 3 in the table. Then, compare the rows for 3 and 6. What do you notice about their products?

_____

_____

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Name _____

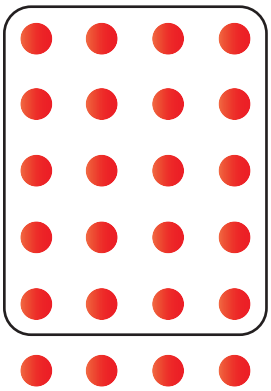
Share and Show

MATH BOARD

1. Use 5s facts and addition to find $6 \times 4 = \square$.

$6 \times 4 =$ _____ $\times$ _____ $+$ _____ $=$ _____

$6 \times 4 =$ _____



Math Talk Mathematical Practices

Explain how you would use 5s facts and addition to find 6×3.

Find the product.

2. $6 \times 1 =$ _____ **3.** _____ $= 3 \times 7$ **4.** _____ $= 6 \times 5$ **5.** $3 \times 9 =$ _____

On Your Own

Find the product.

6. $2 \times 3 =$ _____ **7.** _____ $= 3 \times 6$ **8.** _____ $= 3 \times 0$ **9.** $1 \times 6 =$ _____

10. $\begin{array}{r} 3 \\ \times 6 \\ \hline \end{array}$ **11.** $\begin{array}{r} 8 \\ \times 3 \\ \hline \end{array}$ **12.** $\begin{array}{r} 6 \\ \times 7 \\ \hline \end{array}$ **13.** $\begin{array}{r} 3 \\ \times 3 \\ \hline \end{array}$ **14.** $\begin{array}{r} 10 \\ \times\ 6 \\ \hline \end{array}$

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Complete the table.**

	Multiply by 3.	
	Factor	Product
15.	4	
16.		18

	Multiply by 6.	
	Factor	Product
17.	5	
18.	7	

19.	Multiply by ☐.	
	Factor	Product
	3	15
20.	2	

Problem Solving • Applications Real World

Use the table for 21–22.

Quilt Pieces	
Shape	**Number in One Quilt Piece**
Square	6
Triangle	4
Circle	4

21. The table tells about quilt pieces Jenna has made. How many squares are there in 6 of Jenna's quilt pieces?

_____

22. GO DEEPER How many more squares than triangles are in 3 of Jenna's quilt pieces?

_____

23. THINK SMARTER Alli used some craft sticks to make shapes. If she used one craft stick for each side of the shape, would Alli use more craft sticks for 5 squares or 6 triangles? Explain.

_____

_____

_____

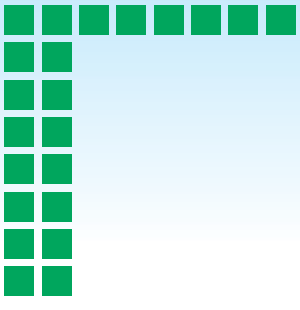
24. MATHEMATICAL PRACTICE 3 **Apply** Draw a picture and use words to explain the Commutative Property of Multiplication with the factors 3 and 4.

_____

_____

25. THINK SMARTER Omar reads 6 pages in his book each night. How many pages does Omar read in 7 nights?

Use the array to explain how you know your answer is correct.



_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Distributive Property

Essential Question How can you use the Distributive Property to find products?

Operations and Algebraic Thinking—3.OA.5 *Also 3.OA.1, 3.OA.3, 3.OA.4, 3.OA.7*

MATHEMATICAL PRACTICES
MP.4, MP.7, MP.8

Unlock the Problem

Real World

Mark bought 6 new fish for his aquarium. He paid $7 for each fish. How much money did he spend in all?

Find $6 \times \$7$.

- Describe the groups in this problem.

- Circle the numbers you will use to solve the problem.

You can use the Distributive Property to solve the problem.

The **Distributive Property** states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products.

Remember

sum—the answer to an addition problem

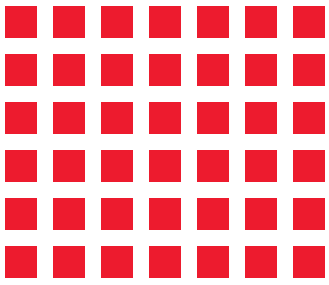
addends—the numbers being added

Activity

Materials ■ square tiles

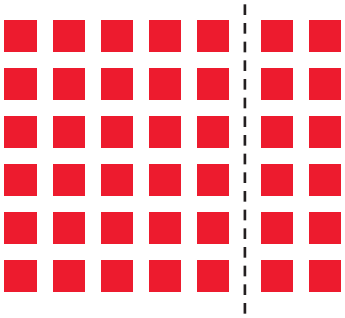
Hands On

Make an array with tiles to show 6 rows of 7.



$6 \times 7 = \square$

Break apart the array to make two smaller arrays for facts you know.



6×5 6×2

$6 \times 7 = \square$

$6 \times 7 = 6 \times (5 + 2)$ **Think:** $7 = 5 + 2$

$6 \times 7 = (6 \times 5) + (6 \times 2)$ Multiply each addend by 6.

$6 \times 7 =$ _____ + _____ Add the products.

$6 \times 7 =$ _____

So, Mark spent $\$$_____ for his new fish.

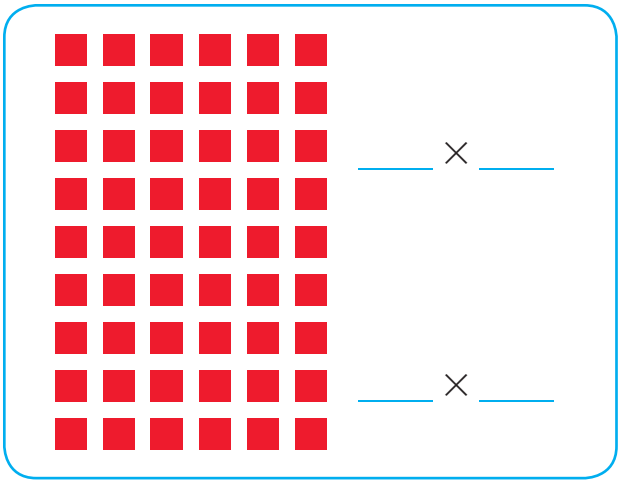
Math Talk **Mathematical Practices**

What other ways could you break apart the 6×7 array?

Try This!

Suppose Mark bought 9 fish for $6 each.

You can break apart a 9×6 array into two smaller arrays for facts you know. One way is to think of 9 as $5 + 4$. Draw a line to show this way. Then find the product.



$9 \times 6 = (\_\_\_\_ \times \_\_\_\_) + (\_\_\_\_ \times \_\_\_\_)$

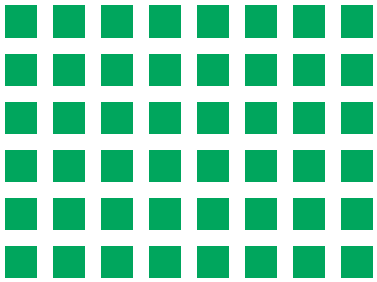
$9 \times 6 = \_\_\_\_ + \_\_\_\_$

So, Mark spent $\$\_\_\_\_$ for 9 fish.

Share and Show

MATH BOARD

Hands On



1. Draw a line to show how you could break apart this 6×8 array into two smaller arrays for facts you know.

   - What numbers do you multiply? ____ and ____
     ____ and ____
   - What numbers do you add? ____ + ____

   $6 \times 8 = 6 \times (\_\_\_\_ + \_\_\_\_)$

   $6 \times 8 = (\_\_\_\_ \times \_\_\_\_) + (\_\_\_\_ \times \_\_\_\_)$

   $6 \times 8 = \_\_\_\_ + \_\_\_\_$

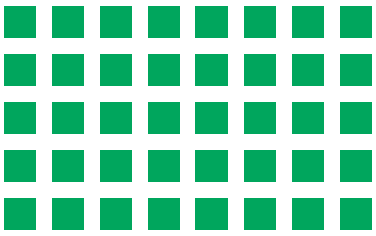
   $6 \times 8 = \_\_\_\_$

Math Talk — **Mathematical Practices**

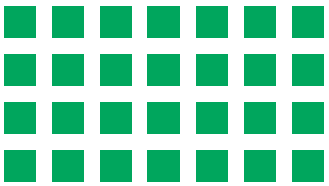
Why do you have to add to find the total product when you use the Distributive Property?

Write one way to break apart the array. Then find the product.

2.



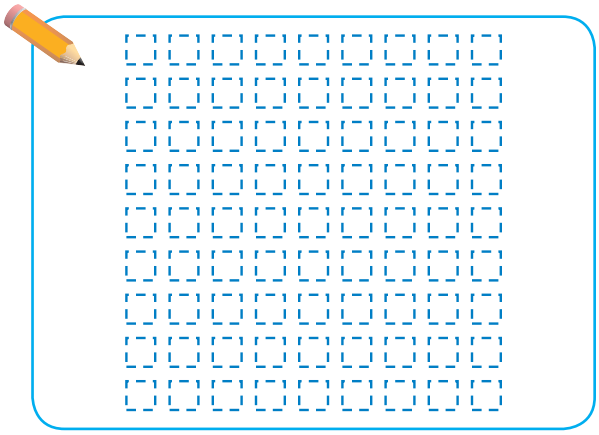
3.



Name _____

On Your Own

4. GO DEEPER Shade tiles to make an array that shows a fact with 7, 8, or 9 as a factor. Write the fact. Explain how you found the product.



5. THINK SMARTER Robin says, "I can find 8×7 by multiplying 3×7 and doubling it." Does her statement make sense? Justify your answer.

6. THINK SMARTER For numbers 6a–6d, choose Yes or No to indicate whether the number sentence has the same value as 7×5.

6a. $7 + (3 + 2) =$ ▢	○ Yes	○ No
6b. $7 \times (3 + 2) =$ ▢	○ Yes	○ No
6c. $(5 \times 4) + (5 \times 3) =$ ▢	○ Yes	○ No
6d. $(7 \times 2) + (7 \times 5) =$ ▢	○ Yes	○ No

Problem Solving • Applications

What's the Error?

7. MATHEMATICAL PRACTICE 3 **Verify the Reasoning of Others**

Brandon needs 8 boxes of spinners for his fishing club. The cost of each box is $9. How much will Brandon pay?

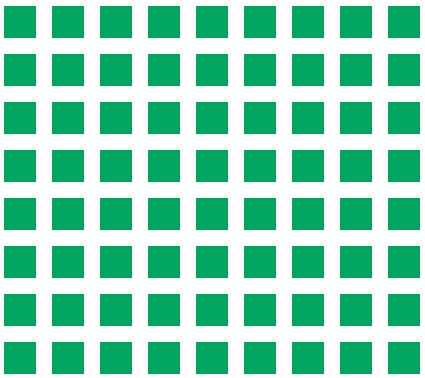
$8 \times \$9 =$ ■

Look at how Brandon solved the problem. Find and describe his error.

$8 \times 9 = (4 \times 9) + (5 \times 9)$

$8 \times 9 = 36 + 45$

$8 \times 9 = 81$



_____

_____

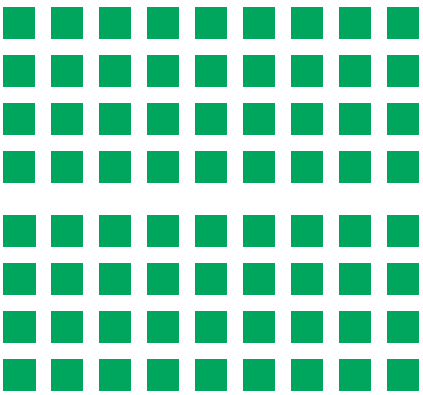
Use the array to help solve the problem and correct his error.

$8 \times 9 = (4 + 4) \times 9$

$8 \times 9 = (\_\_\_\_ \times \_\_\_\_) + (\_\_\_\_ \times \_\_\_\_)$

$8 \times 9 = \_\_\_\_ + \_\_\_\_$

$8 \times 9 = \_\_\_\_$



So, Brandon will pay $ _____ for the spinners.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply with 7

Essential Question What strategies can you use to multiply with 7?

Operations and Algebraic Thinking—3.OA.7 *Also 3.OA.1, 3.OA.3, 3.OA.4, 3.OA.5*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Jason's family has a new puppy. Jason takes a turn walking the puppy once a day. How many times will Jason walk the puppy in 4 weeks?

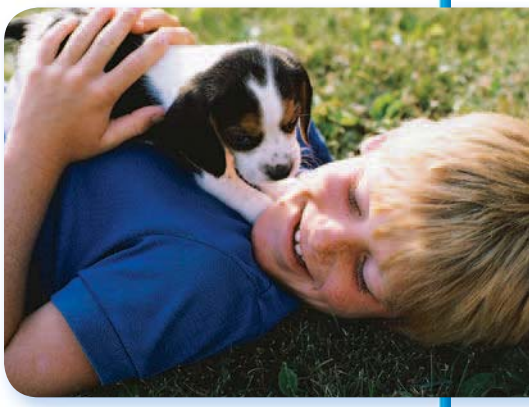
Find 4×7.

- How often does Jason walk the puppy?

_____

- How many days are in 1 week?

_____



One Way Use the Commutative Property of Multiplication.

If you know 7×4, you can use that fact to find 4×7.

You can change the order of the factors and the product is the same.

$7 \times 4 =$ _____, so $4 \times 7 =$ _____.

So, Jason will walk the puppy _____ times in 4 weeks.

Other Ways

A Use the Distributive Property.

STEP 1 Complete the array to show 4 rows of 7.

STEP 2 Draw a line to break the array into two smaller arrays for facts you know.

STEP 3 Multiply the facts for the smaller arrays. Add the products.

$4 \times$ _____ $=$ _____ $\quad 4 \times$ _____ $=$ _____

_____ $+$ _____ $=$ _____

So, $4 \times 7 =$ _____.

Math Talk **Mathematical Practices**

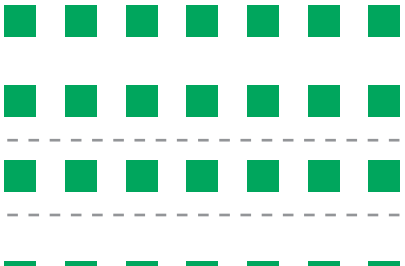
Explain two other ways you can break apart the 4×7 array.

B **Use a fact you know.**

Multiply. $4 \times 7 =$ ■

- Start with a fact you know. $2 \times 7 =$ ____
- Add a group of 7 for 3×7. $2 \times 7 + 7 =$ ____
- Then add 7 more for 4×7. $3 \times 7 + 7 =$ ____

So, $4 \times 7 =$ ____.



Share and Show

MATH BOARD

1. **Explain** how you could break apart an array to find 6×7. Draw an array to show your work.

_____

_____

Math Talk **Mathematical Practices**

How can you use doubles to find 8×7?

Find the product.

2. $9 \times 7 =$ ____ **3.** ____ $= 5 \times 7$ **4.** ____ $= 7 \times 3$ **5.** $1 \times 7 =$ ____

On Your Own

Find the product.

6. ____ $= 7 \times 7$ **7.** $6 \times 7 =$ ____ **8.** ____ $= 7 \times 10$ **9.** ____ $= 7 \times 2$

10. 7×3	**11.** 6×7	**12.** 9×7	**13.** 8×7	**14.** 1×7	**15.** 4×7
16. 10×4	**17.** 0×7	**18.** 2×7	**19.** 5×7	**20.** 6×9	**21.** 7×8

Problem Solving • Applications Real World

Use the table for 22–24.

Rusty's Care	
Food	3 cups a day
Water	4 cups a day
Bath	2 times a month

22. Lori has a dog named Rusty. How many baths will Rusty have in 7 months?

_____

23. THINK SMARTER How many more cups of water than food will Rusty get in 1 week?

_____

24. GO DEEPER Tim's dog, Midnight, eats 28 cups of food in a week. Midnight eats the same amount each day. In one day, how many more cups of food will Midnight eat than Rusty? Explain.

WRITE Math • Show Your Work

_____

_____

_____

_____

25. José walks his dog 10 miles every week. How many miles do they walk in 7 weeks?

_____

26. MATHEMATICAL PRACTICE 7 **Look for Structure** Dave takes Zoey, his dog, for a 3-mile walk twice a day. How many miles do they walk in one week?

_____

27. THINK SMARTER Alia arranges some playing cards in 7 equal rows with 7 cards in each row. How many cards does Alia arrange?

_____

Connect to Reading

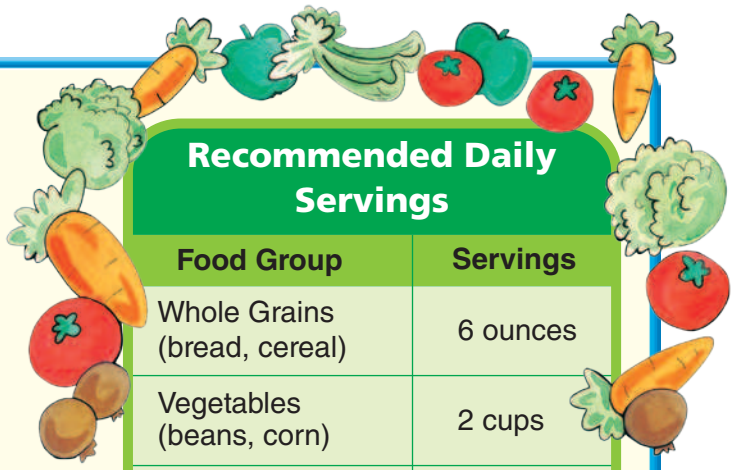
Summarize

To help you stay healthy, you should eat a balanced diet and exercise every day.

The table shows the recommended daily servings for third graders. You should eat the right amounts of the food groups.

Suppose you want to share with your friends what you learned about healthy eating. How could you summarize what you learned?

When you *summarize*, you restate the most important information in a shorter way to help you understand what you have read.



Recommended Daily Servings

Food Group	Servings
Whole Grains (bread, cereal)	6 ounces
Vegetables (beans, corn)	2 cups
Fruits (apples, oranges)	1 cup
Dairy Products (milk, cheese)	3 cups
Meat, Beans, Fish, Eggs, Nuts	5 ounces

8 ounces = 1 cup

- To stay healthy, you should eat a balanced _____ and _____ every day.
- A third grader should eat 3 cups of _____, such as milk and cheese, each day.
- A third grader should eat _____ of vegetables and fruits each day.

  How many cups of vegetables and fruits should a third grader eat in 1 week? _____

  Remember: 1 week = 7 days
- A third grader should eat _____ of whole grains, such as bread and cereal, each day.

  How many ounces of whole grains should a third grader eat in 1 week? _____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box to complete the sentence.

Vocabulary
Commutative Property of Multiplication
Distributive Property
multiple

1. A _____ of 4 is any product that has 4 as one of its factors. (p. 143)

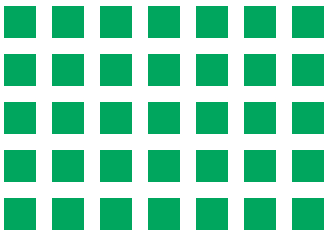
2. This is an example of the _____ Property.

$$3 \times 8 = (3 \times 6) + (3 \times 2)$$

This property states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products. (p. 151)

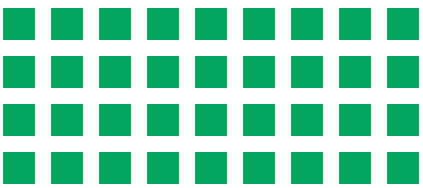
Concepts and Skills

Write one way to break apart the array. Then find the product. (3.OA.5)

3. 

_____

_____

4. 

_____

_____

Find the product. (3.OA.3, 3.OA.7)

5. $3 \times 1 =$ ____

6. $5 \times 6 =$ ____

7. ____ $= 7 \times 7$

8. $2 \times 10 =$ ____

9. $\begin{array}{r} 2 \\ \times 1 \\ \hline \end{array}$

10. $\begin{array}{r} 6 \\ \times 6 \\ \hline \end{array}$

11. $\begin{array}{r} 8 \\ \times 7 \\ \hline \end{array}$

12. $\begin{array}{r} 6 \\ \times 0 \\ \hline \end{array}$

13. $\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$

14. Lori saw 6 lightning bugs. They each had 6 legs. How many legs did the lightning bugs have in all? (3.OA.3)

15. Zach walked his dog twice a day, for 7 days. Moira walked her dog three times a day for 5 days. Whose dog was walked more times? How many more? (3.OA.3)

16. Annette buys 4 boxes of pencils. There are 8 pencils in each box. Jordan buys 3 boxes of pencils with 10 pencils in each box. Who buys more pencils? How many more? (3.OA.3)

17. Shelly can paint 4 pictures in a day. How many pictures can she paint in 7 days? (3.OA.7)

Name _____

Associative Property of Multiplication

Essential Question How can you use the Associative Property of Multiplication to find products?

Operations and Algebraic Thinking—3.OA.5 *Also 3.OA.1, 3.OA.3, 3.OA.4, 3.OA.7*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7, MP.8

CONNECT You have learned the Associative Property of Addition. When the grouping of the addends is changed, the sum stays the same.

$$(2 + 3) + 4 = 2 + (3 + 4)$$

The **Associative Property of Multiplication** states that when the grouping of the factors is changed, the product is the same. It is also called the Grouping Property of Multiplication.

$$2 \times (3 \times 4) = (2 \times 3) \times 4$$

Math Idea
Always multiply the numbers inside the parentheses first.

Unlock the Problem

Each car on the roller coaster has 2 rows of seats. Each row has 2 seats. There are 3 cars in each train. How many seats are on each train?

- Underline what you need to find.
- Describe the grouping of the seats.

_____

Use an array.

You can use an array to show $3 \times (2 \times 2)$.

$3 \times (2 \times 2) =$ ☐

$3 \times$ _____ $=$ _____

So, there are 3 cars with 4 seats in each car.

There are _____ seats on each roller coaster train.

You can change the grouping with parentheses and the product is the same.

$(3 \times 2) \times 2 =$ ☐

_____ $\times 2 =$ _____

Math Talk **Mathematical Practices**

Explain why the products $3 \times (2 \times 2)$ and $(3 \times 2) \times 2$ are the same.

Example Use the Commutative and Associative Properties.

You can also change the order of the factors.
The product is the same.

$(4 \times 3) \times 2 = \square$

$4 \times (3 \times 2) = \square$ Associative Property

$4 \times \_\_\_\_ = \_\_\_\_$

$4 \times (3 \times 2) = \square$

$4 \times (2 \times 3) = \square$ Commutative Property

$(4 \times 2) \times 3 = \square$ Associative Property

$\_\_\_\_ \times 3 = \_\_\_\_$

Share and Show

MATH BOARD

1. Find the product of 5, 2, and 3. Write another way to group the factors. Is the product the same? Why?

Write another way to group the factors. Then find the product.

2. $(2 \times 1) \times 7$

3. $3 \times (3 \times 4)$

4. $5 \times (2 \times 5)$

5. $3 \times (2 \times 6)$

6. $2 \times (2 \times 5)$

7. $(1 \times 3) \times 6$

Math Talk Mathematical Practices

Choose one answer from Exercises 2–7. **Explain** why you multiplied those factors first.

Name _____

On Your Own

Write another way to group the factors. Then find the product.

8. $(2 \times 3) \times 3$

_____

_____

9. $(8 \times 3) \times 2$

_____

_____

10. $2 \times (5 \times 5)$

_____

_____

11. $(3 \times 2) \times 4$

_____

_____

12. $(6 \times 1) \times 4$

_____

_____

13. $2 \times (2 \times 6)$

_____

_____

14. $2 \times (4 \times 2)$

_____

_____

15. $5 \times (2 \times 4)$

_____

_____

16. $9 \times (1 \times 2)$

_____

_____

Practice: Copy and Solve **Use parentheses and multiplication properties. Then, find the product.**

17. $6 \times 5 \times 2$

18. $2 \times 3 \times 5$

19. $3 \times 1 \times 6$

20. $2 \times 5 \times 6$

21. $2 \times 0 \times 8$

22. $1 \times 9 \times 4$

23. $2 \times 2 \times 2$

24. $4 \times 2 \times 2$

25. $2 \times 4 \times 5$

26. $2 \times 6 \times 1$

27. $2 \times 9 \times 3$

28. $2 \times 7 \times 2$

THINK SMARTER **Algebra** **Find the unknown factor.**

29. $7 \times (2 \times \_\_\_\_) = 56$

30. $30 = 6 \times (5 \times \_\_\_\_)$

31. $\_\_\_\_ \times (2 \times 2) = 32$

32. $42 = 7 \times (2 \times \_\_\_\_)$

33. $8 \times (5 \times \_\_\_\_) = 40$

34. $0 = \_\_\_\_ \times (25 \times 1)$

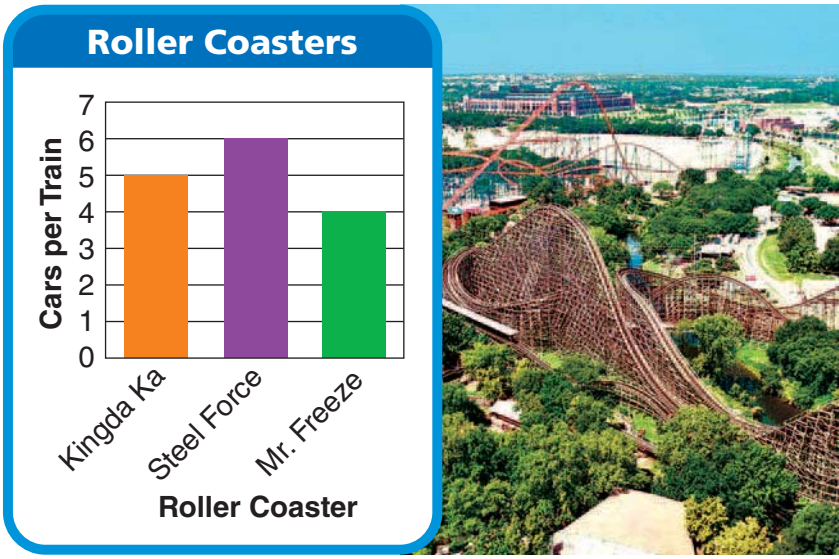
35. $(2 \times 9) \times \_\_\_\_ = 18$

36. $60 = (2 \times \_\_\_\_) \times 6$

37. $4 \times (3 \times \_\_\_\_) = 24$

Problem Solving • Applications

Use the graph for 38–39.



38. MATHEMATICAL PRACTICE 2 **Represent a Problem** Each car on the Steel Force train has 3 rows with 2 seats in each row. How many seats are on the train? Draw a quick picture.

_____

39. THINK SMARTER A Kingda Ka train has 4 seats per car, but the last car has only 2 seats. How many seats are on one Kingda Ka train?

_____

WRITE Math
Show Your Work

40. GO DEEPER **Sense or Nonsense?** Each week, Kelly works 2 days for 4 hours each day and earns $5 an hour. Len works 5 days for 2 hours each day and earns $4 an hour. Kelly says they both earn the same amount. Does this statement make sense? Explain.

_____

_____

41. THINK SMARTER Clayton packs 3 boxes. He puts 3 lunch bags in each box. There are 4 sandwiches in each lunch bag. How many sandwiches does Clayton pack? Show your work.

_____

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Patterns on the Multiplication Table

Essential Question How can you use properties to explain patterns on the multiplication table?

Operations and Algebraic Thinking—3.OA.9 *Also 3.OA.5*

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.7

Unlock the Problem

Real World

You can use a multiplication table to explore number patterns.

×	0	1	2	3	4	5	6	7	8	9	10
0											
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											

Activity 1

Materials ■ MathBoard

- Write the products for the green squares. What do you notice about the products?

_____

_____

_____

Write the multiplication sentences for the products on your MathBoard. What do you notice about the factors?

_____

- Will this be true in the yellow squares? **Explain** using a property you know.

_____

Write the products for the yellow squares.

- Complete the columns for 1, 5, and 6. Look across each row and compare the products. What do you notice?

_____

What property does this show?

_____

Math Talk **Mathematical Practices**

Explain how you can use these patterns to find other products.

Activity 2

Materials ■ yellow and blue crayons

- Shade the rows for 0, 2, 4, 6, 8, and 10 yellow.
- What pattern do you notice about each shaded row? _____

_____

- Compare the rows for 2 and 4. What do you notice about the products?

_____

- Shade the columns for 1, 3, 5, 7, and 9 blue.
- What do you notice about the products for each shaded column?

_____

- Compare the products for the green squares. What do you notice? What do you notice about the factors?

_____

- What other patterns do you see?

_____

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Share and Show

MATH BOARD

1. Use the table to write the products for the row for 2.

_____, _____, _____, _____, _____,

_____, _____, _____, _____, _____, _____

Describe a pattern you see.

_____

Math Talk — **Mathematical Practices**

What do you notice about the product of any number and 2?

Is the product even or odd? Write *even* or *odd*.

2. 5×8 _____

3. 6×3 _____

4. 3×5 _____

5. 4×4 _____

Name _____

Use the multiplication table. Describe a pattern you see.

6. in the column for 10

_____

_____

7. in the column for 8

_____

_____

On Your Own

Is the product even or odd? Write *even* or *odd*.

8. 4×8 _____ **9.** 5×5 _____ **10.** 7×4 _____ **11.** 2×9 _____

12. GO DEEPER Correct the pattern. Rewrite your pattern.

6, 12, 18, 22, 30, 36 _____

Problem Solving • Applications Real World

Complete the table. Then describe a pattern you see in the products.

13.

×	2	4	6	8	10
5					

_____

_____

14.

×	1	3	5	7	9
5					

_____

_____

15. THINK SMARTER **Explain** how patterns of the ones digits in the products relate to the factors in Exercises 13 and 14.

_____

_____

_____

Personal Math Trainer

16. THINK SMARTER + Helene selected an odd number to multiply by the factors in this table. Write *even* or *odd* to describe each product.

×	1	2	3	4	5
odd number					

Sense or Nonsense?

17. MATHEMATICAL PRACTICE 3 **Make Arguments** Whose statement makes sense? Whose statement is nonsense? Explain your reasoning.

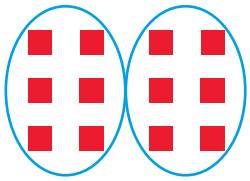
The product of an odd number and an even number is even.

The product of two even numbers is even.

Gunter's Work

odd × even = even

3 × 4 = 12

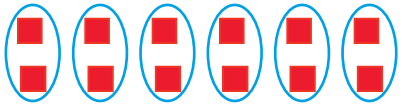


I can circle 2 equal groups of 6 with no tiles left over. So, the product is even.

Giselle's Work

even × even = even

2 × 6 = 12



I can circle 6 pairs with no tiles left over. So, the product is even.

18. GO DEEPER Write a statement about the product of two odd numbers. Give an example to show why your statement is true.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply with 8

Essential Question What strategies can you use to multiply with 8?

Operations and Algebraic Thinking—3.OA.7 *Also 3.OA.1, 3.OA.3, 3.OA.4, 3.OA.5, 3.OA.9*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

A scorpion has 8 legs. How many legs do 5 scorpions have?

- How many legs does one scorpion have?

_____

- What are you asked to find?

_____

_____

Find 5×8.

One Way Use doubles.

$5 \times 8 = \square$

$\swarrow \quad \searrow$

$4 + 4$

Think: The factor 8 is an even number. $4 + 4 = 8$

$5 \times 4 =$ _____

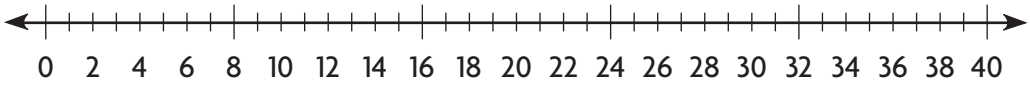
20 doubled is _____.

$5 \times 8 =$ _____

So, 5 scorpions have _____ legs.

Another Way Use a number line.

Use the number line to show 5 jumps of 8.



So, 5 jumps of 8 is _____. _____ × _____ = _____

ERROR Alert

Be sure to count the spaces between the tick marks, not the tick marks.

- **Describe** two different ways you can use doubles to find 6×8.

_____

_____

Example Use the Associative Property of Multiplication.

Scorpions have two eyes on the top of the head, and usually two to five pairs along the front corners of the head. If each scorpion has 6 eyes, how many eyes would 8 scorpions have?

$8 \times 6 = \blacksquare$

$8 \times 6 = (2 \times 4) \times 6$ **Think:** $8 = 2 \times 4$

$8 \times 6 = 2 \times (4 \times 6)$ Use the Associative Property.

$8 \times 6 = 2 \times$ _____ Multiply. 4×6

$8 \times 6 =$ _____ + _____ Double the product.

$8 \times 6 =$ _____

Math Talk **Mathematical Practices**

When you multiply with 8, will the product always be even? **Explain**.

Share and Show

MATH BOARD

1. **Explain** one way you can find 4×8.

_____

Find the product.

2. $3 \times 8 =$ _____

3. _____ $= 8 \times 2$

4. _____ $= 7 \times 8$

5. $9 \times 8 =$ _____

On Your Own

Find the product.

6. _____ $= 6 \times 8$

7. $10 \times 8 =$ _____

8. _____ $= 8 \times 3$

9. $1 \times 8 =$ _____

10. $4 \times 8 =$ _____

11. $5 \times 8 =$ _____

12. $0 \times 8 =$ _____

13. $8 \times 8 =$ _____

14. $\begin{array}{r} 6 \\ \times 8 \\ \hline \end{array}$

15. $\begin{array}{r} 8 \\ \times 2 \\ \hline \end{array}$

16. $\begin{array}{r} 5 \\ \times 8 \\ \hline \end{array}$

17. $\begin{array}{r} 3 \\ \times 8 \\ \hline \end{array}$

18. $\begin{array}{r} 10 \\ \times\ 8 \\ \hline \end{array}$

19. $\begin{array}{r} 7 \\ \times 8 \\ \hline \end{array}$

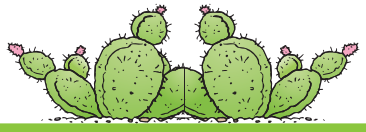
20. A chef is making 5 batches of potato salad. He needs 8 cups of dressing for each salad. How many cups of dressing does he need?

_____

Name _____

Problem Solving • Applications (Real World)

Use the table for 21–24.



Average Yearly Rainfall in North American Deserts	
Desert	**Inches**
Chihuahuan	8
Great Basin	9
Mojave	4
Sonoran	9

21. About how much rain falls in the Chihuahuan Desert in 6 years? **Explain** how you can use doubles to find the answer.

22. GO DEEPER In 2 years, about how many more inches of rain will fall in the Sonoran Desert than in the Chihuahuan Desert? **Explain**.

23. MATHEMATICAL PRACTICE 6 **Describe a Method** Look back at Exercise 22. Write and show how to solve a similar problem by comparing two different deserts.

24. THINK SMARTER How can you find about how many inches of rain will fall in the Mohave Desert in 20 years?

25. THINK SMARTER For numbers 25a–25d, select True or False for each multiplication sentence.

25a.	$3 \times (2 \times 4) = 24$	○ True	○ False
25b.	$4 \times 8 = 32$	○ True	○ False
25c.	$7 \times 8 = 72$	○ True	○ False
25d.	$2 \times (5 \times 8) = 80$	○ True	○ False

Connect to Science

There are 90 species of scorpions that live in the United States. Only 3 species of scorpions live in Arizona. They are the Arizona bark scorpion, the Desert hairy scorpion, and the Stripe-tailed scorpion.

Facts About Scorpions

Scorpions:

- are between 1 and 4 inches long
- mostly eat insects
- glow under ultraviolet light

They have:

- 8 legs for walking
- 2 long, claw-like pincers used to hold their food
- a curled tail held over their body with a stinger on the tip

▲ **Scorpions glow under ultraviolet light.**

26. How many species of scorpions do *not* live in Arizona?

27. Students saw 8 scorpions. What multiplication sentences can help you find how many pincers and legs the 8 scorpions had?

28. GO DEEPER Three scorpions were in a display with ultraviolet light. Eight groups of 4 students saw the display. How many students saw the glowing scorpions?

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply with 9

Essential Question What strategies can you use to multiply with 9?

Operations and Algebraic Thinking—3.OA.7 *Also 3.OA.1, 3.OA.3, 3.OA.4, 3.OA.5, 3.OA.9*

MATHEMATICAL PRACTICES
MP.2, MP.7, MP.8

Unlock the Problem

Olivia's class is studying the solar system. Seven students are making models of the solar system. Each model has 9 spheres (eight for the planets and one for Pluto, a dwarf planet). How many spheres do the 7 students need for all the models?

Find 7×9.

- What are you asked to find?

_____

_____

- How many students are making models? _____

One Way Use the Distributive Property.

A With multiplication and addition

$7 \times 9 = \square$

Think: $9 = 3 + 6$ $\quad 7 \times 9 = 7 \times (3 + 6)$

Multiply each addend by 7. $\quad 7 \times 9 = (7 \times 3) + (7 \times 6)$

Add the products. $\quad 7 \times 9 =$ _____ $+$ _____

$7 \times 9 =$ _____

B With multiplication and subtraction

$7 \times 9 = \square$

Think: $9 = 10 - 1$ $\quad 7 \times 9 = 7 \times (10 - 1)$

Multiply each number by 7. $\quad 7 \times 9 = (7 \times 10) - (7 \times 1)$

Subtract the products. $\quad 7 \times 9 =$ _____ $-$ _____

$7 \times 9 =$ _____

So, 7 students need _____ spheres for all the models.

Another Way Use patterns of 9.

The table shows the 9s facts.

- What do you notice about the tens digit in the product?

  The tens digit is _____ less than the factor that is multiplied by 9.

- What do you notice about the sum of the digits in the product?

  The sum of the digits in the product is always _____.

So, to multiply 7×9, think the tens digit is _____

and the ones digit is _____. The product is _____.

Multiply by 9.

Factors	Product
1×9	9
2×9	18
3×9	27
4×9	36
5×9	45
6×9	54
7×9	
8×9	
9×9	

Try This! **Complete the table above.**

Use the patterns to find 8×9 and 9×9.

Share and Show

MATH BOARD

1. What is the tens digit in the product 3×9? _____

Think: What number is 1 less than 3?

Math Talk **Mathematical Practices**

Explain how you know the ones digit in the product 3×9.

Find the product.

2. $9 \times 8 =$ _____ **3.** _____ $= 2 \times 9$ **4.** _____ $= 6 \times 9$ **5.** $9 \times 1 =$ _____

On Your Own

Find the product.

6. $4 \times 9 =$ _____ **7.** $5 \times 9 =$ _____ **8.** $10 \times 9 =$ _____ **9.** $1 \times 9 =$ _____

10. $\begin{array}{r} 9 \\ \times 5 \\ \hline \end{array}$ **11.** $\begin{array}{r} 9 \\ \times 3 \\ \hline \end{array}$ **12.** $\begin{array}{r} 6 \\ \times 9 \\ \hline \end{array}$ **13.** $\begin{array}{r} 7 \\ \times 9 \\ \hline \end{array}$ **14.** $\begin{array}{r} 4 \\ \times 9 \\ \hline \end{array}$

15. A beetle has 6 legs. How many legs do 9 beetles have? _____

Name _____

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** **Compare. Write <, >, or =.**

16. $2 \times 9 \bigcirc 3 \times 6$ **17.** $5 \times 9 \bigcirc 6 \times 7$ **18.** $1 \times 9 \bigcirc 3 \times 3$

19. $9 \times 4 \bigcirc 7 \times 5$ **20.** $9 \times 0 \bigcirc 2 \times 3$ **21.** $5 \times 8 \bigcirc 3 \times 9$

Problem Solving • Applications Real World

Use the table for 22–25.

22. The number of moons for one of the planets can be found by multiplying 7×9. Which planet is it?

_____

23. GO DEEPER This planet has 9 times the number of moons that Mars and Earth have together. Which planet is it? **Explain** your answer.

_____

_____

_____

Moons

Planet	Number of Moons
Earth	1
Mars	2
Jupiter	63
Saturn	47
Uranus	27
Neptune	13

24. THINK SMARTER Uranus has 27 moons. What multiplication fact with 9 can be used to find the number of moons Uranus has? Describe how you can find the fact.

_____

_____

_____

25. MATHEMATICAL PRACTICE 2 **Use Reasoning** Nine students made models of Mars and its moons. The answer is 18. What's the question?

_____

Unlock the Problem Real World

26. The school library has 97 books about space. John and 3 of his friends each check out 9 books. How many space books are still in the school library?

a. What do you need to find? _____

_____

b. Describe one way you can find the answer. _____

_____

c. Show the steps you used to solve the problem.

d. Complete the sentences.

The library has _____ space books.

Multiply _____ × _____ to find how many books John and his 3 friends check out in all.

After you find the number of books they check out, _____

to find the number of books still in the library.

So, there are _____ space books still in the library.

27. THINK SMARTER Circle the symbol that makes the multiplication sentence true.

9×7 [> < =] $3 \times (3 \times 7)$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Multiplication

Essential Question How can you use the strategy *make a table* to solve multiplication problems?

Operations and Algebraic Thinking—3.OA.8, 3.OA.9
Also 3.OA.3, 3.OA.7

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5

Unlock the Problem

Real World

Scott has a stamp album. Some pages have 1 stamp on them, and other pages have 2 stamps on them. If Scott has 18 stamps, show how many different ways he could put them in the album. Use the graphic organizer below to solve the problem.

Read the Problem

What do I need to find?

_____

_____

_____

What information do I need to use?

Scott has _____ stamps. Some of the pages have _____ stamp on them, and the other pages have _____ stamps.

How will I use the information?

I will make a _____ showing all the different ways of arranging the stamps in the album.

Solve the Problem

Make a table to show the number of pages with 1 stamp and with 2 stamps. Each row must equal _____, the total number of stamps.

Pages with 2 Stamps	Pages with 1 Stamp	Total Stamps
8	2	18
7	4	18
6	6	18
5		18
	10	18
3	12	
2		

So, there are _____ different ways.

1. What number patterns do you see in the table?

_____

_____

Try Another Problem

What if Scott bought 3 more stamps and now has 21 stamps? Some album pages have 1 stamp and some pages have 2 stamps. Show how many different ways he could put the odd number of stamps in the album.

Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use the information?	So, there are ____ different ways.

2. What patterns do you see in this table? _____

_____

3. How are these patterns different from the patterns in the table on page 177? _____

_____

_____

Name _____

Share and Show

MATH BOARD

1. Aaron's mother is making lemonade. For each pitcher, she uses 1 cup of lemon juice, 1 cup of sugar, and 6 cups of water. What is the total number of cups of ingredients she will use to make 5 pitchers of lemonade?

Think: For every pitcher, the number of cups of water increases by 6.

First, make a table to show the number of cups of lemon juice, sugar, and water that are in 1 pitcher of lemonade.

Next, multiply to find the number of cups of water needed for each pitcher of lemonade.

Last, use the table to solve the problem.

Number of Pitchers	1	2	3		5
Cups of Lemon Juice	1		3		
Cups of Sugar	1	2			
Cups of Water	6	12		24	
Total Number of Cups of Ingredients	8				

So, in 5 pitchers of lemonade, there are _____ cups of lemon juice, _____ cups of sugar, and _____ cups of water.

This makes a total of _____ cups of ingredients.

2. What if it takes 4 lemons to make 1 cup of lemon juice? How many lemons would it take to make 5 pitchers? Explain how you can use the table to help you find the answer.

_____

_____

3. What pattern do you see in the total number of cups of ingredients?

_____

_____

On Your Own

4. Julie saw 3 eagles each day she went bird-watching. How many eagles did Julie see in 6 days?

_____

5. MATHEMATICAL PRACTICE 2 **Use Reasoning** Greg has a dollar bill, quarters, and dimes. How many ways can he make $1.75?

Name the ways. _____

_____

_____

6. THINK SMARTER Cammi needs 36 postcards. She buys 4 packages of 10 postcards. How many postcards will Cammi have left over? Explain.

_____

_____

_____

7. GO DEEPER Phillip has 8 books on each of 3 bookshelves. His aunt gives him 3 new books. How many books does Phillip have now?

_____

Personal Math Trainer

8. THINK SMARTER + Stuart has some 2-ounce, 3-ounce, and 4-ounce weights. How many different ways can Stuart combine the weights to make a total of 12 ounces? Write multiplication sentences to show your work.

_____

_____

_____

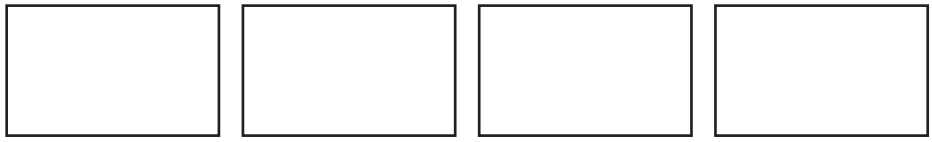
FOR MORE PRACTICE:
Standards Practice Book

Name _____

Chapter 4 Review/Test

1. Mrs. Ruiz sorted spools of thread into 4 boxes. Each box holds 5 spools. How many spools of thread does Mrs. Ruiz have?

   Draw circles to model the problem. Then solve.



_____

_____

2. For numbers 2a–2d, select True or False for each multiplication sentence.

2a.	$2 \times 8 = 16$	○ True	○ False
2b.	$5 \times 8 = 40$	○ True	○ False
2c.	$6 \times 8 = 56$	○ True	○ False
2d.	$8 \times 8 = 64$	○ True	○ False

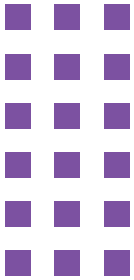
3. Bella is planning to write in a journal. Some pages will have one journal entry on them, and other pages will have two journal entries on them. If Bella wants to make 10 entries, how many different ways can she write them in her journal?

4. There are 7 days in 1 week. How many days are there in 4 weeks?

_____ days

GO DIGITAL Assessment Options
Chapter Test

5. Circle groups to show $3 \times (2 \times 3)$.



6. Dale keeps all of his pairs of shoes in his closet. Select the number of shoes that Dale could have in his closet. Mark all that apply.

- (A) 3
- (B) 4
- (C) 6
- (D) 7
- (E) 8

7. Lisa completed the table to describe the product of a mystery one-digit factor and each number.

×	1	2	3	4	5
?	even	even	even	even	even

Part A

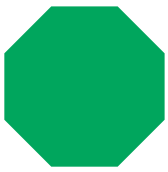
Give all of the possible numbers that could be Lisa's mystery one-digit factor.

Part B

Explain how you know that you have selected all of the correct possibilities.

Name _____

8. Kate drew 7 octagons. An octagon has 8 sides. How many sides did Kate draw?

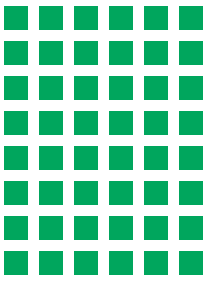


_____ sides

9. José buys 6 bags of flour. Each bag weighs 5 pounds. How many pounds of flour did José buy?

_____ pounds

10. Break apart the array to show $8 \times 6 = (4 \times 6) + (4 \times 6)$.



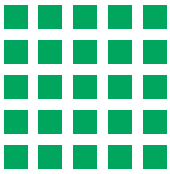
11. Circle the symbol that makes the multiplication sentence true.

$9 \times 6 \quad \boxed{\begin{matrix} > \\ < \\ = \end{matrix}} \quad 3 \times (3 \times 9)$

12. Roberto wants to make $2.00 using dollars, half dollar, and quarters. How many different ways can he make $2.00?

_____ different ways

13. A carpenter builds stools that have 3 legs each. How many legs does the carpenter use to build 5 stools? Use the array to explain how you know your answer is correct.



_____

_____

14. Etta buys some ribbon and cuts it into 7 pieces that are the same length. Each piece is 9 inches long. How long was the ribbon that Etta bought?

_____ inches

15. Antoine and 3 friends divide some pennies evenly among themselves. Each friend separates his pennies into 3 equal stacks with 5 pennies in each stack.

Write a multiplication sentence that shows the total number of pennies.

_____

16. Luke is making 4 first-aid kits. He wants to put 3 large and 4 small bandages in each kit. How many bandages does he need for the kits? Show your work.

_____ bandages

Name _____

17. For numbers 17a–17d, select True or False for each equation.

17a.	$3 \times 7 = 21$	○ True	○ False
17b.	$5 \times 7 = 28$	○ True	○ False
17c.	$8 \times 7 = 49$	○ True	○ False
17d.	$9 \times 7 = 63$	○ True	○ False

18. Circle the number that makes the multiplication sentence true.

$$10 \times \boxed{\begin{matrix}4\\5\\8\end{matrix}} = 40$$

19. For numbers 19a–19d, select Yes or No to indicate whether the number sentence has the same value as 8×6.

19a.	$8 + (4 \times 2) =$ ■	○ Yes	○ No
19b.	$(8 \times 4) + (8 \times 2) =$ ■	○ Yes	○ No
19c.	$(6 \times 4) + (6 \times 2) =$ ■	○ Yes	○ No
19d.	$6 \times (4 + 4) =$ ■	○ Yes	○ No

20. Chloe bought 4 movie tickets. Each ticket cost $6. What was the total cost of the movie tickets?

$ _____

21. Write a multiplication sentence using the following numbers and symbols.

6	60	5	2	( )	=

_____

22. Louis started a table showing a multiplication pattern.

Part A

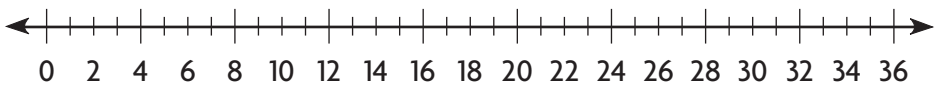
Complete the table. Describe a pattern you see in the products.

×	1	2	3	4	5	6	7	8	9	10
3	3	6	9							

Part B

If you multiplied 3×37, would the product be an even number or an odd number? Use the table to explain your reasoning.

23. Use the number line to show the product of 8×4.



$8 \times 4 =$ _____

Chapter 5

Use Multiplication Facts

Show What You Know

Check your understanding of important skills.

Name _____

▶ Add Tens Write how many tens. Then add.

1. 30 + 30 = ■

_____ tens + _____ tens =

_____ tens

30 + 30 = _____

2. 40 + 50 = ■

_____ tens + _____ tens =

_____ tens

40 + 50 = _____

▶ Regroup Tens as Hundreds Write the missing numbers.

3. 35 tens = _____ hundreds _____ tens

4. 52 tens = _____ hundreds _____ tens

5. 97 tens = _____ hundreds _____ tens

▶ Multiplication Facts Through 9 Find the product.

6. 3 × 9 = _____ **7.** 4 × 5 = _____ **8.** 7 × 6 = _____ **9.** 8 × 2 = _____

Math Detective

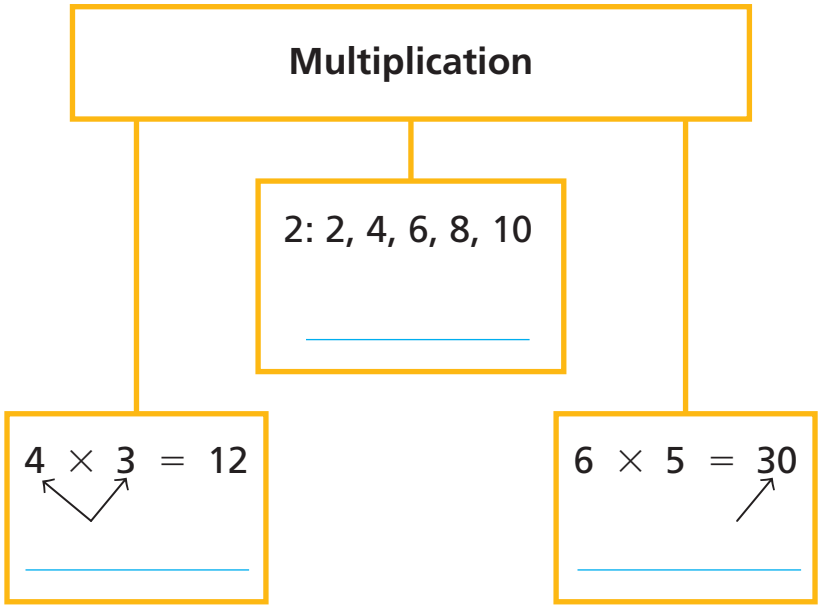
The butterfly exhibit at the museum will display 60 different butterfly species arranged in an array. Each row has 6 butterflies. Be a Math Detective to find the number of rows in the butterfly exhibit.

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Complete the tree map by using the words with a ✓.



Review Words

- array
- Commutative Property of Multiplication
- Distributive Property
- ✓ factors
- hundreds
- ✓ multiples
- ones
- pattern
- place value
- ✓ product
- tens

Preview Word

- equation

Understand Vocabulary

Read the definition. Write the preview word or review word that matches it.

1. An ordered set of numbers or objects in which the order helps you predict what will come next. _____
2. A set of objects arranged in rows and columns. _____
3. A number sentence that uses the equal sign to show that two amounts are equal. _____
4. The property that states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products. _____
5. The value of each digit in a number, based on the location of the digit. _____

Name _____

Describe Patterns

Essential Question What are some ways you can describe a pattern in a table?

Operations and Algebraic Thinking—
3.OA.9 *Also 3.OA.3, 3.OA.7*

MATHEMATICAL PRACTICES
MP.4, MP.6, MP.7

Unlock the Problem

The outdoor club is planning a camping trip. Each camper will need a flashlight. One flashlight uses 4 batteries. How many batteries are needed for 8 flashlights?

You can describe a pattern in a table.

Flashlights	1	2	3	4	5	6	7	8
Batteries	4	8	12	16	20	24	28	■

Think: Count by 1s.

Think: Count by 4s.

One Way Describe a pattern across the rows.

STEP 1 Look for a pattern to complete the table. As you look across the rows, you can see that the number of batteries increases by 4 for each flashlight.

So, for every flashlight add _____ batteries.

ERROR Alert
Check that your pattern will work for all the numbers in the table.

STEP 2 Use the pattern to find the number of batteries in 8 flashlights.

Add _____ to 28 batteries. $28 + 4 =$ _____

So, _____ batteries are needed for 8 flashlights.

Another Way Describe a pattern in the columns.

STEP 1 Look for a pattern by comparing the columns in the table. You can multiply the number of flashlights by 4 to find the number of batteries that are needed.

STEP 2 Use the pattern to find how many batteries are needed for 8 flashlights.

$8 \times 4 =$ _____

Math Talk
Mathematical Practices
Why is it important to know how many batteries are needed for 1 flashlight?

Try This! **Describe a pattern. Then complete the table.**

The campers need 5 packs of batteries. If there are 8 batteries in each pack, how many batteries will be in 5 packs?

Packs of Batteries	Number of Batteries
1	8
2	16
3	
4	32
5	

Use addition.

Describe a pattern.

Add _____ batteries for each pack.

Use multiplication.

Describe a pattern.

Multiply the number of packs of batteries by _____.

So, there will be _____ batteries in 5 packs.

Share and Show

1. How can you describe a pattern to find the cost of 4 packs of batteries?

_____

Packs of Batteries	1	2	3	4
Cost	$3	$6	$9	

Describe a pattern in the table. Then complete the table.

2.

Tents	Lanterns
2	4
3	6
4	8
5	10
6	
7	

_____

3.

Adults	1	2	3	4	5
Campers	6	12	18		

_____

Math Talk **Mathematical Practices**

Explain how you use your description for a pattern to complete a table.

Name _____

On Your Own

Describe a pattern in the table. Then complete the table.

4.

Hours	1	2	3	4	5
Miles Hiked	2	4	6		

5.

Cabins	3	4	5	6	7
Campers	27	36	45		

6.

Cabins	Beds
1	5
2	10
3	
4	20
5	
6	

7.

Adults	Students
2	12
3	18
4	
5	30
6	
7	

8.

Canoes	4	5	6	7	8
Campers	12	15	18		

9.

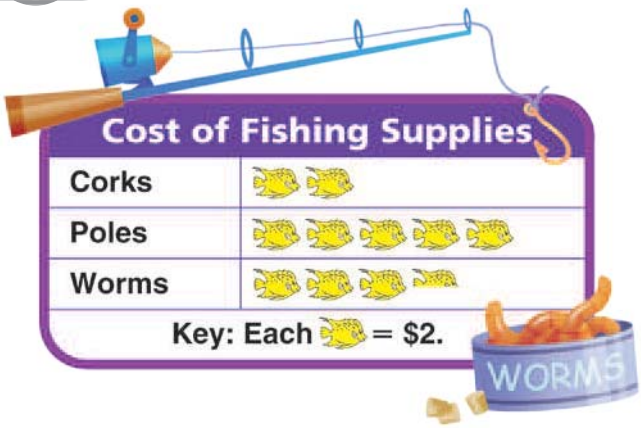
Canoes	2	3	4	5	6
Paddles	4	6	8		

10. THINK SMARTER Students made a craft project at camp. They used 2 small pine cone patterns and 1 large pine cone pattern. Complete the table to find how many patterns were used for the different numbers of projects.

Projects	1	2	3							
Small Pattern	2									
Large Pattern	1									

Problem Solving • Applications

MATHEMATICAL PRACTICE 4 **Use Graphs** **Use the picture graph for 11–13.**



11. Jena bought 3 fishing poles. How much money did she spend?

12. Noah bought 1 fishing pole, 2 corks, and 1 carton of worms. What was the total cost?

13. WRITE *Math* Ryan bought 8 corks. Explain how you can use the Commutative Property to find the cost.

14. GO DEEPER The cost to rent a raft is $7 per person. A raft can hold up to 6 people. There is a $3 launch fee per raft. What is the total cost for a group of 6? Explain.

15. Taylor bought 4 boxes of granola bars. There are 6 bars in each box. How many granola bars did Taylor buy?

Personal Math Trainer

16. THINK SMARTER + Complete the table. Amir said a rule for the pattern shown in this table is "Multiply by 4." Is he correct? Explain how you know your answer is reasonable.

Cans	2	3	4		6
Peaches	8	12		20	

FOR MORE PRACTICE: Standards Practice Book

Name _____

Find Unknown Numbers

Essential Question How can you use an array or a multiplication table to find an unknown factor or product?

Operations and Algebraic Thinking—
3.OA.4 *Also 3.OA.1, 3.OA.3, 3.OA.7*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5, MP.6

Unlock the Problem

Real World

Tanisha plans to invite 24 people to a picnic. The invitations come in packs of 8. How many packs of invitations does Tanisha need to buy?

- How many people is Tanisha inviting? _____
- How many invitations are in 1 pack? _____

An **equation** is a number sentence that uses the equal sign to show that two amounts are equal.

A symbol or letter can stand for an unknown factor. You can write the equation, $n \times 8 = 24$, to find how many packs of invitations Tanisha needs. Find the number, n, that makes the equation true.

Use an array.

- Show an array of 24 tiles with 8 tiles in each row by completing the drawing.

n	$\times$	8	$=$	24
↑		↑		↑
factor		factor		product
number of rows		number in each row		total number

- Count how many rows of 8 tiles there are.

Think: What number times 8 equals 24?

There are _____ rows of 8 tiles. The unknown factor is _____. $n =$ _____

_____ $\times 8 = 24$ Check.

_____ $= 24$ ✓ The equation is true.

So, Tanisha needs _____ packs of invitations.

Math Talk **Mathematical Practices**

Explain how the array represents the problem. How do the factors relate to the array?

Use a multiplication table.

$3 \times 8 = \square$

Think: The symbol, $\square$, stands for the unknown product.

Find the product 3×8 where row 3 and column 8 meet.

The unknown product is _____.

$\square =$ _____

$3 \times 8 =$ _____ Check.

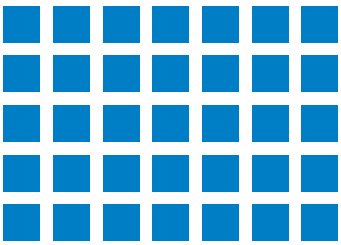
$24 =$ _____ ✓ The equation is true.

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Share and Show

MATH BOARD

1. What is the unknown factor shown by this array?



$5 \times \square = 35$

$\square =$ _____

Find the unknown number.

2. $d \times 3 = 27$

$d =$ _____

3. $6 \times 5 = \blacktriangle$

$\blacktriangle =$ _____

4. $c = 5 \times 4$

$c =$ _____

5. $\square \times 2 = 14$

$\square =$ _____

6. $b = 4 \times 9$

$b =$ _____

7. $8 \times e = 64$

$e =$ _____

8. $7 \times \bigstar = 42$

$\bigstar =$ _____

9. $8 \times 9 = z$

$z =$ _____

Math Talk

Mathematical Practices

Explain how you know if you are looking for the number of rows or the number in each row when you make an array to find an unknown factor.

Name _____

On Your Own

Find the unknown number.

10. ■ $= 9 \times 2$

■ = _____

11. $28 = 4 \times m$

m = _____

12. $y \times 3 = 9$

y = _____

13. $7 \times 9 = g$

g = _____

14. $5 \times p = 40$

p = _____

15. $w = 8 \times 7$

w = _____

16. $36 =$ ◆ $\times 6$

◆ = _____

17. $8 \times e = 72$

e = _____

18. $9 \times$ ★ $= 27$

★ = _____

19. $a = 6 \times 10$

a = _____

20. $2 \times 5 = d$

d = _____

21. $32 = 8 \times n$

n = _____

22. $a = 6 \times 4$

a = _____

23. $7 = 7 \times n$

n = _____

24. $w \times 3 = 15$

w = _____

25. ★ $= 8 \times 6$

★ = _____

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** **Find the unknown number.**

26. $3 \times 6 = k \times 9$

k = _____

27. $4 \times y = 2 \times 6$

y = _____

28. $5 \times g = 36 - 6$

g = _____

29. $6 \times 4 =$ ■ $\times 3$

■ = _____

30. $9 \times d = 70 + 2$

d = _____

31. $8 \times h = 60 - 4$

h = _____

32. GO DEEPER Invitations cost $3 for a pack of 8. Lori gives the cashier $20 to buy invitations and gets $11 in change. How many packs of invitations does Lori buy? Explain.

_____

_____

Problem Solving • Applications Real World

Use the table for 33–36.

Picnic Supplies		
Item	Number in 1 Pack	Cost
Bowls	6	$10
Cups	8	$3
Tablecloth	1	$2
Napkins	36	$2
Forks	50	$3

33. Tanisha needs 40 cups for the picnic. How many packs of cups should she buy?

_____

34. GO DEEPER Ms. Hill buys 3 tablecloths and 2 packs of napkins. How much money does she spend?

_____

35. THINK SMARTER What if Tanisha needs 40 bowls for the picnic? Explain how to write an equation with a letter for an unknown factor to find the number of packs she should buy. Then find the unknown factor.

_____

_____

_____

36. MATHEMATICAL PRACTICE 1 **Analyze** What if Randy needs an equal number of bowls and cups for his picnic? How many packs of each will he need to buy?

_____

_____

37. THINK SMARTER For numbers 37a–37d, choose Yes or No to show whether the unknown factor is 8.

37a. $8 \times \square = 64$ ○ Yes ○ No

37b. $\square \times 3 = 27$ ○ Yes ○ No

37c. $6 \times \square = 42$ ○ Yes ○ No

37d. $\square \times 7 = 56$ ○ Yes ○ No

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

Vocabulary
array
equation

1. An _____ is a number sentence that uses the equal sign to show that two amounts are equal. (p. 193)

Concepts and Skills

Describe a pattern in the table. Then complete the table. (3.OA.9)

2.

Weeks	1	2	3	4	5
Days	7	14	21		

_____

3.

Tickets	2	3	4	5	6
Cost	$8	$12	$16		

_____

4.

Project Teams	Members
3	9
4	12
5	
6	18
7	

_____

5.

Tables	Chairs
1	8
2	16
3	
4	32
5	

_____

Find the unknown number. (3.OA.4)

6. $m \times 5 = 30$

   $m =$ _____

7. $\square \times 6 = 48$

   $\square =$ _____

8. $n = 2 \times 10$

   $n =$ _____

9. $4 \times 8 = p$

   $p =$ _____

10. $25 = y \times 5$

    $y =$ _____

11. $\diamond \times 10 = 10$

    $\diamond =$ _____

12. Describe a pattern in the table. (3.OA.9)

Packages	1	2	3	4	5
Stickers	6	12	18	24	30

13. What number makes the equation true? (3.OA.4)

$$a \times 8 = 72$$

14. Mia bought 2 copies of the same book. She spent $18. What was the cost of one book? (3.OA.4)

15. Kyle saves $10 every week for 6 weeks. How much money will Kyle have in Week 6? (3.OA.9)

Weeks	1	2	3	4	5	6
Amount	$10	$20	$30			

16. There are 24 students in the class. They arrange their desks in rows with 6 desks in each row. How many rows are there? (3.OA.4)

Name _____

Problem Solving • Use the Distributive Property

Essential Question How can you use the strategy *draw a diagram* to multiply with multiples of 10?

Number and Operations in Base Ten—3.NBT.3 *Also 3.OA.3, 3.OA.5, 3.OA.7*

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.7

Unlock the Problem

The school assembly room has 5 rows of chairs with 20 chairs in each row. If the third-grade classes fill 3 rows of chairs, how many third graders are at the assembly?

Read the Problem

What do I need to find?

I need to find how many _____ are at the assembly.

What information do I need to use?

There are _____ chairs in each row.

The third graders fill _____ rows of chairs.

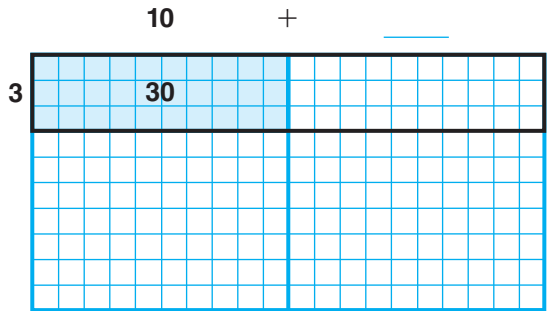
How will I use the information?

The Distributive Property tells me I can _____ the factor 20 to multiply.

$3 \times 20 = 3 \times (10 + \_\_\_\_)$

Solve the Problem

Draw a diagram. Finish the shading to show 3 rows of 20 chairs.



I can use the sum of the products of the smaller rectangles to find how many third graders are at the assembly.

$3 \times 10 =$ _____ $3 \times 10 =$ _____

_____ + _____ = _____

$3 \times 20 =$ _____

So, _____ third graders are at the assembly.

1. Explain how breaking apart the factor 20 makes finding the product easier. _____

Try Another Problem

Megan is watching a marching band practice. The band marches by with 4 rows of people playing instruments. She counts 30 people in each row. How many people march in the band?

Read the Problem	Solve the Problem
What do I need to find?	**Record the steps you used to solve the problem.**
What information do I need to use?	
How will I use the information?	

2. How can you check to see if your answer is reasonable?

3. Explain how you can use the Distributive Property to help you find a product.

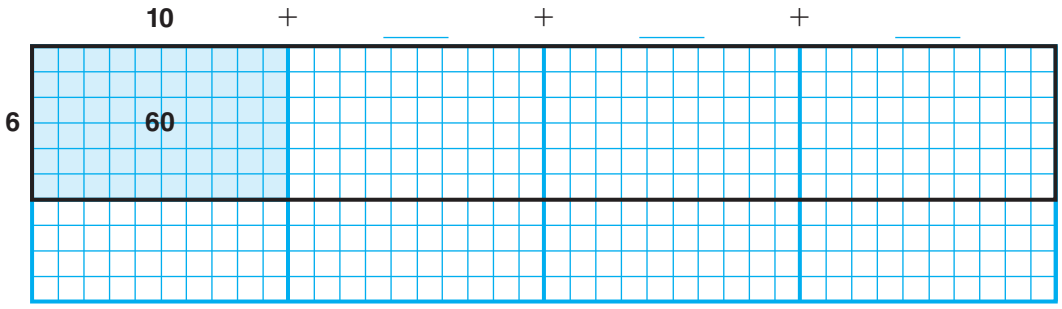
Name _____

Share and Show

MATH BOARD

1. People filled all the seats in the front section of the theater. The front section has 6 rows with 40 seats in each row. How many people are in the front section of the theater?

First, draw and label a diagram to break apart the problem into easier parts to solve.



Next, find the products of the smaller rectangles.

6 × 10 = _____ _____ × _____ = _____

_____ × _____ = _____ _____ × _____ = _____

Then, find the sum of the products.

_____ + _____ + _____ + _____ = _____

So, there are _____ people in the front section of the theater.

2. What if seats are added to the front section of the theater so that there are 6 rows with 50 seats in each row? How many seats are in the front section?

_____

Unlock the Problem

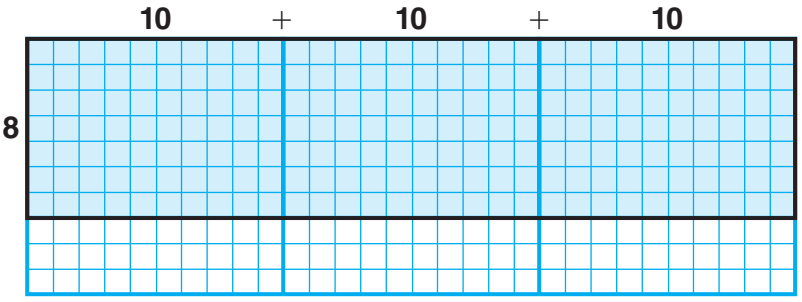
- Circle the numbers you will use.
- Use the Distributive Property and break apart a greater factor to use facts you know.
- Draw a diagram to help you solve the problem.

On Your Own

3. THINK SMARTER Tova sewed 60 pieces of blue ribbon together to make a costume. Each piece of ribbon was 2 meters long. She also sewed 40 pieces of red ribbon together that were each 3 meters long. Did Tova use more blue ribbon or red ribbon? Explain.

_____

4. MATHEMATICAL PRACTICE 3 **Verify the Reasoning of Others**
Carina draws this diagram to show that $8 \times 30 = 210$. Explain her error.



5. WRITE *Math* Tamika wants to display 10 trophies on a table in a rectangular array. How many different ways can Tamika arrange the trophies? Explain your answer.

6. GO DEEPER The drama club has 350 tickets to sell. They sell 124 tickets on Monday and 98 tickets on Tuesday. How many tickets does the drama club have left to sell?

7. THINK SMARTER Select the equations that show the Distributive Property. Mark all that apply.

(A) $3 \times 20 = (3 \times 10) + (3 \times 10)$

(B) $(7 + 3) + 8 = 7 + (3 + 8)$

(C) $(5 \times 10) + (5 \times 10) = 5 \times 20$

(D) $(9 \times 2) + (9 \times 4) = 9 \times 6$

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Multiplication Strategies with Multiples of 10

Essential Question What strategies can you use to multiply with multiples of 10?

Number and Operations in Base Ten—3.NBT.3
Also 3.OA.3, 3.OA.5, 3.OA.7

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5, MP.7

Unlock the Problem

Real World

Hands On

You can use models and place value to multiply with multiples of 10.

- What is a product of 10 and the counting numbers 1, 2, 3, and so on?

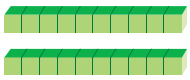
_____

Activity Model multiples of 10.

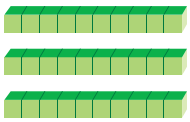
Materials ■ base-ten blocks

Model the first nine multiples of 10.

1×10
1×1 ten
1 ten
10



2×10
2×1 ten
2 tens
20



3×10
3×1 ten
3 tens
30

What are the first nine multiples of 10?

10, 20, 30, _____ , _____ , _____ , _____ , _____ , _____

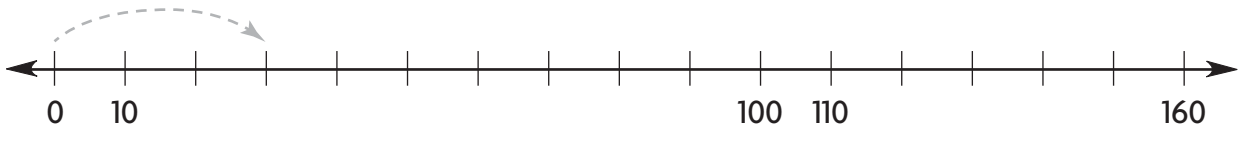
Best Care Veterinary Clinic offered free pet care classes for 5 days. Erin attended the pet care class for 30 minutes each day. How many minutes did Erin attend the class?

One Way Use a number line.

$5 \times 30 = \blacksquare$ **Think:** 30 = 3 tens

STEP 1 Complete the number line. Write the labels for the multiples of 10.

STEP 2 Draw jumps on the number line to show 5 groups of 3 tens.



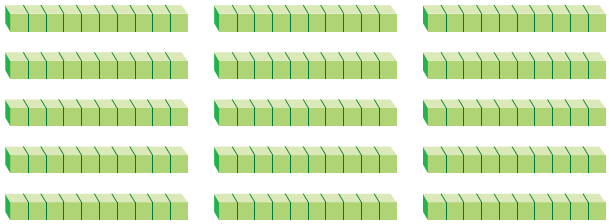
$5 \times 30 =$ _____

So, Erin attended the pet care class for _____ minutes.

Another Way Use place value.

Hands On

MODEL



THINK

$5 \times 30 = 5 \times$ _____ tens

$=$ _____ tens $=$ _____

So, $5 \times 30 =$ _____.

Try This!

$4 \times 50 =$ _____ $\times$ _____ tens

$=$ _____ tens $=$ _____

Math Talk Mathematical Practices

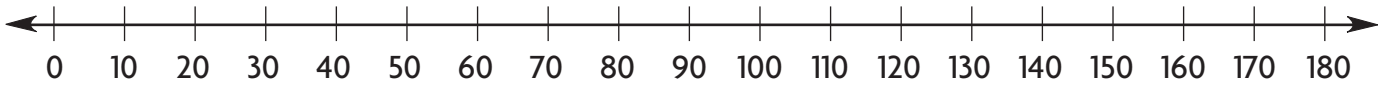
Explain why 5×30 has one zero in the product and 4×50 has two zeros in the product.

Share and Show

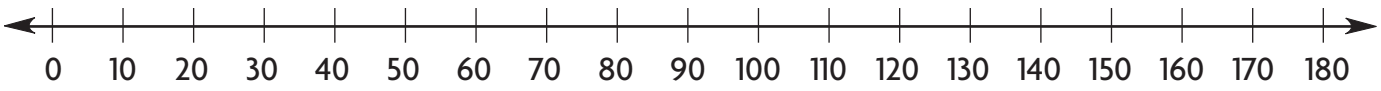
MATH BOARD

Use a number line to find the product.

1. $3 \times 40 =$ _____ **Think:** There are 3 jumps of 40.



2. $8 \times 20 =$ _____



Use place value to find the product.

3. $3 \times 70 = 3 \times$ _____ tens

$=$ _____ tens $=$ _____

4. $50 \times 2 =$ _____ tens $\times 2$

$=$ _____ tens $=$ _____

Math Talk Mathematical Practices

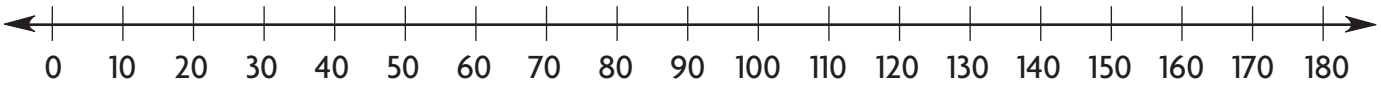
Will the product of 50×2 be the same as the product of 2×50? **Explain**.

Name _____

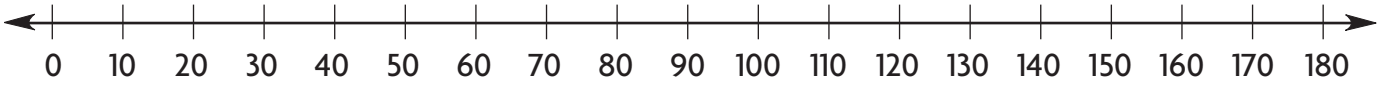
On Your Own

Use a number line to find the product.

5. $7 \times 20 =$ _____



6. $3 \times 50 =$ _____



Use place value to find the product.

7. $6 \times 60 = 6 \times$ _____ tens

$=$ _____ tens $=$ _____

8. $50 \times 7 =$ _____ tens $\times 7$

$=$ _____ tens $=$ _____

Problem Solving • Applications

Use the table for 9–11.

Best Care Clinic Pet Supplies	
Item	**Amount**
Cat toys	10 packs
Treats	8 bags
Shampoo	20 bottles
Vitamins	3 boxes

9. The cost of a bottle of shampoo is $9. If the clinic sells their entire supply of shampoo, how much money will they receive?

_____

10. **What's the Question?** Each bag of treats has 30 treats. The answer is 240.

_____

11. THINK SMARTER There are 4 bottles of vitamins in each box of vitamins. Each bottle of vitamins has 20 vitamins. If the clinic wants to have a supply of 400 vitamins, how many more boxes should they order?

_____

Unlock the Problem Real World

12. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** Hiromi needs to set up chairs for 155 people to attend the school career day program. So far she has set up 6 rows with 20 chairs in each row. How many more chairs does Hiromi need to set up?

a. What do you need to find?

_____

b. What operations will you use to find how many more chairs Hiromi needs to set up?

_____

c. Write the steps you will use to solve the problem.

d. Complete the sentences.

Hiromi needs to set up _____ chairs for people to attend the program.

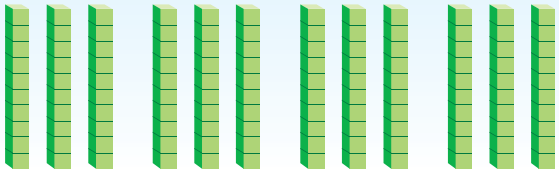
She has set up _____ rows with _____ chairs in each row.

So, Hiromi needs to set up _____ more chairs.

13. GO DEEPER Last week, Dr. Newman examined the paws of 30 dogs at her clinic. She examined the paws of 20 cats. What is the total number of paws Dr. Newman examined last week?

_____

14. THINK SMARTER Nick made this multiplication model. Complete the equation that represents the model.



_____ × _____ = _____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Multiply 1-Digit Numbers by Multiples of 10

Essential Question How can you model and record multiplying 1-digit whole numbers by multiples of 10?

Number and Operations in Base Ten—3.NBT.3
Also 3.OA.3, 3.OA.7

MATHEMATICAL PRACTICES
MP.4, MP.5, MP.7, MP.8

Unlock the Problem

Real World

Hands On

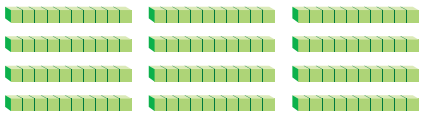
The community center offers 4 dance classes. If 30 students sign up for each class, how many students sign up for dance class?

- How many equal groups are there? _____
- How many are in each group? _____

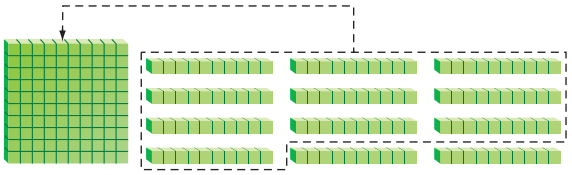
Activity **Use base-ten blocks to model 4 × 30.**

Materials ■ base-ten blocks

STEP 1 Model 4 groups of 30.



STEP 2 Combine the tens. Regroup 12 tens as 1 hundred 2 tens.



4 × 30 = _____

So, _____ students sign up for dance class.

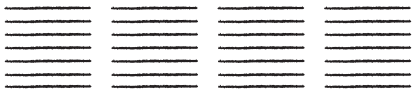
Math Idea

If one factor is a multiple of 10, then the product will also be a multiple of 10.

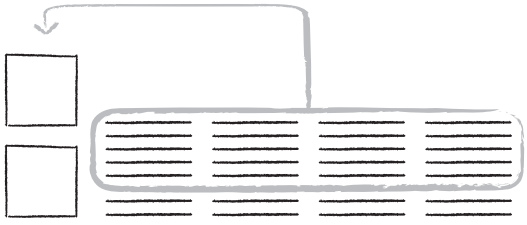
Try This! **Find 7 × 40.**

Use a quick picture to record your model. Draw a stick for each ten. Draw a square for each hundred.

STEP 1 Model _____ groups of _____.



STEP 2 Combine the tens. Regroup 28 tens as _____ hundreds _____ tens.



So, 7 × 40 = _____.

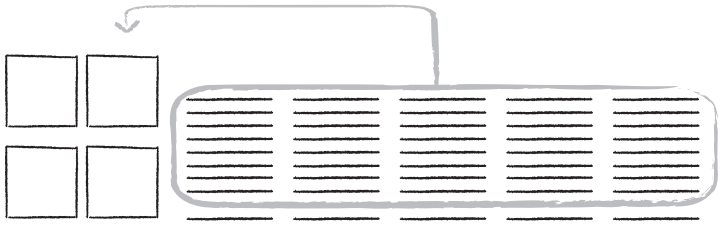
Math Talk

Mathematical Practices

Will the product of 7 × 40 be the same as 4 × 70? **Explain**.

Example Use place value and regrouping.

Find 9×50.

	MODEL	THINK	RECORD
STEP 1		Multiply the ones. 9×0 ones = ____ ones	5 0 × 9 0
STEP 2		Multiply the tens. 9×5 tens = 45 tens Regroup the ____ tens as ____ hundreds ____ tens.	5 0 × 9 4 5 0

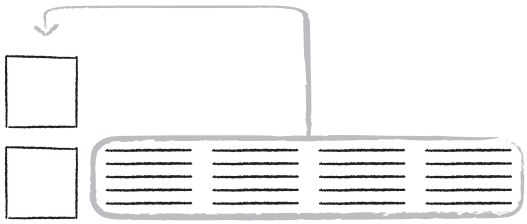
So, $9 \times 50 =$ _____.

Share and Show

MATH BOARD

1. Use the quick picture to find 5×40.

$5 \times 40 =$ _____



Find the product. Use base-ten blocks or draw a quick picture on your MathBoard.

2. $7 \times 30 =$ _____ 3. ____ $= 2 \times 90$ 4. $8 \times 40 =$ _____ 5. ____ $= 4 \times 60$

Find the product.

6. $\begin{array}{r} 80 \\ \times\ 9 \\ \hline \end{array}$

7. $\begin{array}{r} 70 \\ \times\ 7 \\ \hline \end{array}$

8. $\begin{array}{r} 90 \\ \times\ 4 \\ \hline \end{array}$

9. $\begin{array}{r} 60 \\ \times\ 8 \\ \hline \end{array}$

Math Talk **Mathematical Practices**

Explain how you can use place value to solve Exercise 9.

Name _____

On Your Own

Find the product. Use base-ten blocks or draw a quick picture on your MathBoard.

10. $2 \times 70 =$ ____ **11.** $8 \times 50 =$ ____ **12.** ____ $= 3 \times 90$ **13.** $2 \times 80 =$ ____

Find the product.

14. 80×3 **15.** 60×9 **16.** 90×8 **17.** 80×8

Practice: Copy and Solve Find the product.

18. 6×70 **19.** 9×90 **20.** 70×8 **21.** 90×7

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** **Find the unknown factor.**

22. $a \times 80 = 480$ $a =$ ____ **23.** $b \times 30 = 30$ $b =$ ____ **24.** $7 \times \square = 420$ $\square =$ ____ **25.** $50 \times \triangle = 0$ $\triangle =$ ____

Problem Solving • Applications Real World

26. THINK SMARTER Ava's class bought 6 packages of balloons for a school celebration. Each package had 30 balloons. If 17 balloons were left over, how many balloons were used for the party?

_____

27. **Sense or Nonsense?** Lori says that 8 is not a factor of 80 because 8 does not end in zero. Does Lori's statement make sense? Explain.

_____

28. MATHEMATICAL PRACTICE 4 **Model Mathematics** The book club members read 200 books in all. Each member read 5 books. Write an equation to find the number of members in the book club. Use a letter to stand for the unknown factor.

_____

Unlock the Problem Real World

29. GO DEEPER Frank has a 2-digit number on his baseball uniform. The number is a multiple of 10 and has 3 for one of its factors. What three numbers could Frank have on his uniform?

a. What do you need to find?

_____

b. What information do you need to use?

_____

c. How can you solve the problem?

d. Complete the sentences.

Frank has a _____ on his uniform.

The number is a multiple of _____.

One factor of the number is _____.

Frank could have _____, _____, or _____ on his uniform.

Personal Math Trainer

30. THINK SMARTER + Baker Farm grows and sells carrots to local grocery stores. The stores bundle the carrots to sell. Which grocery store bought the greatest number of carrots from Baker Farm? How many carrots did the store buy?

Grocery Store	Number of Carrots in 1 Bundle	Number of Bundles
Buy–More Foods	6	90
Lower Price Foods	8	60
Yummy Foods	7	80
Healthy Foods	9	70

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 5 Review/Test

1. The camping club wants to rent rafts. Each raft can hold 8 people. Which equation could be used to find how many rafts are needed for 32 people?

   (A) $8 \times 32 = \square$

   (B) $32 \times \square = 8$

   (C) $\square \times 8 = 32$

   (D) $32 \times 8 = \square$

2. Select the equations that show the Distributive Property. Mark all that apply.

   (A) $8 \times 20 = 8 \times (10 + 10)$

   (B) $5 \times 60 = 5 \times (20 + 40)$

   (C) $30 \times 6 = 6 \times 30$

   (D) $9 \times (4 + 3) = 9 \times 7$

3. Choose the number from the box that makes the sentence true.

   A library has 48 shelves of fiction books. There are 6 shelves in each cabinet.

   There are | 7 / 8 / 9 | cabinets of fiction books in the library.

GO DIGITAL Assessment Options
Chapter Test

4. For numbers 4a–4d, choose True or False for each equation.

4a.	$5 \times (4 + 4) = 8 \times 5$	○ True	○ False
4b.	$8 \times (3 + 3) = 8 \times 5$	○ True	○ False
4c.	$(3 \times 5) + (5 \times 5) = 8 \times 5$	○ True	○ False
4d.	$(3 \times 2) + (8 \times 3) = 8 \times 5$	○ True	○ False

5. Alya planted 30 trays of flowers. Each tray held 8 flowers. Javon planted 230 flowers. Did Alya plant more flowers than Javon, the same number of flowers as Javon, or fewer flowers than Javon?

Ⓐ She planted more flowers than Javon.

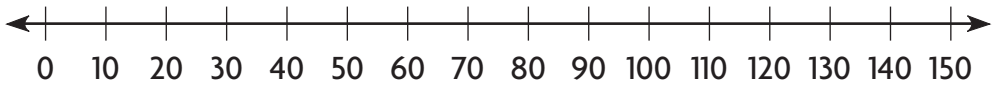
Ⓑ She planted the exact same number of flowers as Javon.

Ⓒ She planted fewer flowers than Javon.

6. For numbers 6a–6d, choose Yes or No to show whether the unknown factor is 6.

6a.	$4 \times \square = 32$	○ Yes	○ No
6b.	$\square \times 6 = 36$	○ Yes	○ No
6c.	$8 \times \square = 49$	○ Yes	○ No
6d.	$\square \times 30 = 180$	○ Yes	○ No

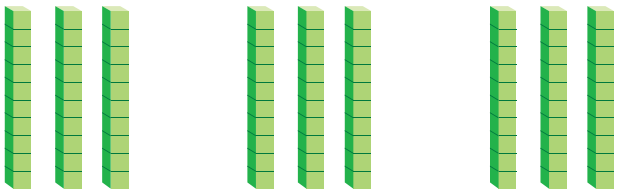
7. Each train can carry 20 cars. Use the number line to find how many cars 6 trains can carry.



_____ cars

Name _____

8. Samantha made this multiplication model. Complete the equation that represents the model.



_____ × _____ = _____

9. A printer prints newsletters for many groups every month. Which group uses the greatest number of pieces of paper?

Group	Number of pieces of paper in newsletter	Number of copies of newsletter printed
Garden Ladies	5	70
Book Lovers Club	6	80
Model Train Fans	7	60
Travel Club	8	50

_____

10. A store has 30 boxes of melons. Each box holds 4 bags. Each bag holds 2 melons. What is the total number of melons in the store?

_____ melons

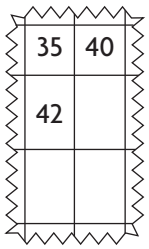
11. Heather's puppy weighs 23 pounds. He has been gaining 3 pounds every month as he grows. If this pattern continues, how much will the puppy weigh 5 months from now?

_____

12. Tim describes a pattern. He says the rule for the pattern shown in the table is "Add 3." Is his rule correct? Explain how you know.

Packages	1	2	3	4	5
Markers	4	8	12	16	20

13. This shows a part of a multiplication table. Find the missing numbers. Explain how you found the numbers.



14. Find a rule for this table.

Tanks	3	4	5	6	7
Fish	240	320	400	480	560

Rule: _____

How would the table change if the rule was "Multiply by 8"? Explain.

Name _____

15. Devon has 80 books to pack in boxes. She packs 20 books in each box. How many boxes does she need?

Write an equation using the letter n to stand for the unknown factor. Explain how to find the unknown factor.

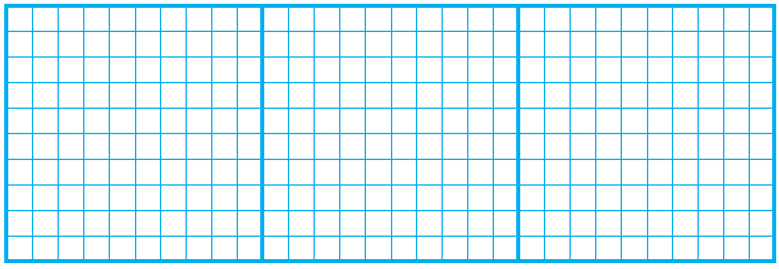
_____

_____

_____

16. The bookstore has 6 shelves of books about animals. There are 30 books on each shelf. How many books about animals does the bookstore have?

Shade squares to make a diagram to show how you can use the Distributive Property to find the number of books about animals in the bookstore.



_____ animal books

17. Cody saves all his nickels. Today he is getting them out of his piggy bank and wrapping them to take to the bank. He finds he has 360 nickels. It takes 40 nickels to fill each paper wrapper and make a roll. How many wrappers does he need?

Part A

Write an equation using n for the unknown factor. Find the number of rolls needed.

_____ × _____ = _____

Part B

Explain how you solved this problem and how you know your answer is correct.

_____

_____

_____

_____

18. Ruben is collecting cans for the recycling contest at school. He makes two plans to try to collect the most cans.

Plan A: Collect 20 cans each week for 9 weeks.

Plan B: Collect 30 cans each week for 7 weeks.

Part A

Which plan should Ruben choose? _____

Part B

Explain how you made your choice.

_____

_____

_____

_____

_____

Chapter 6

Understand Division

Show What You Know

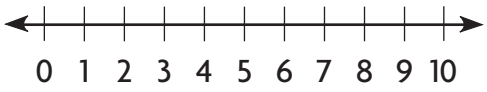
Check your understanding of important skills.

Name _____

▶ Count Back to Subtract Use the number line. Write the difference.

1. $8 - 5 =$ _____

2. $9 - 4 =$ _____



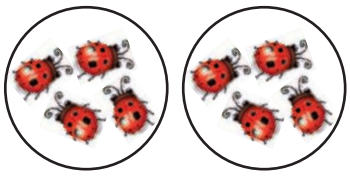
▶ Count Equal Groups Complete.

3.

_____ groups

_____ in each group

4.



_____ groups

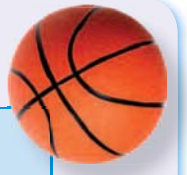
_____ in each group

▶ Multiplication Facts Through 9 Find the product.

5. $8 \times 5 =$ _____ **6.** _____ $= 7 \times 7$ **7.** $3 \times 9 =$ _____

Math Detective

The table shows 3 different ways you can score points in basketball. Corina scored 12 points in a basketball game. Be a Math Detective to find the greatest number of field goals she could have scored. Then find the greatest number of 3-pointers she could have scored.

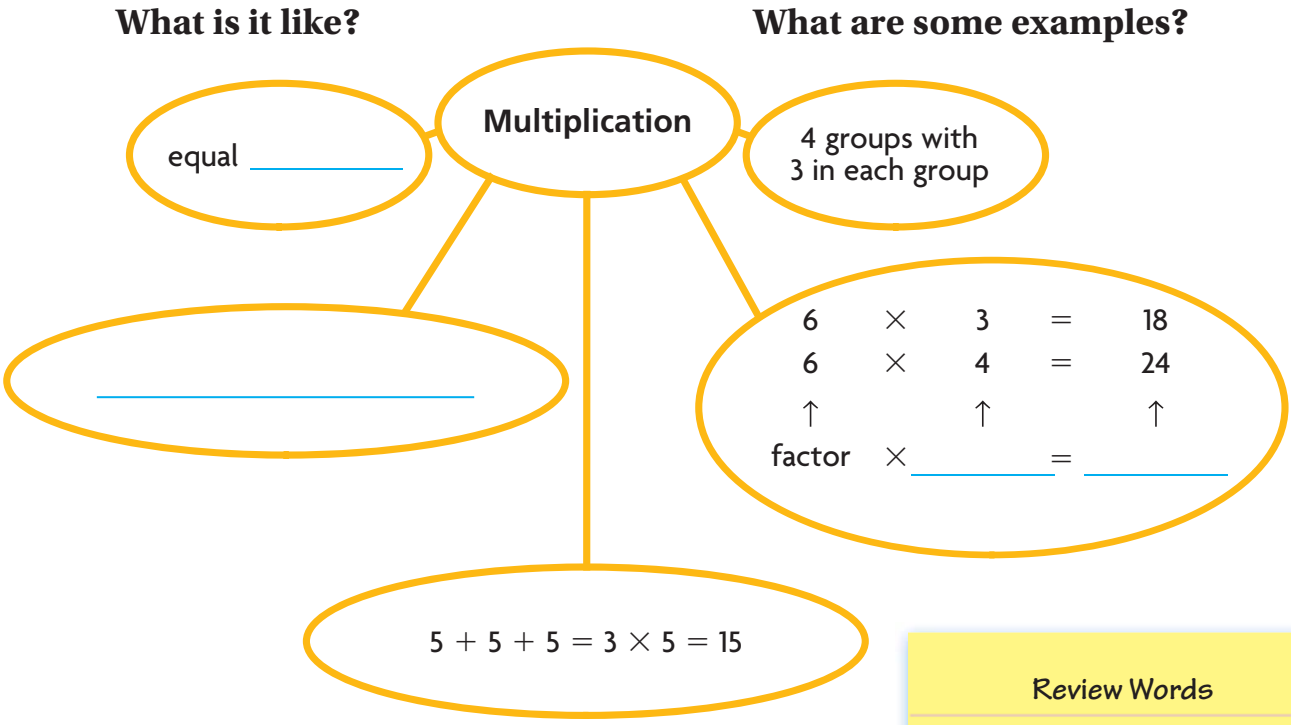


Scoring Points in Basketball	
free throw	1 point
field goal	2 points
3-pointer	3 points

Vocabulary Builder

Visualize It

Complete the bubble map by using the words with a ✓ .



Understand Vocabulary

Draw a line to match each word or term with its definition.

Preview Words	Definitions
1. dividend	A set of related multiplication and division equations
2. related facts	The number that divides the dividend
3. divisor	The number that is to be divided in a division problem

Review Words

- array
- ✓ equal groups
- equation
- ✓ factor
- Identity Property of Multiplication
- ✓ product
- ✓ repeated addition

Preview Words

- divide
- dividend
- divisor
- inverse operations
- quotient
- related facts

Name _____

Problem Solving • Model Division

Essential Question How can you use the strategy *act it out* to solve problems with equal groups?

Operations and Algebraic Thinking—3.OA.3 *Also 3.OA.2*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.7

Unlock the Problem

Real World

Stacy has 16 flowers. She puts an equal number of flowers in each of 4 vases. How many flowers does Stacy put in each vase?

Use the graphic organizer below to solve the problem.

Read the Problem

What do I need to find?

I need to find the number

of _____ Stacy puts in

each _____.

What information do I need to use?

Stacy has _____ flowers.
She puts an equal number of flowers in each of

_____ vases.

How will I use the information?

I will act out the problem

by making equal _____ with counters.

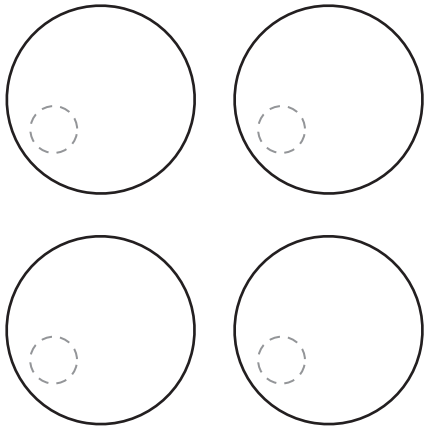
Solve the Problem

Describe how to act out the problem to solve.

First, count out _____ counters.

Next, make _____ equal groups. Place 1 counter at a time in each group until all 16 counters are used.

Last, draw the equal groups by completing the picture below.



So, Stacy puts _____ flowers in each vase.

Try Another Problem

Jamal is at the pet store. He buys 21 dog treats. If he plans to give each dog 3 treats, how many dogs does he feed?

Read the Problem	Solve the Problem
What do I need to find?	**Describe how to act out the problem to solve.**
What information do I need to use?	
How will I use the information?	

- How can you check your answer is reasonable? _____

_____

_____

Math Talk

Mathematical Practices

Explain how acting out a problem helps you solve it.

Name _____

Unlock the Problem

- Use the Problem Solving MathBoard
- Underline important facts.
- Choose a strategy you know.

Share and Show

MATH BOARD

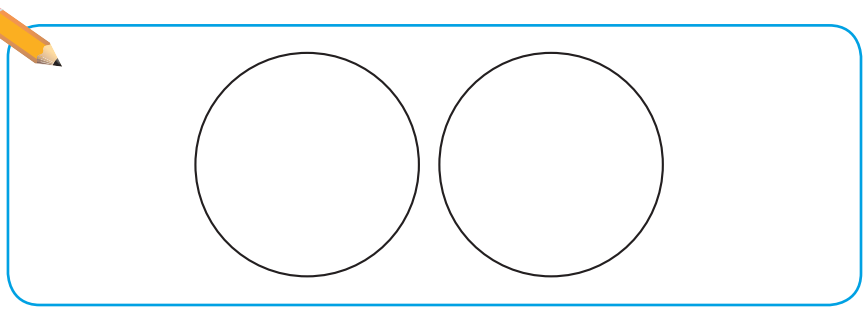
1. Mariana is having a party. She has 16 cups. She puts them in 2 equal stacks. How many cups are in each stack?

First, decide how to act out the problem.

You can use counters to represent the _____.

You can draw _____ to represent the stacks.

Then, draw to find the number of _____ in each stack.



There are _____ groups. There are _____ counters in each group.

So, there are _____ cups in each stack.

2. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** What if Mariana has 24 cups and puts 4 cups in each stack? If she already made 4 stacks, how many more stacks can she make with the remaining cups?

_____

On Your Own

3. THINK SMARTER At Luke's school party, the children get into teams of 5 to play a game. If there are 20 boys and 15 girls, how many teams are there?

_____

4. GO DEEPER Anne put 20 party hats and 20 balloons on 4 tables. If she put the same number on each one, how many hats and balloons did she put on each table?

_____

Use the table for 5–6.

Sadie's Party Supplies	
Item	**Number**
Plates	30
Napkins	28
Cups	24

5. Sadie's plates came in packages of 5. How many packages of plates did she buy?

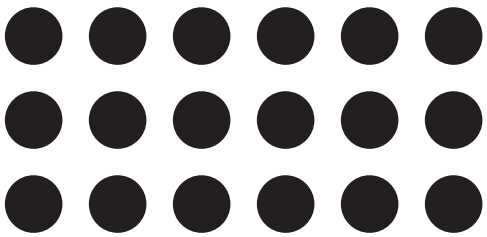
6. MATHEMATICAL PRACTICE 6 **Explain a Method** Sadie bought 4 packages of napkins and 3 packages of cups. Which item had more in each package? How many more? Explain how you found your answer.

7. Megan put 3 red balloons and 4 white balloons at each of 4 tables. How many balloons are at the tables?

WRITE Math
Show Your Work

Personal Math Trainer

8. THINK SMARTER Miguel bought 18 party favors. He gave 2 party favors to each of the children at his party. How many children were at Miguel's party?



Ring equal groups to model the problem.

_____ children

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Size of Equal Groups

Essential Question How can you model a division problem to find how many in each group?

Operations and Algebraic Thinking—3.OA.2
Also 3.OA.3

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.7

Unlock the Problem

Real World

Hands On

Hector has 12 rocks from a nearby state park. He puts an equal number of his rocks in each of 3 boxes. How many rocks are in each box?

- What do you need to find?

_____

- Circle the numbers you need to use.

When you multiply, you put equal groups together. When you **divide**, you separate into equal groups.

You can divide to find the number in each group.

Activity Use counters to model the problem.

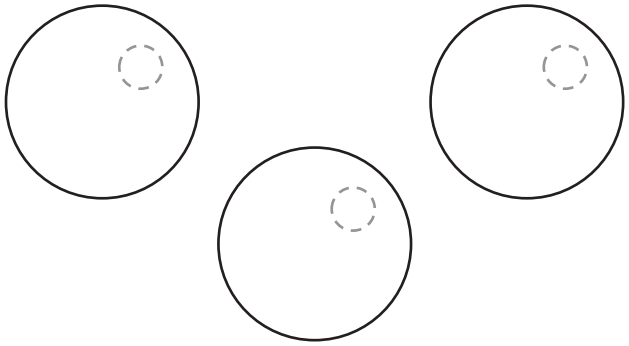
Materials ■ counters ■ MathBoard

STEP 1

Use 12 counters.

STEP 2

Draw 3 circles on your MathBoard. Place 1 counter at a time in each circle until all 12 counters are used. Draw the rest of the counters to show your work.



There are _____ counters in each group.

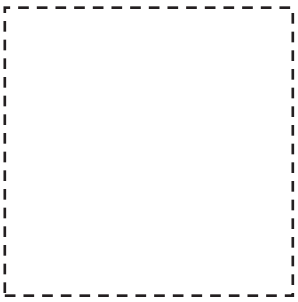
So, there are _____ rocks in each box.

Try This!

Madison has 15 rocks. She puts an equal number of rocks in each of 5 boxes. How many rocks are in each box?

STEP 1

Draw 5 squares to show 5 boxes.



STEP 2

Draw 1 counter in each square to show the rocks. Continue drawing 1 counter at a time in each box until all 15 counters are drawn.

There are _____ counters in each group.

So, there are _____ rocks in each box.

Mathematical Practices

Describe another way to arrange 15 counters to make equal groups.

1. How many counters did you draw? _____
2. How many equal groups did you make? _____
3. How many counters are in each group? _____

Name _____

Share and Show

MATH BOARD

1. Jon has 8 counters. He makes 4 equal groups. Draw a picture to show the number of counters in each group.

Math Talk — **Mathematical Practices**

Explain how you made the groups equal.

Use counters or draw a quick picture on your MathBoard. Make equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
2.	10	2	
3.	24	6	

On Your Own

Use counters or draw a quick picture on your MathBoard. Make equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
4.	14	7	
5.	21	3	

6. GO DEEPER Cameron and Jody collected 20 stamps. Cameron says they can put an equal number of stamps on 5 pages of their album. Jody says they can put an equal number on 4 pages. Whose statement makes sense? Explain.

_____

_____

Problem Solving • Applications Real World

Use the table for 7–8.

Photos	
Name	**Number of Photos**
Madison	28
Joe	25
Ella	15

7. Madison puts all of her photos in a photo album. She puts an equal number of photos on each of 4 pages in her album. How many photos are on each page?

_____

8. THINK SMARTER Joe and Ella combine their photos. Then they put an equal number on each page of an 8-page photo album. How many photos are on each page?

_____

9. MATHEMATICAL PRACTICE 3 **Make Arguments** Rebekah found 28 sea shells. Can she share the sea shells equally among the 6 people in her family? Explain.

_____

_____

_____

_____

10. THINK SMARTER Zana has 9 rocks from a trip. She puts an equal number of rocks in each of 3 bags. How many rocks are in each bag?

Circle the amount to complete the sentence.

There are | 3 | 6 | 12 | 27 | rocks in each bag.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Number of Equal Groups

Essential Question How can you model a division problem to find how many equal groups?

Operations and Algebraic Thinking—3.OA.2
Also 3.OA.3

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.7

CONNECT You have learned how to divide to find the number in each group. Now you will learn how to divide to find the number of equal groups.

Unlock the Problem

Real World

Hands On

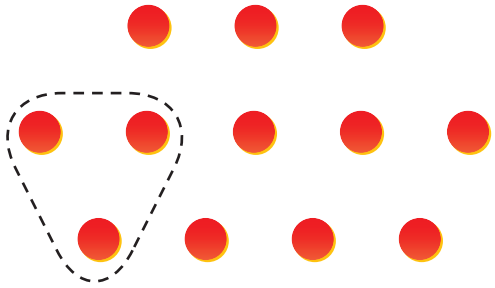
Juan has 12 shells and some boxes. He wants to put his shells in groups of 3. How many boxes does he need for his shells?

- Underline what you need to find.
- How many shells does Juan want to put in each group?

_____

Make equal groups.

- Look at the 12 counters.
- Circle a group of 3 counters.
- Continue circling groups of 3 until all 12 counters are in groups.



There are _____ groups of counters.

So, Juan needs _____ boxes for his shells.

Math Talk **Mathematical Practices**

Explain how the drawing would change if Juan wanted to put his shells in groups of 4.

Try This!

Sarah has 15 shells. She wants to put each group of 5 shells in a box. How many boxes does she need for her shells?

STEP 1

Draw 15 counters.

STEP 2

Make a group of 5 counters by drawing a circle around them. Continue circling groups of 5 until all 15 counters are in groups.

There are _____ groups of 5 counters.

So, Sarah needs _____ boxes for her shells.

- THINK SMARTER What if Sarah puts her 15 shells in groups of 3?

  How many boxes does she need? _____
  Draw a quick picture to show your work.

Name _____

Share and Show

MATH BOARD

1. Tamika has 12 counters. She puts them in groups of 2. Draw a picture to show the number of groups.

Hands On

Math Talk

Mathematical Practices

Explain how you find the number of equal groups when you divide.

Draw counters on your MathBoard. Then circle equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
2.	20		4
3.	24		3

On Your Own

Draw counters on your MathBoard. Then circle equal groups. Complete the table.

	Counters	Number of Equal Groups	Number in Each Group
4.	18		2
5.	16		8

6. THINK SMARTER A store has 18 red beach balls and 17 green beach balls in boxes of 5 beach balls each. How many boxes of beach balls are at the store?

_____

Math on the Spot

Unlock the Problem Real World

7. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** A store has 24 beach towels in stacks of 6 towels each. How many stacks of beach towels are at the store?

a. What do you need to find? _____

_____

b. How will you use what you know about making equal groups to solve the problem? _____

_____

c. Draw equal groups to find how many stacks of beach towels there are at the store.

d. Complete the sentences.

The store has _____ beach towels.

There are _____ towels in each stack.

So, there are _____ stacks of beach towels at the store.

8. GO DEEPER Write a problem about dividing beach toys into equal groups. Then solve the problem.

_____

_____

_____

_____

9. THINK SMARTER Dan's train is 27 inches long. If each train car is 3 inches long, how many train cars are there?

Choose a number from the box to complete the sentence.

6
7
8
9

There are _____ train cars.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Model with Bar Models

Essential Question How can you use bar models to solve division problems?

Operations and Algebraic Thinking—3.OA.2
Also 3.OA.3

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.7

Unlock the Problem

Real World

Hands On

A dog trainer has 20 dog treats for 5 dogs in his class. If each dog gets the same number of treats, how many treats will each dog get?

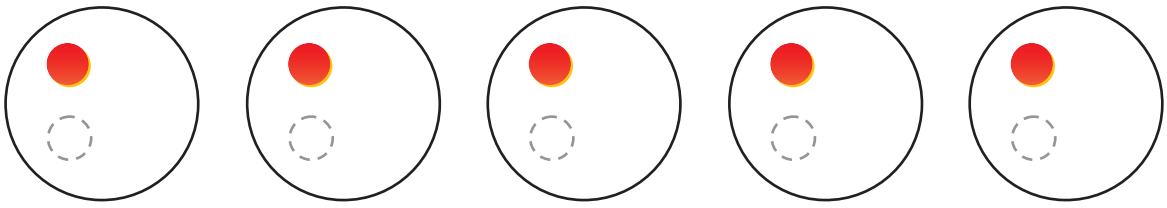
- What do you need to find?

_____

Activity 1 Use counters to find how many in each group.

Materials ■ counters ■ MathBoard

- Use 20 counters.
- Draw 5 circles on your MathBoard.
- Place 1 counter at a time in each circle until all 20 counters are used.
- Draw the rest of the counters to show your work.



There are ____ counters in each of the 5 groups.

A bar model can show how the parts of a problem are related.

- Complete the bar model to show 20 dog treats divided into 5 equal groups.

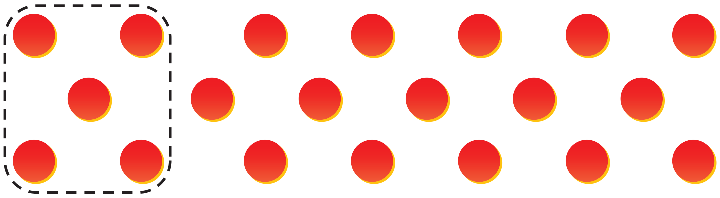
20 dog treats

So, each dog will get ____ treats.

Activity 2 Draw to find how many equal groups.

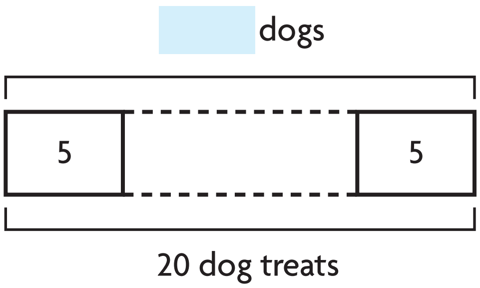
A dog trainer has 20 dog treats. If the dog trainer gives 5 treats to each dog in the class, how many dogs are in the class?

- Look at the 20 counters.
- Circle a group of 5 counters.
- Continue circling groups of 5 until all 20 counters are in groups.



There are ______ groups of 5 counters.

- Complete the bar model to show 20 treats divided into groups of 5 treats.



So, there are ______ dogs in the class.

Here are two ways to record division.

Write: 20 ÷ 5 = 4, where 20 is the **dividend**, 5 is the **divisor**, and 4 is the **quotient**.

divisor → $5\overline{)20}$ with 4 ← quotient written above; 20 is the dividend.

Read: Twenty divided by five equals four.

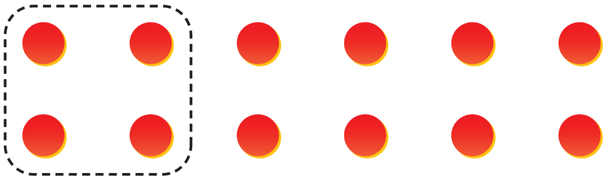
Math Talk — Mathematical Practices

Describe how you solved the problem. Use the terms *dividend, divisor,* and *quotient* in your explanation.

Share and Show

MATH BOARD

1. Complete the picture to find 12 ÷ 4. ______



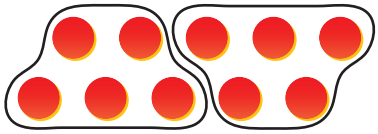
Math Talk — Mathematical Practices

Explain how you know how many groups to make.

Name _____

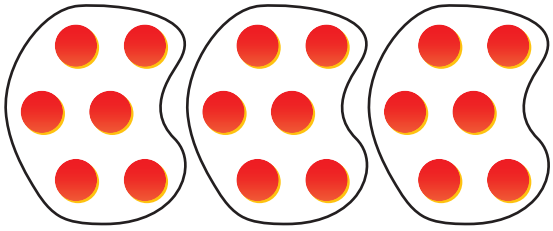
Write a division equation for the picture.

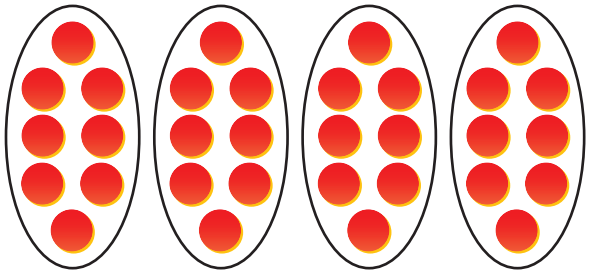
2. 

3. 

On Your Own

Write a division equation for the picture.

4. 

5. 

Practice: Copy and Solve **Make equal groups to find the quotient. Draw a quick picture to show your work.**

6. $20 \div 2$

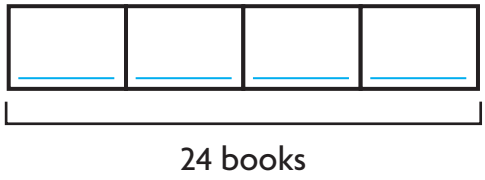
7. $27 \div 9$

8. $20 \div 5$

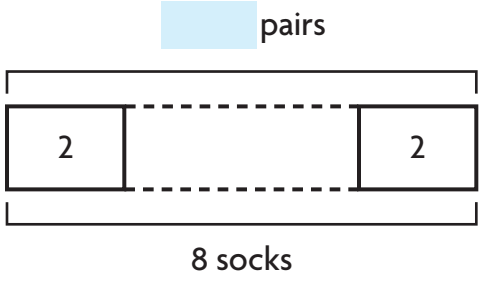
9. $18 \div 3$

Complete the bar model to solve. Then write a division equation for the bar model.

10. There are 24 books in 4 equal stacks. How many books are in each stack?



11. There are 8 matching socks. How many pairs of socks can you make?



Problem Solving • Applications

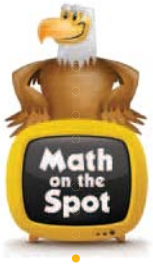
Use the table for 12–13.

Dog Treats

Type	Number in Box
Chew Sticks	14
Chewies	25
Dog Bites	30
Puppy Chips	45

12. MATHEMATICAL PRACTICE 4 **Write an Equation** Pat bought one box of Chew Sticks to share equally between his 2 dogs. Mia bought one box of Chewies to share equally among her 5 dogs. How many more treats will each of Pat's dogs get than each of Mia's dogs? Explain.

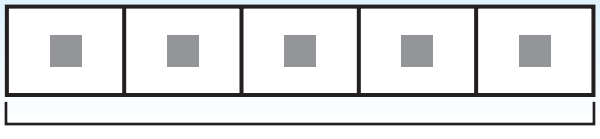
WRITE Math • Show Your Work



13. THINK SMARTER Kevin bought a box of Puppy Chips for his dog. If he gives his dog 5 treats each day, for how many days will one box of treats last?

14. GO DEEPER Write and solve a problem for $42 \div 7$ in which the quotient is the number of groups.

15. THINK SMARTER Ed buys 5 bags of treats. He buys 15 treats in all. How many treats are in each bag?



_____ treats

FOR MORE PRACTICE: Standards Practice Book

Name _____

Relate Subtraction and Division

Essential Question How is division related to subtraction?

Operations and Algebraic Thinking—
3.OA.3 *Also 3.OA.2, 3.OA.7*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.7, MP.8

Unlock the Problem

Serena and Mandy brought a total of 12 newspapers to school for the recycling program. Each girl brought in one newspaper each day. For how many days did the girls bring in newspapers?

- How many newspapers were brought in altogether?

_____

- How many newspapers did the two girls bring in altogether each day?

_____

One Way Use repeated subtraction.

- Start with 12.
- Subtract 2 until you reach 0.
- Count the number of times you subtract 2.

12 − 2 = 10	10 − 2 = 8	8 − 2 = ☐	6 − 2 = ☐	4 − 2 = ☐	2 − 2 = ☐
Number of times you subtract 2: 1	2	3	4	5	6

ERROR Alert
Be sure to keep subtracting 2 until you are unable to subtract 2 anymore.

Since you subtract 2 six times,

there are _____ groups of 2 in 12.

So, Serena and Mandy brought in

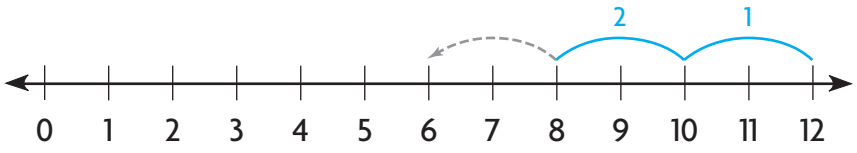
newspapers for _____ days.

Write: $12 \div 2 = 6$ or $2\overline{)12}\,\overset{6}{}$

Read: Twelve divided by two equals six.

Another Way Count back on a number line.

- Start at 12.
- Count back by 2s as many times as you can. Draw the rest of the jumps on the number line.
- Count the number of times you jumped back 2.



You jumped back by 2 six times.

There are ____ jumps of 2 in 12.

$12 \div 2 =$ ____

Math Talk **Mathematical Practices**

Explain in your own words how you found the answer.

- What do your jumps of 2 represent? _____

_____

Share and Show

MATH BOARD

1. Draw the rest of the jumps on the number line to complete the division equation. $12 \div 4 =$ ____

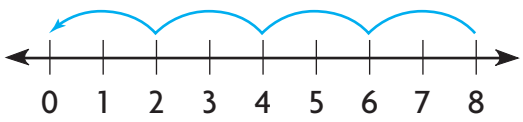
Math Talk **Mathematical Practices**

Explain how counting back on a number line is like using repeated subtraction.

Write a division equation.

2. $\begin{array}{r} 10 \\ -\ 5 \\ \hline 5 \end{array}$ $\begin{array}{r} 5 \\ -\ 5 \\ \hline 0 \end{array}$

_____

3. 

_____

Name _____

On Your Own

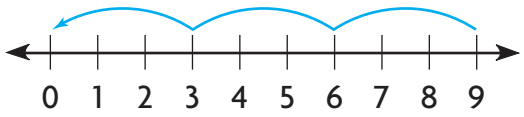
Write a division equation.

4.

$$\begin{array}{r} 28 \\ -\ 7 \\ \hline 21 \end{array} \quad \begin{array}{r} 21 \\ -\ 7 \\ \hline 14 \end{array} \quad \begin{array}{r} 14 \\ -\ 7 \\ \hline 7 \end{array} \quad \begin{array}{r} 7 \\ -\ 7 \\ \hline 0 \end{array}$$

_____

5.



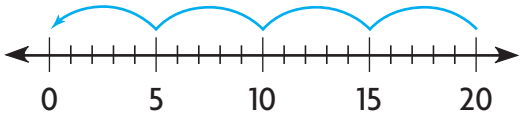
_____

6.

$$\begin{array}{r} 24 \\ -\ 8 \\ \hline 16 \end{array} \quad \begin{array}{r} 16 \\ -\ 8 \\ \hline 8 \end{array} \quad \begin{array}{r} 8 \\ -\ 8 \\ \hline 0 \end{array}$$

_____

7.



_____

8. THINK SMARTER Write a word problem that can be solved by using one of the division equations above.

_____

_____

Use repeated subtraction or a number line to solve.

9. $18 \div 6 =$ _____

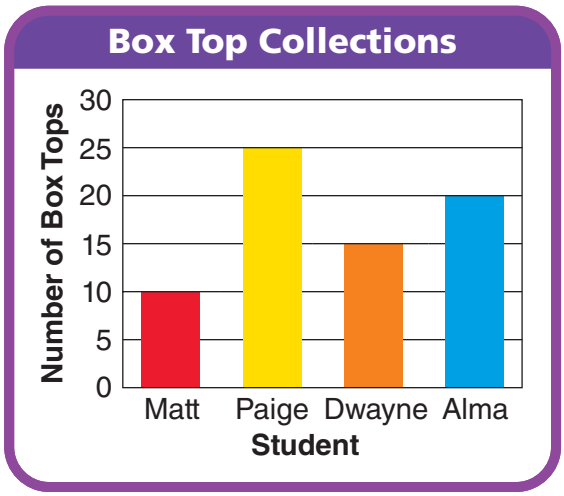
10. $14 \div 7 =$ _____

11. $9\overline{)27}$

12. $3\overline{)24}$

Problem Solving • Applications

Use the graph for 13–15.



13. MATHEMATICAL PRACTICE 1 **Analyze** Matt puts his box tops in 2 equal piles. How many box tops are in each pile?

_____

14. THINK SMARTER Paige brought an equal number of box tops to school each day for 5 days. Alma also brought an equal number of box tops each day for 5 days. How many box tops did the two students bring in altogether each day? Explain.

WRITE Math • Show Your Work

_____

_____

_____

15. GO DEEPER Dwayne collects another 15 box tops and puts all his box tops into bins. He puts an equal number in each bin. The answer is 5. What's the question?

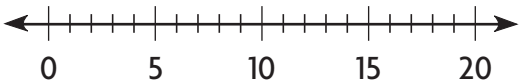
_____

_____

Personal Math Trainer

16. THINK SMARTER + Maya collected 4 box tops each day. She collected 20 box tops in all. For how many days did Maya collect box tops?

Draw jumps on the number line to model the problem.



_____ days

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box to complete the sentence.

Vocabulary
divide
divisor

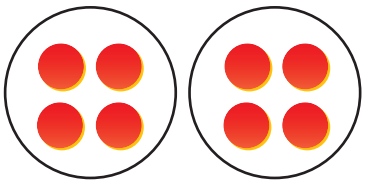
1. You _____ when you separate into equal groups. (p. 223)

Concepts and Skills

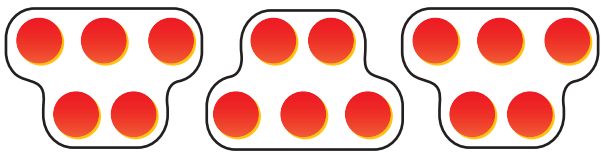
Use counters or draw a quick picture on your MathBoard. Make or circle equal groups. Complete the table. (3.OA.2)

	Counters	Number of Equal Groups	Number in Each Group
2.	6	2	
3.	30		5
4.	28	7	

Write a division equation for the picture. (3.OA.2)

5. 

_____

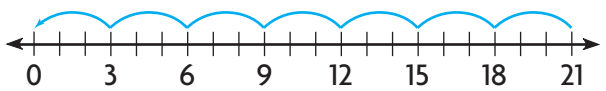
6. 

_____

Write a division equation. (3.OA.3)

7. $36 - 9 = 27$; $27 - 9 = 18$; $18 - 9 = 9$; $9 - 9 = 0$

_____

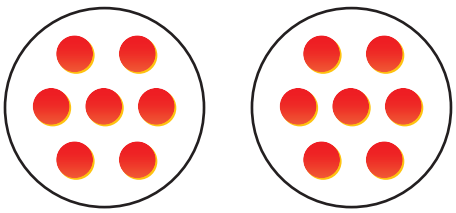
8. 

_____

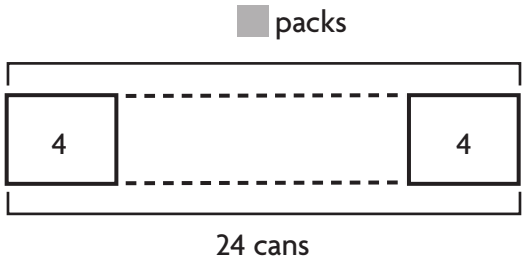
9. Victor plants 14 seeds in some flowerpots. If he puts 2 seeds in each pot, how many flowerpots does he use? (3.OA.2)

10. Desiree has 20 stickers. She gives the same number of stickers to each of 5 friends. What equation can be used to find the number of stickers each friend receives? (3.OA.3)

11. Jayden modeled a division equation with some counters. What division equation matches the model? (3.OA.2)



12. Lillian bought 24 cans of cat food. There were 4 cans in each pack. How many packs of cat food did Lillian buy? (3.OA.2)



Name _____

Model with Arrays

Essential Question How can you use arrays to solve division problems?

Operations and Algebraic Thinking—3.OA.3 *Also 3.OA.2*

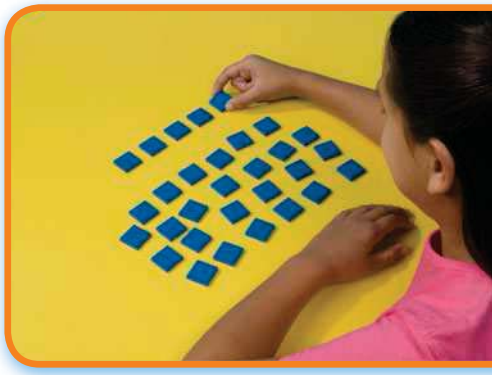
MATHEMATICAL PRACTICES
MP.4, MP.6, MP.7, MP.8

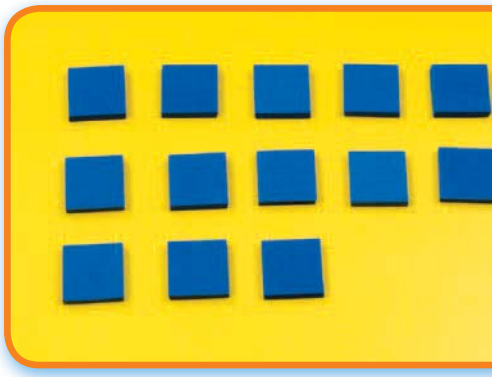
Investigate

Hands On

Materials ■ square tiles

You can use arrays to model division and find equal groups.





A. Count out 30 tiles. Make an array to find how many rows of 5 are in 30.

B. Make a row of 5 tiles.

C. Continue to make as many rows of 5 tiles as you can.

How many rows of 5 did you make? _____

Draw Conclusions

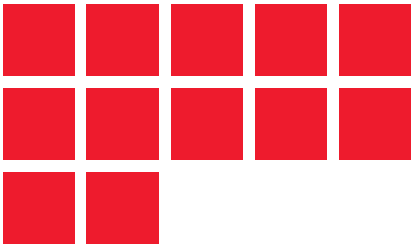
1. Explain how you used the tiles to find the number of rows of 5 in 30.

2. What multiplication equation could you write for the array? Explain.

3. Tell how to use an array to find how many rows of 6 are in 30.

Make Connections

You can write a division equation to show how many rows of 5 are in 30. Show the array you made in Investigate by completing the drawing below.



Math Idea

You can divide to find the number of equal rows or to find the number in each row.

$30 \div 5 = \square$

There are _____ rows of 5 tiles in 30.

So, $30 \div 5 =$ _____.

Try This!

Count out 24 tiles. Make an array with the same number of tiles in 4 rows. Place 1 tile in each of the 4 rows. Then continue placing 1 tile in each row until you use all the tiles. Draw your array below.

Mathematical Practices

Explain how making an array helps you divide.

- How many tiles are in each row? _____
- What division equation can you write for your array? _____

Name _____

Share and Show

MATH BOARD

Hands On

Use square tiles to make an array. Solve.

1. How many rows of 3 are in 18?

_____

2. How many rows of 6 are in 12?

_____

3. How many rows of 7 are in 21?

_____

4. How many rows of 8 are in 32?

_____

Make an array. Then write a division equation.

5. 25 tiles in 5 rows

_____

6. 14 tiles in 2 rows

_____

7. 28 tiles in 4 rows

_____

8. 27 tiles in 9 rows

_____

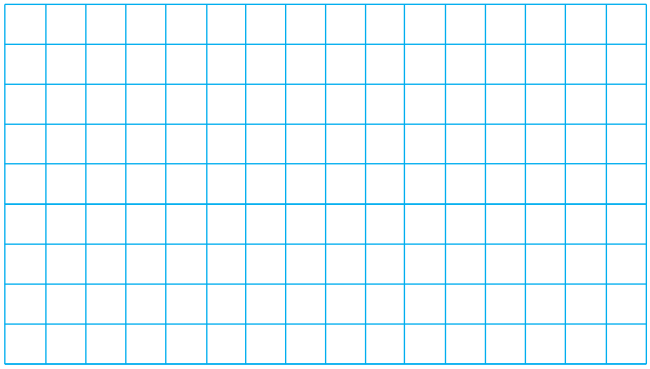
Problem Solving • Applications

9. THINK SMARTER Tell how to use an array to find how many rows of 8 are in 40.

_____

_____

10. MATHEMATICAL PRACTICE 4 **Model Mathematics** Show two ways you could make an array with tiles for 18 ÷ 6. Shade squares on the grid to record the arrays.



Unlock the Problem Real World

11. MATHEMATICAL PRACTICE 7 **Look for Structure** Thomas has 28 tomato seedlings to plant in his garden. He wants to plant 4 seedlings in each row. How many rows of tomato seedlings will Thomas plant?

a. What do you need to find? _____

_____

b. What operation could you use to solve the problem? _____

_____

c. Draw an array to find the number of rows of tomato seedlings.

d. What is another way you could have solved the problem?

_____

_____

e. Complete the sentences.

Thomas has _____ tomato seedlings.

He wants to plant _____

seedlings in each _____.

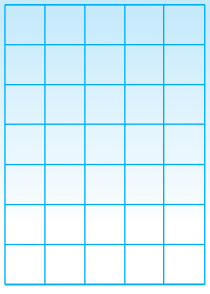
So, Thomas will plant _____ rows of tomato seedlings.

12. GO DEEPER There were 20 plants sold at a store on Saturday, and 30 plants sold at the store on Sunday. Customers bought 5 plants each. How many customers in all bought the plants?

_____

13. THINK SMARTER Paige walked her dog 15 times in 5 days. She walked him the same number of times each day. How many times did Paige walk her dog each day?

Shade squares to make an array to model the problem.



_____ times

FOR MORE PRACTICE: Standards Practice Book

Name _____

Relate Multiplication and Division

Essential Question How can you use multiplication to divide?

Operations and Algebraic Thinking—3.OA.6 *Also 3.OA.2, 3.OA.3, 3.OA.4, 3.OA.7*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.7, MP.8

Unlock the Problem Real World

Pam went to the fair. She went on the same ride 6 times and used the same number of tickets each time. She used 18 tickets. How many tickets did she use each time she went on the ride?

- What do you need to find?

_____

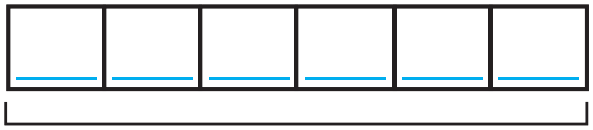
_____

- Circle the numbers you need to use.

One Way Use bar models.

You can use bar models to understand how multiplication and division are related.

Complete the bar model to show 18 tickets divided into 6 equal groups.



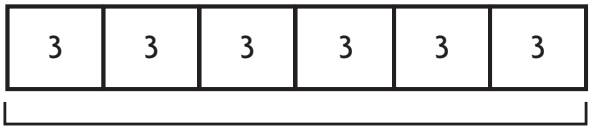
18 tickets

Write: 18 ÷ 6 = _____

So, Pam used _____ tickets each time she went on the ride.

What if the problem said Pam went on the ride 6 times and used 3 tickets each time? How many tickets did Pam use in all?

Complete the bar model to show 6 groups of 3 tickets.



_____ tickets

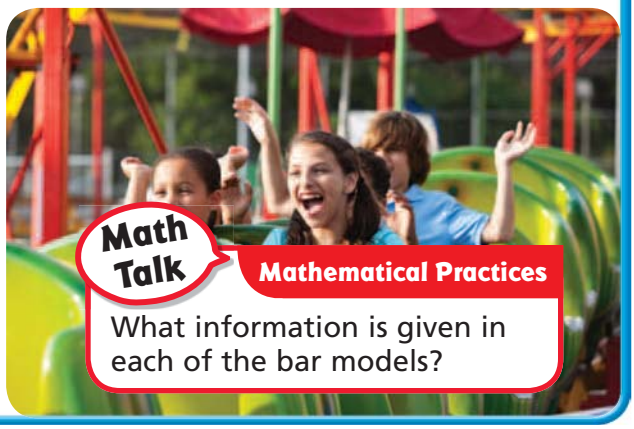
Write: 6 × 3 = _____

Multiplication and division are opposite operations, or **inverse operations**.

You can think about multiplication to solve a division problem.

To solve 18 ÷ 6 = ■, think 6 × ■ = 18.

Since 6 × 3 = 18, then 18 ÷ 6 = 3.



Math Talk **Mathematical Practices**

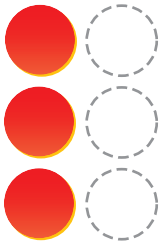
What information is given in each of the bar models?

Another Way Use an array.

Hands On

You can use an array to see how multiplication and division are related.

Show an array with 18 counters in 3 equal rows by completing the drawing.



There are _____ counters in each row.

Write: 18 ÷ 3 = _____

The same array can be used to find the total number if you know there are 3 rows with 6 counters in each row.

Write: 3 × 6 = _____

Share and Show

MATH BOARD

1. Use the array to complete the equation.

Think: There are 3 counters in each row.

6 ÷ 2 = _____

Math Talk Mathematical Practices

Describe another way to find the quotient for 6 ÷ 2.

Complete.

2.

3 rows of _____ = 15

3 × _____ = 15

15 ÷ 3 = _____

3.

2 rows of _____ = 12

2 × _____ = 12

12 ÷ 2 = _____

4.

3 rows of _____ = 21

3 × _____ = 21

21 ÷ 3 = _____

Complete the equations.

5. 5 × _____ = 40 40 ÷ 5 = _____

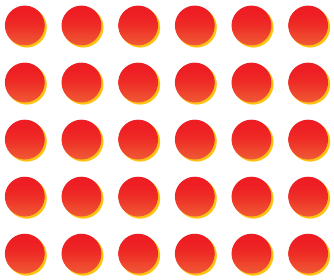
6. 6 × _____ = 18 18 ÷ 6 = _____

Name _____

On Your Own

Complete.

7.

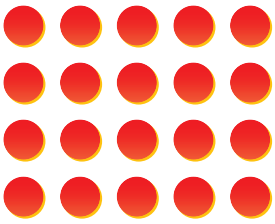


5 rows of ____ = 30

5 × ____ = 30

30 ÷ 5 = ____

8.

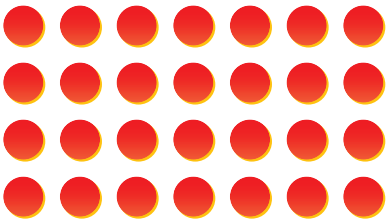


4 rows of ____ = 20

4 × ____ = 20

20 ÷ 4 = ____

9.



4 rows of ____ = 28

4 × ____ = 28

28 ÷ 4 = ____

Complete the equations.

10. 7 × ____ = 21 21 ÷ 7 = ____

11. 8 × ____ = 16 16 ÷ 8 = ____

12. 4 × ____ = 32 32 ÷ 4 = ____

13. 6 × ____ = 24 24 ÷ 6 = ____

MATHEMATICAL PRACTICE 6 **Attend to Precision** **Algebra** **Complete.**

14. 3 × 3 = 27 ÷ ____

15. 16 ÷ 2 = ____ × 2

16. 9 = ____ ÷ 4

17. 5 = ____ ÷ 7

18. 42 ÷ 7 = ____ × 2

19. 30 ÷ ____ = 2 × 3

20. Justin and Ivan went to the fair when all rides were $2 each. Each boy went on the same number of rides, and spent $10. How many rides did each boy go on?

_____

Problem Solving • Applications Real World

Use the table for 21–22.

Ventura County Fair	
Price of Admission	
Adults	$6
Students	$3
Children 5 and under free	

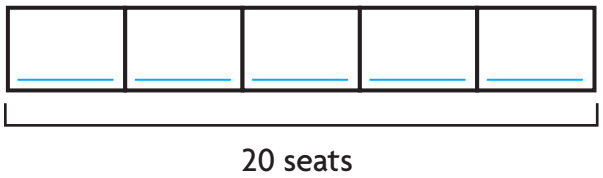
21. Mr. Jerome paid $24 for some students to get into the fair. How many students did Mr. Jerome pay for?

_____

22. THINK SMARTER Garrett is 8 years old. He and his family are going to the county fair. What is the price of admission for Garrett, his 2 parents, and baby sister?

_____

23. MATHEMATICAL PRACTICE 4 **Use a Diagram** There are 20 seats on the Wildcat ride. The number of seats in each car is the same. If there are 5 cars on the ride, how many seats are in each car? Complete the bar model to show the problem. Then answer the question.



_____

24. GO DEEPER How many days are there in 2 weeks? Write and solve a related word problem to represent the inverse operation.

_____

25. THINK SMARTER There are 35 prizes in 5 equal rows. How many prizes are in each row?

Complete each equation to represent the problem.

$5 \times$ ____ $= 35$ $35 \div 5 =$ ____

____ prizes

FOR MORE PRACTICE: Standards Practice Book

Name _____

Write Related Facts

Essential Question How can you write a set of related multiplication and division facts?

Operations and Algebraic Thinking—3.OA.7 *Also 3.OA.2, 3.OA.3*

MATHEMATICAL PRACTICES
MP.2, MP.6, MP.7, MP.8

Unlock the Problem

Related facts are a set of related multiplication and division equations. What related facts can you write for 2, 4, and 8?

- What model can you use to show how multiplication and division are related?

_____

Activity

Materials ■ square tiles

Hands On

STEP 1

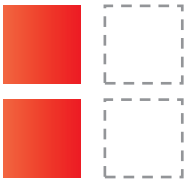
Use 8 tiles to make an array with 2 equal rows.

Draw the rest of the tiles.

How many tiles are in each row? _____

Write a division equation for the array using the total number of tiles as the dividend and the number of rows as the divisor.

_____ ÷ _____ = _____



Write a multiplication equation for the array.

_____ × _____ = _____

STEP 2

Now, use 8 tiles to make an array with 4 equal rows.

Draw the rest of the tiles.

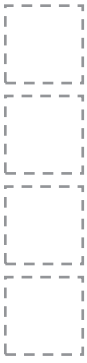
How many tiles are in each row? _____

Write a division equation for the array using the total number of tiles as the dividend and the number of rows as the divisor.

_____ ÷ _____ = _____

So, 8 ÷ 2 = _____, 2 × 4 = _____,

8 ÷ 4 = _____, and 4 × 2 = _____ are related facts.



Write a multiplication equation for the array.

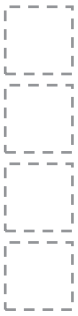
_____ × _____ = _____

Try This! **Draw an array with 4 rows of 4 tiles.**

Your array shows the related facts for 4, 4, and 16.

$4 \times 4 =$ _____ $16 \div 4 =$ _____

Since both factors are the same, there are only two equations in this set of related facts.



- MATHEMATICAL PRACTICE 6 **Attend to Precision** Write another set of related facts that has only two equations.

_____

Remember

4	×	4	=	16
↑		↑		↑
factor		factor		product

Share and Show

MATH BOARD

1. Complete the related facts for this array.

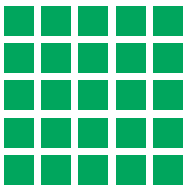
$2 \times 8 = 16$ $16 \div 2 = 8$

_____ _____

Math Talk **Mathematical Practices**

Look at the multiplication and division equations in a set of related facts. What do you notice about the products and dividends? **Explain**.

Write the related facts for the array.

2. 

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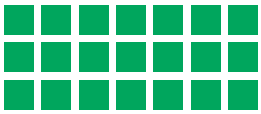
_____

3. 

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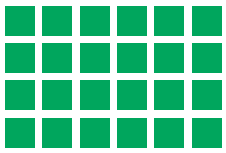
4. 

_____

_____

_____

_____

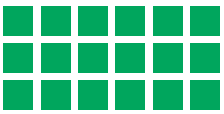
5. Why do the related facts for the array in Exercise 2 have only two equations?

_____

Name _____

On Your Own

Write the related facts for the array.

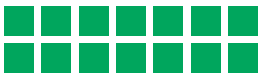
6. 

_____

_____

_____

_____

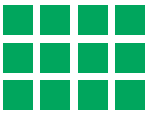
7. 

_____

_____

_____

_____

8. 

_____

_____

_____

_____

Write the related facts for the set of numbers.

9. 2, 5, 10

_____

_____

_____

_____

10. 3, 8, 24

_____

_____

_____

_____

11. 6, 6, 36

_____

_____

_____

_____

Complete the related facts.

12. $4 \times 7 =$ ____

$7 \times$ ____ $= 28$

$28 \div$ ____ $= 4$

$28 \div 4 =$ ____

13. $5 \times$ ____ $= 30$

$6 \times$ ____ $= 30$

$30 \div 6 =$ ____

$30 \div 5 =$ ____

14. ____ $\times 9 = 27$

____ $\times 3 = 27$

____ $\div 9 = 3$

$27 \div$ ____ $= 9$

15. Write a set of related facts that has only two equations. Draw an array to show the facts.

_____

Problem Solving • Applications (Real World)

Use the table for 16–17.

Clay Supplies	
Item	**Number in Package**
Clay	12 sections
Clay tool set	11 tools
Glitter dough	36 sections

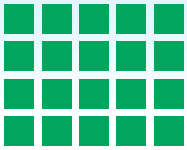
16. MATHEMATICAL PRACTICE 3 **Verify the Reasoning of Others** Ty has a package of glitter dough. He says he can give 9 friends 5 equal sections. Describe his error. What is the correct answer?

WRITE Math
Show Your Work

17. THINK SMARTER Mr. Lee divides 1 package of clay and 1 package of glitter dough equally among 4 students. How many more glitter dough sections than clay sections does each student get?

18. GO DEEPER Write a word problem that can be solved by using $35 \div 5$. Solve your problem.

19. THINK SMARTER Select the equations that represent the array. Mark all that apply.



- (A) $2 \times 10 = 20$
- (B) $20 \div 4 = 5$
- (C) $5 \times 4 = 20$
- (D) $20 \div 2 = 10$
- (E) $4 \times 5 = 20$
- (F) $20 \div 5 = 4$

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Division Rules for 1 and 0

Essential Question What are the rules for dividing with 1 and 0?

Operations and Algebraic Thinking—
3.OA.5 *Also 3.OA.2, 3.OA.3, 3.OA.7*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4, MP.7

Unlock the Problem

What rules for division can help you divide with 1 and 0?

If there is only 1 fishbowl, then all the fish must go in that fishbowl.

$4 \div 1 = 4$

4 ↑ number of fish; 1 ↑ number of bowls; 4 ↑ number in each bowl

Try This! There are 3 fish and 1 fishbowl. Draw a quick picture to show the fish in the fishbowl.

Write the equation your picture shows.

_____ ÷ _____ = _____

Rule A: Any number divided by 1 equals that number.

Math Talk **Mathematical Practices**

Explain how Rule A is related to the Identity Property of Multiplication.

If there is the same number of fish and fishbowls, then 1 fish goes in each fishbowl.

$4 \div 4 = 1$

4 ↑ number of fish; 4 ↑ number of bowls; 1 ↑ number in each bowl

Try This! There are 3 fish and 3 fishbowls. Draw a quick picture to show the fish divided equally among the fishbowls.

Write the equation your picture shows.

_____ ÷ _____ = _____

Rule B: Any number (except 0) divided by itself equals 1.

If there are 0 fish and 4 fishbowls, there will not be any fish in the fishbowls.

$0 \div 4 = 0$

number of fish | number of bowls | number in each bowl

Try This! There are 0 fish and 3 fishbowls. Draw a quick picture to show the fishbowls.

Write the equation your picture shows.

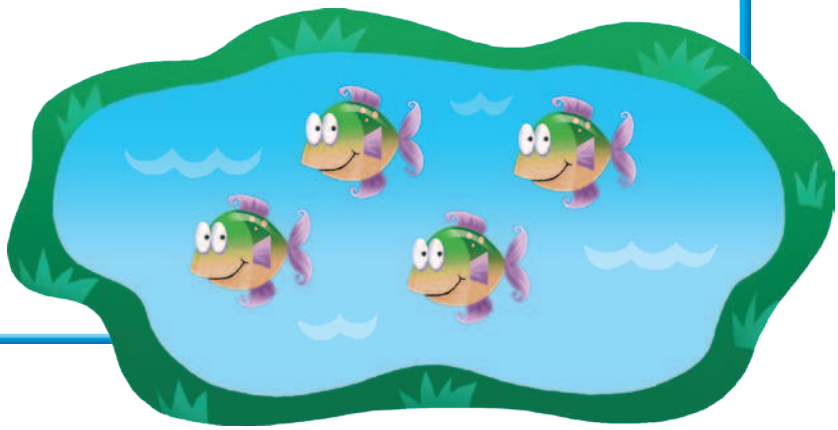
_____ ÷ _____ = _____

Rule C: Zero divided by any number (except 0) equals 0.

If there are 0 fishbowls, then you cannot separate the fish equally into fishbowls. Dividing by 0 is not possible.

~~$4 \div 0 =$~~

Rule D: You cannot divide by 0.



Share and Show

MATH BOARD

1. Use the picture to find $2 \div 2$. _____

Math Talk Mathematical Practices

Explain what happens when you divide a number (except 0) by itself.

Find the quotient.

2. $7 \div 1 =$ _____ **3.** $8 \div 8 =$ _____ **4.** $0 \div 5 =$ _____ **5.** _____ $= 6 \div 6$

Name _____

On Your Own

Find the quotient.

6. $0 \div 8 =$ ____ **7.** $5 \div 5 =$ ____ **8.** $2 \div 1 =$ ____ **9.** $0 \div 7 =$ ____

10. $5\overline{)0}$ **11.** $1\overline{)9}$ **12.** $7\overline{)7}$ **13.** $10\overline{)10}$

Practice: Copy and Solve **Find the quotient.**

14. $6 \div 1$ **15.** $25 \div 5$ **16.** $0 \div 6$ **17.** $18 \div 3$

18. $14 \div 2$ **19.** $9 \div 9$ **20.** $28 \div 4$ **21.** $8 \div 1$

22. $3\overline{)27}$ **23.** $5\overline{)10}$ **24.** $3\overline{)0}$ **25.** $1\overline{)0}$

Problem Solving • Applications

26. THINK SMARTER Claire has 7 parakeets. She puts 4 of them in a cage. She divides the other parakeets equally among 3 friends to hold. How many parakeets does each friend get to hold?

_____

27. GO DEEPER Lena has 5 parrots. She gives each parrot 1 grape in the morning and 1 grape in the evening. How many grapes does she give to her parrots each day?

_____

28. MATHEMATICAL PRACTICE 6 Suppose a pet store has 21 birds that are in 21 cages. Use what you know about division rules to find the number of birds in each cage. **Explain** your answer.

_____

_____

29. THINK SMARTER For numbers 29a–29c, select True or False for each equation.

29a.	$4 \div 4 = 1$	○ True	○ False
29b.	$6 \div 1 = 1$	○ True	○ False
29c.	$1 \div 5 = 1$	○ True	○ False

Connect to Reading

Compare and Contrast

You have learned the rules for division with 1. Compare and contrast them to help you learn how to use the rules to solve problems.

Compare the rules. Think about how they are *alike*.

Contrast the rules. Think about how they are *different*.

Read: Rule A: Any number divided by 1 equals that number.
Rule B: Any number (except 0) divided by itself equals 1.

Compare: How are the rules alike?
- Both are division rules for 1.

Contrast: How are the rules different?
- Rule A is about dividing a number by 1. The quotient is that number.
- Rule B is about dividing a number (except 0) by itself. The quotient is always 1.

Read the problem. Write an equation. Solve. Write *Rule A* or *Rule B* to tell which rule you used.

30. Jamal bought 7 goldfish at the pet store. He put them in 1 fishbowl. How many goldfish did he put in the fishbowl?

_____

31. Ava has 6 turtles. She divides them equally among 6 aquariums. How many turtles does she put in each aquarium?

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 6 Review/Test

1. For numbers 1a–1d, select True or False for each equation.

1a.	$3 \div 1 = 1$	○ True	○ False
1b.	$0 \div 4 = 0$	○ True	○ False
1c.	$7 \div 7 = 1$	○ True	○ False
1d.	$6 \div 1 = 6$	○ True	○ False

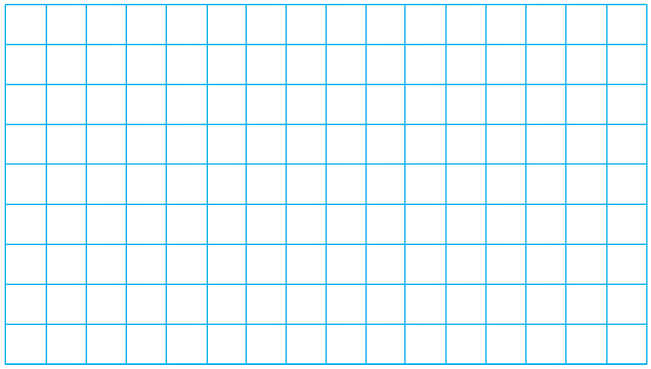
2. Elizabeth has 12 horses on her farm. She puts an equal number of horses in each of 3 pens. How many horses are in each pen?

Circle a number that makes the sentence true.

There are [4 / 9 / 36] horses in each pen.

3. Chris plants 25 pumpkins seeds in 5 equal rows. How many seeds does Chris plant in each row?

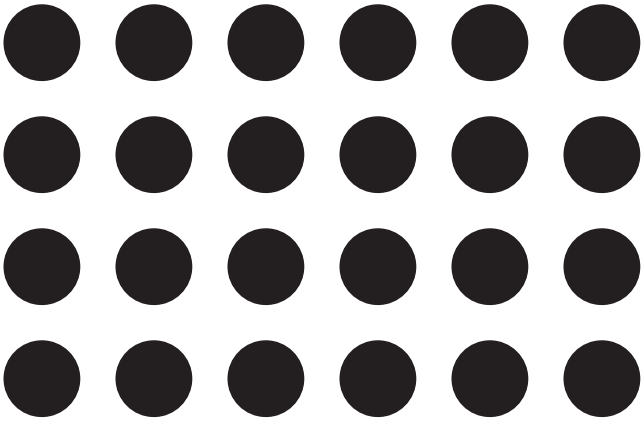
Make an array to represent the problem. Then solve the problem.



_____ seeds

GO DIGITAL Assessment Options
Chapter Test

4. Becca spent 24 minutes walking around a track. It took her 3 minutes to walk each time around the track. How many times did Becca walk around the track?

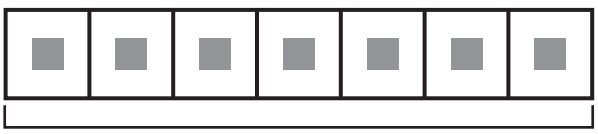


Make equal groups to model the problem. Then explain how you solved the problem.

_____

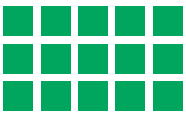
_____

5. There are 7 cars in an amusement park ride. There are 42 people divided equally among the 7 cars. An equal number of people ride in each car. How many people ride in one car?



_____ people

6. Select the equations that represent the array. Mark all that apply.



Ⓐ $3 \times 5 = \square$

Ⓑ $2 \times \square = 12$

Ⓒ $\square \div 3 = 5$

Ⓓ $5 \times \square = 15$

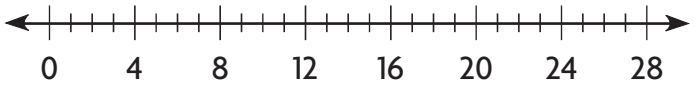
Ⓔ $12 \div 3 = \square$

Ⓕ $15 \div 5 = \square$

Name _____

7. Eduardo visited his cousin for 28 days over the summer. There are 7 days in each week. How long, in weeks, was Eduardo's visit?

Part A
Draw jumps on the number line to model the problem.



Part B
Write a division equation to represent the model.

_____

_____ weeks

8. A workbook is 64 pages long. If each chapter is 8 pages long, how many chapters are there?

_____ chapters

9. There are 56 apples packed in 7 baskets with the same number of apples in each basket. How many apples are in each basket?

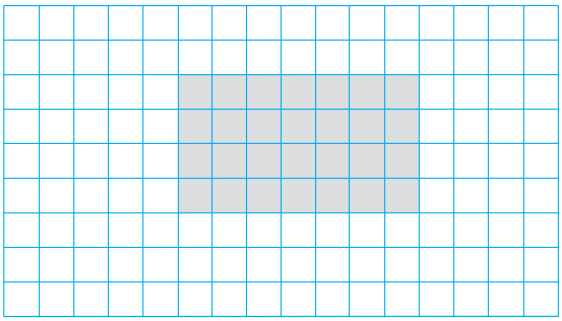
For numbers 9a–9d, choose Yes or No to tell whether the equation represents the problem.

9a.	$56 + 7 = \square$	○ Yes	○ No
9b.	$7 \times \square = 56$	○ Yes	○ No
9c.	$56 \div \square = 8$	○ Yes	○ No
9d.	$56 - \square = 8$	○ Yes	○ No

10. Stefan has 24 photos to display on some posters. Select a way that he could display the photos in equal groups on the posters. Mark all that apply.

- (A) 6 photos on each of 4 posters
- (B) 7 photos on each of 3 posters
- (C) 4 photos on each of 6 posters
- (D) 5 photos on each of 5 posters
- (E) 3 photos on each of 8 posters
- (F) 7 photos on each of 4 posters

11. Debbie made this array to model a division equation. Which equation did Debbie model? Mark all that apply.



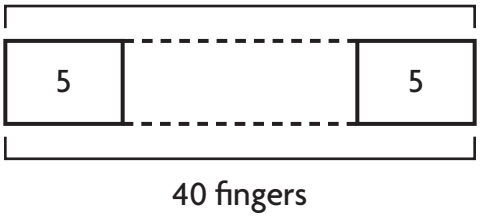
Ⓐ $14 \div 7 = 2$

Ⓑ $28 \div 4 = 7$

Ⓒ $28 \div 7 = 4$

Ⓓ $14 \div 2 = 7$

12. Mrs. Edwards made a total of 40 fingers on some gloves she knitted. How many gloves did Mrs. Edwards knit?



_____ gloves

13. Make true equations. Select a number to complete the equation.

$7 \div 7 =$ _____ $7 \div 1 =$ _____ $0 \div 7 =$ _____

14. The coach separated the 18 players at lacrosse practice into 3 different groups. How many players were in each group?

_____ players

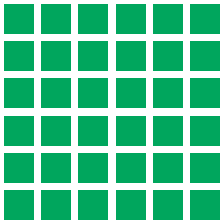
Name _____

15. Write a division equation to represent the repeated subtraction.

$$\begin{array}{r} 32 \\ -\ 8 \\ \hline 24 \end{array} \quad \begin{array}{r} 24 \\ -\ 8 \\ \hline 16 \end{array} \quad \begin{array}{r} 16 \\ -\ 8 \\ \hline 8 \end{array} \quad \begin{array}{r} 8 \\ -\ 8 \\ \hline 0 \end{array}$$

_____

16. Write related facts for the array. Explain why there are not more related facts.



_____

_____

17. Darius bakes 18 muffins for his friends. He gives each of his friends an equal number of muffins and has none left over.

Part A

Draw a picture to show how Darius divided the muffins and complete the sentence.

Darius gave muffins to _____

_____ friends.

Part B

Could Darius have given all of his muffins equally to 4 of his friends? Explain why or why not.

_____

_____

18. Circle numbers to complete the related facts.

7
9
64
80

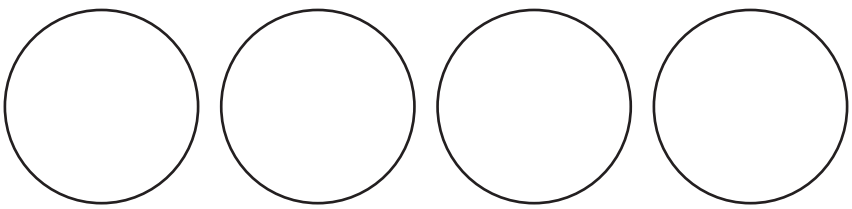
$\times 8 = 72$ $\quad 72 \div$

7
8
9
64

$= 8$

19. Use the numbers to write a related multiplication and division facts.

20. Tyrone took 16 pennies from his bank and put them in 4 equal stacks. How many pennies did Tyrone put in each stack? Show your work.



_____ pennies

Chapter 7

Division Facts and Strategies

Show What You Know

Check your understanding of important skills.

Name _____

Think Addition to Subtract

Write the missing numbers.

1. $10 - 3 = \square$

Think: $3 + \square = 10$

$3 + \_\_\_\_ = 10$

So, $10 - 3 =$ ____.

2. $12 - 8 = \square$

Think: $8 + \square = 12$

$8 + \_\_\_\_ = 12$

So, $12 - 8 =$ ____.

Missing Factors

Write the missing factor.

3. $2 \times \_\_\_\_ = 10$

4. $42 = \_\_\_\_ \times 7$

5. $\_\_\_\_ \times 6 = 18$

Multiplication Facts Through 9

Find the product.

6. $\_\_\_\_ = 6 \times 9$

7. $3 \times 8 = \_\_\_\_$

8. $4 \times 4 = \_\_\_\_$

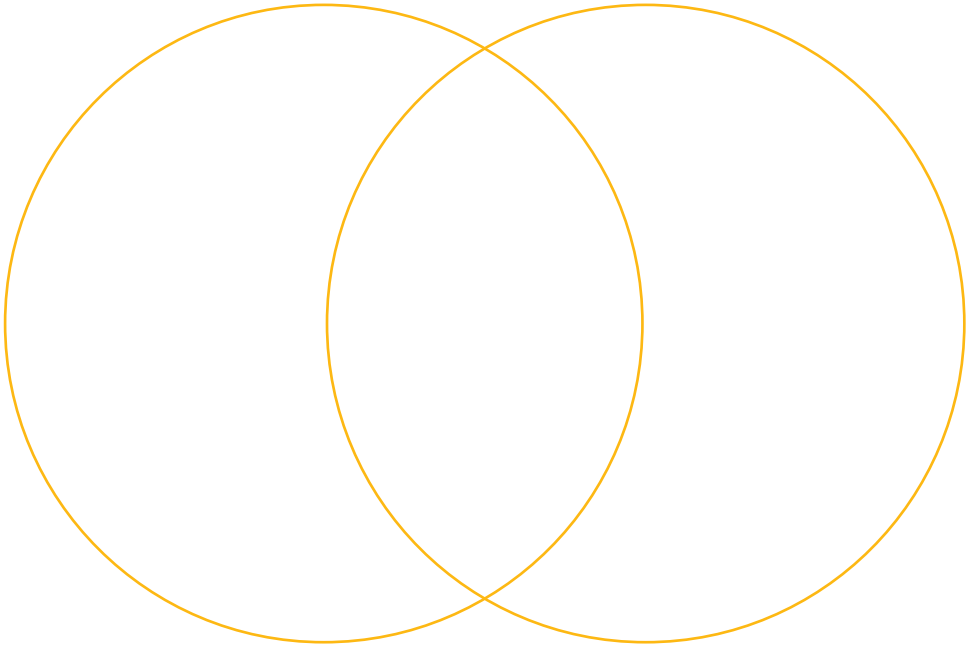
On Monday, the students in Mr. Carson's class worked in pairs. On Tuesday, the students worked in groups of 3. On Wednesday, the students worked in groups of 4. Each day the students made equal groups with no student left out of a group. Be a Math Detective to find how many students could be in Mr. Carson's class.

Personal Math Trainer
Online Assessment and Intervention

Vocabulary Builder

Visualize It

Sort the review words into the Venn diagram.



Multiplication Words Division Words

Review Words
divide
dividend
divisor
equation
factor
inverse operations
multiply
product
quotient
related facts
Preview Word
order of operations

Understand Vocabulary

Complete the sentences by using the review and preview words.

1. An _____ is a number sentence that uses the equal sign to show that two amounts are equal.

2. The _____ is a special set of rules that gives the order in which calculations are done to solve a problem.

3. _____ are a set of related multiplication and division equations.

Name _____

Divide by 2

Essential Question What does dividing by 2 mean?

Operations and Algebraic Thinking—
3.OA.3 *Also 3.OA.2, 3.OA.7*

MATHEMATICAL PRACTICES
MP.4, MP.5, MP.6

Unlock the Problem

Real World

There are 10 hummingbirds and 2 feeders in Marissa's backyard. If there are an equal number of birds at each feeder, how many birds are at each one?

- What do you need to find?

_____

- Circle the numbers you need to use.
- What can you use to help solve the problem? _____

Activity 1

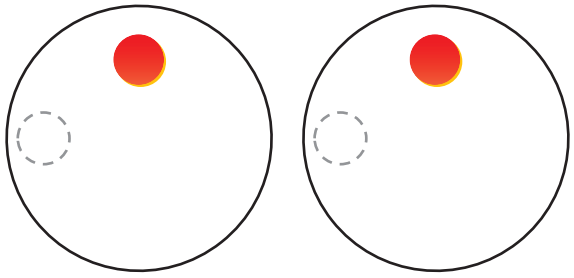
Hands On

Use counters to find how many in each group.

Materials ■ counters ■ MathBoard

MODEL

- Use 10 counters.
- Draw 2 circles on your MathBoard.
- Place 1 counter at a time in each circle until all 10 counters are used.
- Draw the rest of the counters to show your work.



THINK

_____ in all

_____ equal groups

_____ in each group

RECORD

$10 \div 2 = 5$ or $2\overline{)10}^{\,5}$

Read: Ten divided by two equals five.

There are _____ counters in each of the 2 groups.

So, there are _____ hummingbirds at each feeder.

A hummingbird can fly right, left, up, down, forward, backward, and even upside down! ▶

Math Talk

Mathematical Practices

Explain what each number in $10 \div 2 = 5$ represents from the word problem.

Activity 2 Draw to find how many equal groups.

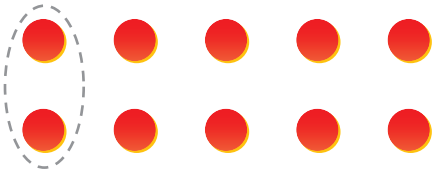
There are 10 hummingbirds in Tyler's backyard. If there are 2 hummingbirds at each feeder, how many feeders are there?

Math Idea

You can divide to find the number in each group or to find the number of equal groups.

MODEL

- Look at the 10 counters.
- Circle a group of 2 counters.
- Continue circling groups of 2 until all 10 counters are in groups.



THINK

_____ in all

_____ in each group

_____ equal groups

RECORD

$10 \div 2 = 5$ or $2\overline{)10}^{\,5}$

Read: Ten divided by two equals five.

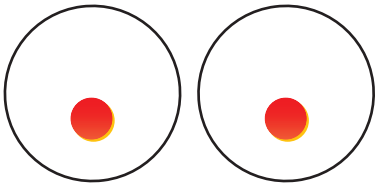
There are _____ groups of 2 counters.

So, there are _____ feeders.

Share and Show

MATH BOARD

1. Complete the picture to find $6 \div 2$. _____

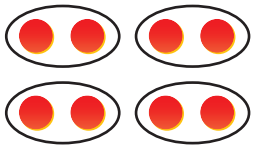


Math Talk **Mathematical Practices**

Describe another division equation that could be written for the picture you drew.

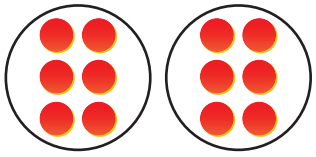
Write a division equation for the picture.

2.



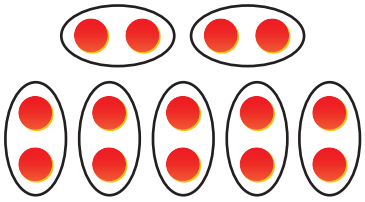
_____

3.



_____

4.

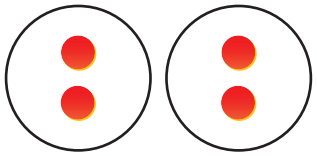


_____

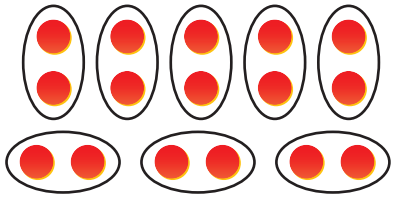
Name _____

On Your Own

Write a division equation for the picture.

5. 

_____

6. 

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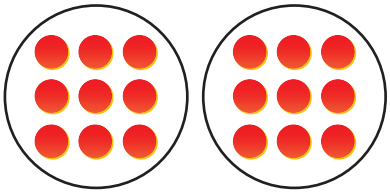
7. 

_____

Find the quotient. You may want to draw a quick picture to help.

8. $2 \div 2 =$ ____

9. ____ $= 10 \div 2$

10. ____ $= 14 \div 2$

11. ____ $= 18 \div 2$

12. $16 \div 2 =$ ____

13. ____ $= 0 \div 2$

14. $2\overline{)8}$

15. $2\overline{)12}$

16. $2\overline{)20}$

MATHEMATICAL PRACTICE 2 **Reason Abstractly** **Algebra** **Find the unknown number.**

17. ____ $\div 2 = 5$

18. ____ $\div 2 = 2$

19. ____ $\div 2 = 3$

20. ____ $\div 2 = 8$

Problem Solving • Applications

Use the table for 21–22.

Hummingbirds

Type	Mass (in grams)
Magnificent	7
Ruby-throated	3
Violet-crowned	5

21. GO DEEPER Two hummingbirds of the same type have a total mass of 10 grams. Which type of hummingbird are they? Write a division equation to show how to find the answer.

_____

22. THINK SMARTER There are 3 Ruby-throated hummingbirds and 2 of another type of hummingbird at a feeder. The birds have a mass of 23 grams in all. What other type of hummingbird is at the feeder? **Explain**.

WRITE Math • Show Your Work

_____

_____

_____

_____

_____

23. THINK SMARTER Ryan has 18 socks.

Divisor	Quotient
○ 1	○ 1
○ 2	○ 3
○ 6	○ 9
○ 18	○ 18

Select one number from each column to show the division equation represented by the picture.

$18 \div \frac{?}{\text{(divisor)}} = \frac{?}{\text{(quotient)}}$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Divide by 10

Essential Question What strategies can you use to divide by 10?

Operations and Algebraic Thinking—3.OA.7 *Also 3.OA.2, 3.OA.3, 3.OA.4, 3.OA.6*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.5, MP.8

Unlock the Problem Real World

There are 50 students going on a field trip to the Philadelphia Zoo. The students are separated into equal groups of 10 students each. How many groups of students are there?

- What do you need to find?

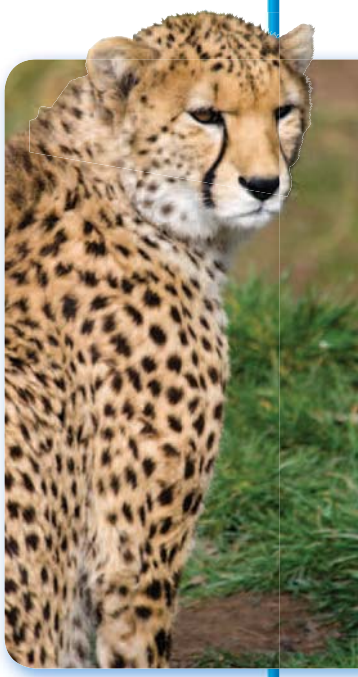
_____

- Circle the numbers you need to use.

One Way Use repeated subtraction.

- Start with 50.
- Subtract 10 until you reach 0.
- Count the number of times you subtract 10.

50	40	30	20	10
−10	−10	−10	−10	−10
40	30			
1	2	3	4	5



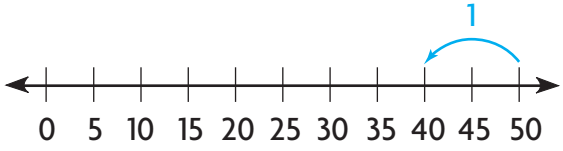
You subtracted 10 five times. $50 \div 10 =$ _____

So, there are _____ groups of 10 students.

Other Ways

A Use a number line.

- Start at 50 and count back by 10s until you reach 0.
- Count the number of times you jumped back 10.



You jumped back by 10 five times.

$50 \div 10 =$ _____

Math Talk Mathematical Practices

How is counting on a number line to divide by 10 different from counting on a number line to multiply by 10?

B Use a multiplication table.

Divide. $50 \div 10 = \square$

Since division is the opposite of multiplication, you can use a multiplication table to find a quotient.

Think of a related multiplication fact.

$\square \times 10 = 50$

STEP 1 Find the factor, 10, in the top row.

STEP 2 Look down to find the product, 50.

STEP 3 Look left to find the unknown factor, ____.

Since ____ $\times 10 = 50$, then $50 \div 10 =$ ____.

In Step 1, is the divisor or the dividend the given factor in the related multiplication fact?

In Step 2, is the divisor or the dividend the product in the related multiplication fact?

The quotient is the unknown factor.

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Share and Show

MATH BOARD

1. Use repeated subtraction to find $30 \div 10$. ____

Think: How many times do you subtract 10?

$30 - 10 = 20$ → $20 - 10 = 10$ → $10 - 10$

Math Talk Mathematical Practices

Describe two other ways to find $30 \div 10$.

Find the unknown factor and quotient.

2. $10 \times$ ____ $= 40$ ____ $= 40 \div 10$

3. $10 \times$ ____ $= 60$ $60 \div 10 =$ ____

Find the quotient.

4. ____ $= 20 \div 10$

5. $10\overline{)50}$

6. $10\overline{)70}$

7. $90 \div 10 =$ ____

Name _____

On Your Own

Find the unknown factor and quotient.

8. $10 \times \_\_\_\_ = 70$ $70 \div 10 = \_\_\_\_$

9. $10 \times \_\_\_\_ = 10$ $10 \div 10 = \_\_\_\_$

10. $10 \times \_\_\_\_ = 80$ $80 \div 10 = \_\_\_\_$

11. $\_\_\_\_ \times 2 = 12$ $\_\_\_\_ = 12 \div 2$

Find the quotient.

12. $50 \div 10 = \_\_\_\_$

13. $\_\_\_\_ = 60 \div 10$

14. $16 \div 2 = \_\_\_\_$

15. $90 \div 10 = \_\_\_\_$

16. $10 \div 2 = \_\_\_\_$

17. $30 \div 10 = \_\_\_\_$

18. $\_\_\_\_ = 20 \div 2$

19. $\_\_\_\_ = 0 \div 10$

20. $10\overline{)20}$

21. $10\overline{)100}$

22. $10\overline{)40}$

23. $10\overline{)80}$

MATHEMATICAL PRACTICE 2 **Reason Quantitatively** **Algebra** **Write <, >, or =.**

24. $10 \div 1 \bigcirc 4 \times 10$

25. $17 - 6 \bigcirc 18 \div 2$

26. $4 \times 4 \bigcirc 8 + 8$

27. $23 + 14 \bigcirc 5 \times 8$

28. $70 \div 10 \bigcirc 23 - 16$

29. $9 \times 0 \bigcirc 9 + 0$

Problem Solving • Applications Real World

Use the picture graph for 30–32.

Animal Stickers	
Elephants	▯ ▯ ▯ ▮
Giraffes	▯ ▯ ▮
Monkeys	▯ ▯ ▯ ▯

Key: Each ▯ = 10 stickers.

30. Lyle wants to add penguins to the picture graph. There are 30 stickers of penguins. How many symbols should Lyle draw for penguins?

_____

31. GO DEEPER Write a word problem using information from the picture graph. Then solve your problem.

_____

_____

WRITE Math • Show Your Work

32. THINK SMARTER **Sense or Nonsense?** Lena wants to put the monkey stickers in an album. She says she will use more pages if she puts 5 stickers on a page instead of 10 stickers on a page. Is she correct? Explain.

_____

_____

_____

33. MATHEMATICAL PRACTICE 6 **Explain** how a division problem is like an unknown factor problem.

_____

_____

_____

34. THINK SMARTER Lilly found 40 seashells. She put 10 seashells in each bucket. How many buckets did Lilly use? Show your work.

____ buckets

FOR MORE PRACTICE: Standards Practice Book

Name _____

Divide by 5

Essential Question What does dividing by 5 mean?

Operations and Algebraic Thinking—
3.OA.3 *Also 3.OA.2, 3.OA.7*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.5, MP.7

Unlock the Problem

Kaley wants to buy a new cage for Coconut, her guinea pig. She has saved 35¢. If she saved a nickel each day, for how many days has she been saving?

- How much is a nickel worth?

_____

One Way Count up by 5s.

- Begin at 0.
- Count up by 5s until you reach 35. 5, 10, _____, _____, _____, _____, _____
- Count the number of times you count up. 1 2 3 4 5 6 7

You counted up by 5 seven times. 35 ÷ 5 = _____

So, Kaley has been saving for _____ days.

Another Way

Hands On

Count back on a number line.

- Start at 35.
- Count back by 5s until you reach 0. Complete the jumps on the number line.
- Count the number of times you jumped back 5.

You jumped back by 5 _____ times.

35 ÷ 5 = _____

Math Talk **Mathematical Practices**

What if Kaley saved 7¢ each day instead of a nickel? What would you do differently to find how many days she has saved?

Strategies for Multiplying and Dividing with 5

You have learned how to use doubles to multiply. Now you will learn how to use doubles to divide by 5.

Use 10s facts, and then take half to multiply with 5.

When one factor is 5, you can use a 10s fact. $5 \times 2 = \blacksquare$

First, multiply by 10. $10 \times 2 =$ _____

After you multiply, take half of the product. $20 \div 2 =$ _____

So, $5 \times 2 =$ _____.

Divide by 10, and then double to divide by 5.

When the divisor is 5 and the dividend is even, you can use a 10s fact. $30 \div 5 = \blacksquare$

First, divide by 10. $30 \div 10 =$ _____

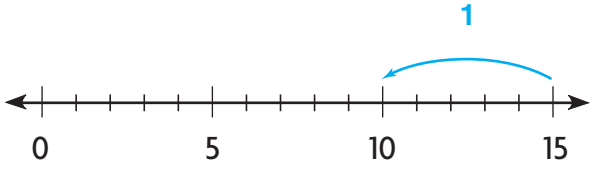
After you divide, double the quotient. $3 +$ _____ = _____

So, $30 \div 5 =$ _____.

Share and Show

MATH BOARD

1. Count back on the number line to find $15 \div 5$. _____



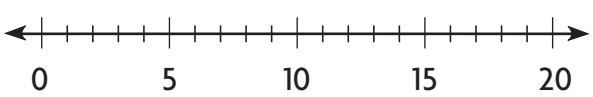
Math Talk **Mathematical Practices**

Explain how counting up to solve a division problem is like counting back on a number line.

Use count up or count back on a number line to solve.

2. $10 \div 2 =$ _____

3. $20 \div 5 =$ _____



Find the quotient.

4. $50 \div 5 =$ _____ **5.** $5 \div 5 =$ _____ **6.** $45 \div 5 =$ _____

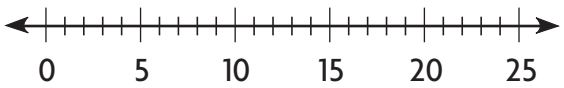
Name _____

On Your Own

Use count up or count back on a number line to solve.

7. $30 \div 5 =$ _____

8. $25 \div 5 =$ _____



Find the quotient.

9. ____ $= 20 \div 5$

10. $40 \div 5 =$ ____

11. ____ $= 18 \div 2$

12. $0 \div 5 =$ ____

13. $35 \div 5 =$ ____

14. ____ $= 10 \div 5$

15. $40 \div 10 =$ ____

16. ____ $= 4 \div 2$

17. $10\overline{)30}$

18. $2\overline{)16}$

19. $5\overline{)45}$

20. $5\overline{)15}$

MATHEMATICAL PRACTICE 7 **Look for a Pattern** **Algebra** **Complete the table.**

21.

×	1	2	3	4	5
10					
5					

22.

÷	10	20	30	40	50
10					
5					

Problem Solving • Applications

23. MATHEMATICAL PRACTICE 1 **Evaluate** Guinea pigs eat hay, pellets, and vegetables. If Wonder Hay comes in a 5-pound bag and costs $15, how much does 1 pound of hay cost?

_____

24. Guinea pigs sleep about 45 hours every 5 days with their eyes open. About how many hours a day do guinea pigs sleep?

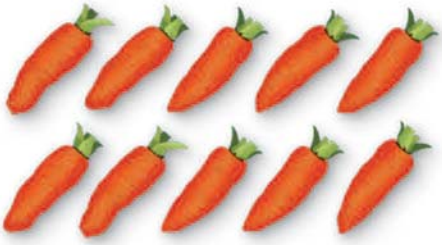
_____

25. GO DEEPER The clerk at the pet supply store works 45 hours a week. He works an equal number of hours on Monday through Friday. He works an extra 5 hours on Saturday. How many hours does he work on each weekday?

_____

26. THINK SMARTER **Pose a Problem** Maddie went to a veterinary clinic. She saw the vet preparing some carrots for the guinea pigs.

Write a division problem that can be solved using the picture of carrots. Draw circles to group the carrots for your problem.



Pose a problem.

Solve your problem.

- Group the carrots in a different way. Then write a problem for the new groups. Solve your problem.

27. THINK SMARTER Circle the unknown factor and quotient.

$5 \times \boxed{\begin{matrix}5\\6\\7\end{matrix}} = 35$ $\qquad$ $\boxed{\begin{matrix}5\\6\\7\end{matrix}} = 35 \div 5$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Divide by 3

Essential Question What strategies can you use to divide by 3?

Operations and Algebraic Thinking—3.OA.7 *Also 3.OA.2, 3.OA.3, 3.OA.4, 3.OA.6*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.6

Unlock the Problem

Real World

Hands On

For field day, 18 students have signed up for the relay race. Each relay team needs 3 students. How many teams can be made?

- What do you need to find?

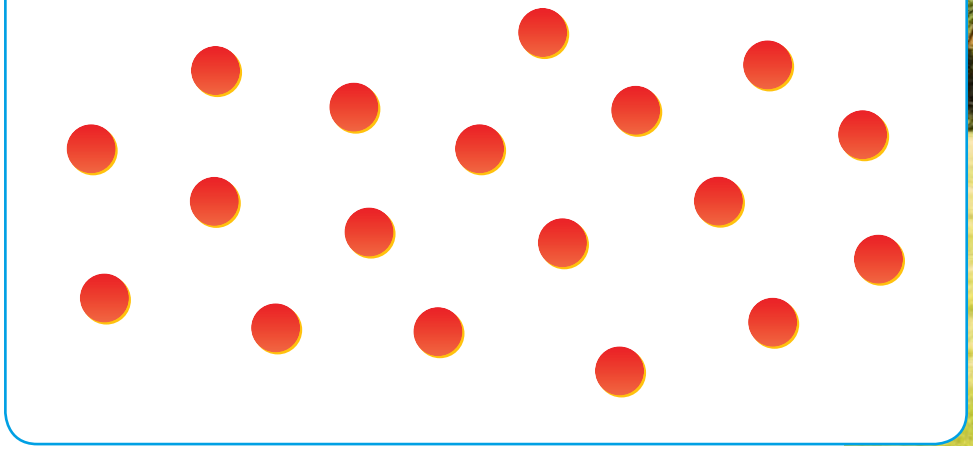
_____

_____

- Circle the numbers you need to use.

One Way Make equal groups.

- Look at the 18 counters below.
- Circle as many groups of 3 as you can.
- Count the number of groups.



There are _____ groups of 3.

So, _____ teams can be made.

You can write $18 \div 3 =$ _____ or $3\overline{)18}$.

Math Talk **Mathematical Practices**

Suppose the question asked how many students would be on 3 equal teams. How would you model 3 equal teams? Would the quotient be the same?

Other Ways

A Count back on a number line.

- Start at 18.
- Count back by 3s as many times as you can. Complete the jumps on the number line.
- Count the number of times you jumped back 3.

ERROR Alert

Be sure to count back the same number of spaces each time you jump back on the number line.

You jumped back by 3 _____ times.

B Use a related multiplication fact.

Since division is the opposite of multiplication, think of a related multiplication fact to find 18 ÷ 3.

$\square \times 3 = 18$
$6 \times 3 = 18$

Think: What number completes the multiplication fact?

So, $18 \div 3 =$ _____ or $3\overline{)18}$.

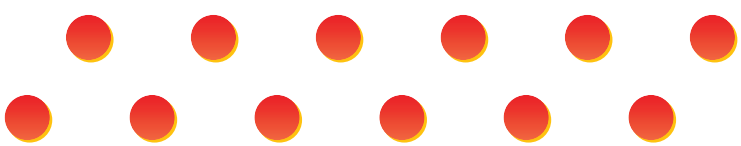
- What if 24 students signed up for the relay race and there were 3 students on each team? What related multiplication fact would you use to find the number of teams?

_____

Share and Show

MATH BOARD

1. Circle groups of 3 to find $12 \div 3$. _____



Math Talk **Mathematical Practices**

Explain what the number of circles you made tells you.

Find the quotient.

2. $6 \div 3 =$ ___ **3.** ___ $= 14 \div 2$ **4.** $21 \div 3 =$ ___ **5.** ___ $= 30 \div 5$

Name _____

On Your Own

Practice: Copy and Solve **Find the quotient. Draw a quick picture to help.**

6. $9 \div 3$ **7.** $10 \div 5$ **8.** $18 \div 2$ **9.** $24 \div 3$

Find the quotient.

10. ___ $= 12 \div 2$ **11.** $40 \div 5 =$ ___ **12.** $60 \div 10 =$ ___ **13.** ___ $= 20 \div 10$

14. $27 \div 3 =$ ___ **15.** ___ $= 0 \div 3$ **16.** $12 \div 3 =$ ___ **17.** ___ $= 8 \div 2$

18. $3\overline{)15}$ **19.** $2\overline{)4}$ **20.** $5\overline{)20}$ **21.** $3\overline{)18}$

22. $2\overline{)16}$ **23.** $3\overline{)12}$ **24.** $3\overline{)6}$ **25.** $5\overline{)35}$

26. $3\overline{)3}$ **27.** $10\overline{)70}$ **28.** $3\overline{)30}$ **29.** $10\overline{)50}$

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Write +, −, ×, or ÷.**

30. $25 \bigcirc 5 = 10 \div 2$ **31.** $3 \times 3 = 6 \bigcirc 3$ **32.** $16 \bigcirc 2 = 24 - 16$

33. $13 + 19 = 8 \bigcirc 4$ **34.** $14 \bigcirc 2 = 6 \times 2$ **35.** $21 \div 3 = 5 \bigcirc 2$

Problem Solving • Applications Real World

Use the table for 36–37.

Field Day Events

Activity	Number of Students
Relay race	25
Beanbag toss	18
Jump-rope race	27

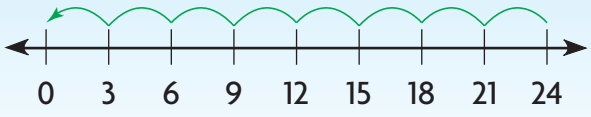
36. GO DEEPER There are 5 equal teams in the relay race. How many students are on each team? Write a division equation that shows the number of students on each team.

37. THINK SMARTER Students doing the jump-rope race and the beanbag toss compete in teams of 3. How many more teams participate in the jump-rope race than in the beanbag toss? **Explain** how you know.

WRITE Math
Show Your Work

38. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** Michael puts 21 sports cards into stacks of 3. The answer is 7 stacks. What's the question?

39. THINK SMARTER Jorge made $24 selling water at a baseball game. He wants to know how many bottles of water he sold. Jorge used this number line to help him.



Write the division equation that the number line represents.

_____ ÷ _____ = _____

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Divide by 4

Essential Question What strategies can you use to divide by 4?

Operations and Algebraic Thinking—
3.OA.7 *Also 3.OA.2, 3.OA.3, 3.OA.4, 3.OA.5, 3.OA.6*

MATHEMATICAL PRACTICES
MP.3, MP.4, MP.7, MP.8

Unlock the Problem

Real World

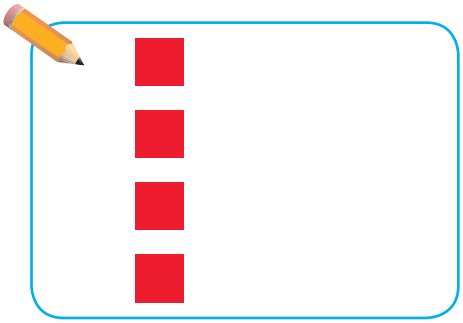
A tree farmer plants 12 red maple trees in 4 equal rows. How many trees are in each row?

- What strategy could you use to solve the problem?

_____

One Way Make an array.

- Look at the array.
- Continue the array by drawing 1 tile in each of the 4 rows until all 12 tiles are drawn.
- Count the number of tiles in each row.



There are _____ tiles in each row.

So, there are _____ trees in each row.

Write: _____ ÷ _____ = _____ or $4\overline{)12}$

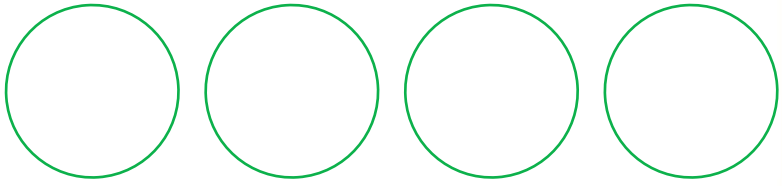
Read: Twelve divided by four equals three.

Other Ways

A Make equal groups.

- Draw 1 counter in each group.
- Continue drawing 1 counter at a time until all 12 counters are drawn.

There are _____ counters in each group.



Math Talk **Mathematical Practices**

Explain how making an array to solve the problem is like making equal groups.

B **Use factors to find 12 ÷ 4.**

The factors of 4 are 2 and 2.

$2 \times 2 = 4$

factors, product

To divide by 4, use the factors.

$12 \div 4 = n$

Divide by 2. $12 \div 2 = 6$

Then divide by 2 again. $6 \div 2 = 3$

$12 \div 4 =$ _____

C **Use a related multiplication fact.**

$12 \div 4 = n$

$4 \times n = 12$

$4 \times 3 = 12$

Think: What number completes the multiplication fact?

$12 \div 4 =$ _____ or $4\overline{)12}$

Remember

A letter or symbol, like *n*, can stand for an unknown number.

Try This! **Use factors of 4 to find 16 ÷ 4.**

The factors of 4 are 2 and 2. $16 \div 4 = \square$

Divide by 2. $16 \div 2 =$ _____

Then divide by 2 again. $8 \div 2 =$ _____

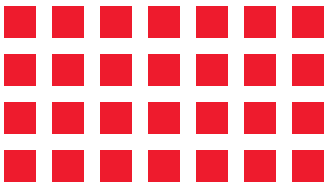
So, $16 \div 4 =$ _____.

Think: Dividing by the factors of the divisor is the same as dividing by the divisor.

Share and Show

MATH BOARD

1. Use the array to find $28 \div 4$. _____



Math Talk **Mathematical Practices**

Explain how you used the array to find the quotient.

Find the quotient.

2. _____ $= 21 \div 3$

3. $8 \div 4 =$ _____

4. _____ $= 40 \div 5$

5. $24 \div 4 =$ _____

Find the unknown number.

6. $20 \div 4 = a$

$a =$ _____

7. $12 \div 2 = p$

$p =$ _____

8. $27 \div 3 = \blacktriangle$

$\blacktriangle =$ _____

9. $12 \div 4 = t$

$t =$ _____

Name _____

On Your Own

Practice: Copy and Solve **Draw tiles to make an array. Find the quotient.**

10. $30 \div 10$ **11.** $15 \div 5$ **12.** $40 \div 4$ **13.** $16 \div 2$

Find the quotient.

14. $12 \div 3 = \_\_$ **15.** $20 \div 4 = \_\_$ **16.** $\_\_ = 0 \div 4$ **17.** $\_\_ = 36 \div 4$

18. $4\overline{)28}$ **19.** $2\overline{)18}$ **20.** $4\overline{)16}$ **21.** $5\overline{)25}$

Find the unknown number.

22. $45 \div 5 = b$

$b = \_\_$

23. $20 \div 10 = e$

$e = \_\_$

24. $8 \div 2 = \square$

$\square = \_\_$

25. $24 \div 3 = h$

$h = \_\_$

26. $4 \div 4 = p$

$p = \_\_$

27. $24 \div 4 = t$

$t = \_\_$

28. $16 \div 4 = s$

$s = \_\_$

29. $32 \div 4 = \square$

$\square = \_\_$

Algebra **Complete the table.**

30.

÷	9	12	15	18
3				

31.

÷	20	24	28	32
4				

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Find the unknown number.**

32. $14 \div \_\_ = 7$ **33.** $30 \div \_\_ = 6$ **34.** $8 \div \_\_ = 2$ **35.** $24 \div \_\_ = 8$

36. $36 \div \_\_ = 9$ **37.** $40 \div \_\_ = 4$ **38.** $3 \div \_\_ = 1$ **39.** $35 \div \_\_ = 7$

Problem Solving • Applications Real World

Use the table for 40–41.

Trees Planted

Type	Number Planted
Dogwood	24
Oak	28
Birch	16

40. GO DEEPER Douglas planted the birch trees in 4 equal rows. Then he added 2 more birch trees to each row. How many birch trees did he plant in each row?

41. THINK SMARTER Mrs. Banks planted the oak trees in 4 equal rows. Mr. Webb planted the dogwood trees in 3 equal rows. Who planted more trees in each row? How many more? Explain how you know.

WRITE Math
Show Your Work

42. MATHEMATICAL PRACTICE 6 **Use Math Vocabulary** Bryan earns $40 mowing lawns each week. He earns the same amount of money for each lawn. If he mows 4 lawns, how much does Bryan earn for each lawn? Explain how you found your answer.

43. THINK SMARTER For numbers 43a–43d, select True or False for each equation.

43a. $0 \div 4 = 4$ ○ True ○ False

43b. $4 \div 4 = 1$ ○ True ○ False

43c. $20 \div 4 = 6$ ○ True ○ False

43d. $24 \div 4 = 8$ ○ True ○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Divide by 6

Essential Question What strategies can you use to divide by 6?

Operations and Algebraic Thinking—
3.OA.7 *Also 3.OA.2, 3.OA.3, 3.OA.4, 3.OA.5, 3.OA.6*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5, MP.6

Unlock the Problem

Real World

Hands On

Ms. Sing needs to buy 24 juice boxes for the class picnic. Juice boxes come in packs of 6. How many packs does Ms. Sing need to buy?

- Circle the number that tells you how many juice boxes come in a pack.
- How can you use the information to solve the problem?

_____

_____

_____

One Way Make equal groups.

- Draw 24 counters.
- Circle as many groups of 6 as you can.
- Count the number of groups.

There are _____ groups of 6.

So, Ms. Sing needs to buy _____ packs of juice boxes.

You can write _____ ÷ _____ = _____ or $6\overline{)24}$.

Math Talk **Mathematical Practices**

If you divided the 24 counters into groups of 4, how many groups would there be? **Explain** how you know.

Other Ways

A **Use a related multiplication fact.**

dividend divisor quotient

$24 \div 6 = \square$

$\square \times 6 = 24$

$4 \times 6 = 24$

Think: What number completes the multiplication fact?

$24 \div 6 =$ _____ or $6\overline{)24}$

B **Use factors to find $24 \div 6$.**

The factors of 6 are 3 and 2.

$3 \times 2 = 6$

factors product

To divide by 6, use the factors.

$24 \div 6 = \square$

Divide by 3. $24 \div 3 = 8$

Then divide by 2. $8 \div 2 = 4$

$24 \div 6 =$ _____

- How does knowing $6 \times 9 = 54$ help you find $54 \div 6$?

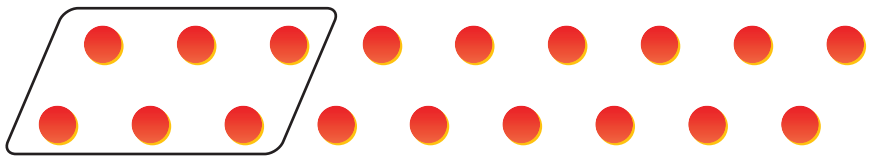
_____

_____

Share and Show

MATH BOARD

1. Continue making equal groups to find $18 \div 6$. _____



Math Talk **Mathematical Practices**

Explain how you could use factors to find $18 \div 6$.

Find the unknown factor and quotient.

2. ___ $\times 6 = 36$ $36 \div 6 =$ ___

3. $6 \times$ ___ $= 12$ $12 \div 6 =$ ___

Find the quotient.

4. ___ $= 0 \div 2$

5. $6 \div 6 =$ ___

6. ___ $= 28 \div 4$

7. $42 \div 6 =$ ___

Name _____

On Your Own

Find the unknown factor and quotient.

8. $6 \times \_\_\_\_ = 30$ $30 \div 6 = \_\_\_\_$

9. $\_\_\_\_ \times 6 = 48$ $48 \div 6 = \_\_\_\_$

10. $2 \times \_\_\_\_ = 16$ $\_\_\_\_ = 16 \div 2$

11. $5 \times \_\_\_\_ = 45$ $\_\_\_\_ = 45 \div 5$

Find the quotient.

12. $12 \div 6 = \_\_\_\_$

13. $\_\_\_\_ = 6 \div 1$

14. $\_\_\_\_ = 60 \div 6$

15. $27 \div 3 = \_\_\_\_$

16. $5\overline{)35}$

17. $6\overline{)42}$

18. $6\overline{)6}$

19. $2\overline{)10}$

Find the unknown number.

20. $24 \div 6 = n$

$n = \_\_\_\_$

21. $40 \div 5 = \blacktriangle$

$\blacktriangle = \_\_\_\_$

22. $60 \div 10 = m$

$m = \_\_\_\_$

23. $18 \div 6 = \blacksquare$

$\blacksquare = \_\_\_\_$

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Find the unknown number.**

24. $20 \div \_\_\_\_ = 4$

25. $24 \div \_\_\_\_ = 8$

26. $16 \div \_\_\_\_ = 4$

27. $3 \div \_\_\_\_ = 3$

28. $42 \div \_\_\_\_ = 7$

29. $30 \div \_\_\_\_ = 10$

30. $10 \div \_\_\_\_ = 2$

31. $32 \div \_\_\_\_ = 4$

32. THINK SMARTER Derek has 2 boxes of fruit snacks. There are 12 fruit snacks in each box. If he eats 6 fruit snacks each day, how many days will the fruit snacks last? Explain.

_____

_____

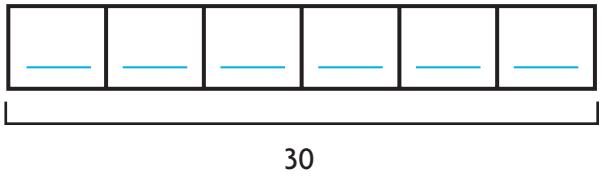
Problem Solving • Applications

33. GO DEEPER Cody baked 12 muffins. He keeps 6 muffins. How many muffins can he give to each of his 6 friends if each friend gets the same number of muffins?

34. MATHEMATICAL PRACTICE 3 **Make Arguments** Mary has 36 stickers to give to 6 friends. She says she can give each friend only 5 stickers. Use a division equation to describe Mary's error.

WRITE Math • Show Your Work

35. WRITE Math **Pose a Problem** Write and solve a word problem for the bar model.



Personal Math Trainer

36. THINK SMARTER + Each van can transport 6 people. How many vans are needed to transport 48 people to an event? Explain the strategy you used to solve the problem.

_____ vans

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Concepts and Skills

1. **Explain** how to find 20 ÷ 4 by making an array.
(3.OA.3)

_____

_____

_____

2. **Explain** how to find 30 ÷ 6 by making equal groups.
(3.OA.3)

_____

_____

_____

Find the unknown factor and quotient. (3.OA.7)

3. 10 × ___ = 50 ___ = 50 ÷ 10

4. 2 × ___ = 16 ___ = 16 ÷ 2

5. 2 × ___ = 20 ___ = 20 ÷ 2

6. 5 × ___ = 20 ___ = 20 ÷ 5

Find the quotient. (3.OA.3, 3.OA.7)

7. ___ = 6 ÷ 6

8. 21 ÷ 3 = ___

9. ___ = 0 ÷ 3

10. 36 ÷ 4 = ___

11. $5\overline{)35}$

12. $4\overline{)24}$

13. $6\overline{)54}$

14. $3\overline{)9}$

15. Carter has 18 new books. He plans to read 3 of them each week. How many weeks will it take Carter to read all of his new books? (3.OA.7)

16. Gabriella made 5 waffles for breakfast. She has 25 strawberries and 15 blueberries to put on top of the waffles. She will put an equal number of berries on each waffle. How many berries will Gabriella put on each waffle? (3.OA.3)

17. There are 60 people at the fair waiting in line for a ride. Each car in the ride can hold 10 people. Write an equation that could be used to find the number of cars needed to hold all 60 people. (3.OA.7)

18. Alyssa has 4 cupcakes. She gives 2 cupcakes to each of her cousins. How many cousins does Alyssa have? (3.OA.3)

Name _____

Divide by 7

Essential Question What strategies can you use to divide by 7?

Operations and Algebraic Thinking—3.OA.7 *Also 3.OA.2, 3.OA.3, 3.OA.4, 3.OA.6*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6, MP.8

Unlock the Problem

Real World

Hands On

Yasmin used 28 large apples to make 7 loaves of apple bread. She used the same number of apples for each loaf. How many apples did Yasmin use for each loaf?

- Do you need to find the number of equal groups or the number in each group?

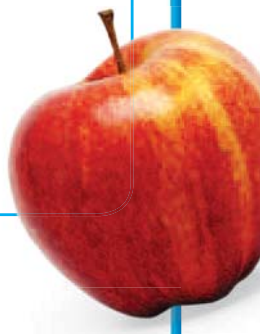
_____

- What label will your answer have?

_____

One Way Make an array.

- Draw 1 tile in each of 7 rows.
- Continue drawing 1 tile in each of the 7 rows until all 28 tiles are drawn.
- Count the number of tiles in each row.



There are ____ tiles in each row.

So, Yasmin used _____ for each loaf.

You can write $28 \div 7 =$ ____ or $7\overline{)28}$.

Math Talk **Mathematical Practices**

Why can you use division to solve the problem? **Explain**.

Other Ways

Hands On

A **Use a related multiplication fact.**

$28 \div 7 = a$ $\quad 7 \times a = 28$ $\quad 7 \times 4 = 28$

Think: What number completes the multiplication fact?

$28 \div 7 =$ ____ or $7\overline{)28}$

B **Make equal groups.**

- Draw 7 circles to show 7 groups.
- Draw 1 counter in each group.
- Continue drawing 1 counter at a time until all 28 counters are drawn.

There are ____ counters in each group.

Share and Show

MATH BOARD

1. Use the related multiplication fact to find $42 \div 7$.

$6 \times 7 = 42$

$42 \div 7 =$ ____

Math Talk

Mathematical Practices

Explain why you can use a related multiplication fact to solve a division problem.

Find the unknown factor and quotient.

2. $7 \times$ ____ $= 7$ $\quad 7 \div 7 =$ ____

3. $7 \times$ ____ $= 35$ $\quad 35 \div 7 =$ ____

Find the quotient.

4. $4 \div 2 =$ ____ **5.** $56 \div 7 =$ ____ **6.** ____ $= 20 \div 5$ **7.** ____ $= 21 \div 7$

Name _____

On Your Own

Find the unknown factor and quotient.

8. $3 \times \_\_\_\_ = 9$ $\_\_\_\_ = 9 \div 3$

9. $7 \times \_\_\_\_ = 49$ $49 \div 7 = \_\_\_\_$

10. $\_\_\_\_ \times 7 = 63$ $63 \div 7 = \_\_\_\_$

11. $4 \times \_\_\_\_ = 32$ $\_\_\_\_ = 32 \div 4$

Find the quotient.

12. $48 \div 6 = \_\_\_\_$

13. $7 \div 1 = \_\_\_\_$

14. $\_\_\_\_ = 42 \div 6$

15. $\_\_\_\_ = 18 \div 2$

16. $7\overline{)56}$

17. $1\overline{)9}$

18. $7\overline{)21}$

19. $2\overline{)8}$

Find the unknown number.

20. $60 \div 10 = \blacksquare$

$\blacksquare = \_\_\_\_$

21. $70 \div 7 = k$

$k = \_\_\_\_$

22. $m = 63 \div 9$

$m = \_\_\_\_$

23. $r = 12 \div 6$

$r = \_\_\_\_$

MATHEMATICAL PRACTICE 6 **Make Connections** **Algebra** **Complete the table.**

24.

÷	18	30	24	36
6				

25.

÷	56	42	49	35
7				

26. Clare bought 35 peaches to make peach jam. She used 7 peaches for each jar of jam. How many jars did Clare make?

_____

27. There are 49 jars of peach salsa packed into 7 gift boxes. If each box has the same number of jars of salsa, how many jars are in each box?

_____

Unlock the Problem Real World

28. THINK SMARTER Gavin sold 21 bagels to 7 different people. Each person bought the same number of bagels. How many bagels did Gavin sell to each person?

a. What do you need to find? _____

_____

b. How can you use a bar model to help you decide which operation to use to solve the problem? _____

_____

_____

c. Complete the bar model to help you find the number of bagels Gavin sold to each person.

21 bagels

d. What is another way you could have solved the problem?

_____

_____

e. Complete the sentences.

Gavin sold ____ bagels to ____ different people.

Each person bought the same number of _____.

So, Gavin sold _____ bagels to each person.

29. GO DEEPER There are 35 plain bagels and 42 wheat bagels on 7 shelves in the bakery. Each shelf has the same number of plain bagels and the same number of wheat bagels. How many bagels are on each shelf?

_____

30. THINK SMARTER Write the correct symbol that makes the equations true.

×	÷	+	−

$28 = 7 \square 4$ $\quad 42 \square 7 = 35$

$7 = 49 \square 7$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Divide by 8

Essential Question What strategies can you use to divide by 8?

Operations and Algebraic Thinking—
3.OA.3, 3.OA.4 *Also 3.OA.2, 3.OA.6, 3.OA.7*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6, MP.7

Unlock the Problem

Real World

At Stephen's camping store, firewood is sold in bundles of 8 logs. He has 32 logs to put in bundles. How many bundles of firewood can he make?

- What will Stephen do with the 32 logs?

_____

_____

One Way Use repeated subtraction.

- Start with 32.
- Subtract 8 until you reach 0.
- Count the number of times you subtract 8.

32	24		
− 8	− 8	− 8	− 8
24			

Number of times you subtract 8:	1	2	3	4

You subtracted 8 _____ times.

So, Stephen can make _____ bundles of firewood.

You can write 32 ÷ 8 = _____ or $8\overline{)32}$.

ERROR Alert

Continue to subtract the divisor, 8, until the difference is less than 8.

Another Way Use a related multiplication fact.

32 ÷ 8 = ■ ■ × 8 = 32

4 × 8 = 32

Think: What number completes the multiplication fact?

32 ÷ 8 = _____ or $8\overline{)32}$

Math Talk **Mathematical Practices**

How does knowing 4 × 8 = 32 help you find 32 ÷ 8?

Example Find the unknown divisor.

Stephen has a log that is 16 feet long. If he cuts the log into pieces that are 2 feet long, how many pieces will Stephen have?

Divide. 16 ÷ ☐ = 2

You can also use a multiplication table to find the divisor in a division problem.

Think: ☐ × 2 = 16

STEP 1 Find the factor, 2, in the top row.

STEP 2 Look down to find the product, 16.

STEP 3 Look left to find the unknown factor.

The unknown factor is _____.

☐ = _____

_____ × 2 = 16 **Check.**

_____ = 16 ✓ The equation is true.

So, Stephen will have _____ pieces.

×	0	1	2	3	4	5	6	7	8	9	10
0	0	0	0	0	0	0	0	0	0	0	0
1	0	1	2	3	4	5	6	7	8	9	10
2	0	2	4	6	8	10	12	14	16	18	20
3	0	3	6	9	12	15	18	21	24	27	30
4	0	4	8	12	16	20	24	28	32	36	40
5	0	5	10	15	20	25	30	35	40	45	50
6	0	6	12	18	24	30	36	42	48	54	60
7	0	7	14	21	28	35	42	49	56	63	70
8	0	8	16	24	32	40	48	56	64	72	80
9	0	9	18	27	36	45	54	63	72	81	90
10	0	10	20	30	40	50	60	70	80	90	100

Math Talk **Mathematical Practices**

Explain how to use the multiplication table to find the unknown dividend for ☐ ÷ 8 = 5.

Share and Show

MATH BOARD

1. Use repeated subtraction to find 24 ÷ 8. _____

$$\begin{array}{r} 24 \\ -\ 8 \\ \hline 16 \end{array} \qquad \begin{array}{r} 16 \\ -\ 8 \\ \hline 8 \end{array} \qquad \begin{array}{r} 8 \\ -8 \\ \hline 0 \end{array}$$

Think: How many times do you subtract 8?

Math Talk **Mathematical Practices**

Explain why you subtract 8 from 24 to find 24 ÷ 8.

Find the unknown factor and quotient.

2. 8 × _____ = 56 56 ÷ 8 = _____

3. _____ × 8 = 40 40 ÷ 8 = _____

Find the quotient.

4. 18 ÷ 3 = _____

5. _____ = 48 ÷ 8

6. 56 ÷ 7 = _____

7. _____ = 32 ÷ 8

Name _____

On Your Own

Find the unknown factor and quotient.

8. $8 \times \_\_\_\_ = 8$ $\quad 8 \div 8 = \_\_\_\_$

9. $\_\_\_\_ \times 5 = 35$ $\quad \_\_\_\_ = 35 \div 5$

10. $6 \times \_\_\_\_ = 18$ $\quad 18 \div 6 = \_\_\_\_$

11. $8 \times \_\_\_\_ = 72$ $\quad \_\_\_\_ = 72 \div 8$

Find the quotient.

12. $28 \div 4 = \_\_\_\_$

13. $42 \div 7 = \_\_\_\_$

14. $\_\_\_\_ = 3 \div 3$

15. $\_\_\_\_ = 28 \div 7$

16. $8\overline{)0}$

17. $6\overline{)24}$

18. $8\overline{)64}$

19. $1\overline{)8}$

Find the unknown number.

20. $72 \div ★ = 9$ $\quad ★ = \_\_\_\_$

21. $t \div 8 = 2$ $\quad t = \_\_\_\_$

22. $64 \div ▲ = 8$ $\quad ▲ = \_\_\_\_$

23. $m \div 8 = 10$ $\quad m = \_\_\_\_$

24. $▲ \div 2 = 10$ $\quad ▲ = \_\_\_\_$

25. $40 \div ■ = 8$ $\quad ■ = \_\_\_\_$

26. $25 \div k = 5$ $\quad k = \_\_\_\_$

27. $54 \div n = 9$ $\quad n = \_\_\_\_$

28. MATHEMATICAL PRACTICE 2 **Connect Symbols and Words** Write a word problem that can be solved by using one of the division facts above.

_____

_____

MATHEMATICAL PRACTICE 4 **Use Symbols** **Algebra** **Write +, −, ×, or ÷.**

29. $6 \times 6 = 32 \bigcirc 4$

30. $12 \bigcirc 3 = 19 - 15$

31. $40 \div 8 = 35 \bigcirc 7$

Problem Solving • Applications

Use the table for 32–33.

Tent Sizes	
Type	**Number of People**
Cabin	10
Vista	8
Trail	4

32. GO DEEPER There are 32 people who plan to camp over the weekend. Describe two different ways the campers can sleep using 4 tents.

33. THINK SMARTER There are 36 people camping at Max's family reunion. They have cabin tents and vista tents. How many of each type of tent do they need to sleep exactly 36 people if each tent is filled? Explain.

WRITE Math • Show Your Work

34. Josh is dividing 64 bags of trail mix equally among 8 campers. How many bags of trail mix will each camper get?

35. THINK SMARTER Circle the unknown factor and quotient.

$8 \times \boxed{\begin{matrix}6\\7\\8\end{matrix}} = 48$ $\qquad$ $\boxed{\begin{matrix}6\\7\\8\end{matrix}} = 48 \div 8$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Divide by 9

Essential Question What strategies can you use to divide by 9?

Operations and Algebraic Thinking—3.OA.7 *Also 3.OA.2, 3.OA.3, 3.OA.4, 3.OA.5, 3.OA.6*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Unlock the Problem

Real World

Hands On

Becket's class goes to the aquarium. The 27 students from the class are separated into 9 equal groups. How many students are in each group?

- Do you need to find the number of equal groups or the number in each group?

_____

One Way Make equal groups.

- Draw 9 circles to show 9 groups.
- Draw 1 counter in each group.
- Continue drawing 1 counter at a time until all 27 counters are drawn.

There are ____ counters in each group.

So, there are _____ in each group.

You can write $27 \div 9 =$ ____ or $9\overline{)27}$.

Math Talk **Mathematical Practices**

What is another way you could solve the problem? **Explain**.

Other Ways

A **Use factors to find 27 ÷ 9.**

The factors of 9 are 3 and 3.

$3 \times 3 = 9$

factors, product

To divide by 9, use the factors.

$27 \div 9 = s$

Divide by 3. $27 \div 3 = 9$

Then divide by 3 again. $9 \div 3 = 3$

$27 \div 9 =$ _____

B **Use a related multiplication fact.**

$27 \div 9 = s$

$9 \times s = 27$

$9 \times 3 = 27$

Think: What number completes the multiplication fact?

$27 \div 9 =$ _____ or $9\overline{)27}$

- What multiplication fact can you use to find $63 \div 9$? _____

Share and Show

MATH BOARD

1. Draw counters in the groups to find $18 \div 9$. _____

Math Talk

Mathematical Practices

Explain how you would use factors to find $18 \div 9$.

Find the quotient.

2. _____ $= 45 \div 9$

3. $36 \div 6 =$ _____

4. $9 \div 1 =$ _____

5. _____ $= 54 \div 9$

6. $7\overline{)28}$

7. $9\overline{)9}$

8. $5\overline{)40}$

9. $9\overline{)36}$

Name _____

On Your Own

10. $8 \div 2 =$ ____ **11.** ____ $= 72 \div 9$ **12.** $56 \div 8 =$ ____ **13.** ____ $= 27 \div 9$

14. ____ $= 5 \div 1$ **15.** ____ $= 36 \div 4$ **16.** $81 \div 9 =$ ____ **17.** $30 \div 5 =$ ____

18. $4\overline{)12}$ **19.** $9\overline{)63}$ **20.** $2\overline{)16}$ **21.** $5\overline{)25}$

Find the unknown number.

22. $64 \div 8 = e$

$e =$ ____

23. $0 \div 9 = g$

$g =$ ____

24. ■ $= 20 \div 4$

■ $=$ ____

25. $s = 9 \div 9$

$s =$ ____

MATHEMATICAL PRACTICE 2 **Use Reasoning** **Algebra** **Complete the table.**

26.

÷	24	40	32	48
8				

27.

÷	54	45	72	63
9				

28. GO DEEPER Sophie has two new fish. She feeds one fish 4 pellets and the other fish 5 pellets each day. If Sophie has fed her fish 72 pellets, for how many days has she had her fish? Explain.

_____

_____

29. MATHEMATICAL PRACTICE 4 **Write an Equation** Each van going to the aquarium carries 9 students. If 63 third-grade students go to the aquarium, what multiplication fact can you use to find the number of vans that will be needed?

_____

Unlock the Problem Real World

30. THINK SMARTER Carlos has 28 blue tang fish and 17 yellow tang fish in one large fish tank. He wants to separate the fish so that there are the same number of fish in each of 9 smaller tanks. How many tang fish will Carlos put in each smaller tank?

a. What do you need to find? _____

_____

b. Why do you need to use two operations to solve the problem? _____

_____

c. Write the steps to find how many tang fish Carlos will put in each smaller tank.

d. Complete the sentences.

Carlos has ____ blue tang fish and ____ yellow tang fish in one large fish tank.

He wants to separate the fish so that there are the same number of fish in each of ____ smaller tanks.

So, Carlos will put ____ fish in each smaller tank.

31. THINK SMARTER Complete the chart to show the quotients.

÷	27	18	45	36
9				

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Two-Step Problems

Essential Question How can you use the strategy *act it out* to solve two-step problems?

Operations and Algebraic Thinking—3.OA.8
Also 3.OA.2, 3.OA.3, 3.OA.7

MATHEMATICAL PRACTICES
MP.4, MP.5, MP.6

Unlock the Problem

Real World

Madilyn bought 2 packs of pens and a notebook for $11. The notebook cost $3. Each pack of pens cost the same amount. What is the price of 1 pack of pens?

Read the Problem

What do I need to find?

I need to find the price of

1 pack of _____.

What information do I need to use?

Madilyn spent _____ in all.

She bought _____ packs of

pens and _____ notebook.

The notebook cost _____.

How will I use the information?

I will use the information to

_____ out the problem.

Solve the Problem

Describe how to act out the problem.

Start with 11 counters. Take away 3 counters.

total cost		cost of notebook		p, cost of 2 packs of pens
↓		↓		↓
_____	−	_____	=	p
		_____	=	p

Now I know that 2 packs of pens cost _____.

Next, make _____ equal groups with the 8 remaining counters.

p, cost of 2 packs of pens		number of packs		c, cost of 1 pack of pens
↓		↓		↓
$8	÷	_____	=	c
		_____	=	c

So, the price of 1 pack of pens is _____.

Math Talk **Mathematical Practices**

Why do you need to use two operations to solve the problem? **Explain**.

Try Another Problem

Chad bought 4 packs of T-shirts. He gave 5 T-shirts to his brother. Now Chad has 19 shirts. How many T-shirts were in each pack?

Read the Problem	Solve the Problem
What do I need to find?	**Describe how to act out the problem.**
What information do I need to use?	
How will I use the information?	

- How can you use multiplication and subtraction to check your answer?

Math Talk **Mathematical Practices**

Explain another strategy you could use to solve this problem.

Name _____

Share and Show

MATH BOARD

1. Mac bought 4 packs of toy cars. Then his friend gave him 9 cars. Now Mac has 21 cars. How many cars were in each pack?

Unlock the Problem

- Circle the question.
- Underline the important facts.
- Choose a strategy you know.

Act out the problem by using counters or the picture and by writing equations.

First, subtract the cars Mac's friend gave him.

total cars		cars given to Mac		c, cars in 4 packs
21	$-$	____	$=$	c
		____	$=$	c

Then, divide to find the number of cars in each pack.

c, cars in 4 packs		number of packs		p, number in each pack
12	$\div$	____	$=$	p
		____	$=$	p

So, there were ____ cars in each pack.

2. THINK SMARTER What if Mac bought 8 packs of cars and then he gave his friend 3 cars? If Mac has 13 cars now, how many cars were in each pack?

On Your Own

3. THINK SMARTER Ryan gave 7 of his model cars to a friend. Then he bought 6 more cars. Now Ryan has 13 cars. How many cars did Ryan start with?

4. GO DEEPER Chloe bought 5 sets of books. She donated 9 of her books to her school. Now she has 26 books. How many books were in each set?

5. Raul bought 2 packs of erasers. He found 2 erasers in his backpack. Now Raul has 8 erasers. How many erasers were in each pack?

6. Hilda cuts a ribbon into 2 equal pieces. Then she cuts 4 inches off one piece. That piece is now 5 inches long. What was the length of the original ribbon?

WRITE Math
Show Your Work

7. MATHEMATICAL PRACTICE 6 Rose saw a movie, shopped, and ate at a restaurant. She did not see the movie first. She shopped right after she ate. In what order did Rose do these activities? **Explain** how you know.

Personal Math Trainer

8. THINK SMARTER + Eleni bought 3 packs of crayons. She then found 3 crayons in her desk. Eleni now has 24 crayons. How many crayons were in each pack she bought? Explain how you solved the problem.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

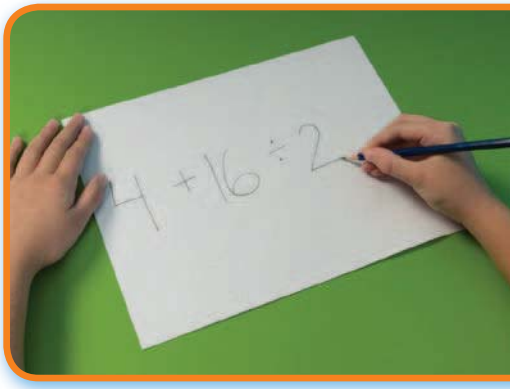
Order of Operations

Essential Question Why are there rules such as the order of operations?

Operations and Algebraic Thinking—3.OA.8 *Also 3.OA.1, 3.OA.2, 3.OA.3, 3.OA.7*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Investigate



CONNECT You can use what you know about acting out a two-step problem to write one equation to describe and solve a two-step problem.

- If you solved a two-step problem in a different order, what do you think might happen?

Use different orders to find 4 + 16 ÷ 2.

A. Make a list of all the possible orders you can use to find the answer to 4 + 16 ÷ 2.

B. Use each order in your list to find the answer. Show the steps you used.

Draw Conclusions

1. Did following different orders change the answer? _____

2. MATHEMATICAL PRACTICE 8 **Draw Conclusions** If a problem has more than one type of operation, how does the order in which you perform the operations affect the answer?

3. Explain the need for setting an order of operations that everyone follows.

Make Connections

When solving problems with more than one type of operation, you need to know which operation to do first. A special set of rules, called the **order of operations**, gives the order in which calculations are done in a problem.

First, multiply and divide from left to right.

Then, add and subtract from left to right.

Meghan buys 2 books for $4 each. She pays with a $10 bill. How much money does she have left?

You can write $\$10 - 2 \times \$4 = c$ to describe and solve the problem.

Use the order of operations to solve $\$10 - 2 \times \$4 = c$.

STEP 1

Multiply from left to right.

$$\$10 - 2 \times \$4 = c$$
$$\$10 - \quad \$8 \quad = c$$

STEP 2

Subtract from left to right.

$$\$10 - \$8 = c$$
$$\$2 \quad = c$$

So, Meghan has _____ left.

- Does your answer make sense? Explain.

_____

_____

_____

Math Talk Mathematical Practices

What operation should you do first to find: $12 - 6 \div 2$ and $12 \div 6 - 2$? What is the answer to each problem?

Share and Show

MATH BOARD

Write *correct* if the operations are listed in the correct order. If not correct, write the correct order of operations.

1. $4 + 5 \times 2$ multiply, add

_____

2. $8 \div 4 \times 2$ multiply, divide

_____

3. $12 + 16 \div 4$ add, divide

_____

4. $9 + 2 \times 3$ add, multiply

_____

5. $4 + 6 \div 3$ divide, add

_____

6. $36 - 7 \times 3$ multiply, subtract

_____

Name _____

Follow the order of operations to find the unknown number. Use your MathBoard.

7. $63 \div 9 - 2 = f$

$f =$ _____

8. $7 - 5 + 8 = y$

$y =$ _____

9. $3 \times 6 - 2 = h$

$h =$ _____

10. $80 - 64 \div 8 = n$

$n =$ _____

11. $3 \times 4 + 6 = a$

$a =$ _____

12. $2 \times 7 \div 7 = c$

$c =$ _____

Problem Solving • Applications

MATHEMATICAL PRACTICE 4 **Write an Equation** **Algebra** **Use the numbers listed to make the equation true.**

13. 2, 6, and 5

_____ + _____ × _____ = 16

14. 4, 12, and 18

_____ − _____ ÷ _____ = 15

15. 8, 9, and 7

_____ × _____ − _____ = 47

16. 2, 4, and 9

_____ ÷ _____ + _____ = 11

17. WRITE Math **Pose a Problem** Write a word problem that can be solved by using $2 \times 5 \div 5$. Solve your problem.

_____

_____

_____

_____

18. THINK SMARTER Is $4 + 8 \times 3$ equal to $4 + 3 \times 8$? Explain how you know without finding the answers.

_____

_____

_____

19. THINK SMARTER For numbers 19a–19d, select True or False for each equation.

19a.	$24 \div 3 + 5 = 13$	○ True	○ False
19b.	$5 + 2 \times 3 = 21$	○ True	○ False
19c.	$15 - 3 \div 3 = 14$	○ True	○ False
19d.	$18 \div 3 \times 2 = 12$	○ True	○ False

Connect to Social Studies

Picture Book Art

The Eric Carle Museum of Picture Book Art in Amherst, Massachusetts, is the first museum in the United States that is devoted to picture book art. Picture books introduce literature to young readers.

The museum has 3 galleries, a reading library, a café, an art studio, an auditorium, and a museum shop. The exhibits change every 3 to 6 months, depending on the length of time the picture art is on loan and how fragile it is.

The table shows prices for some souvenirs in the bookstore in the museum.

Souvenir Prices

Souvenir	Price
Firefly Picture Frame	$25
Exhibition Posters	$10
Caterpillar Note Cards	$8
Caterpillar Pens	$4
Sun Note Pads	$3

20. Kallon bought 3 Caterpillar note cards and 1 Caterpillar pen. How much did he spend on souvenirs?

_____

21. GO DEEPER Raya and 4 friends bought their teacher 1 Firefly picture frame. They shared the cost equally. Then Raya bought an Exhibition poster. How much money did Raya spend in all? Explain.

_____

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 7 Review/Test

1. Ming divided 35 marbles between 7 different friends. Each friend received the same number of marbles. How many marbles did Ming give to each friend?

$$35 \div 7 = a$$
$$7 \times a = 35$$

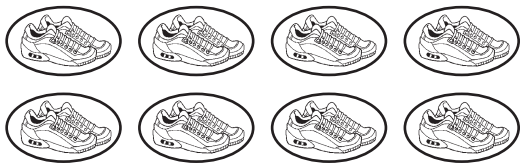
Ⓐ 4

Ⓑ 5

Ⓒ 6

Ⓓ 7

2. Mrs. Conner has 16 shoes.



Select one number from each column to show the division equation represented by the picture.

$$16 \div \frac{?}{\text{(divisor)}} = \frac{?}{\text{(quotient)}}$$

Divisor	Quotient
○ 1	○ 1
○ 2	○ 4
○ 4	○ 8
○ 16	○ 16

3. Twenty boys are going camping. They brought 5 tents. An equal number of boys sleep in each tent. How many boys will sleep in each tent?

_____ boys

GO DIGITAL Assessment Options
Chapter Test

4. Circle a number for the unknown factor and quotient that makes the equation true.

$4 \times \boxed{\begin{matrix}6\\7\\8\end{matrix}} = 28$ $\qquad$ $\boxed{\begin{matrix}6\\7\\8\end{matrix}} = 28 \div 4$

5. Mrs. Walters has 30 markers. She gives each student 10 markers. How many students received the markers?

$$\begin{array}{r} 30 \\ -10 \\ \hline 20 \end{array} \quad \begin{array}{r} 20 \\ -10 \\ \hline 10 \end{array} \quad \begin{array}{r} 10 \\ -10 \\ \hline 0 \end{array}$$

Write a division equation to represent the repeated subtraction.

_____ ÷ _____ = _____

6. Complete the chart to show the quotients.

÷	27	36	45	54
9				

7. For numbers 7a–7e, select True or False for each equation.

7a. $12 \div 6 = 2$ ○ True ○ False

7b. $24 \div 6 = 3$ ○ True ○ False

7c. $30 \div 6 = 6$ ○ True ○ False

7d. $42 \div 6 = 7$ ○ True ○ False

7e. $48 \div 6 = 8$ ○ True ○ False

Name _____

8. Alicia says that $6 \div 2 + 5$ is the same as $5 + 6 \div 2$. Is Alicia correct or incorrect? Explain.

_____

_____

_____

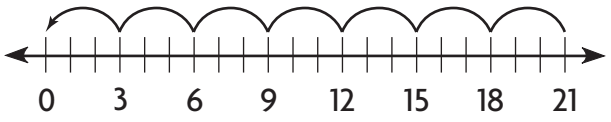
_____

_____

9. Keith arranged 40 toy cars in 8 equal rows. How many toy cars are in each row?

_____ toy cars

10. Bella made $21 selling bracelets. She wants to know how many bracelets she sold. Bella used this number line.



Write the division equation that the number line represents.

_____ ÷ _____ = _____

11. Each picnic table seats 6 people. How many picnic tables are needed to seat 24 people? Explain the strategy you used to solve the problem.

_____

_____

_____

12. Finn bought 2 packs of stickers. Each pack had the same number of stickers. A friend gave him 4 more stickers. Now he has 24 stickers in all. How many stickers were in each pack? Explain how you solved the problem.

_____

_____

_____

13. Ana used 49 strawberries to make 7 strawberry smoothies. She used the same number of strawberries in each smoothies. How many strawberries did Ana use in each smoothie?

_____ strawberries

14. For numbers 14a–14e, use the order of operation to select True or False for each equation.

14a.	$81 \div 9 + 2 = 11$	○ True	○ False
14b.	$6 + 4 \times 5 = 50$	○ True	○ False
14c.	$10 + 10 \div 2 = 15$	○ True	○ False
14d.	$12 - 3 \times 2 = 6$	○ True	○ False
14e.	$20 \div 4 \times 5 = 1$	○ True	○ False

15. A flower shop sells daffodils in bunches of 9. It sells 27 daffodils. How many bunches of daffodils does the shop sell?

_____ bunches

Name _____

16. Aviva started a table showing a division pattern.

÷	20	30	40	50
10				
5				

Part A

Complete the table.

Compare the quotients when dividing by 10 and when dividing by 5. Describe a pattern you see in the quotients.

_____

_____

Part B

Find the quotient, a.

$70 \div 10 = a$

$a =$ _____

How could you use a to find the value of n? Find the value of n.

$70 \div 5 = n$

$n =$ _____

_____

_____

17. Ben needs 2 oranges to make a glass of orange juice. If oranges come in bags of 10, how many glasses of orange juice can he make using one bag of oranges.

_____ glasses

18. For numbers 18a–18e, select True or False for each equation.

18a.	$0 \div 9 = 0$	○ True	○ False
18b.	$9 \div 9 = 1$	○ True	○ False
18c.	$27 \div 9 = 4$	○ True	○ False
18d.	$54 \div 9 = 6$	○ True	○ False
18e.	$90 \div 9 = 9$	○ True	○ False

19. Ellen is making gift baskets for four friends. She has 16 prizes she wants to divide equally among the baskets. How many prizes should she put in each basket?

_____ prizes

20. Emily is buying a pet rabbit. She needs to buy items for her rabbit at the pet store.

Part A

Emily buys a cage and 2 bowls for $54. The cage costs $40. Each bowl costs the same amount. What is the price of 1 bowl? Explain the steps you used to solve the problem.

Part B

Emily also buys food and toys for her rabbit. She buys a bag of food for $20. She buys 2 toys for $3 each. Write one equation to describe the total amount Emily spends on food and toys. Explain how to use the order of operations to solve the equation.

Critical Area Fractions

CRITICAL AREA Developing understanding of fractions, especially unit fractions (fractions with numerator 1)

The Missouri quarter shows explorers Lewis and Clark traveling down the Missouri River. The Gateway Arch is in the background.

Project

Coins in the U.S.

Many years ago, a coin called a *piece of eight* was sometimes cut into 8 equal parts. Each part was equal to one eighth ($\frac{1}{8}$) of the whole. Now, U.S. coin values are based on the dollar. Four quarters are equal in value to 1 dollar. So, 1 quarter is equal to one fourth ($\frac{1}{4}$) of a dollar.

Get Started

Work with a partner. In which year were the Missouri state quarters minted? Use the Important Facts to help you. Then write fractions to answer these questions:

1. 2 quarters are equal to what part of a dollar?
2. 1 nickel is equal to what part of a dime?
3. 2 nickels are equal to what part of a dime?

Important Facts

- The U.S. government minted state quarters every year from 1999 to 2008 in the order that the states became part of the United States.
- 1999—Delaware, Pennsylvania, New Jersey, Georgia, Connecticut
- 2000—Massachusetts, Maryland, South Carolina, New Hampshire, Virginia
- 2001—New York, North Carolina, Rhode Island, Vermont, Kentucky
- 2002—Tennessee, Ohio, Louisiana, Indiana, Mississippi
- 2003—Illinois, Alabama, Maine, Missouri, Arkansas
- 2004—Michigan, Florida, Texas, Iowa, Wisconsin
- 2005—California, Minnesota, Oregon, Kansas, West Virginia
- 2006—Nevada, Nebraska, Colorado, North Dakota, South Dakota
- 2007—Montana, Washington, Idaho, Wyoming, Utah
- 2008—Oklahoma, New Mexico, Arizona, Alaska, Hawaii

Completed by _____

Chapter 8

Understand Fractions

Show What You Know

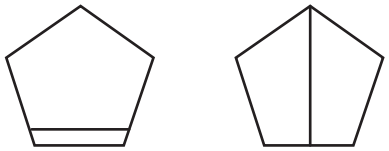
Check your understanding of important skills.

Name _____

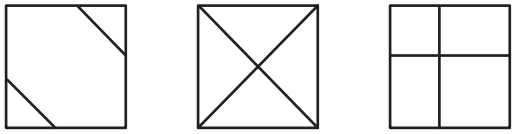
Equal Parts

Circle the shape that has equal parts.

1.



2.



Combine Plane Shapes

Write the number of  **needed to cover the shape.**

3.

_____ triangles

4.

_____ triangles

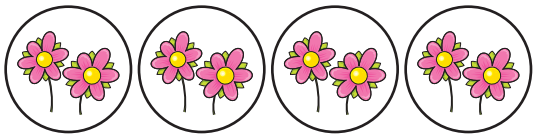
5.

_____ triangles

Count Equal Groups

Complete.

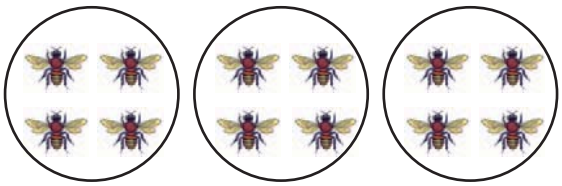
6.



_____ groups

_____ in each group

7.



_____ groups

_____ in each group

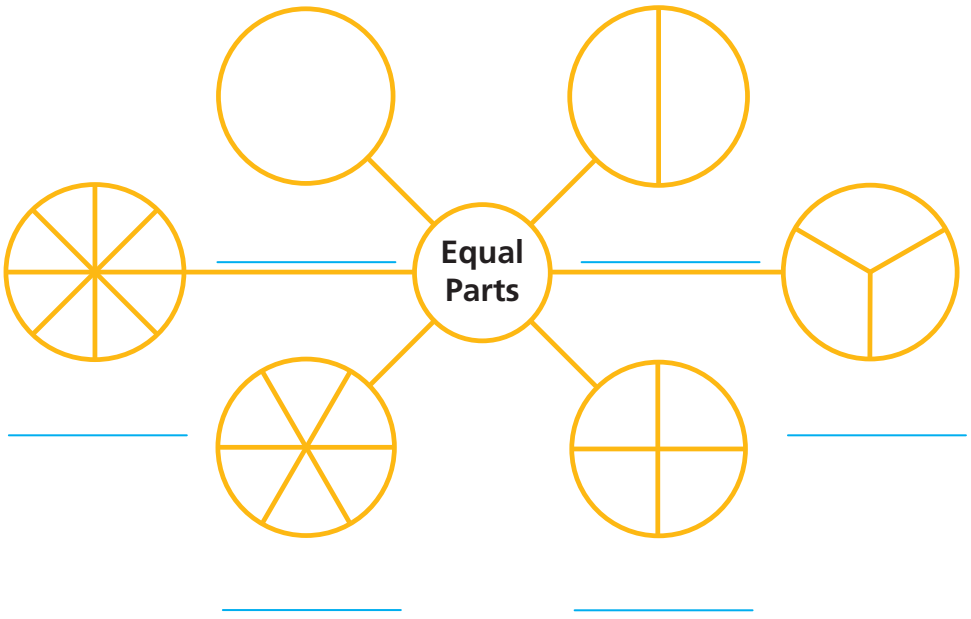
Math Detective

Casey shared a pizza with some friends. They each ate $\frac{1}{3}$ of the pizza. Be a Math Detective to find how many people shared the pizza.

Vocabulary Builder

Visualize It

Complete the bubble map by using the words with a ✓.



Preview Words

- denominator
- ✓ eighths
- equal parts
- ✓ fourths
- fraction
- fraction greater than 1
- ✓ halves
- numerator
- ✓ sixths
- ✓ thirds
- unit fraction
- ✓ whole

Understand Vocabulary

Read the description. Write the preview word.

1. It is a number that names part of a whole or part of a group. _____
2. It is the part of a fraction above the line, which tells how many parts are being counted. _____
3. It is the part of a fraction below the line, which tells how many equal parts there are in the whole or in the group. _____
4. It is a number that names 1 equal part of a whole and has 1 as its numerator. _____

Name _____

Equal Parts of a Whole

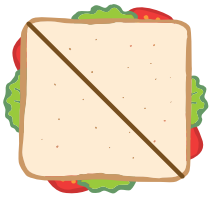
Essential Question What are equal parts of a whole?

Number and Operations—Fractions—3.NF.1 *Also 3.G.2*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5

Unlock the Problem

Lauren shares a sandwich with her brother. They each get an equal part. How many equal parts are there?



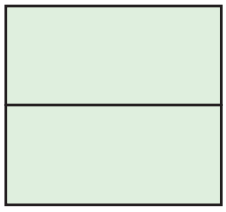
- What do you need to find?

_____

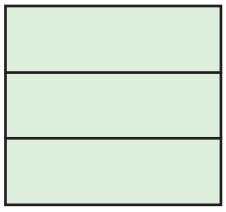
_____

- How many people share the sandwich? _____

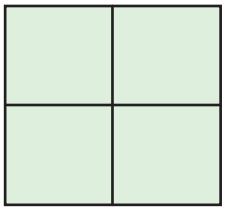
Each whole shape below is divided into equal parts. A **whole** is all of the parts of one shape or group. **Equal parts** are exactly the same size.



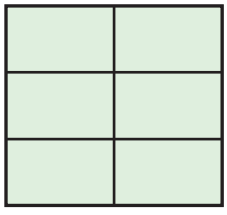
2 **halves**



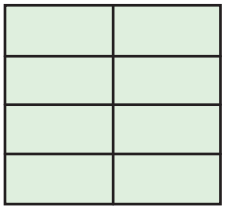
3 **thirds**



4 **fourths**



_____ **sixths**



_____ **eighths**

Lauren's sandwich is divided into halves.

So, there are _____ equal parts.

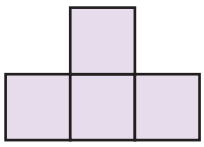
- Draw a picture to show a different way Lauren's sandwich could have been divided into halves.

Math Talk **Mathematical Practices**

Are your halves the same shape as your classmates' halves? **Explain** why both halves represent the same size.

Try This! **Write whether the shape is divided into *equal* parts or *unequal* parts.**

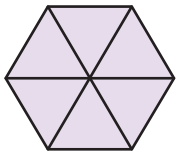
A



4 _____ parts

fourths

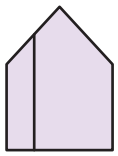
B



6 _____ parts

sixths

C



2 _____ parts

These are not halves.

ERROR Alert

Be sure the parts are equal in size.

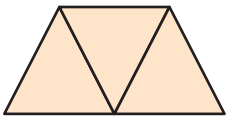
equal

unequal

Share and Show

MATH BOARD

1. This shape is divided into 3 equal parts. What is the name for the parts?



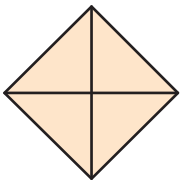
_____

Math Talk **Mathematical Practices**

Explain how you know if parts are equal.

Write the number of equal parts. Then write the name for the parts.

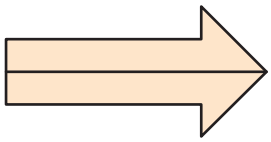
2.



_____ equal parts

_____

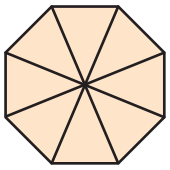
3.



_____ equal parts

_____

4.

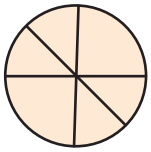


_____ equal parts

_____

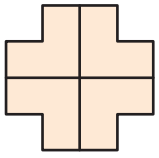
Write whether the shape is divided into *equal* parts or *unequal* parts.

5.



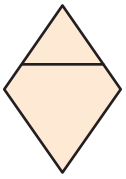
_____ parts

6.



_____ parts

7.

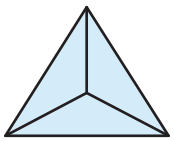


_____ parts

Name _____

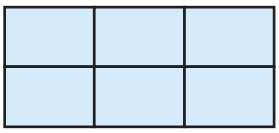
On Your Own

Write the number of equal parts. Then write the name for the parts.

8. 

_____ equal parts

_____

9. 

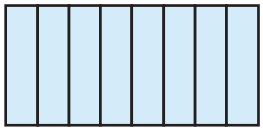
_____ equal parts

_____

10. 

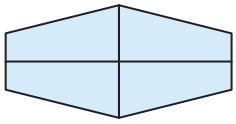
_____ equal parts

_____

11. 

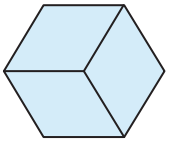
_____ equal parts

_____

12. 

_____ equal parts

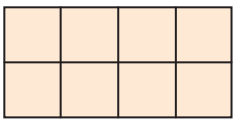
_____

13. 

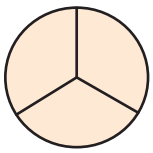
_____ equal parts

_____

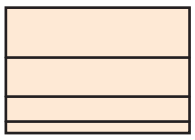
Write whether the shape is divided into *equal* parts or *unequal* parts.

14. 

_____ parts

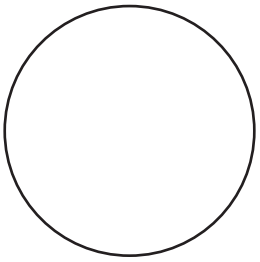
15. 

_____ parts

16. 

_____ parts

17. Draw lines to divide the circle into 8 eighths.

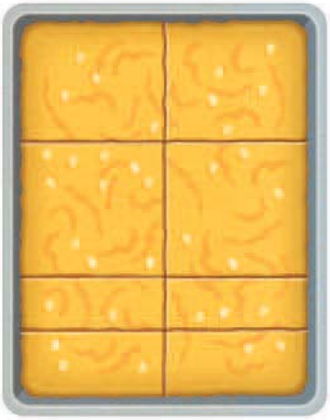


18. GO DEEPER Thomas wants to divide a square piece of paper into 4 equal parts. Draw two different quick pictures to show what his paper could look like.

Problem Solving • Applications

Use the pictures for 19–20.

Pan A



Pan B

19. Mrs. Rivera made 2 pans of corn casserole for a large family dinner. She cut each pan into parts. What is the name of the parts in A?

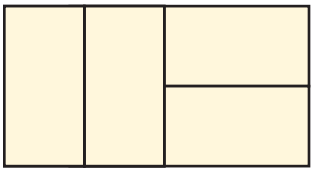
_____

20. THINK SMARTER Alex said his mom divided Pan B into eighths. Does his statement make sense? Explain.

_____

_____

21. MATHEMATICAL PRACTICE 6 **Explain** why the rectangle is divided into 4 equal parts.



_____

_____

22. GO DEEPER Shakira cut a triangle out of paper. She wants to divide the triangle into 2 equal parts. Draw a quick picture to show what her triangle could look like.

23. THINK SMARTER Parker divides a fruit bar into 3 equal parts. Circle the word that makes the sentence true.

The fruit bar is divided into | thirds | halves | fourths | .

FOR MORE PRACTICE: Standards Practice Book

Name _____

Equal Shares

Essential Question Why do you need to know how to make equal shares?

Number and Operations—Fractions—3.NF.1 *Also 3.G.2*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7

Unlock the Problem

Four friends share 2 small pizzas equally. What are two ways the pizza could be divided equally? How much pizza will each friend get?

- How might the two ways be different?

_____

_____

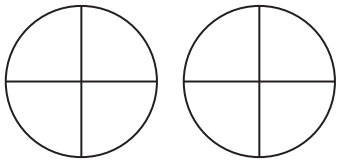
Draw to model the problem.

Draw 2 circles to show the pizzas.

One Way

There are _____ friends.

So, divide each pizza into 4 slices.



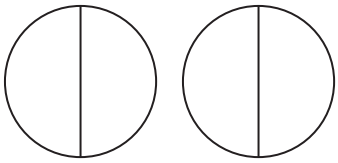
There are _____ equal parts.

Each friend can have 2 equal parts. Each friend will get 2 eighths of all the pizza.

Another Way

There are _____ friends.

So, divide all the pizza into 4 slices.



There are _____ equal parts.

Each friend can have 1 equal part. Each friend will get 1 half of a pizza.

Math Talk **Mathematical Practices**

Explain why both ways let the friends have an equal share.

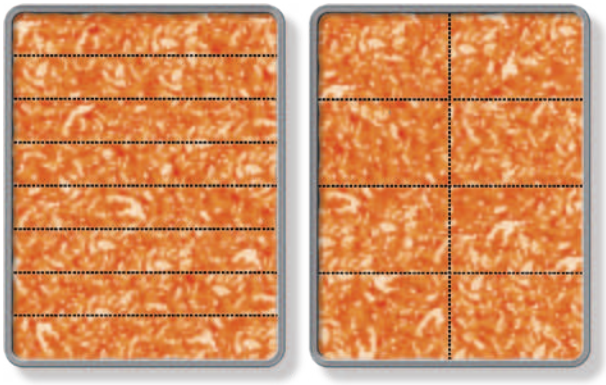
Try This! Four girls share 3 oranges equally. Draw a quick picture to find out how much each girl gets.

- Draw 3 circles to show the oranges.
- Draw lines to divide the circles equally.
- Shade the part 1 girl gets.
- Describe what part of an orange each girl gets.

_____

Example

Melissa and Kyle are planning to share one pan of lasagna with 6 friends. They do not agree on the way to cut the pan into equal parts. Will each friend get an equal share using Melissa's way? Using Kyle's way?



Melissa's Way **Kyle's Way**

- Will Melissa's shares and Kyle's shares have the same shape? _____
- Will their shares using either way be the same size? _____

So, each friend will get an _____ share using either way.

- Explain why both ways let the friends have the same amount.

_____

_____

Share and Show

MATH BOARD

1. Two friends share 4 oranges equally. Use the picture to find how much each friend gets.

Think: There are more oranges than friends.

_____

Math Talk **Mathematical Practices**

Explain another way the oranges could have been divided. Tell how much each friend will get.

Draw lines to show how much each person gets. Write the answer.

2. 8 sisters share 3 eggrolls equally.

_____

3. 6 students share 4 bagels equally.

_____

Name _____

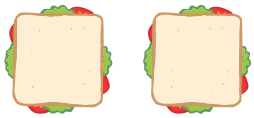
On Your Own

Draw lines to show how much each person gets. Write the answer.

4. 3 classmates share 2 granola bars equally.

_____

5. 4 brothers share 2 sandwiches equally.



_____

Draw to show how much each person gets. Shade the amount that one person gets. Write the answer.

6. 8 friends share 4 sheets of construction paper equally.

_____

7. MATHEMATICAL PRACTICE 4 **Model Mathematics** 4 sisters share 3 muffins equally.

_____

8. GO DEEPER Maria prepared 5 quesadillas. She wants to share them equally among 8 of her neighbors. How much of a quesadilla will each neighbor get?

_____

Unlock the Problem Real World

9. THINK SMARTER Julia holds a bread-baking class. She has 4 adults and 3 children in the class. The class will make 2 round loaves of bread. If Julia plans to give each person, including herself, an equal part of the baked breads, how much bread will each person get?

a. What do you need to find? _____

_____

b. How will you use what you know about drawing equal shares to solve the problem? _____

_____

c. Draw a quick picture to find the share of bread each person will get.

d. So, each person will get _____ of a loaf of bread.

10. THINK SMARTER Lara and three girl friends share three sandwiches equally.

How much does each girl get? Mark all that apply.

Ⓐ 3 fifths of a sandwich

Ⓑ 3 fourths of a sandwich

Ⓒ 1 whole sandwich

Ⓓ one half and 1 fourth of a sandwich

FOR MORE PRACTICE: Standards Practice Book

Name _____

Unit Fractions of a Whole

Essential Question What do the top and bottom numbers of a fraction tell?

Number and Operations—Fractions—3.NF.1 *Also 3.G.2*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.7

A **fraction** is a number that names part of a whole or part of a group.

In a fraction, the top number tells how many equal parts are being counted. → $\frac{1}{6}$

The bottom number tells how many equal parts are in the whole or in the group. → $\frac{1}{6}$

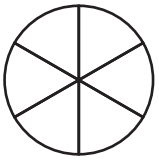
A **unit fraction** names 1 equal part of a whole. It has 1 as its top number. $\frac{1}{6}$ is a unit fraction.

Unlock the Problem

Real World

Luke's family picked strawberries. They put the washed strawberries in one part of a fruit platter. The platter had 6 equal parts. What fraction of the fruit platter had strawberries?

Find part of a whole.



Shade 1 of the 6 equal parts.

Read: one sixth **Write:** $\frac{1}{6}$

So, _____ of the platter had strawberries.

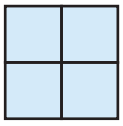
Use a fraction to find a whole.

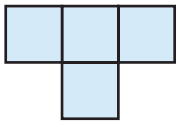
This shape ☐ is $\frac{1}{4}$ of the whole. Here are examples of what the whole could look like.

Math Talk **Mathematical Practices**

Explain how you can make a whole if you know what one equal part looks like.

A 

B 

C 

Try This! Look again at the examples at the bottom of page 329. Draw two other pictures of how the whole might look.

Share and Show

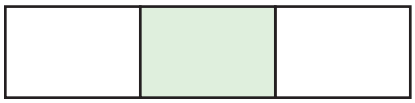
MATH BOARD

Math Talk **Mathematical Practices**

Explain how you knew what number to write as the bottom number of the fraction in Exercise 1.

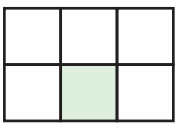
1. What fraction names the shaded part? _____

Think: 1 out of 3 equal parts is shaded.



Write the number of equal parts in the whole. Then write the fraction that names the shaded part.

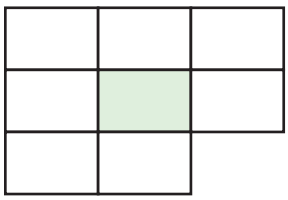
2.



_____ equal parts

_____

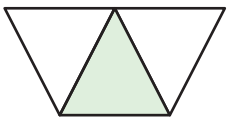
3.



_____ equal parts

_____

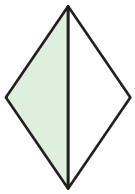
4.



_____ equal parts

_____

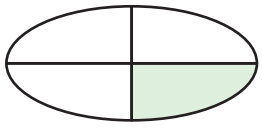
5.



_____ equal parts

_____

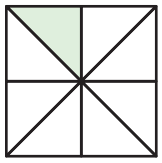
6.



_____ equal parts

_____

7.



_____ equal parts

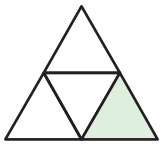
_____

Name _____

On Your Own

Write the number of equal parts in the whole.
Then write the fraction that names the shaded part.

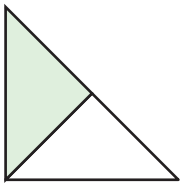
8.



_____ equal parts

_____

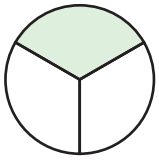
9.



_____ equal parts

_____

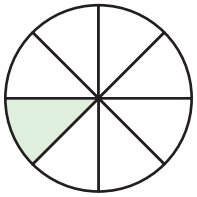
10.



_____ equal parts

_____

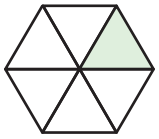
11.



_____ equal parts

_____

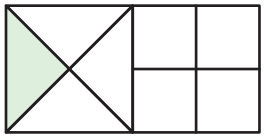
12.



_____ equal parts

_____

13. GO DEEPER

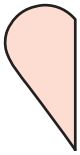


_____ equal parts

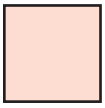
_____

MATHEMATICAL PRACTICE 4 **Use Diagrams** **Draw a picture of the whole.**

14. $\frac{1}{2}$ is



15. $\frac{1}{3}$ is

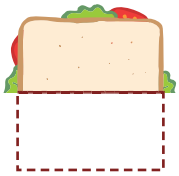
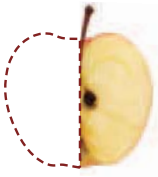


16. $\frac{1}{6}$ is

17. $\frac{1}{4}$ is

Problem Solving • Applications Real World

Use the pictures for 18–19.

Kylie's Lunch	Dylan's Lunch
 sandwich	 pizza
 apple	 fruit bar

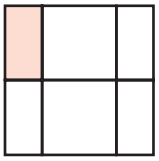
18. The missing parts of the pictures show what Kylie and Dylan ate for lunch. What fraction of the pizza did Dylan eat?

_____

19. What fraction of the apple did Kylie eat? Write the fraction in numbers and in words.

_____ _____

20. MATHEMATICAL PRACTICE 3 **Make Arguments** Diego drew lines to divide the square into 6 pieces as shown. Then he shaded part of the square. Diego says he shaded $\frac{1}{6}$ of the square. Is he correct? Explain how you know.



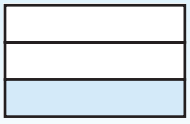
_____

_____

21. THINK SMARTER Riley and Chad each have a granola bar broken into equal pieces. They each eat one piece, or $\frac{1}{4}$, of their granola bar. How many more pieces do Riley and Chad need to eat to finish both granola bars? Draw a picture to justify your answer.

_____

22. THINK SMARTER What fraction names the shaded part? Explain how you know how to write the fraction.



_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Fractions of a Whole

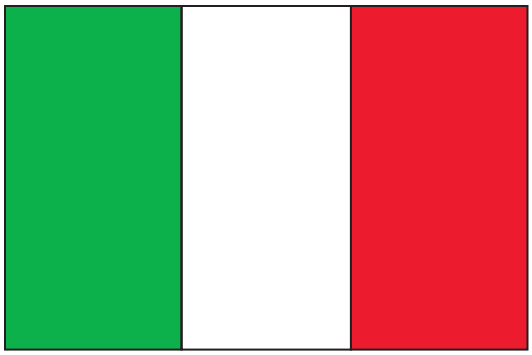
Essential Question How does a fraction name part of a whole?

Number and Operations—Fractions—3.NF.1 *Also 3.G.2*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.7

Unlock the Problem

The first pizzeria in America opened in New York in 1905. The pizza recipe came from Italy. Look at Italy's flag. What fraction of the flag is not red?



▲ Italy's flag has three equal parts.

Name equal parts of a whole.

A fraction can name more than 1 equal part of a whole.

The flag is divided into 3 equal parts, and 2 parts are not red.

2 parts not red → $\frac{2}{3}$ ← numerator
3 equal parts in all → ← denominator

Read: two thirds or two parts out of three equal parts

Write: $\frac{2}{3}$

So, _____ of the flag is not red.

Math Idea

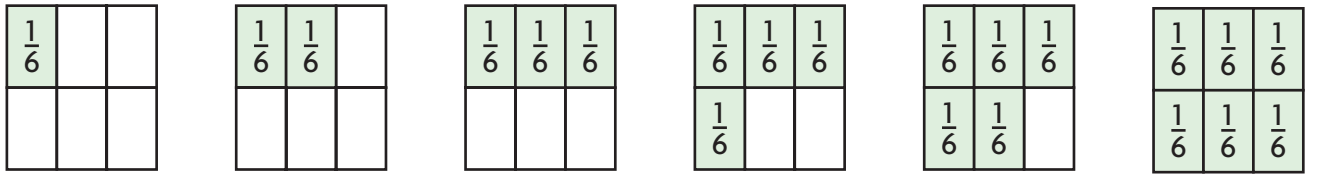
When all the parts are shaded, one whole shape is equal to all of its parts. It represents the whole number 1.

$\frac{3}{3} = 1$

The **numerator** tells how many parts are being counted.

The **denominator** tells how many equal parts are in the whole or in the group.

You can count equal parts, such as sixths, to make a whole.



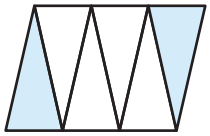
One $\frac{1}{6}$ part | Two $\frac{1}{6}$ parts | Three $\frac{1}{6}$ parts | Four $\frac{1}{6}$ parts | Five $\frac{1}{6}$ parts | Six $\frac{1}{6}$ parts

$\frac{1}{6}$ $\quad$ $\frac{2}{6}$ $\quad$ $\frac{3}{6}$ $\quad$ $\frac{\square}{6}$ $\quad$ $\frac{\square}{6}$ $\quad$ $\frac{\square}{6}$

For example, $\frac{6}{6}$ = one whole, or 1.

Try This! **Write the missing word or number to name the shaded part.**

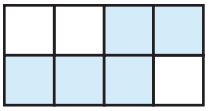
A



$\frac{2}{6}$

_____ sixths

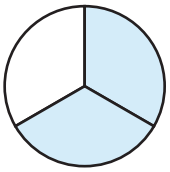
B



$\frac{5}{8}$

_____ eighths

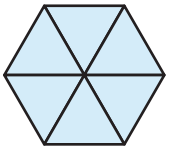
C



$\frac{\square}{3}$

two thirds

D



$\frac{\square}{6}$, or 1

six sixths, or one whole

Share and Show

MATH BOARD

1. Shade two parts out of eight equal parts. Write a fraction in words and in numbers to name the shaded part.

Think: Each part is $\frac{1}{8}$.

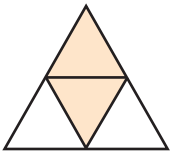
Read: _____ eighths **Write:** _____

Math Talk **Mathematical Practices**

Explain what the numerator and denominator of a fraction tell you.

Write the fraction that names each part. Write a fraction in words and in numbers to name the shaded part.

2.

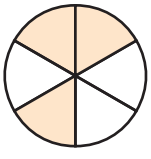


Each part is _____.

_____ fourths

_____

3.

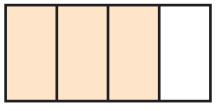


Each part is _____.

_____ sixths

_____

4.



Each part is _____.

_____ fourths

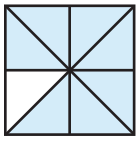
_____

Name _____

On Your Own

Write the fraction that names each part. Write a fraction in words and in numbers to name the shaded part.

5.

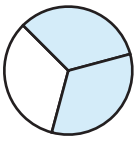


Each part is ____.

_____ eighths

_____

6.

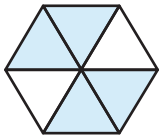


Each part is ____.

_____ thirds

_____

7.

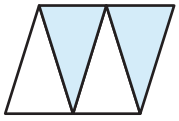


Each part is ____.

_____ sixths

_____

8.

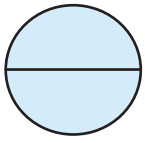


Each part is ____.

_____ fourths

_____

9.

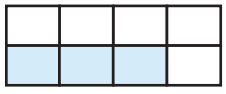


Each part is ____.

_____ halves

_____

10.



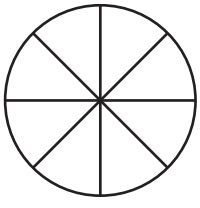
Each part is ____.

_____ eighths

_____

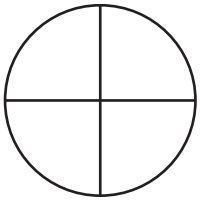
Shade the fraction circle to model the fraction. Then write the fraction in numbers.

11. six out of eight



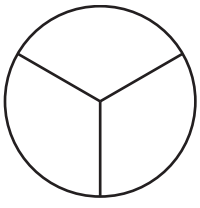
_____

12. three fourths



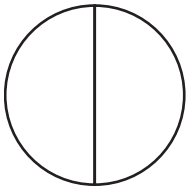
_____

13. three out of three



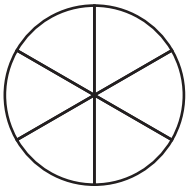
_____

14. one out of two



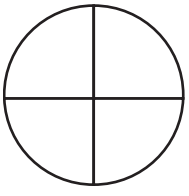
_____

15. five sixths



_____

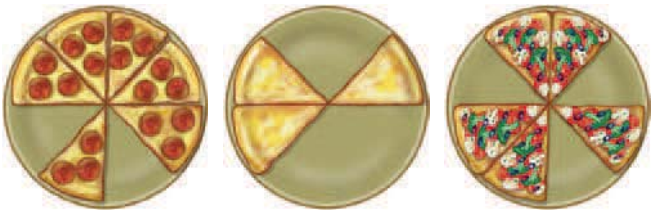
16. one out of four



_____

Problem Solving • Applications

Use the diagrams for 17–18.



Pepperoni Cheese Veggie

17. GO DEEPER Mrs. Ormond ordered pizza. Each pizza had 8 equal slices. What fraction of the pepperoni pizza was eaten? What fraction of the cheese pizza is left?

_____

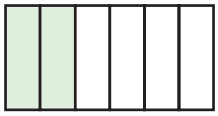
18. THINK SMARTER **Pose a Problem** Use the picture of the veggie pizza to write a problem that includes a fraction. Solve your problem.

_____

_____

_____

19. MATHEMATICAL PRACTICE 3 **Verify the Reasoning of Others** Kate says that $\frac{2}{4}$ of the rectangle is shaded. Describe her error. Use the model to write the correct fraction for the shaded part.



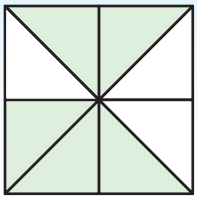
_____

_____

_____

20. THINK SMARTER Select a numerator and a denominator for the fraction that names the shaded part of the shape.

Numerator	Denominator
○ 2	○ 3
○ 3	○ 5
○ 5	○ 6
○ 6	○ 8



FOR MORE PRACTICE: Standards Practice Book

Name _____

Fractions on a Number Line

Essential Question How can you represent and locate fractions on a number line?

Number and Operations—Fractions—3.NF.2a, 3.NF.2b
Also 3.NF.2

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7

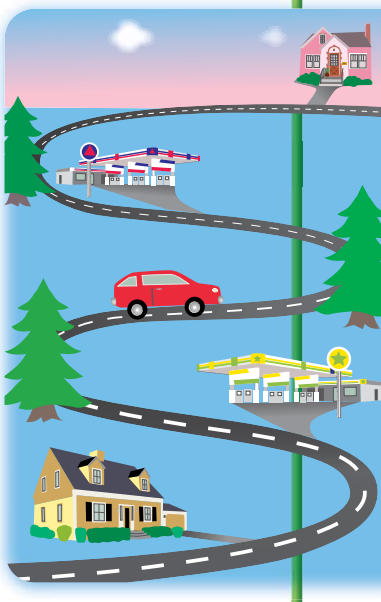
Unlock the Problem

Billy's family is traveling from his house to his grandma's house. They stop at gas stations when they are $\frac{1}{4}$ and $\frac{3}{4}$ of the way there. How can you represent those distances on a number line?

You can use a number line to show fractions. The length from one whole number to the next whole number represents one whole. The line can be divided into any number of equal parts, or lengths.

Math Idea

A point on a number line shows the endpoint of a length, or distance, from zero. A number or fraction can name the distance.



Activity Locate fractions on a number line.

Materials ■ fraction strips

STEP 1 Divide the line into four equal lengths, or fourths.
Place four $\frac{1}{4}$-fraction strips end-to-end above the line to help.

STEP 2 At the end of each strip, draw a mark on the line.

STEP 3 Count the fourths from zero to 1 to label the distances from zero.

STEP 4 Think: $\frac{1}{4}$ is 1 out of 4 equal lengths.
Draw a point at $\frac{1}{4}$ to represent the distance from 0 to $\frac{1}{4}$.
Label the point *G1*.

STEP 5 Think: $\frac{3}{4}$ is 3 out of 4 equal lengths.
Draw a point at $\frac{3}{4}$ to represent the distance from 0 to $\frac{3}{4}$.
Label the point *G2*.

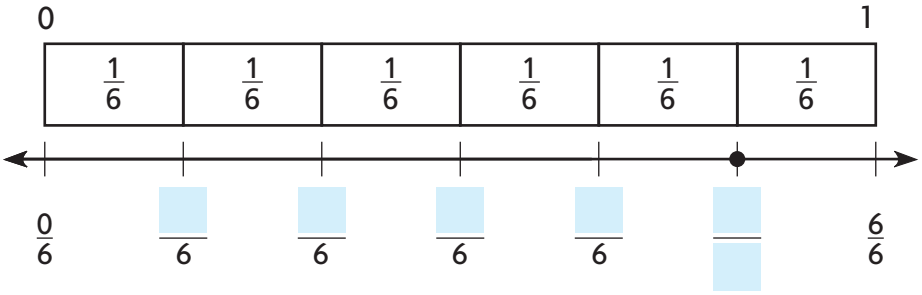
Example Complete the number line to name the point.

Materials ■ color pencils

Write the fraction that names the point on the number line.

Think: This number line is divided into six equal lengths, or sixths.

The length of one equal part is _____.



Shade the fraction strips to show the location of the point.

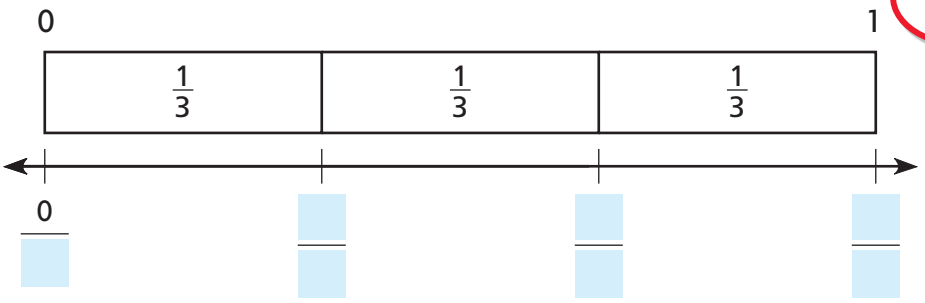
There are _____ out of _____ equal lengths shaded.
The shaded length shows $\frac{5}{6}$.

So, _____ names the point.

Share and Show

MATH BOARD

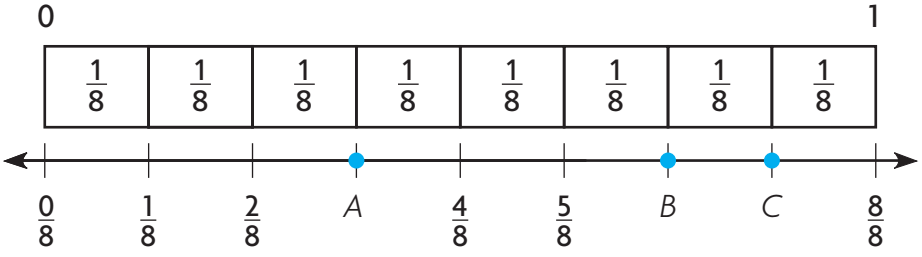
1. Complete the number line. Draw a point to show $\frac{2}{3}$.



Math Talk **Mathematical Practices**

Explain what the length between each mark on this number line represents.

Write the fraction that names the point.



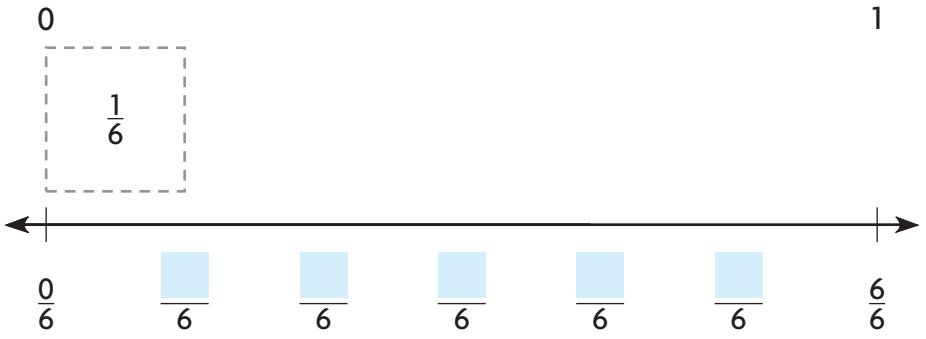
2. point A _____ **3.** point B _____ **4.** point C _____

Name _____

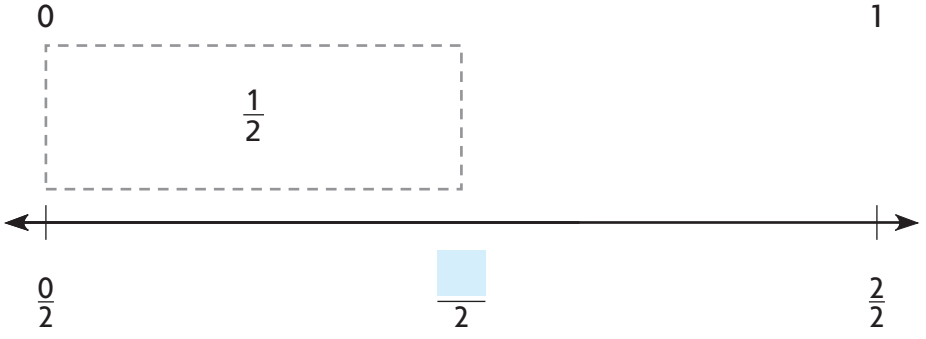
On Your Own

Use fraction strips to help you complete the number line. Then locate and draw a point for the fraction.

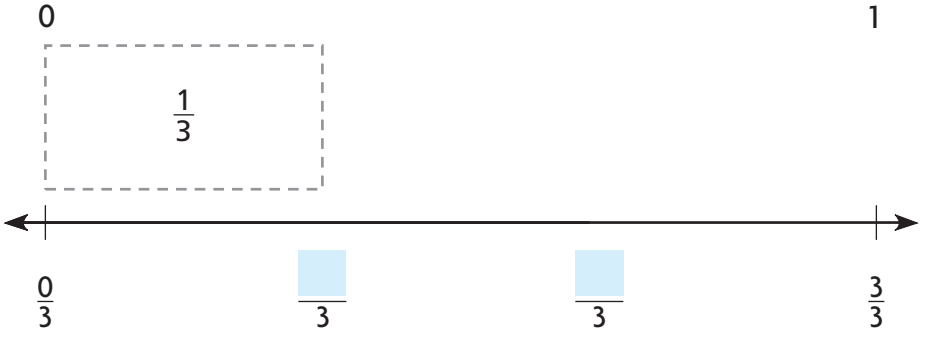
5. $\frac{2}{6}$



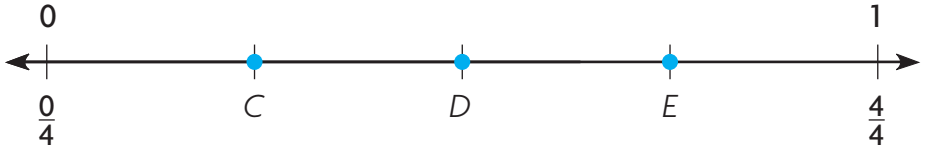
6. $\frac{1}{2}$



7. $\frac{2}{3}$



Write the fraction that names the point.



8. point C _____ **9.** point D _____ **10.** point E _____

Unlock the Problem

11. THINK SMARTER Javia ran 8 laps around a track to run a total of 1 mile on Monday. How many laps will she need to run on Tuesday to run $\frac{3}{8}$ of a mile?

a. What do you need to find?

_____

_____

_____

b. How will you use what you know about number lines to help you solve the problem?

_____

_____

_____

_____

c. MATHEMATICAL PRACTICE 4 **Use Models** Make a model to solve the problem.

d. Complete the sentences.

There are _____ laps in 1 mile.

Each lap represents _____ of a mile.

_____ laps represent the distance of three eighths of a mile.

So, Javia will need to run _____ laps to run $\frac{3}{8}$ of a mile.

Personal Math Trainer

12. THINK SMARTER + Locate and draw point F on the number line to represent the fraction $\frac{2}{4}$.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

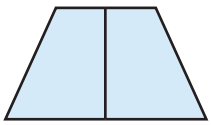
Choose the best term from the box to complete the sentence.

Vocabulary
denominator
fraction
numerator

1. A _____ is a number that names part of a whole or part of a group. (p. 329)
2. The _____ tells how many equal parts are in the whole or in the group. (p. 333)

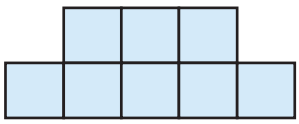
Concepts and Skills

Write the number of equal parts. Then write the name for the parts. (3.NF.1)

3. 

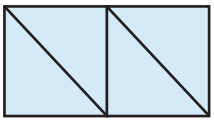
_____ equal parts

_____

4. 

_____ equal parts

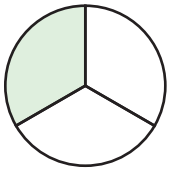
_____

5. 

_____ equal parts

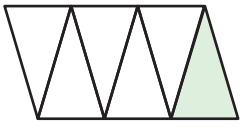
_____

Write the number of equal parts in the whole. Then write the fraction that names the shaded part. (3.NF.1)

6. 

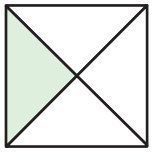
_____ equal parts

_____

7. 

_____ equal parts

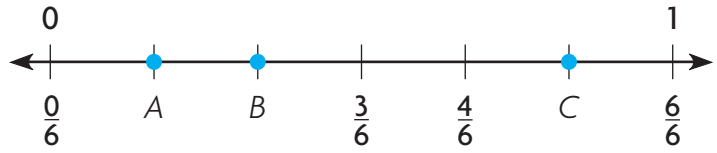
_____

8. 

_____ equal parts

_____

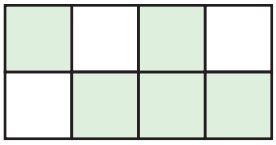
Write the fraction that names the point. (3.NF.2a, 3.NF.2b)



9. point A _____ **10.** point B _____ **11.** point C _____

12. Jessica ordered a pizza. What fraction of the pizza has mushrooms? (3.NF.1)

13. Which fraction names the shaded part? (3.NF.1)



14. Six friends share 3 oatmeal squares equally. How much of an oatmeal square does each friend get? (3.NF.1)

Name _____

Relate Fractions and Whole Numbers

Essential Question When might you use a fraction greater than 1 or a whole number?

Number and Operations—Fractions—3.NF.3c *Also 3.NF.2, 3.NF.2b, 3.G.2*

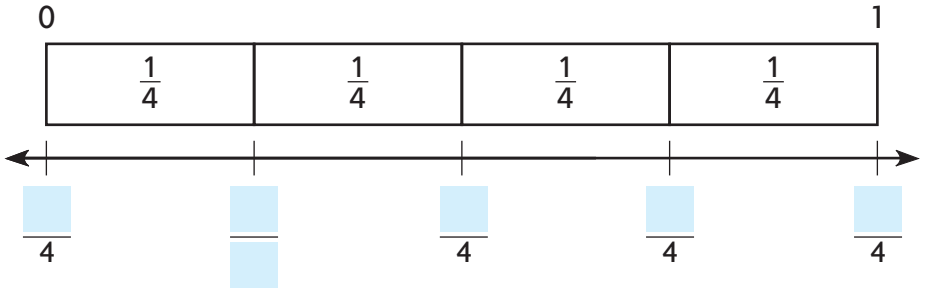
MATHEMATICAL PRACTICES
MP.1, MP.4, MP.6, MP.7

Unlock the Problem

Steve ran 1 mile and Jenna ran $\frac{4}{4}$ of a mile. Did Steve and Jenna run the same distance?

Locate 1 and $\frac{4}{4}$ on a number line.

- Shade 4 lengths of $\frac{1}{4}$ and label the number line.
- Draw a point at 1 and $\frac{4}{4}$.

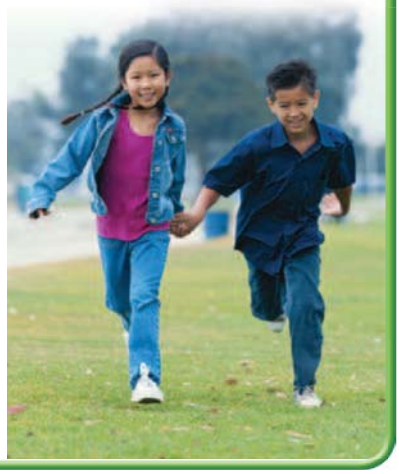


Since the distance _____ and _____ end at the same point, they are equal.

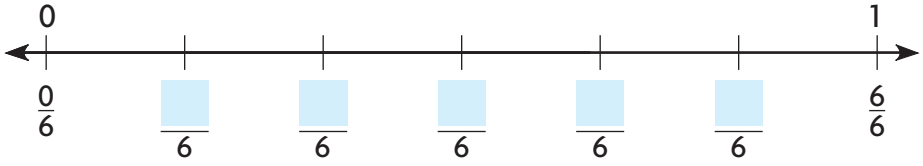
So, Steve and Jenna ran the _____ distance.

Math Idea

If two numbers are located at the same point on a number line, then they are equal and represent the same distance.



Try This! **Complete the number line. Locate and draw points at $\frac{3}{6}$, $\frac{6}{6}$, and 1.**



A Are $\frac{3}{6}$ and 1 equal? Explain.

Think: Do the distances end at the same point?

_____

_____

So, $\frac{3}{6}$ and 1 are _____.

B Are $\frac{6}{6}$ and 1 equal? Explain.

Think: Do the distances end at the same point?

_____

_____

So, $\frac{6}{6}$ and 1 are _____.

CONNECT The number of equal parts the whole is divided into is the denominator of a fraction. The number of parts being counted is the numerator. A **fraction greater than 1** has a numerator greater than its denominator.

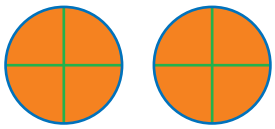
Examples

Each shape is 1 whole. Write a whole number and a fraction greater than 1 for the parts that are shaded.

Remember

$\frac{4}{1}$ ← numerator
$\frac{4}{1}$ ← denominator

A



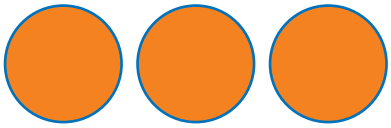
There are 2 wholes.

Each whole is divided into 4 equal parts, or fourths.

$2 = \frac{8}{4}$

There are _____ equal parts shaded.

B



There are 3 wholes.

Each whole is divided into 1 equal part.

$3 = \frac{3}{1}$

There are _____ equal parts shaded.

1. Explain what *each whole is divided into 1 equal part* means in Example B.

_____

_____

Read Math

Read $\frac{3}{1}$ as *three ones*.

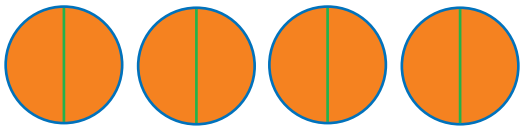
2. How do you divide a whole into 1 equal part?

_____

_____

Try This!

Each shape is 1 whole. Write a whole number and a fraction greater than 1 for the parts that are shaded.



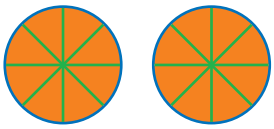
$\square = \frac{\square}{\square}$

Name _____

Share and Show

MATH BOARD

1. Each shape is 1 whole. Write a whole number and a fraction greater than 1 for the parts that are shaded.

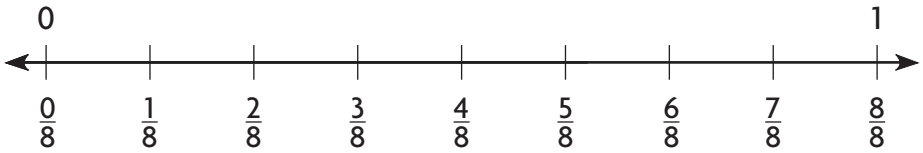


There are _____ wholes.

Each whole is divided into _____ equal parts.

There are ____ equal parts shaded.

Use the number line to find whether the two numbers are equal. Write *equal* or *not equal*.



2. $\frac{1}{8}$ and $\frac{8}{8}$ _____

3. $\frac{8}{8}$ and 1 _____

4. 1 and $\frac{4}{8}$ _____

On Your Own

Use the number line to find whether the two numbers are equal. Write *equal* or *not equal*.

5. $\frac{0}{3}$ and 1 _____

6. 1 and $\frac{2}{3}$ _____

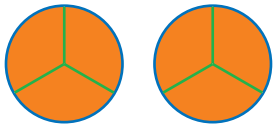
7. $\frac{3}{3}$ and 1 _____

Math Talk — **Mathematical Practices**

Explain how you know whether the two fractions are equal or not equal in Exercise 4.

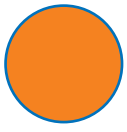
Each shape is 1 whole. Write a fraction for the parts that are shaded.

8.



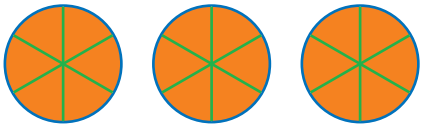
2 = _____

9.



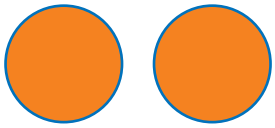
1 = _____

10.



3 = _____

11.



2 = _____

MATHEMATICAL PRACTICE 6 **Make Connections** **Draw a model of the fraction or fraction greater than 1. Then write it as a whole number.**

12. $\frac{8}{4} =$ _____

13. $\frac{6}{6} =$ _____

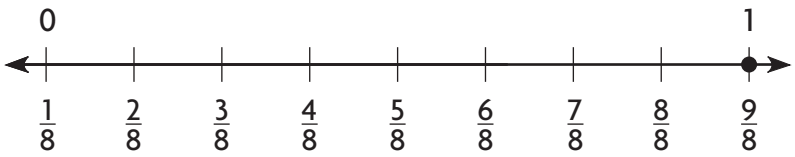
14. $\frac{5}{1} =$ _____

Problem Solving • Applications

15. GO DEEPER Jeff rode his bike around a bike trail that was $\frac{1}{3}$ of a mile long. He rode around the trail 9 times. Write a fraction greater than 1 for the distance. How many miles did Jeff ride?

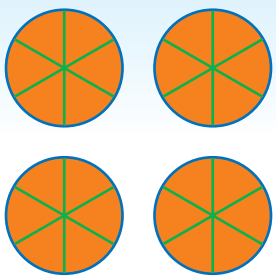
_____

16. THINK SMARTER **What's the Error?** Andrea drew the number line below. She said that $\frac{9}{8}$ and 1 are equal. Explain her error.



_____

17. THINK SMARTER Each shape is 1 whole. Which numbers name the parts that are shaded? Mark all that apply.



(A) 4 (C) $\frac{26}{6}$ (E) $\frac{6}{4}$

(B) 6 (D) $\frac{24}{6}$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Fractions of a Group

Essential Question How can a fraction name part of a group?

Number and Operations—Fractions—3.NF.1

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5

Unlock the Problem

Jake and Emma each have a collection of marbles. What fraction of each collection is blue?

You can use a fraction to name part of a group.

Jake's Marbles

number of blue marbles → ___ ← numerator

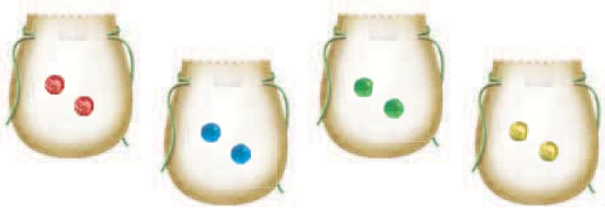
total number of marbles → 8 ← denominator

Read: three eighths, or three out of eight

Write: $\frac{3}{8}$

So, ____ of Jake's marbles are blue.

Emma's Marbles



bags of blue marbles → ___ ← numerator

total number of bags → 4 ← denominator

Read: one fourth, or one out of four

Write: $\frac{1}{4}$

So, ____ of Emma's marbles are blue.

Try This! Name part of a group.

Draw 2 red counters and 6 yellow counters.

Write the fraction of counters that are red.

___ ← number of red counters

___ ← total number of counters

Write the fraction of counters that are not red.

___ ← number of yellow counters

___ ← total number of counters

So, ____ of the counters are red and ____ are not red.

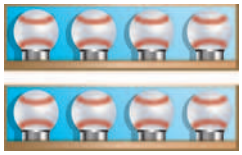
Fractions Greater Than 1

Sometimes a fraction can name more than a whole group.

Daniel collects baseballs. He has collected 8 so far. He puts them in cases that hold 4 baseballs each. What part of the baseball cases has Daniel filled?

Think: 1 case = 1

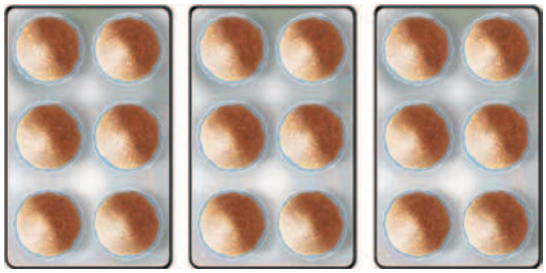
Daniel has two full cases of 4 baseballs each.



So, 2, or $\frac{8}{4}$, baseball cases are filled.

Try This! **Complete the whole number and the fraction greater than 1 to name the part filled.**

A



Think: 1 pan = 1

_____, or $\frac{\square}{6}$

B

Think: 1 box = 1

_____, or $\frac{\square}{8}$

Share and Show

MATH BOARD

1. What fraction of the counters are red? _____

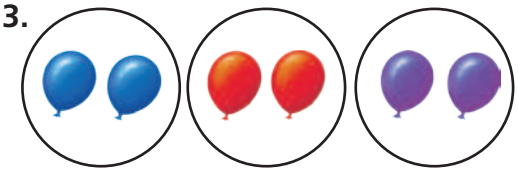
Think: How many red counters are there? How many counters are there in all?

Math Talk **Mathematical Practices**

Explain another way to name the fraction for Exercise 3.

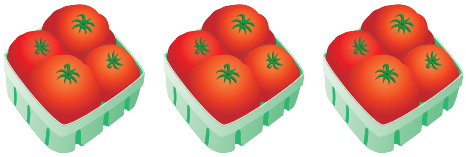
Write a fraction to name the red part of each group.

2.  _____

3.  _____

Name _____

Write a whole number and a fraction greater than 1 to name the part filled.

4. 

Think: 1 carton = 1

_____ _____

5. 

Think: 1 container = 1

_____ _____

On Your Own

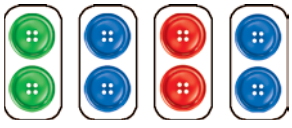
Write a fraction to name the blue part of each group.

6. 

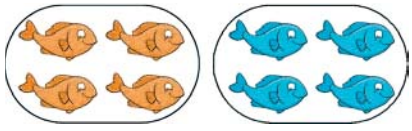
_____

7. 

_____

8. 

_____

9. 

_____

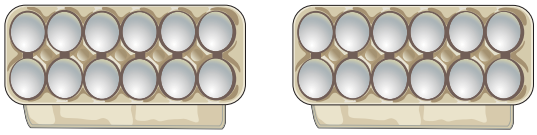
Write a whole number and a fraction greater than 1 to name the part filled.

10. 

Think: 1 container = 1

_____ _____

11. THINK SMARTER



Think: 1 carton = 1

_____ _____

Draw a quick picture on your MathBoard. Then write a fraction to name the shaded part of the group.

12. Draw 8 circles.
Shade 8 circles.

_____

13. Draw 8 triangles.
Make 4 groups.
Shade 1 group.

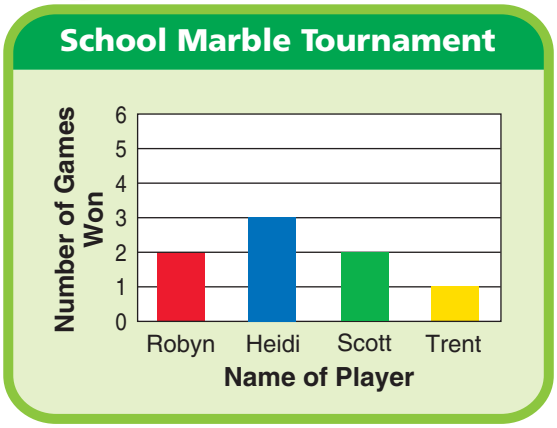
_____

14. Draw 4 rectangles.
Shade 2 rectangles.

_____

Problem Solving • Applications

Use the graph for 15–16.



15. GO DEEPER The bar graph shows the winners of the Smith Elementary School Marble Tournament. How many games were played? What fraction of the games did Scott win?

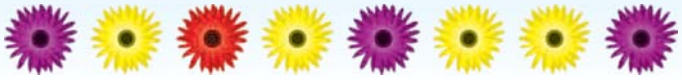
16. MATHEMATICAL PRACTICE 1 **Analyze** What fraction of the games did Robyn NOT win?

WRITE Math • **Show Your Work**

17. THINK SMARTER Li has 6 marbles. Of them, $\frac{1}{3}$ are blue. The rest are red. Draw a picture to show Li's marbles.

18. WRITE Math **What's the Question?** A bag has 2 yellow cubes, 3 blue cubes, and 1 white cube. The answer is $\frac{1}{6}$.

19. THINK SMARTER Makayla picked some flowers. What fraction of flowers are yellow or red? What fraction of the flowers are NOT yellow or red? Show your work.



FOR MORE PRACTICE: Standards Practice Book

Name _____

Find Part of a Group Using Unit Fractions

Essential Question How can a fraction tell how many are in part of a group?

Number and Operations—Fractions—3.NF.1

MATHEMATICAL PRACTICES
MP.4, MP.5

Unlock the Problem

Real World

Hands On

Audrey buys a bouquet of 12 flowers. One third of them are red. How many of the flowers are red?

- How many flowers does Audrey buy in all? _____
- What fraction of the flowers are red? _____

Activity

Materials ■ two-color counters ■ MathBoard

- Put 12 counters on your MathBoard.
- Since you want to find $\frac{1}{3}$ of the group, there should be _____ equal groups. Draw the counters below.

- Circle one of the groups to show _____. Then count the number of counters in that group.

There are _____ counters in 1 group. $\frac{1}{3}$ of 12 = _____

So, _____ of the flowers are red.

- What if Audrey buys a bouquet of 9 flowers and one third of them are yellow? Use your MathBoard and counters to find how many of the flowers are yellow.

_____

Math Talk **Mathematical Practices**

Explain how you can use the numerator and denominator in a fraction to find part of a group.

Try This! Find part of a group.

Raul picks 20 flowers from his mother's garden. One fourth of them are purple. How many of the flowers are purple?

STEP 1 Draw a row of 4 counters.

Think: To find $\frac{1}{4}$, make 4 equal groups.

STEP 2 Continue to draw as many rows of 4 counters as you can until you have 20 counters.

STEP 3 Then circle _____ equal groups.

Think: Each group represents $\frac{1}{4}$ of the flowers.

$\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$ $\frac{1}{4}$

There are _____ counters in 1 group.

$\frac{1}{4}$ of 20 = _____

So, _____ of the flowers are purple.

Share and Show

MATH BOARD

1. Use the model to find $\frac{1}{2}$ of 8. _____

Think: How many counters are in 1 of the 2 equal groups?

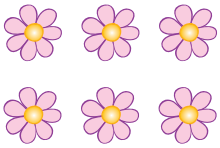
Math Talk — **Mathematical Practices**

Explain why you count the number of counters in just one of the groups in Exercise 1.

Circle equal groups to solve. Count the number of flowers in 1 group.

2. $\frac{1}{4}$ of 8 = _____

3. $\frac{1}{3}$ of 6 = _____



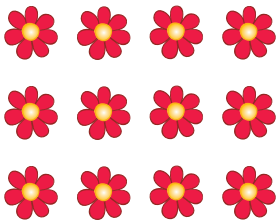
4. $\frac{1}{6}$ of 12 = _____

Name _____

On Your Own

Circle equal groups to solve. Count the number of flowers in 1 group.

5. $\frac{1}{4}$ of 12 = _____



6. $\frac{1}{3}$ of 15 = _____

7. $\frac{1}{4}$ of 16 = _____

8. $\frac{1}{3}$ of 9 = _____

9. $\frac{1}{6}$ of 18 = _____

10. $\frac{1}{8}$ of 8 = _____

11. $\frac{1}{6}$ of 30 = _____

12. $\frac{1}{3}$ of 12 = _____

13. THINK SMARTER

$\frac{1}{2}$ of 6 = _____

THINK SMARTER **Draw counters. Then circle equal groups to solve.**

14. $\frac{1}{8}$ of 16 = _____

15. $\frac{1}{6}$ of 24 = _____

Problem Solving • Applications Real World

Use the table for 16–17.

Flower Seeds Bought

Name	Number of Packs
Ryan	8
Brooke	12
Cole	20

16. MATHEMATICAL PRACTICE 4 **Use Diagrams** One fourth of the seed packs Ryan bought are violet seeds. How many packs of violet seeds did Ryan buy? Draw counters to solve.

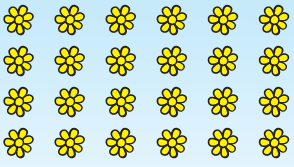
17. GO DEEPER One third of Brooke's seed packs and one fourth of Cole's seed packs are daisy seeds. How many packs of daisy seeds did they buy altogether? Explain how you know.

WRITE Math
Show Your Work

18. THINK SMARTER **Sense or Nonsense?** Sophia bought 12 pots. One sixth of them are green. Sophia said she bought 2 green pots. Does her answer make sense? Explain how you know.

Personal Math Trainer

19. THINK SMARTER + A florist has 24 sunflowers in a container. Mrs. Mason buys $\frac{1}{4}$ of the flowers. Mr. Kim buys $\frac{1}{3}$ of the flowers. How many sunflowers are left? Explain how you solved the problem.



FOR MORE PRACTICE:
Standards Practice Book

Name _____

Problem Solving • Find the Whole Group Using Unit Fractions

Essential Question How can you use the strategy *draw a diagram* to solve fraction problems?

Number and Operations—Fractions—3.NF.1

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.5, MP.6

Unlock the Problem

Real World

Cameron has 4 clown fish in his fish tank. One third of the fish in the tank are clown fish. How many fish does Cameron have in his tank?

Use the graphic organizer to help you solve the problem.

Read the Problem

What do I need to find?

I need to find _____ are in Cameron's fish tank.

What information do I need to use?

Cameron has _____ clown fish.

_____ of the fish in the tank are clown fish.

How will I use the information?

I will use the information in the problem

to draw a _____.

Solve the Problem

Describe how to draw a diagram to solve.

The denominator in $\frac{1}{3}$ tells you

that there are _____ equal parts in the whole group. Draw 3 circles to

show _____ equal parts.

Since 4 fish are $\frac{1}{3}$ of the whole group,

draw _____ counters in the first circle.

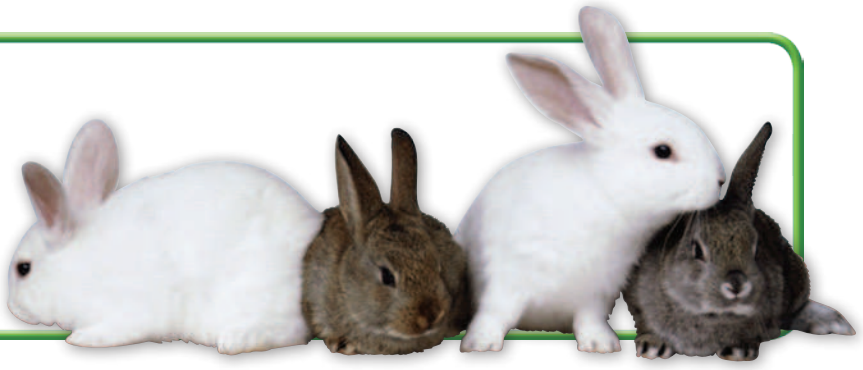
Since there are _____ counters

in the first circle, draw _____ counters in each of the remaining circles. Then find the total number of counters.

So, Cameron has _____ fish in his tank.

Try Another Problem

A pet store has 2 gray rabbits. One eighth of the rabbits at the pet store are gray. How many rabbits does the pet store have?



Read the Problem	Solve the Problem
What do I need to find?	
What information do I need to use?	
How will I use the information?	

1. MATHEMATICAL PRACTICE 8 **Draw Conclusions** How do you know that your answer is reasonable?

_____

_____

2. How did your diagram help you solve the problem? _____

_____

Math Talk **Mathematical Practices**

Suppose $\frac{1}{2}$ of the rabbits are gray. **Explain** how you can find the number of rabbits at the pet store.

Name _____

Share and Show

MATH BOARD

1. Lily has 3 dog toys that are red. One fourth of all her dog toys are red. How many dog toys does Lily have?

First, draw _____ circles to show _____ equal parts.

Next, draw _____ toys in _____ circle since

_____ circle represents the number of red toys.

Last, draw _____ toys in each of the remaining circles. Find the total number of toys.

So, Lily has _____ dog toys.

2. THINK SMARTER What if Lily has 4 toys that are red? How many dog toys would she have?

_____

3. The pet store sells bags of pet food. There are 4 bags of cat food. One sixth of the bags of food are bags of cat food. How many bags of pet food does the pet store have?

_____

4. Rachel owns 2 parakeets. One fourth of all her birds are parakeets. How many birds does Rachel own?

_____

Unlock the Problem

- Circle the question.
- Underline important facts.
- Put the problem in your own words.
- Choose a strategy you know.

On Your Own

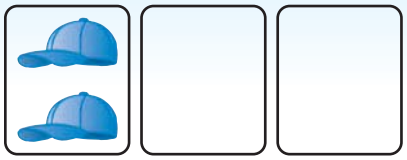
5. THINK SMARTER Before lunchtime, Abigail and Teresa each read some pages from different books. Abigail read 5, or one fifth, of the pages in her book. Teresa read 6, or one sixth, of the pages in her book. Whose book had more pages? How many more pages?

WRITE Math • Show Your Work

6. MATHEMATICAL PRACTICE 2 **Represent a Problem** Six friends share 5 meat pies. Each friend first eats half of a meat pie. How much more meat pie does each friend need to eat to finish all the meat pies and share them equally? Draw a quick picture to solve.

7. GO DEEPER Braden bought 4 packs of dog treats. He gave 4 treats to his neighbor's dog. Now Braden has 24 treats left for his dog. How many dog treats were in each pack? Explain how you know.

8. THINK SMARTER Two hats are $\frac{1}{3}$ of the group. How many hats are in the whole group?



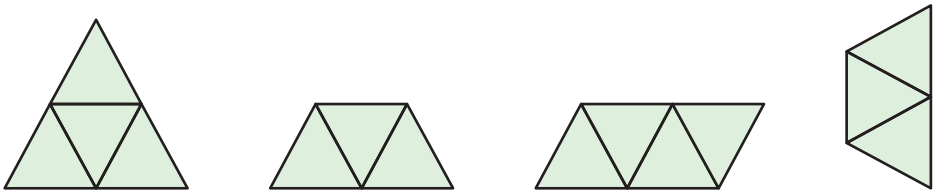
_____ hats

FOR MORE PRACTICE: Standards Practice Book

Name _____

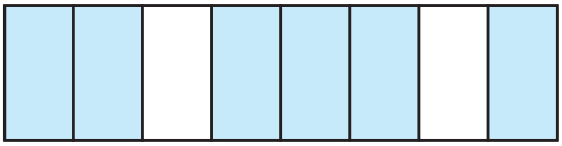
Chapter 8 Review/Test

1. Each shape is divided into equal parts. Select the shapes that show thirds. Mark all that apply.



Ⓐ Ⓑ Ⓒ Ⓓ

2. What fraction names the shaded part of the shape?



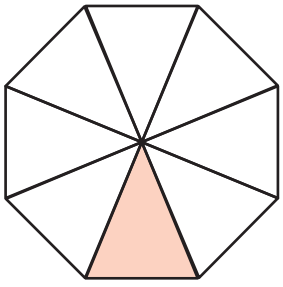
Ⓐ 8 sixths

Ⓑ 8 eighths

Ⓒ 6 eighths

Ⓓ 2 sixths

3. Omar shaded a model to show the part of the lawn that he finished mowing. What fraction names the shaded part? Explain how you know how to write the fraction.

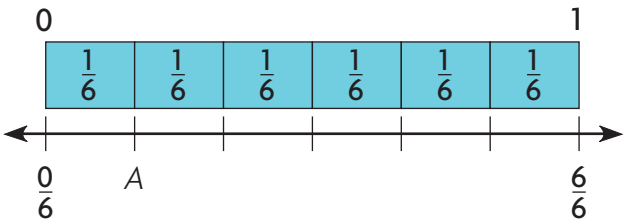


_____

_____

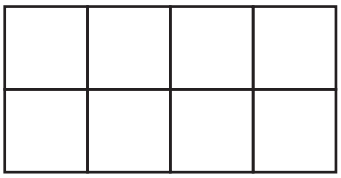
GO DIGITAL Assessment Options
Chapter Test

4. What fraction names point *A* on the number line?



_____

5. Jamal folded this piece of paper into equal parts. Circle the word that makes the sentence true.



The paper is folded into

sixths
eighths
fourths

.

6. Caleb took 18 photos at the zoo. One sixth of his photos are of giraffes. How many of Caleb's photos are of giraffes?

_____ photos

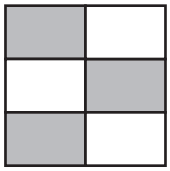
7. Three teachers share 2 packs of paper equally.

How much paper does each teacher get? Mark all that apply.

- (A) 3 halves of a pack
- (B) 2 thirds of a pack
- (C) 3 sixths of a pack
- (D) 1 half of a pack
- (E) 1 third of a pack

Name _____

8. Lilly shaded this design.

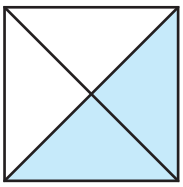


Select one number from each column to show the part of the design that Lilly shaded.

Numerator	Denominator
○ 1	○ 3
○ 3	○ 4
○ 5	○ 5
○ 6	○ 6

9. Marcus baked a loaf of banana bread for a party. He cut the loaf into equal size pieces. At the end of the party, there were 6 pieces left. Explain how you can find the number of pieces in the whole loaf if Marcus told you that $\frac{1}{3}$ of the loaf was left. Use a drawing to show your work.

10. The model shows one whole. What fraction of the model is NOT shaded?



_____

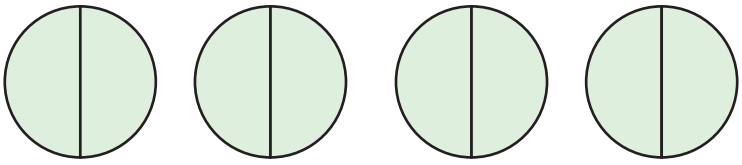
11. Together, Amy and Thea make up $\frac{1}{4}$ of the midfielders on the soccer team. How many midfielders are on the team? Show your work.

_____ midfielders

12. Six friends share 4 apples equally. How much apple does each friend get?

_____

13. Each shape is 1 whole.



For numbers 13a–13e, choose Yes or No to show whether the number names the parts that are shaded.

13a. 4 ○ Yes ○ No

13b. 8 ○ Yes ○ No

13c. $\frac{8}{2}$ ○ Yes ○ No

13d. $\frac{8}{4}$ ○ Yes ○ No

13e. $\frac{2}{8}$ ○ Yes ○ No

Name _____

14. Alex has 3 baseballs. He brings 2 baseballs to school. What fraction of his baseballs does Alex bring to school?

_____

15. Janeen and Nicole each made fruit salad for a school event.

Part A

Janeen used 16 pieces of fruit to make her salad. If $\frac{1}{4}$ of the fruits were peaches, how many peaches did she use? Make a drawing to show your work.

_____ peaches

Part B

Nicole used 24 pieces of fruit. If $\frac{1}{6}$ of them were peaches, how many peaches in all did Janeen and Nicole use to make their fruit salads? Explain how you found your answer.

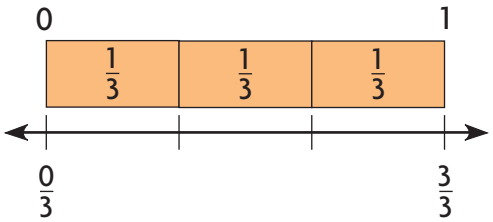
_____

_____

16. There are 8 rows of chairs in the auditorium. Three of the rows are empty. What fraction of the rows are empty?

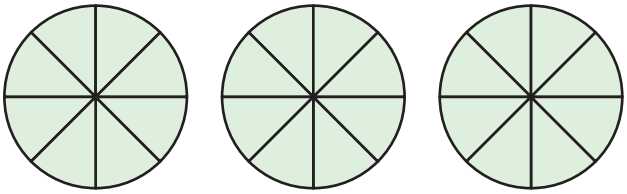
_____

17. Tara ran 3 laps around her neighborhood for a total of 1 mile yesterday. Today she wants to run $\frac{2}{3}$ of a mile. How many laps will she need to run around her neighborhood?



_____ laps

18. Gary painted some shapes.



Select one number from each column to show a fraction greater than 1 that names the parts Gary painted.

Numerator	Denominator
○ 3	○ 3
○ 4	○ 4
○ 8	○ 8
○ 24	○ 24

19. Angelo rode his bike around a bike trail that was $\frac{1}{4}$ of a mile long. He rode his bike around the trail 8 times. Angelo says he rode a total of $\frac{8}{4}$ miles. Teresa says he is wrong and that he actually rode 2 miles. Who is correct? Use words and drawings to explain how you know.

Chapter 9

Compare Fractions

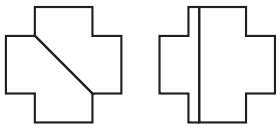
Show What You Know

Check your understanding of important skills.

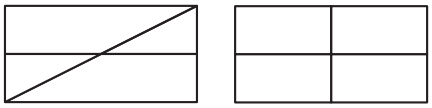
Name _____

Halves and Fourths

1. Find the shape that is divided into 2 equal parts. Color $\frac{1}{2}$.



2. Find the shape that is divided into 4 equal parts. Color $\frac{1}{4}$.



Parts of a Whole

Write the number of shaded parts and the number of equal parts.

3. 

____ shaded parts

____ equal parts

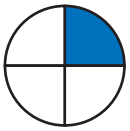
4. 

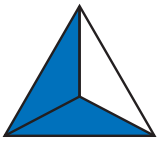
____ shaded parts

____ equal parts

Fractions of a Whole

Write the fraction that names the shaded part of each shape.

5.  ____

6.  ____

7.  ____

Math Detective

Hannah keeps her marbles in bags with 4 marbles in each bag. She writes $\frac{3}{4}$ to show the number of red marbles in each bag. Be a Math Detective to find another fraction to name the number of red marbles in 2 bags.

Vocabulary Builder

Visualize It

Complete the flow map by using the words with a ✓.

Fractions and Whole Numbers

What is it?	What are some examples?
_____ →	$\frac{2}{3} > \frac{1}{3}$
_____ →	$\frac{1}{4} < \frac{2}{4}$
_____ →	$\frac{1}{2} = \frac{2}{4}$
_____ →	$\frac{1}{3}, \frac{1}{4}$
_____ →	$\frac{2}{2}, \frac{4}{2}$

Review Words

- compare
- denominator
- eighths
- equal parts
- equal to (=)
- fourths
- fraction
- ✓ greater than (>)
- halves
- ✓ less than (<)
- numerator
- order
- sixths
- thirds
- ✓ unit fractions
- ✓ whole numbers

Preview Word

- ✓ equivalent fractions

Understand Vocabulary

Write the review word or preview word that answers the riddle.

1. We are two fractions that name the same amount.

   _____

2. I am the part of a fraction above the line. I tell how many parts are being counted.

   _____

3. I am the part of a fraction below the line. I tell how many equal parts are in the whole or in the group.

   _____

Name _____

Problem Solving • Compare Fractions

Essential Question How can you use the strategy *act it out* to solve comparison problems?

Number and Operations—Fractions—3.NF.3d *Also 3.NF.1*

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.5

Unlock the Problem

Real World

Mary and Vincent climbed up a rock wall at the park. Mary climbed $\frac{3}{4}$ of the way up the wall. Vincent climbed $\frac{3}{8}$ of the way up the wall. Who climbed higher?

You can act out the problem by using manipulatives to help you compare fractions.

Remember

< is less than
> is greater than
= is equal to

Hands On

Read the Problem

What do I need to find?

_____

What information do I need to use?

Mary climbed _____ of the way.

Vincent climbed _____ of the way.

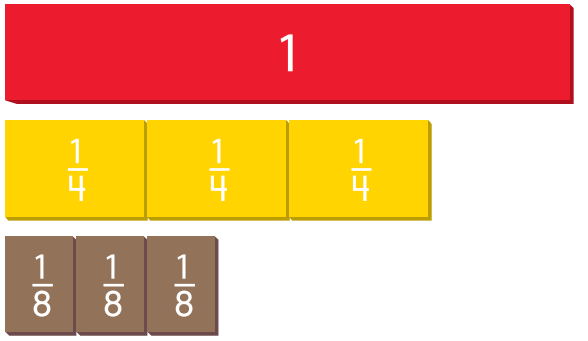
How will I use the information?

I will use _____

and _____ the lengths of the models to find who climbed _____.

Solve the Problem

Record the steps you used to solve the problem.



Compare the lengths.

_____ ◯ _____

The length of the $\frac{3}{4}$ model is _____ than the length of the $\frac{3}{8}$ model.

So, _____ climbed higher on the rock wall.

Math Talk **Mathematical Practices**

How do you know who climbed higher?

Try Another Problem

Students at day camp are decorating paper circles for placemats. Tracy finished $\frac{3}{6}$ of her placemat. Kim finished $\frac{5}{6}$ of her placemat. Who finished more of her placemat?

Read the Problem	Solve the Problem
What do I need to find?	**Record the steps you used to solve the problem.**
What information do I need to use?	
How will I use the information?	

Math Talk **Mathematical Practices**

Explain how you know that $\frac{5}{6}$ is greater than $\frac{3}{6}$ without using models.

1. How did your model help you solve the problem? _____

2. Tracy and Kim each had a carton of milk with lunch. Tracy drank $\frac{5}{8}$ of her milk. Kim drank $\frac{7}{8}$ of her milk. Who drank more of her milk? Explain.

Name _____

Share and Show

MATH BOARD

1. At the park, people can climb a rope ladder to its top. Rosa climbed $\frac{2}{8}$ of the way up the ladder. Justin climbed $\frac{2}{6}$ of the way up the ladder. Who climbed higher on the rope ladder?

First, what are you asked to find?

_____

Then, model and compare the fractions. **Think:** Compare $\frac{2}{8}$ and $\frac{2}{6}$.

Last, find the greater fraction.

_____ ◯ _____

So, _____ climbed higher on the rope ladder.

2. What if Cara also tried the rope ladder and climbed $\frac{2}{4}$ of the way up? Who climbed highest on the rope ladder: Rosa, Justin, or Cara? Explain how you know.

_____

_____

_____

_____

Unlock the Problem

- Circle the question.
- Underline important facts.
- Act out the problem using manipulatives.

On Your Own

3. MATHEMATICAL PRACTICE 5 **Use a Concrete Model** Ted walked $\frac{2}{3}$ mile to his soccer game. Then he walked $\frac{1}{3}$ mile to his friend's house. Which distance is shorter? Explain how you know.

_____

_____

Use the table for 4–5.

4. GO DEEPER Suri is spreading jam on 8 biscuits for breakfast. The table shows the fraction of biscuits spread with each jam flavor. Which flavor did Suri use on the most biscuits?

Hint: Use 8 counters to model the biscuits.

Suri's Biscuits	
Jam Flavor	Fraction of Biscuits
Peach	$\frac{3}{8}$
Raspberry	$\frac{4}{8}$
Strawberry	$\frac{1}{8}$

5. WRITE Math **What's the Question?** The answer is strawberry.

WRITE Math • Show Your Work

6. THINK SMARTER Suppose Suri had also used plum jam on the biscuits. She frosted $\frac{1}{2}$ of the biscuits with peach jam, $\frac{1}{4}$ with raspberry jam, $\frac{1}{8}$ with strawberry jam, and $\frac{1}{8}$ with plum jam. Which flavor of jam did Suri use on the most biscuits?

7. Ms. Gordon has many snack bar recipes. One recipe uses $\frac{1}{3}$ cup oatmeal and $\frac{1}{2}$ cup flour. Will Ms. Gordon use more oatmeal or more flour? Explain.

8. THINK SMARTER Rick lives $\frac{4}{6}$ mile from school. Noah lives $\frac{3}{6}$ mile from school.

Use the fractions and symbols to show which distance is longer.

$\frac{3}{6}$, $\frac{4}{6}$, < and > ☐ ○ ☐

FOR MORE PRACTICE: Standards Practice Book

Name _____

Compare Fractions with the Same Denominator

Essential Question How can you compare fractions with the same denominator?

Number and Operations—Fractions—3.NF.3d *Also 3.NF.1, 3.NF.2b*

MATHEMATICAL PRACTICES
MP.2, MP.3, MP.5, MP.8

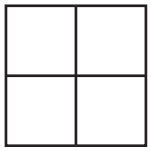
Unlock the Problem

Jeremy and Christina are each making quilt blocks. Both blocks are the same size and both are made of 4 equal-size squares. $\frac{2}{4}$ of Jeremy's squares are green. $\frac{1}{4}$ of Christina's squares are green. Whose quilt block has more green squares?

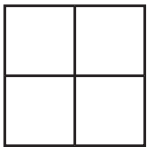
- Circle the two fractions you need to compare.
- How are the two fractions alike?

_____

Jeremy's Quilt Block



Christina's Quilt Block



Compare fractions of a whole.

- Shade $\frac{2}{4}$ of Jeremy's quilt block.
- Shade $\frac{1}{4}$ of Christina's quilt block.
- Compare $\frac{2}{4}$ and $\frac{1}{4}$.

The greater fraction will have the larger amount of the whole shaded.

$\frac{2}{4} \bigcirc \frac{1}{4}$

Math Idea

You can compare two fractions when they refer to the same whole or to groups that are the same size.

So, _____ quilt block has more green squares.

Compare fractions of a group.

Jen and Maggie each have 6 buttons.

- Shade 3 of Jen's buttons to show the number of buttons that are red. Shade 5 of Maggie's buttons to show the number that are red.
- Write a fraction to show the number of red buttons in each group. Compare the fractions.

Jen's Buttons

_____

Maggie's Buttons

_____

There are the same number of buttons in each group, so you can count the number of red buttons to compare the fractions.

3 < _____, so $\frac{\square}{6} < \frac{\square}{6}$.

So, _____ has a greater fraction of red buttons.

Hands On

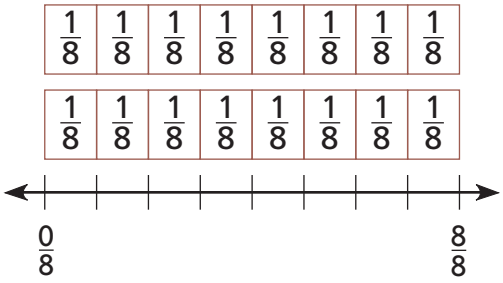
Use fraction strips and a number line.

At the craft store, one piece of ribbon is $\frac{2}{8}$ yard long. Another piece of ribbon is $\frac{7}{8}$ yard long. If Sean wants to buy the longer piece of ribbon, which piece should he buy?

- On a number line, a fraction farther to the right is greater than a fraction to its left.
- On a number line, a fraction farther to the left is _____ a fraction to its right.

Compare $\frac{2}{8}$ and $\frac{7}{8}$.

- Shade the fraction strips to show the locations of $\frac{2}{8}$ and $\frac{7}{8}$.
- Draw and label points on the number line to represent the distances $\frac{2}{8}$ and $\frac{7}{8}$.
- Compare the lengths.



$\frac{2}{8}$ is to the left of $\frac{7}{8}$. It is closer to $\frac{0}{8}$, or _____.

$\frac{7}{8}$ is to the _____ of $\frac{2}{8}$. It is closer to $\frac{\quad}{\quad}$, or _____.

$\frac{\quad}{\quad} < \frac{\quad}{\quad}$ and $\frac{\quad}{\quad} > \frac{\quad}{\quad}$

So, Sean should buy the piece of ribbon that is $\frac{\quad}{\quad}$ yard long.

Use reasoning.

Ana and Omar are decorating same-size bookmarks. Ana covers $\frac{3}{3}$ of her bookmark with glitter. Omar covers $\frac{1}{3}$ of his bookmark with glitter. Whose bookmark is covered with more glitter?

Compare $\frac{3}{3}$ and $\frac{1}{3}$.

- When the denominators are the same, the whole is divided into same-size pieces. You can look at the _____ to compare the number of pieces.
- Both fractions involve third-size pieces. _____ pieces are more than _____ piece. $3 >$ _____, so $\frac{\quad}{\quad} > \frac{\quad}{\quad}$.

So, _____ bookmark is covered with more glitter.

Math Talk — **Mathematical Practices**

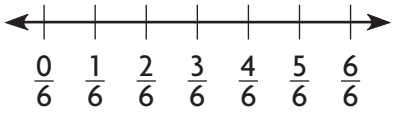
Explain how you can use reasoning to compare fractions with the same denominator.

Name _____

Share and Show

MATH BOARD

1. Draw points on the number line to show $\frac{1}{6}$ and $\frac{5}{6}$. Then compare the fractions.



Think: $\frac{1}{6}$ is to the left of $\frac{5}{6}$ on the number line.

$\frac{1}{6} \bigcirc \frac{5}{6}$

Math Talk Mathematical Practices

Explain why fractions increase in size as you move right on the number line.

Compare. Write <, >, or =.

2. $\frac{4}{8} \bigcirc \frac{3}{8}$

3. $\frac{1}{4} \bigcirc \frac{4}{4}$

4. $\frac{1}{2} \bigcirc \frac{1}{2}$

5. $\frac{3}{6} \bigcirc \frac{2}{6}$

On Your Own

Compare. Write <, >, or =.

6. $\frac{2}{4} \bigcirc \frac{3}{4}$

7. $\frac{2}{3} \bigcirc \frac{2}{3}$

8. $\frac{4}{6} \bigcirc \frac{2}{6}$

9. $\frac{0}{8} \bigcirc \frac{2}{8}$

THINK SMARTER **Write a fraction less than, greater than, or equal to the given fraction.**

10. $\frac{1}{2} < \frac{\square}{\square}$

11. $\frac{\square}{\square} < \frac{12}{6}$

12. $\frac{8}{8} = \frac{\square}{\square}$

13. $\frac{\square}{\square} > \frac{2}{4}$

Problem Solving • Applications

Real World

14. Carlos finished $\frac{5}{8}$ of his art project on Monday. Tyler finished $\frac{7}{8}$ of his art project on Monday. Who finished more of his art project on Monday?

15. MATHEMATICAL PRACTICE 2 **Use Reasoning** Ms. Endo made two loaves of bread that are the same size. Her family ate $\frac{1}{4}$ of the banana bread and $\frac{3}{4}$ of the cinnamon bread. Which loaf of bread had less left over?

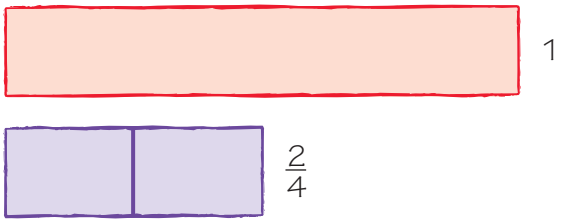
16. THINK SMARTER Todd and Lisa are comparing fraction strips. Which statements are correct? Mark all that apply.

(A) $\frac{1}{4} < \frac{4}{4}$ (B) $\frac{5}{6} < \frac{4}{6}$ (C) $\frac{2}{3} > \frac{1}{3}$ (D) $\frac{5}{8} > \frac{4}{8}$

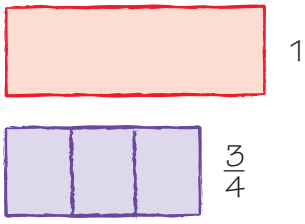
THINK SMARTER What's the Error?

17. Gary and Vanessa are comparing fractions. Vanessa models $\frac{2}{4}$ and Gary models $\frac{3}{4}$. Vanessa writes $\frac{3}{4} < \frac{2}{4}$. Look at Gary's model and Vanessa's model and describe her error.

Vanessa's Model



Gary's Model



- Describe Vanessa's error.

18. GO DEEPER Explain how to correct Vanessa's error. Then show the correct model.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Compare Fractions with the Same Numerator

Essential Question How can you compare fractions with the same numerator?

Number and Operations—Fractions—3.NF.3d *Also 3.NF.1*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4, MP.7

Unlock the Problem

Real World

Hands On

Markos is at Athena's Cafe. He can sit at a table with 5 of his friends or at a different table with 7 of his friends. The same-size spinach pie is shared equally among the people at each table. At which table should Markos sit to get more pie?

- Including Markos, how many friends will be sharing pie at each table?

_____

- What will you compare?

_____

_____

Model the problem.

There will be 6 friends sharing Pie A or 8 friends sharing Pie B.

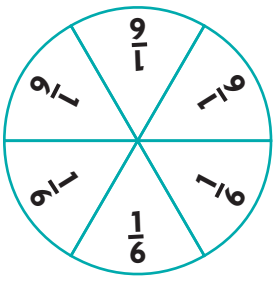
So, Markos will get either $\frac{1}{6}$ or $\frac{1}{8}$ of a pie.

- Shade $\frac{1}{6}$ of Pie A.
- Shade $\frac{1}{8}$ of Pie B.
- Which piece of pie is larger?
- Compare $\frac{1}{6}$ and $\frac{1}{8}$.

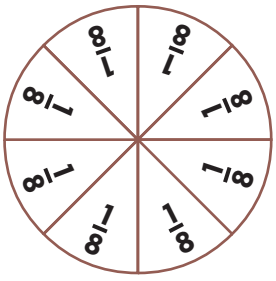
$\frac{1}{6}$ ◯ $\frac{1}{8}$

So, Markos should sit at the table with ____ friends to get more pie.

Pie A



Pie B



1. Which pie has more pieces? _____
The *more* pieces a whole is divided into, the _____ the pieces are.

2. Which pie has fewer pieces? _____
The *fewer* pieces a whole is divided into, the _____ the pieces are.

Math Talk **Mathematical Practices**

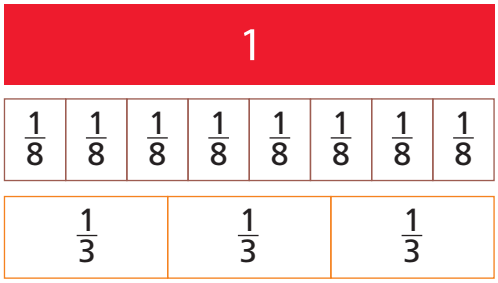
Suppose Markos wants two pieces of one of the pies above. Is $\frac{2}{6}$ or $\frac{2}{8}$ of the pie a greater amount? **Explain** how you know.

Use fraction strips.

On Saturday, the campers paddled $\frac{2}{8}$ of their planned route down the river. On Sunday, they paddled $\frac{2}{3}$ of their route down the river. On which day did the campers paddle farther?

Compare $\frac{2}{8}$ and $\frac{2}{3}$.

- Place a ✓ next to the fraction strips that show more parts in the whole.
- Shade $\frac{2}{8}$. Then shade $\frac{2}{3}$. Compare the shaded parts.
- $\frac{2}{8}$ ◯ $\frac{2}{3}$



Think: $\frac{1}{8}$ is less than $\frac{1}{3}$, so $\frac{2}{8}$ is less than $\frac{2}{3}$.

So, the campers paddled farther on _____.

Use reasoning.

For her class party, Felicia baked two trays of snacks that were the same size. After the party, she had $\frac{3}{4}$ of the carrot snack and $\frac{3}{6}$ of the apple snack left over. Was more carrot snack or more apple snack left over?

Compare $\frac{3}{4}$ and $\frac{3}{6}$.

- Since the numerators are the same, look at the denominators to compare the size of the pieces. $\frac{3}{4}$ ● $\frac{3}{6}$

  - The *more* pieces a whole is divided into, the _____ the pieces are.
  - The *fewer* pieces a whole is divided into, the _____ the pieces are.

- $\frac{1}{4}$ is _____ than $\frac{1}{6}$ because there are _____ pieces.
- $\frac{3}{4}$ ◯ $\frac{3}{6}$

ERROR Alert

When comparing fractions with the same numerator, be sure the symbol shows that the fraction with fewer pieces in the whole is the greater fraction.

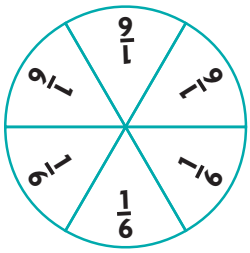
So, there was more of the _____ snack left over.

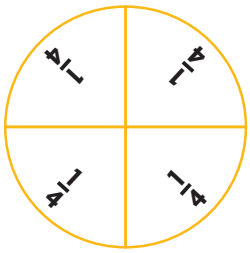
Name _____

Share and Show

MATH BOARD

1. Shade the models to show $\frac{1}{6}$ and $\frac{1}{4}$.





Then compare the fractions.

$\frac{1}{6} \bigcirc \frac{1}{4}$

Compare. Write <, >, or =.

2. $\frac{1}{8} \bigcirc \frac{1}{3}$

3. $\frac{3}{4} \bigcirc \frac{3}{8}$

4. $\frac{2}{6} \bigcirc \frac{2}{3}$

5. $\frac{4}{8} \bigcirc \frac{4}{4}$

6. $\frac{3}{6} \bigcirc \frac{3}{6}$

7. $\frac{8}{4} \bigcirc \frac{8}{8}$

Math Talk Mathematical Practices

Explain why $\frac{1}{2}$ is greater than $\frac{1}{4}$.

On Your Own

Compare. Write <, >, or =.

8. $\frac{1}{3} \bigcirc \frac{1}{4}$

9. $\frac{2}{3} \bigcirc \frac{2}{6}$

10. $\frac{4}{8} \bigcirc \frac{4}{2}$

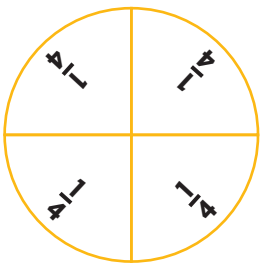
11. $\frac{6}{8} \bigcirc \frac{6}{6}$

12. $\frac{1}{6} \bigcirc \frac{1}{2}$

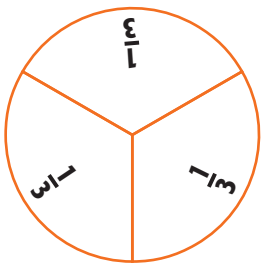
13. $\frac{7}{8} \bigcirc \frac{7}{8}$

14. GO DEEPER James ate $\frac{3}{4}$ of his quesadilla. David ate $\frac{2}{3}$ of his quesadilla. Both are the same size. Who ate more of his quesadilla?

James said he knows he ate more because he looked at the amounts left. Does his answer make sense? Shade the models. Explain.



James



David

_____

_____

Unlock the Problem (Real World)

15. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** Quinton and Hunter are biking on trails in Katy Trail State Park. They biked $\frac{5}{6}$ mile in the morning and $\frac{5}{8}$ mile in the afternoon. Did they bike a greater distance in the morning or in the afternoon?

a. What do you need to know? _____

b. The numerator is 5 in both fractions, so compare $\frac{1}{6}$ and $\frac{1}{8}$. Explain.

_____

c. How can you solve the problem?

d. Complete the sentences.

In the morning, the boys biked _____ mile. In the afternoon, they biked _____ mile.

So, the boys biked a greater distance in the _____. $\frac{5}{6}$ ◯ $\frac{5}{8}$

16. THINK SMARTER Zach has a piece of pie that is $\frac{1}{4}$ of a pie. Max has a piece of pie that is $\frac{1}{2}$ of a pie. Max's piece is smaller than Zach's piece. Explain how this could happen. Draw a picture to show your answer.

_____

_____

Personal Math Trainer

17. THINK SMARTER + Before taking a hike, Kate and Dylan each ate part of same-size granola bars. Kate ate $\frac{1}{3}$ of her bar. Dylan ate $\frac{1}{2}$ of his bar. Who ate more of the granola bar? Explain how you solved the problem.

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Compare Fractions

Essential Question What strategies can you use to compare fractions?

Number and Operations—Fractions—3.NF.3d *Also 3.NF.1, 3.NF.3*

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4, MP.6

Unlock the Problem

Real World

Luka and Ann are eating the same-size small pizzas. One plate has $\frac{3}{4}$ of Luka's cheese pizza. Another plate has $\frac{5}{6}$ of Ann's mushroom pizza. Whose plate has more pizza?

- Circle the numbers you need to compare.
- How many pieces make up each whole pizza?

_____

Compare $\frac{3}{4}$ and $\frac{5}{6}$.

Hands On

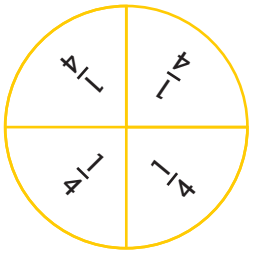
Missing Pieces Strategy

- You can compare fractions by comparing pieces missing from a whole.

- Shade $\frac{3}{4}$ of Luka's pizza and $\frac{5}{6}$ of Ann's pizza. Each fraction represents a whole that is missing one piece.
- Since $\frac{1}{6}$ ◯ $\frac{1}{4}$, a smaller piece is missing from Ann's pizza.
- If a smaller piece is missing from Ann's pizza, she must have more pizza.

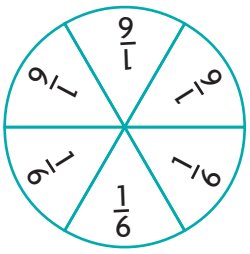
So, _____ plate has more pizza.

Luka



$\frac{3}{4}$

Ann



$\frac{5}{6}$

Math Talk **Mathematical Practices**

Explain how knowing that $\frac{1}{4}$ is less than $\frac{1}{3}$ helps you compare $\frac{3}{4}$ and $\frac{2}{3}$.

Morgan ran $\frac{2}{3}$ mile. Alexa ran $\frac{1}{3}$ mile. Who ran farther?

Compare $\frac{2}{3}$ and $\frac{1}{3}$.

$\frac{\square}{3} > \frac{\square}{3}$

Same Denominator Strategy

- When the denominators are the same, you can compare only the number of pieces, or the numerators.

So, _____ ran farther.

Ms. Davis is making a fruit salad with $\frac{3}{4}$ pound of cherries and $\frac{3}{8}$ pound of strawberries. Which weighs less, the cherries or the strawberries?

Compare $\frac{3}{4}$ and $\frac{3}{8}$.

Same Numerator Strategy

- When the numerators are the same, look at the denominators to compare the size of the pieces.

Think: $\frac{1}{8}$ is smaller than $\frac{1}{4}$ because there are more pieces.

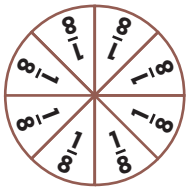
$\frac{3}{\square} < \frac{3}{\square}$

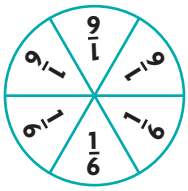
So, the _____ weigh less.

Share and Show

MATH BOARD

1. Compare $\frac{7}{8}$ and $\frac{5}{6}$.





Think: What is missing from each whole?

Write <, >, or =. $\frac{7}{8} \bigcirc \frac{5}{6}$

Compare. Write <, >, or =. Write the strategy you used.

2. $\frac{1}{2} \bigcirc \frac{2}{3}$

3. $\frac{3}{4} \bigcirc \frac{2}{4}$

4. $\frac{3}{8} \bigcirc \frac{3}{6}$

5. $\frac{3}{4} \bigcirc \frac{7}{8}$

Math Talk **Mathematical Practices**

Explain how the missing pieces in Exercise 1 help you compare $\frac{7}{8}$ and $\frac{5}{6}$.

Name _____

On Your Own

Compare. Write <, >, or =. Write the strategy you used.

6. $\frac{1}{2} \bigcirc \frac{2}{2}$

_____

7. $\frac{1}{3} \bigcirc \frac{1}{4}$

_____

8. $\frac{2}{3} \bigcirc \frac{5}{6}$

_____

9. $\frac{4}{6} \bigcirc \frac{4}{2}$

_____

Name a fraction that is less than or greater than the given fraction. Draw to justify your answer.

10. less than $\frac{5}{6}$ _____

11. greater than $\frac{3}{8}$ _____

12. GO DEEPER Luke, Seth, and Anja have empty glasses. Mr. Gabel pours $\frac{3}{6}$ cup of orange juice in Seth's glass. Then he pours $\frac{1}{6}$ cup of orange juice in Luke's glass and $\frac{2}{6}$ cup of orange juice in Anja's glass. Who gets the most orange juice?

_____

13. THINK SMARTER **What's the Error?** Jack says that $\frac{5}{8}$ is greater than $\frac{5}{6}$ because the denominator 8 is greater than the denominator 6. Describe Jack's error. Draw a picture to explain your answer.

_____

_____

_____

_____

Unlock the Problem Real World

14. MATHEMATICAL PRACTICE 1 **Analyze** Tracy is making blueberry muffins. She is using $\frac{4}{4}$ cup of honey and $\frac{4}{2}$ cups of flour. Does Tracy use more honey or more flour?

a. What do you need to know?

_____

b. What strategy will you use to compare the fractions?

_____

c. Show the steps you used to solve the problem.

d. Complete the comparison.

$\square$ > $\square$

So, Tracy uses more _____.

15. THINK SMARTER Compare the fractions. Circle a symbol that makes the statement true.

$\frac{2}{8}$ [> < =] $\frac{2}{4}$ $\qquad$ $\frac{1}{4}$ [> < =] $\frac{4}{8}$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Concepts and Skills

1. When two fractions refer to the same whole, explain why the fraction with a lesser denominator has larger pieces than the fraction with a greater denominator. (3.NF.3d)

_____

_____

_____

2. When two fractions refer to the same whole and have the same denominators, explain why you can compare only the numerators. (3.NF.3d)

_____

_____

_____

Compare. Write <, >, or =. (3.NF.3d)

3. $\frac{1}{6} \bigcirc \frac{1}{4}$

4. $\frac{1}{8} \bigcirc \frac{1}{8}$

5. $\frac{2}{8} \bigcirc \frac{2}{3}$

6. $\frac{4}{2} \bigcirc \frac{1}{2}$

7. $\frac{7}{8} \bigcirc \frac{3}{8}$

8. $\frac{5}{6} \bigcirc \frac{2}{3}$

9. $\frac{2}{4} \bigcirc \frac{3}{4}$

10. $\frac{6}{6} \bigcirc \frac{6}{8}$

11. $\frac{3}{4} \bigcirc \frac{7}{8}$

Name a fraction that is less than or greater than the given fraction. Draw to justify your answer. (3.NF.3d)

12. greater than $\frac{2}{6}$ _____

13. less than $\frac{2}{3}$ _____

14. Two walls in Tiffany's room are the same size. Tiffany paints $\frac{1}{4}$ of one wall. Roberto paints $\frac{1}{8}$ of the other wall. Who painted a greater amount in Tiffany's room? (3.NF.3d)

15. Matthew ran $\frac{5}{8}$ mile during track practice. Pablo ran $\frac{5}{6}$ mile. Write a fraction that shows who ran farther. (3.NF.3d)

16. Mallory bought 6 roses for her mother. Two-sixths of the roses are red and $\frac{4}{6}$ are yellow. Write a fraction that correctly compares the amounts. (3.NF.3d)

17. Lani used $\frac{2}{3}$ cup of raisins and $\frac{3}{4}$ cup of oatmeal to bake cookies. Did Lani use less oatmeal or less raisins? (3.NF.3d)

Name _____

Compare and Order Fractions

Essential Question How can you compare and order fractions?

Number and Operations—Fractions—3.NF.3d *Also 3.NF.1*

MATHEMATICAL PRACTICES
MP.3, MP.4, MP.5, MP.6

Unlock the Problem

Real World

Hands On

Sierra, Tad, and Dale ride their bikes to school. Sierra rides $\frac{3}{4}$ mile, Tad rides $\frac{3}{8}$ mile, and Dale rides $\frac{3}{6}$ mile. Compare and order the distances from least to greatest.

- Circle the fractions you need to use.
- Underline the sentence that tells you what you need to do.

Activity 1 Order fractions with the same numerator.

Materials ■ color pencil

You can order fractions by reasoning about the size of unit fractions.

1			
$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$	$\frac{1}{4}$

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Remember

- The *more* pieces a whole is divided into, the smaller the pieces are.
- The *fewer* pieces a whole is divided into, the larger the pieces are.

STEP 1 Shade one unit fraction for each fraction strip.

_____ is the longest unit fraction.

_____ is the shortest unit fraction.

STEP 2 Shade one more unit fraction for each fraction strip.

Are the shaded fourths still the longest? _____

Are the shaded eighths still the shortest? _____

STEP 3 Continue shading the fraction strips so that three unit fractions are shaded for each strip.

Are the shaded fourths still the longest? _____

Are the shaded eighths still the shortest? _____

$\frac{3}{4}$ mile is the _____ distance. $\frac{3}{8}$ mile is the _____ distance. $\frac{3}{6}$ mile is *between* the other two distances.

So, the distances in order from least to greatest are

_____ mile, _____ mile, _____ mile.

Try This! **Order $\frac{2}{6}$, $\frac{2}{3}$, and $\frac{2}{4}$ from greatest to least.**

Order the fractions $\frac{2}{6}$, $\frac{2}{3}$, and $\frac{2}{4}$ by thinking about the length of the unit fraction strip. Then label the fractions *shortest*, *between*, or *longest*.

Fraction	Unit Fraction	Length
$\frac{2}{6}$		
$\frac{2}{3}$		
$\frac{2}{4}$		

Math Talk **Mathematical Practices**

When ordering three fractions, what do you know about the third fraction when you know which fraction is the shortest and which fraction is the longest? **Explain** your answer.

- When the numerators are the same, think about the _____ of the pieces to compare and order fractions.

So, the order from greatest to least is _____, _____, _____.

Hands On

Activity 2 Order fractions with the same denominator.

Materials ■ color pencil

Shade fraction strips to order $\frac{5}{8}$, $\frac{8}{8}$, and $\frac{3}{8}$ from least to greatest.

1							
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Shade $\frac{5}{8}$.

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Shade $\frac{8}{8}$.

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Shade $\frac{3}{8}$.

- When the denominators are the same, the size of the pieces is the _____.

So, think about the _____ of pieces to compare and order fractions.

_____ is the shortest. _____ is the longest.

_____ is between the other two fractions.

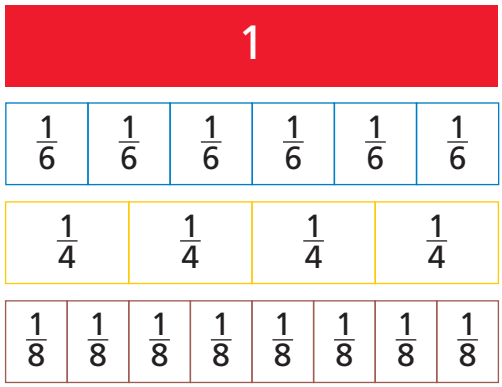
So, the order from least to greatest is _____, _____, _____.

Name _____

Share and Show

MATH BOARD

1. Shade the fraction strips to order $\frac{4}{6}$, $\frac{4}{4}$, and $\frac{4}{8}$ from least to greatest.



_____ is the shortest. _____ is the longest.

_____ is between the other two lengths. _____, _____, _____

Hands On

Math Talk

Mathematical Practices

Explain how you would order the fractions $\frac{2}{3}$, $\frac{1}{3}$, and $\frac{3}{3}$ from greatest to least.

Write the fractions in order from least to greatest.

2. $\frac{1}{2}, \frac{0}{2}, \frac{2}{2}$ _____, _____, _____

3. $\frac{1}{6}, \frac{1}{2}, \frac{1}{3}$ _____, _____, _____

On Your Own

Write the fractions in order from greatest to least.

4. $\frac{6}{6}, \frac{2}{6}, \frac{5}{6}$ _____, _____, _____

5. $\frac{1}{8}, \frac{1}{4}, \frac{1}{2}$ _____, _____, _____

Write the fractions in order from least to greatest.

6. THINK SMARTER
$\frac{6}{3}, \frac{6}{2}, \frac{6}{8}$ _____, _____, _____

7. THINK SMARTER
$\frac{4}{2}, \frac{2}{2}, \frac{8}{2}$ _____, _____, _____

8. MATHEMATICAL PRACTICE 6 **Compare** Pam is making biscuits. She needs $\frac{2}{6}$ cup of oil, $\frac{2}{3}$ cup of water, and $\frac{2}{4}$ cup of milk. Write the ingredients from greatest to least amount.

_____, _____, _____

Problem Solving • Applications

9. In fifteen minutes, Greg's sailboat went $\frac{3}{6}$ mile, Gina's sailboat went $\frac{6}{6}$ mile, and Stuart's sailboat went $\frac{4}{6}$ mile. Whose sailboat went the longest distance in fifteen minutes?

Whose sailboat went the shortest distance?

10. GO DEEPER Look back at Problem 9. Write a similar problem by changing the fraction of a mile each sailboat traveled, so the answers are different from Problem 9. Then solve the problem.

WRITE Math • Show Your Work

11. THINK SMARTER Tom has three pieces of wood. The length of the longest piece is $\frac{3}{4}$ foot. The length of the shortest piece is $\frac{3}{8}$ foot. What might be the length of the third piece of wood?

12. THINK SMARTER Jesse ran $\frac{2}{4}$ mile on Monday, $\frac{2}{3}$ mile on Tuesday, and $\frac{2}{8}$ mile on Wednesday. Order the fractions from least to greatest.

$\frac{2}{4}$, $\frac{2}{3}$ and $\frac{2}{8}$ ☐ ☐ ☐

FOR MORE PRACTICE: Standards Practice Book

Name _____

Model Equivalent Fractions

Essential Question How can you use models to find equivalent fractions?

Number and Operations—Fractions—3.NF.3a *Also 3.NF.1, 3.NF.2a, 3.NF.2b, 3.NF.3, 3.NF.3b, 3.NF.3c, 3.G.2*

MATHEMATICAL PRACTICES
MP.4, MP.5, MP.7

Investigate

Hands On

Materials ■ sheet of paper ■ crayon or color pencil

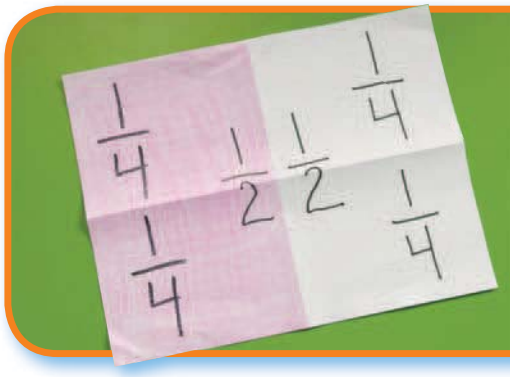
Two or more fractions that name the same amount are called **equivalent fractions**. You can use a sheet of paper to model fractions equivalent to $\frac{1}{2}$.

A. First, fold a sheet of paper into two equal parts. Open the paper and count the parts.

There are ____ equal parts. Each part is ____ of the paper.

Shade one of the halves. Write $\frac{1}{2}$ on each of the halves.

B. Next, fold the paper in half two times. Open the paper.



Now there are ____ equal parts. Each part is ____ of the paper.

Write $\frac{1}{4}$ on each of the fourths.

Look at the shaded parts. $\frac{1}{2} = \frac{\square}{4}$

C. Last, fold the paper in half three times.

Now there are ____ equal parts. Each part is ____ of the paper.

Write $\frac{1}{8}$ on each of the eighths.

Find the fractions equivalent to $\frac{1}{2}$ on your paper.

So, $\frac{1}{2}$, $\frac{\square}{\square}$, and $\frac{\square}{\square}$ are equivalent.

Draw Conclusions

1. Explain how many $\frac{1}{8}$ parts are equivalent to one $\frac{1}{4}$ part on your paper.

_____

_____

Math Idea

Two or more numbers that have the same value or name the same amount are *equivalent.*

2. THINK SMARTER What do you notice about how the numerators changed for the shaded part as you folded the paper? _____

What does this tell you about the change in the number of parts? _____

How did the denominators change for the shaded part as you folded? _____

What does this tell you about the change in the size of the parts? _____

Make Connections

Hands On

You can use a number line to find equivalent fractions.

Find a fraction equivalent to $\frac{2}{3}$.

Materials ■ fraction strips

Math Talk Mathematical Practices

Explain how the number of sixths in a distance on the number line is related to the number of thirds in the same distance.

STEP 1 Draw a point on the number line to represent the distance $\frac{2}{3}$.

STEP 2 Use fraction strips to divide the number line into sixths. At the end of each strip, draw a mark on the number line and label the marks to show sixths.

STEP 3 Identify the fraction that names the same point as $\frac{2}{3}$. _____

So, $\frac{2}{3} = \frac{\square}{6}$.

Name _____

Share and Show

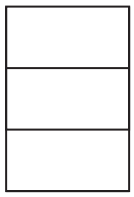
MATH BOARD

Hands On

Shade the model. Then divide the pieces to find the equivalent fraction.

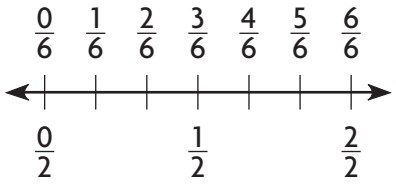
1. 

$\frac{1}{4} = \frac{\square}{8}$

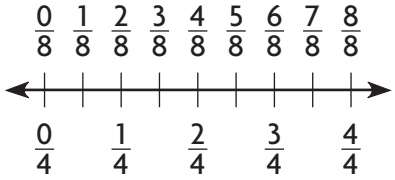
2. 

$\frac{2}{3} = \frac{\square}{6}$

Use the number line to find the equivalent fraction.

3. 

$\frac{1}{2} = \frac{\square}{6}$

4. 

$\frac{3}{4} = \frac{\square}{8}$

Problem Solving • Applications

Real World

5. MATHEMATICAL PRACTICE 6 **Explain** why $\frac{2}{2} = 1$. Write another fraction that is equal to 1. Draw to justify your answer.

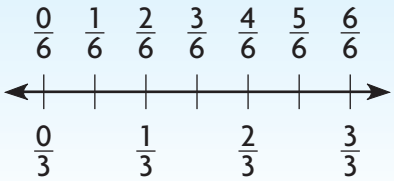
_____

_____

_____

Personal Math Trainer

6. THINK SMARTER + For numbers 6a–6d, select True or False to tell whether the fractions are equivalent.

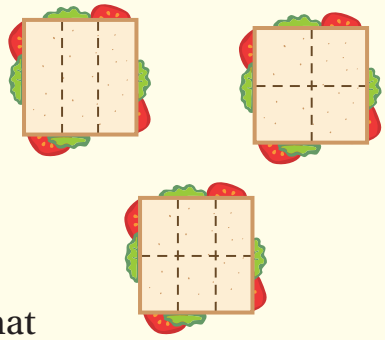


6a.	$\frac{6}{6}$ and $\frac{3}{3}$	○ True	○ False
6b.	$\frac{4}{6}$ and $\frac{1}{3}$	○ True	○ False
6c.	$\frac{2}{3}$ and $\frac{3}{6}$	○ True	○ False
6d.	$\frac{1}{3}$ and $\frac{2}{6}$	○ True	○ False

Connect to Reading

Summarize

You can *summarize* the information in a problem by underlining it or writing the information needed to answer a question.



Read the problem. Underline the important information.

7. THINK SMARTER Mrs. Akers bought three sandwiches that were the same size. She cut the first one into thirds. She cut the second one into fourths and the third one into sixths. Marian ate 2 pieces of the first sandwich. Jason ate 2 pieces of the second sandwich. Marcos ate 3 pieces of the third sandwich. Which children ate the same amount of a sandwich? Explain.

The first sandwich was cut into _____.	The second sandwich was cut into _____.	The third sandwich was cut into _____.
Marian ate _____ pieces of the sandwich. Shade the part Marian ate.	Jason ate _____ pieces of the sandwich. Shade the part Jason ate.	Marcos ate _____ pieces of the sandwich. Shade the part Marcos ate.
Marian ate $\frac{\quad}{\quad}$ of the first sandwich.	Jason ate $\frac{\quad}{\quad}$ of the second sandwich.	Marcos ate $\frac{\quad}{\quad}$ of the third sandwich.

Are all the fractions equivalent? _____

Which fractions are equivalent? $\frac{\quad}{\quad} = \frac{\quad}{\quad}$

So, _____ and _____ ate the same amount of a sandwich.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Equivalent Fractions

Essential Question How can you use models to name equivalent fractions?

Number and Operations—Fractions—3.NF.3b *Also 3.NF.1, 3.NF.3, 3.NF.3a, 3.G.2*

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.8

Unlock the Problem

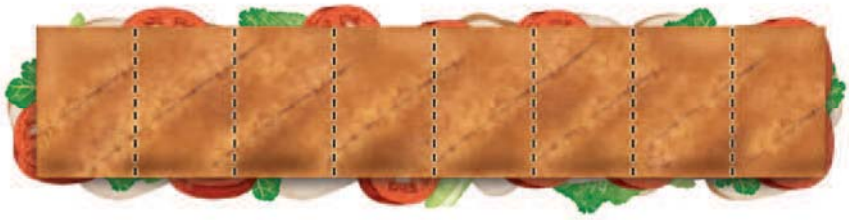
Real World

Cole brought a submarine sandwich to the picnic. He shared the sandwich equally with 3 friends. The sandwich was cut into eighths. What are two ways to describe the part of the sandwich each friend ate?

- How many people shared the sandwich?

_____

Cole grouped the smaller pieces into twos. Draw circles to show equal groups of two pieces to show what each friend ate.



There are 4 equal groups. Each group is $\frac{1}{4}$ of the whole sandwich. So, each friend ate $\frac{1}{4}$ of the whole sandwich.

How many eighths did each friend eat? _____

$\frac{1}{4}$ and _____ are equivalent fractions since they both name the _____ amount of the sandwich.

So, $\frac{1}{4}$ and _____ of the sandwich are two ways to describe the part of the sandwich each friend ate.

Try This! **Circle equal groups. Write an equivalent fraction for the shaded part of the whole.**

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

$\frac{4}{8} =$ _____

Math Talk **Mathematical Practices**

Explain a different way you could have circled the equal groups.

Example Model the problem.

Heidi ate $\frac{3}{6}$ of her fruit bar. Molly ate $\frac{4}{8}$ of her fruit bar, which is the same size. Which girl ate more of her fruit bar?

Shade $\frac{3}{6}$ of Heidi's fruit bar and $\frac{4}{8}$ of Molly's fruit bar.

- Is $\frac{3}{6}$ greater than, less than, or equal to $\frac{4}{8}$? _____

So, both girls ate the _____ amount.

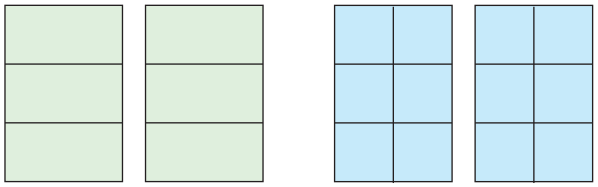
Heidi

$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

Molly

$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$
$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{8}$

Try This! **Each shape is 1 whole. Write an equivalent fraction for the shaded part of the models.**

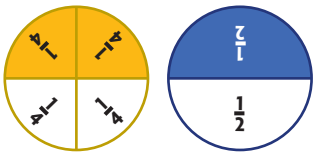


$\frac{6}{3} = \frac{\square}{6}$

Share and Show

MATH BOARD

1. Each shape is 1 whole. Use the model to find the equivalent fraction.



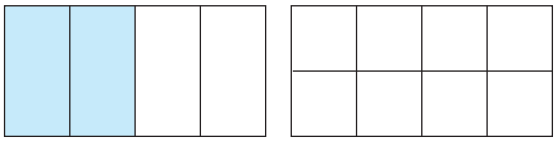
$\frac{2}{4} = \frac{\square}{2}$

Math Talk Mathematical Practices

Explain why both fractions name the same amount.

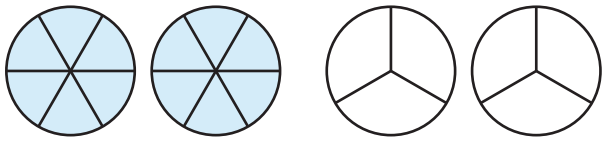
Each shape is 1 whole. Shade the model to find the equivalent fraction.

2.



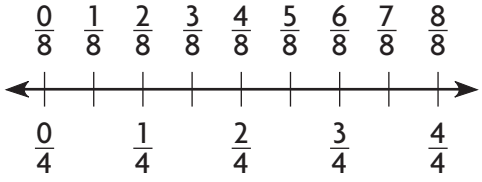
$\frac{2}{4} = \frac{\square}{8}$

3.



$\frac{12}{6} = \frac{\square}{3}$

4. Andy swam $\frac{8}{8}$ mile in a race. Use the number line to find a fraction that is equivalent to $\frac{8}{8}$.



$\frac{8}{8} = \frac{\square}{\square}$

Name _____

Circle equal groups to find the equivalent fraction.

5.

$\frac{3}{6} = \frac{\square}{2}$

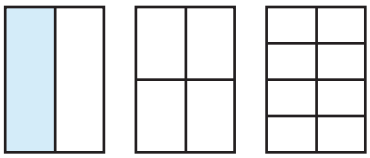
6.

$\frac{6}{6} = \frac{\square}{3}$

On Your Own

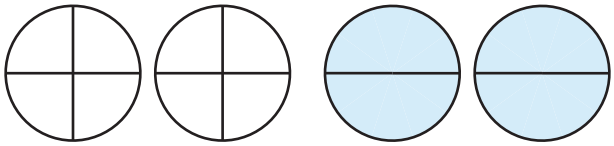
Each shape is 1 whole. Shade the model to find the equivalent fraction.

7.



$\frac{1}{2} = \frac{2}{\square} = \frac{\square}{8}$

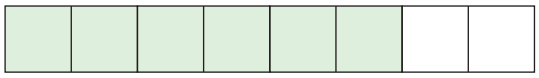
8.



$\frac{8}{\square} = \frac{4}{2}$

Circle equal groups to find the equivalent fraction.

9.

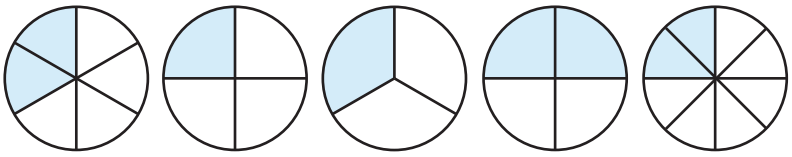


$\frac{6}{8} = \frac{\square}{4}$

10.

$\frac{2}{6} = \frac{\square}{3}$

11. Write the fraction that names the shaded part of each circle.



_____ _____ _____ _____ _____

Which pairs of fractions are equivalent? _____

12. MATHEMATICAL PRACTICE 3 **Apply** Matt cut his small pizza into 6 equal pieces and ate 4 of them. Josh cut his small pizza, which is the same size, into 3 equal pieces and ate 2 of them. Write fractions for the amount they each ate. Are the fractions equivalent? Draw to explain.

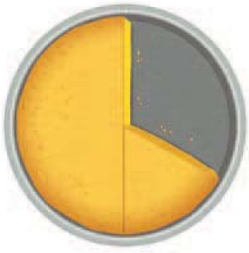
_____

Problem Solving • Applications Real World

13. GO DEEPER Christy bought 8 muffins. She chose 2 apple, 2 banana, and 4 blueberry. She and her family ate the apple and banana muffins for breakfast. What fraction of the muffins did they eat? Write an equivalent fraction. Draw a picture.

_____

14. THINK SMARTER After dinner, $\frac{2}{3}$ of the corn bread is left. Suppose 4 friends want to share it equally. What fraction names how much of the whole pan of corn bread each friend will get? Use the model on the right. Explain your answer.



_____

_____

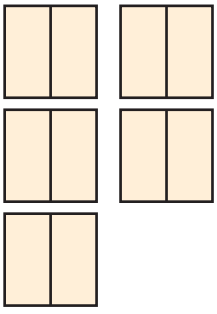
15. There are 16 people having lunch. Each person wants $\frac{1}{4}$ of a pizza. How many whole pizzas are needed? Draw a picture to show your answer.

_____

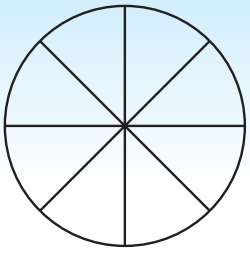
16. Lucy has 5 oatmeal bars, each cut in half.
What fraction names all of the oatmeal bar halves? $\frac{\square}{2}$

What if Lucy cuts each part of the oatmeal bar into 2 equal pieces to share with friends? What fraction names all of the oatmeal bar pieces now? $\frac{\square}{4}$

$\frac{\square}{2}$ and $\frac{\square}{4}$ are equivalent fractions.



17. THINK SMARTER Mr. Peters made a pizza. There is $\frac{4}{8}$ of the pizza left over. Select the fraction that are equivalent to the part of the pizza that is left over. Mark all that apply.



(A) $\frac{5}{8}$ (B) $\frac{3}{4}$ (C) $\frac{2}{4}$ (D) $\frac{1}{2}$

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Chapter 9 Review/Test

1. Alexa and Rose read books that have the same number of pages. Alexa's book is divided into 8 equal chapters. Rose's book is divided into 6 equal chapters. Each girl has read 3 chapters of her book.

   Write a fraction to describe what part of the book each girl read. Then tell who read more pages. Explain.

   _____

   _____

   _____

2. David, Maria, and Simone are shading same-sized index cards for a science project. David shaded $\frac{2}{4}$ of his index card. Maria shaded $\frac{2}{8}$ of her index card and Simone shaded $\frac{2}{6}$ of her index card.

   For 2a–2d, choose Yes or No to indicate whether the comparisons are correct.

   2a. $\frac{2}{4} > \frac{2}{8}$ ○ Yes ○ No

   2b. $\frac{2}{8} > \frac{2}{6}$ ○ Yes ○ No

   2c. $\frac{2}{6} < \frac{2}{4}$ ○ Yes ○ No

   2d. $\frac{2}{8} = \frac{2}{4}$ ○ Yes ○ No

3. Dan and Miguel are working on the same homework assignment. Dan has finished $\frac{1}{4}$ of the assignment. Miguel has finished $\frac{3}{4}$ of the assignment. Which statement is correct? Mark all that apply.

   (A) Miguel has completed the entire assignment.

   (B) Dan has not completed the entire assignment.

   (C) Miguel has finished more of the assignment than Dan.

   (D) Dan and Miguel have completed equal parts of the assignment.

GO DIGITAL Assessment Options
Chapter Test

4. Bryan cut two peaches that were the same size for lunch. He cut one peach into fourths and the other into sixths. Bryan ate $\frac{3}{4}$ of the first peach. His brother ate $\frac{5}{6}$ of the second peach. Who ate more peach? Explain the strategy you used to solve the problem.

5. A nature center offers 2 guided walks. The morning walk is $\frac{2}{3}$ mile. The evening walk is $\frac{3}{6}$ mile. Which walk is shorter? Explain how you can use the model to find the answer.

$\frac{1}{3}$		$\frac{1}{3}$		$\frac{1}{3}$	
$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$

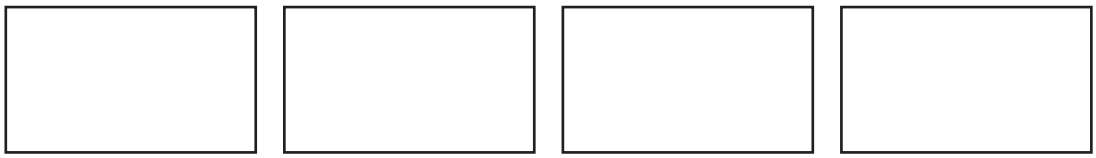
6. Chun lives $\frac{3}{8}$ mile from school. Gail lives $\frac{5}{8}$ mile from school.

   Use the fractions and symbols to show which distance is longer.

$\frac{3}{8}$ $\frac{5}{8}$ < >

Name _____

7. Mrs. Reed baked four pans of lasagna for a family party. Use the rectangles to represent the pans.



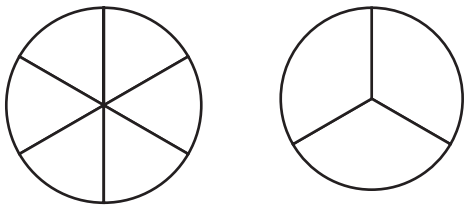
Part A

Draw lines to show how Mrs. Reed could cut one pan of lasagna into thirds, one into fourths, one into sixths, and one into eighths.

Part B

At the end of the dinner, equivalent amounts of lasagna in two pans were left. Use the models to show the lasagna that might have been left over. Write two pairs of equivalent fractions to represent the models.

8. Tom rode his horse for $\frac{4}{6}$ mile. Liz rode her horse for an equal distance. What is an equivalent fraction that describes how far Liz rode? Use the models to show your work.



9. Avery prepares 2 equal-size oranges for the bats at the zoo. One dish has $\frac{3}{8}$ of an orange. Another dish has $\frac{1}{4}$ of an orange. Which dish has more orange? Show your work.

10. Jenna painted $\frac{1}{8}$ of one side of a fence. Mark painted $\frac{1}{6}$ of the other side of the same fence. Use $>$, $=$, or $<$ to compare the parts that they painted.

11. Bill used $\frac{1}{3}$ cup of raisins and $\frac{2}{3}$ cup of banana chips to make a snack.

For 11a–11d, select True or False for each comparison.

11a.	$\frac{1}{3} > \frac{2}{3}$	○ True	○ False
11b.	$\frac{2}{3} = \frac{1}{3}$	○ True	○ False
11c.	$\frac{1}{3} < \frac{2}{3}$	○ True	○ False
11d.	$\frac{2}{3} > \frac{1}{3}$	○ True	○ False

12. Jorge, Lynne, and Crosby meet at the playground. Jorge lives $\frac{5}{6}$ mile from the playground. Lynne lives $\frac{4}{6}$ mile from the playground. Crosby lives $\frac{7}{8}$ mile from the playground.

Part A

Who lives closer to the playground, Jorge or Lynne? Explain how you know.

Part B

Who lives closer to the playground, Jorge or Crosby? Explain how you know.

Name _____

13. Ming needs $\frac{1}{2}$ pint of red paint for an art project. He has 6 jars that have the following amounts of red paint in them. He wants to use only 1 jar of paint. Mark all of the jars of paints that Ming could use.

(A) $\frac{2}{3}$ pint

(B) $\frac{1}{4}$ pint

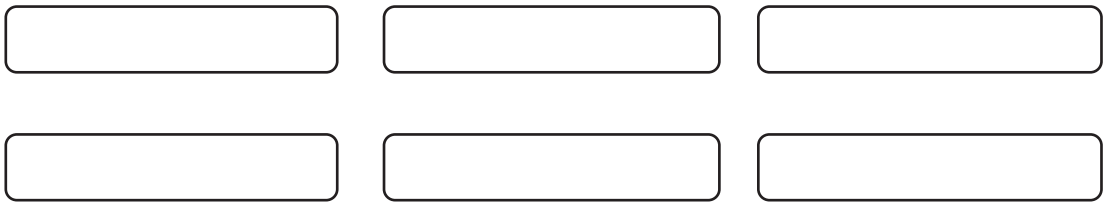
(C) $\frac{4}{6}$ pint

(D) $\frac{3}{4}$ pint

(E) $\frac{3}{8}$ pint

(F) $\frac{2}{6}$ pint

14. There are 12 people having lunch. Each person wants $\frac{1}{3}$ of a sub sandwich. How many whole sub sandwiches are needed? Use the models to show your answer.



_____ sub sandwiches

15. Mavis mixed $\frac{2}{4}$ quart of apple juice with $\frac{1}{2}$ quart of cranberry juice. Compare the fractions. Choose the symbol that makes the statement true.

$\frac{2}{4}$ [$<$ / $=$ / $>$] $\frac{1}{2}$

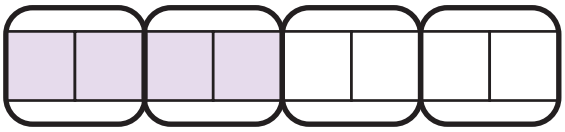
16. Pat has three pieces of fabric that measure $\frac{3}{6}$, $\frac{5}{6}$, and $\frac{2}{6}$ yards long. Write the lengths in order from least to greatest.

_____

17. Cora measures the heights of three plants. Draw a line to match each height on the left to the word on the right that describes its place in the order of heights.

$\frac{4}{6}$ foot •	• least
$\frac{4}{4}$ foot •	• between
$\frac{4}{8}$ foot •	• greatest

18. Danielle drew a model to show equivalent fractions.



Use the model to complete the number sentence.

$\frac{1}{2} =$ _____ $=$ _____

19. Floyd caught a fish that weighed $\frac{2}{3}$ pound. Kira caught a fish that weighed $\frac{7}{8}$ pound. Whose fish weighed more? Explain the strategy you used to solve the problem.

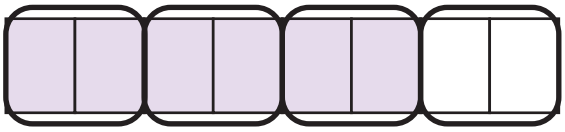
_____

_____

_____

_____

20. Sam went for a ride on a sailboat. The ride lasted $\frac{3}{4}$ hour.



What fraction is equivalent to $\frac{3}{4}$?

_____

Critical Area Measurement

CRITICAL AREA Developing understanding of the structure of rectangular arrays and of area

Measurement tools and data are used to design and build a safe and enjoyable playground.

Project

Plan a Playground

Is there a playground at your school, in your neighborhood, or in a nearby park? Playgrounds provide a fun and safe outdoor space for you to climb, swing, slide, and play.

Important Facts

Playground Features

- Bench
- Jungle Gym
- Playhouse
- Sandbox
- Seesaw
- Slide
- Swing Set
- Water Fountain

Get Started

Suppose you want to help plan a playground for a block in your neighborhood.

- Draw a large rectangle on the grid paper to show a fence around your playground. Find the distance around your playground by counting the number of units on each side. Record the distance.
- Use the Important Facts to help you decide on features to have in your playground. Shade parts of your playground to show each feature's location. Then find the number of unit squares the feature covers and record it on your plan.

▲ This drawing shows a plan for a playground.

Completed by _____

Chapter 10

Time, Length, Liquid Volume, and Mass

Show What You Know

Check your understanding of important skills.

Name _____

▶ Time to the Half Hour

Read the clock. Write the time.

1.  _____

2.  _____

▶ Skip Count by Fives

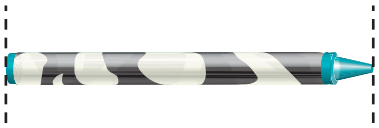
Skip count by fives. Write the missing numbers.

3. 5, 10, 15, ____, 25, ____, 35

4. 55, 60, ____, 70, ____, ____, 85

▶ Inches

Use a ruler to measure the length to the nearest inch.

5. 

about _____ inches

6. 

about _____ inch

You can look at the time the sun rises and sets to find the amount of daylight each day. The table shows the time the sun rose and set from January 10 to January 14 in Philadelphia, Pennsylvania. Be a Math Detective to find which day had the least daylight and which day had the most daylight.

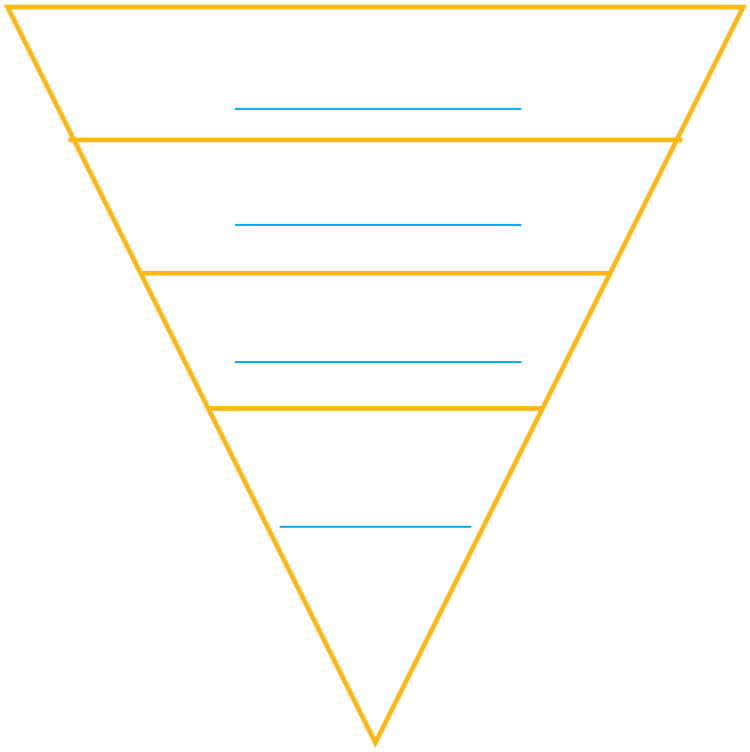
Sunrise and Sunset Times

Date	Sunrise	Sunset
Jan 10	7:22 A.M.	4:55 P.M.
Jan 11	7:22 A.M.	4:56 P.M.
Jan 12	7:22 A.M.	4:57 P.M.
Jan 13	7:21 A.M.	4:58 P.M.
Jan 14	7:21 A.M.	4:59 P.M.

Vocabulary Builder

Visualize It

Complete the graphic organizer by using the words with a ✓. Write the words in order from the greatest to the least length of time.



Review Words

- analog clock
- digital clock
- fourth
- half
- ✓ half hour
- ✓ hour (hr)
- inch (in.)
- ✓ quarter hour

Preview Words

- A.M.
- elapsed time
- gram (g)
- kilogram (kg)
- liquid volume
- liter (L)
- mass
- midnight
- ✓ minute (min)
- noon
- P.M.

Understand Vocabulary

Write the word that answers the riddle.

1. I am written with times after midnight and before noon. _____
2. I am the time when it is 12:00 in the daytime. _____
3. I am the amount of liquid in a container. _____
4. I am the time that passes from the start of an activity to the end of that activity. _____
5. I am the amount of matter in an object. _____

Name _____

Time to the Minute

Essential Question How can you tell time to the nearest minute?

Measurement and Data—3.MD.1

MATHEMATICAL PRACTICES
MP.2, MP.3, MP.6

Unlock the Problem

Groundhog Day is February 2. People say that if a groundhog can see its shadow on that morning, winter will last another 6 weeks. The clock shows the time when the groundhog saw its shadow. What time was it?

- Underline the question.
- Where will you look to find the time?

_____

Example

Look at the time on this clock face.

- What does the hour hand tell you?

_____

- What does the minute hand tell you?

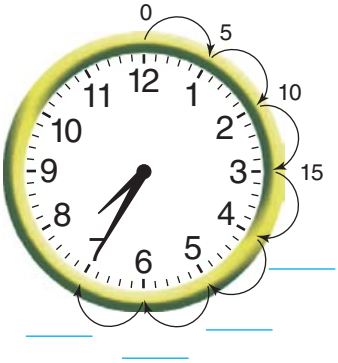
_____

In 1 **minute**, the minute hand moves from one mark to the next on a clock. It takes 5 minutes for the minute hand to move from one number to the next on a clock.

You can count on by fives to tell time to five minutes. Count zero at the 12.

0, 5, 10, 15, _____, _____, _____, _____

So, the groundhog saw its shadow at _____.



Write: 7:35

Read:

- seven _____
- thirty-five minutes after _____

Math Talk **Mathematical Practices**

How does skip counting by fives help you tell the time when the minute hand points to a number?

- Is 7:35 a reasonable answer? Explain. _____

_____

Time to the Minute

Count by fives and ones to help you.

One Way Find minutes after the hour.

Look at the time on this clock face.

- What does the hour hand tell you?

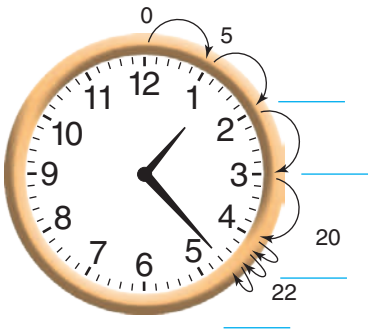
_____

- What does the minute hand tell you?

_____

Count on by fives and ones from the 12 on the clock to where the minute hand is pointing. Write the missing counting numbers next to the clock.

When a clock shows 30 or fewer minutes after the hour, you can read the time as a number of minutes *after* the hour.



Write: _____

Read:

- twenty-three minutes after _____
- one _____

Another Way Find minutes before the hour.

Look at the time on this clock face.

- What does the hour hand tell you?

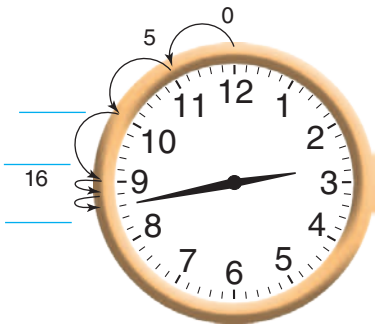
_____

- What does the minute hand tell you?

_____

Now count by fives and ones from the 12 on the clock back to where the minute hand is pointing. Write the missing counting numbers next to the clock.

When a clock shows 31 or more minutes after the hour, you can read the time as a number of minutes *before* the next hour.



Write: 2:43

Read:

- seventeen _____ before three
- two _____

ERROR Alert

Remember that time *after* the hour uses the previous hour, and time *before* the hour uses the next hour.

Name _____

Share and Show

MATH BOARD

1. How would you use counting and the minute hand to find the time shown on this clock? Write the time.

Write the time. Write one way you can read the time.

2. 

3. 

4. 

Math Talk — **Mathematical Practices**

Explain how you know when to stop counting by fives and start counting by ones when counting minutes after an hour.

On Your Own

Write the time. Write one way you can read the time.

5. 

6. 

7. 

MATHEMATICAL PRACTICE 2 **Represent a Problem** **Write the time another way.**

8. 34 minutes after 5

9. 11 minutes before 6

10. 22 minutes after 11

11. 5 minutes before 12

Problem Solving • Applications Real World

Use the clocks for 12–13.

Time of Day the Groundhog Saw Its Shadow	
	
NY	PA

12. How many minutes later in the day did the groundhog in Pennsylvania see its shadow than the groundhog in New York?

_____

13. GO DEEPER What if the groundhog in Pennsylvania saw its shadow 5 minutes later? What time would this be?

_____

14. If you look at your watch and the hour hand is between the 8 and the 9 and the minute hand is on the 11, what time is it?

_____

15. THINK SMARTER What time is it when the hour hand and the minute hand are both pointing to the same number? Aiden says it is 6:30. Camilla says it is 12:00. Who is correct? Explain.

_____

_____

16. MATHEMATICAL PRACTICE 3 **Verify the Reasoning of Others** Lucy said the time is 4:46 on her digital watch. Explain where the hands on an analog clock are pointing when it is 4:46.

_____

_____

17. THINK SMARTER Write the time that is shown on the clock. Then write the time another way.

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

A.M. and P.M.

Essential Question How can you tell when to use A.M. and P.M. with time?

Measurement and Data—3.MD.1

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4

Unlock the Problem

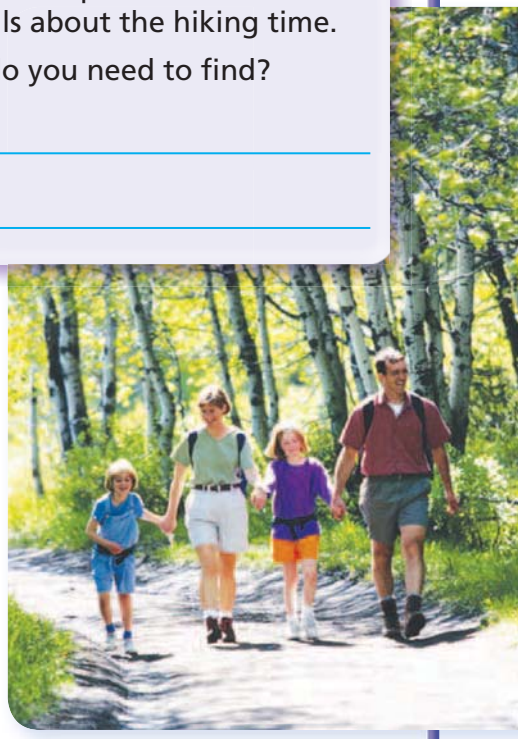
Real World

Lauren's family is going hiking tomorrow at 7:00. How should Lauren write the time to show that they are going in the morning, not in the evening?

- Circle the helpful information that tells about the hiking time.
- What do you need to find?

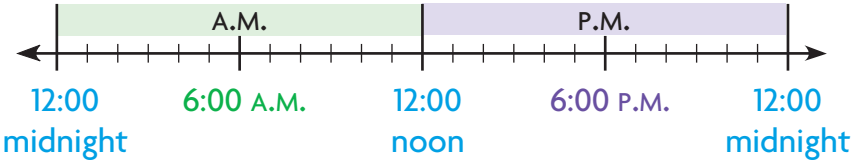
_____

_____



You can use a number line to show the sequence or order of events. It can help you understand the number of hours in a day.

Think: The distance from one mark to the next mark represents one hour.



Tell time after midnight.

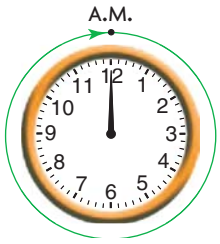
Midnight is 12:00 at night.

The times after midnight and before noon are written with **A.M.**

7:00 in the morning is written as

7:00 _____

After Midnight and Before Noon



So, Lauren should write the hiking time as 7:00 _____

- Find the mark that shows 7:00 A.M. on the number line above. Circle the mark.

Math Talk **Mathematical Practices**

How are the number line on this page and the clock face alike? How are they different?

Tell time after noon.

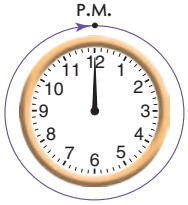
Callie's family is going for a canoe ride at 3:00 in the afternoon. How should Callie write the time?

Noon is 12:00 in the daytime.

The times after noon and before midnight are written with **P.M.**

3:00 in the afternoon is written as 3:00 _____

After Noon and Before Midnight



So, Callie should write the time as 3:00 _____

Share and Show

MATH BOARD

1. Name two things you do in the A.M. hours.
   Name two things you do in the P.M. hours.

_____

_____

Write the time for the activity. Use A.M. or P.M.

2. ride a bicycle

_____

3. make a sandwich

_____

4. get ready for bed

_____

5. This morning Sam woke up at the time shown on this clock. Write the time using A.M. or P.M. _____

Math Talk

Mathematical Practices

Explain how you decide whether to use A.M. or P.M. when you write the time.

Name _____

On Your Own

Write the time for the activity. Use A.M. or P.M.

6. eat breakfast

_____

7. have science class

_____

8. play softball

_____

9. go to the store

_____

10. leave on a morning airplane flight

_____

11. look up at stars

_____

Write the time. Use A.M. or P.M.

12. quarter after 9:00 in the morning

_____

13. 6 minutes after 7:00 in the morning

_____

14. one half hour past midnight

_____

15. 18 minutes before noon

_____

16. Daylight saving time begins on the second Sunday in March at 2:00 in the morning. Write the time.

Use A.M. or P.M. _____

17. THINK SMARTER From midnight to noon each day, how many times does the minute hand on a clock pass 6? Explain how you found your answer.

_____

_____

_____

Unlock the Problem Real World

18. Lea and her father arrived at the scenic overlook 15 minutes before noon and left 12 minutes after noon. Using A.M. or P.M., write the time when Lea and her father arrived at the scenic overlook and the time when they left.

a. What do you need to find? _____

_____

_____

b. What do you need to find first? _____

c. MATHEMATICAL PRACTICE 6 **Describe a Method** Show the steps you used to solve the problem.

d. They arrived at _____ _____.M.

They left at _____ _____.M.

19. THINK SMARTER The Davis family spent the day at the lake. Write the letter for each activity next to the time they did it.

(A) Went swimming soon after lunch.	☐	9:50 A.M.
(B) Ate breakfast at home.	☐	7:00 P.M.
(C) Watched the sunset over the lake.	☐	12:15 P.M.
(D) Got to the lake cabin in the morning.	☐	1:30 P.M.
(E) Had sandwiches for lunch.	☐	7:00 A.M.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Measure Time Intervals

Essential Question How can you measure elapsed time in minutes?

Measurement and Data—3.MD.1

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.8

Unlock the Problem

Real World

Hands On

Alicia and her family visited the Kennedy Space Center. They watched a movie that began at 4:10 P.M. and ended at 4:53 P.M. How long did the movie last?

- Circle the times the movie began and ended.
- Underline the question.

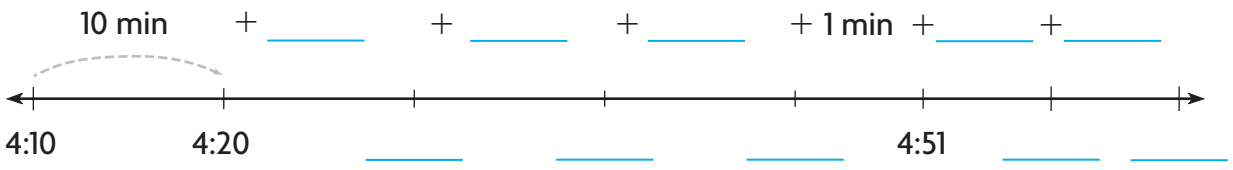
To find **elapsed time**, find the amount of time that passes from the start of an activity to the end of the activity.

One Way Use a number line.

STEP 1 Find the time on the number line that the movie began.

STEP 2 Count on to the ending time, 4:53. Count on by tens for each 10 minutes. Count on by ones for each minute. Write the times below the number line.

STEP 3 Draw the jumps on the number line to show the minutes from 4:10 to 4:53. Record the minutes. Then add them.



10 + 10 + 10 + 10 + 1 + 1 + 1 = _____

The elapsed time from 4:10 P.M. to 4:53 P.M. is _____ minutes.

So, the movie lasted _____ minutes.

Math Talk Mathematical Practices

Describe another way you can use jumps on the number line to find the elapsed time from 4:10 P.M. to 4:53 P.M.

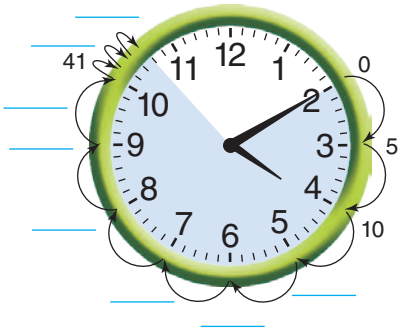
Other Ways

Start time: 4:10 P.M. End time: 4:53 P.M.

A Use an analog clock.

STEP 1 Find the starting time on the clock.

STEP 2 Count the minutes by counting on by fives and ones to 4:53 P.M. Write the missing counting numbers next to the clock.



So, the elapsed time is _____ minutes.

B Use subtraction.

STEP 1 Write the ending time. Then write the starting time so that the hours and minutes line up.

STEP 2 The hours are the same, so subtract the minutes.

4 : ____ ← end time

−4 : ____ ← start time

____ ← elapsed time

Try This! **Find the elapsed time in minutes two ways.**

Start time: 10:05 A.M. End time: 10:30 A.M.

A Use a number line.

STEP 1 Find 10:05 on the number line. Count on from 10:05 to 10:30. Draw marks and record the times on the number line. Then draw and label the jumps.

Think: Count on using longer amounts of time that make sense.

STEP 2 Add to find the total minutes from 10:05 to 10:30.

From 10:05 A.M. to _____ is _____ minutes.

So, the elapsed time is _____ minutes.

B Use subtraction.

Think: The hours are the same, so subtract the minutes.

10 : 30
−10 : 05
____

Math Talk **Mathematical Practices**

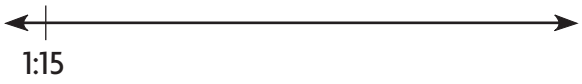
Which method do you prefer to use to find elapsed time? **Explain**.

Name _____

Share and Show

MATH BOARD

1. Use the number line to find the elapsed time from 1:15 P.M. to 1:40 P.M. _____



Find the elapsed time.

2. Start: 11:35 A.M. End: 11:54 A.M.

_____

3. Start: 4:20 P.M. End: 5:00 P.M.

_____

Math Talk — **Mathematical Practices**

Explain how to use a number line to find the elapsed time from 11:10 A.M. until noon.

On Your Own

MATHEMATICAL PRACTICE 5 **Use Appropriate Tools** **Find the elapsed time.**

4. Start: 8:35 P.M. End: 8:55 P.M.

_____

5. Start: 10:10 A.M. End: 10:41 A.M.

_____

6. Start: 9:25 A.M. End: 9:43 A.M.

_____

7. Start: 2:15 P.M. End: 2:52 P.M.

_____

Problem Solving • Applications Real World

8. John started reading his book about outer space at quarter after nine in the morning. He read until quarter to ten in the morning. How long did John read his book?

_____

9. MATHEMATICAL PRACTICE 2 **Use Reasoning** Tim and Alicia arrived at the rocket display at 3:40 P.M. Alicia left the display at 3:56 P.M. Tim left at 3:49 P.M. If the answer is Alicia, what is the question?

WRITE Math • Show Your Work

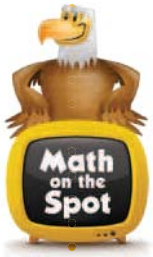
_____

_____

10. GO DEEPER At the space center, Karen bought a model of a shuttle. She started working on the model the next day at 11:13 A.M. She worked until leaving for lunch at 11:51 A.M. After lunch, she worked on the model again from 1:29 P.M. until 1:48 P.M. How long did Karen work on the model?

_____

11. THINK SMARTER Aiden arrived at the rocket display at 3:35 P.M. and left at 3:49 P.M. Ava arrived at the rocket display at 3:30 P.M. and left at 3:56 P.M. Ava spent how many more minutes at the rocket display than Aiden?



_____

12. THINK SMARTER Kira got on the tour bus at 5:15 P.M. She got off the bus at 5:37 P.M. How long was Kira on the bus?

Select the number to make the sentence true.

Kira was on the bus for _____ minutes.

15
22
37
52

FOR MORE PRACTICE: Standards Practice Book

Name _____

Use Time Intervals

Essential Question How can you find a starting time or an ending time when you know the elapsed time?

Measurement and Data—3.MD.1 *Also 3.NBT.2*

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.8

Unlock the Problem

Real World

Hands On

Javier begins working on his oceans project at 1:30 P.M. He spends 42 minutes painting a model of Earth and labeling the oceans. At what time does Javier finish working on his project?

- Circle the information you need.
- What time do you need to find?

_____

_____

One Way Use a number line to find the ending time.

STEP 1 Find the time on the number line when Javier started working on the project.

STEP 2 Count forward on the number line to add the elapsed time. Draw and label the jumps to show the minutes.

Think: I can break apart 42 minutes into shorter amounts of time.

STEP 3 Write the times below the number line.

The jumps end at _____

So, Javier finishes working on his project at _____

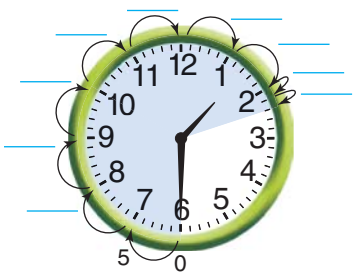
Math Talk Mathematical Practices

Explain how you decided what size jumps to make on the number line.

Another Way Use a clock to find the ending time.

STEP 1 Find the starting time on the clock.

STEP 2 Count on by fives and ones for the elapsed time of 42 minutes. Write the missing counting numbers next to the clock.



So, the ending time is _____

Find Starting Times

Whitney went swimming in the ocean for 25 minutes. She finished swimming at 11:15 A.M. At what time did Whitney start swimming?

One Way Use a number line to find the starting time.

STEP 1 Find the time on the number line when Whitney finished swimming in the ocean.

STEP 2 Count back on the number line to subtract the elapsed time. Draw and label the jumps to show the minutes.

STEP 3 Write the times below the number line.

You jumped back to _____

So, Whitney started swimming at _____

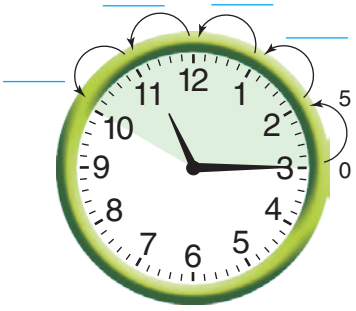
Math Talk Mathematical Practices

Explain how the problem on this page is different from the problem on page 419.

Another Way Use a clock to find the starting time.

STEP 1 Find the ending time on the clock.

STEP 2 Count back by fives for the elapsed time of 25 minutes. Write the missing counting numbers next to the clock.



So, the starting time is _____

Share and Show

MATH BOARD

1. Use the number line to find the starting time if the elapsed time is 35 minutes. _____

Math Talk Mathematical Practices

Explain how to find the starting time when you know the ending time and the elapsed time.

Name _____

Find the ending time.

2. Starting time: 1:40 P.M.
Elapsed time: 33 minutes

_____

3. Starting time: 9:55 A.M.
Elapsed time: 27 minutes

_____

On Your Own

Find the starting time.

4. Ending time: 3:05 P.M.
Elapsed time: 40 minutes

_____

5. Ending time: 8:06 A.M.
Elapsed time: 16 minutes

_____

Problem Solving • Applications

6. THINK SMARTER Suzi began fishing at 10:30 A.M. and fished until 11:10 A.M. James finished fishing at 11:45 A.M. He fished for the same length of time as Suzi. At what time did James start fishing? **Explain**.

_____

_____

Personal Math Trainer

7. THINK SMARTER+ Dante's surfing lesson began at 2:35 P.M. His lesson lasted 45 minutes.
Draw hands on the clock to show the time Dante's surfing lesson ended.

Connect to Science

Tides

If you have ever been to the beach, you have seen the water rise and fall along the shore every day. This change in water level is called the tide. Ocean tides are mostly caused by the pull of the moon and the sun's gravity. High tide is when the water is at its highest level. Low tide is when the water is at its lowest level. In most places on Earth, high tide and low tide each occur about twice a day.

Use the table for 8–9.

Tide Times Atlantic City, NJ		
	Low Tide	High Tide
Day 1	2:12 A.M.	9:00 A.M.
	2:54 P.M.	9:00 P.M.
Day 2	3:06 A.M.	9:36 A.M.
	3:36 P.M.	9:54 P.M.
Day 3	4:00 A.M.	10:12 A.M.
	4:30 P.M.	10:36 P.M.

8. GO DEEPER The first morning, Courtney walked on the beach for 20 minutes. She finished her walk 30 minutes before high tide. At what time did Courtney start her walk?

_____

9. MATHEMATICAL PRACTICE 2 **Use Reasoning** The third afternoon, Courtney started collecting shells at low tide. She collected shells for 35 minutes. At what time did Courtney finish collecting shells?

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Time Intervals

Essential Question How can you use the strategy *draw a diagram* to solve problems about time?

Measurement and Data—
3.MD.1 *Also 3.OA.8, 3.NBT.2*

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.6

Unlock the Problem

Real World

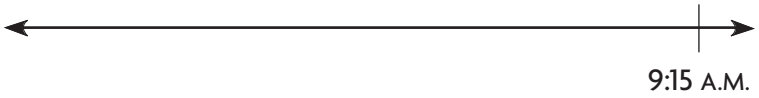
Zach and his family are going to New York City. Their airplane leaves at 9:15 A.M. They need to arrive at the airport 60 minutes before their flight. It takes 15 minutes to get to the airport. The family needs 30 minutes to get ready to leave. At what time should Zach's family start getting ready?

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?
I need to find what _____ Zach's family should start _____.	the time the _____ leaves; the time the family needs to arrive at the _____; the time it takes to get to the _____; and the time the family needs to _____	I will use a number line to find the answer.

Solve the Problem

- Find 9:15 A.M. on the number line. Draw the jumps to show the time.
- Count back _____ minutes for the time they need to arrive at the airport.
- Count back _____ minutes for the time to get to the airport.
- Count back _____ minutes for the time to get ready.



So, Zach's family should start getting ready at _____ _____.M.

Math Talk **Mathematical Practices**

How can you check your answer by starting with the time the family starts getting ready?

Try Another Problem

Bradley gets out of school at 2:45 P.M. It takes him 10 minutes to walk home. Then he spends 10 minutes eating a snack. He spends 8 minutes putting on his soccer uniform. It takes 20 minutes for Bradley's father to drive him to soccer practice. At what time does Bradley arrive at soccer practice?

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?

Solve the Problem

Draw a diagram to help you explain your answer.

1. At what time does Bradley arrive at soccer practice? _____

2. How do you know your answer is reasonable? _____

_____

_____

Math Talk

Mathematical Practices

Do you need to draw jumps on the number line in the same order as the times in the problem? **Explain.**

Name _____

Unlock the Problem

- Circle the question.
- Underline important facts.
- Choose a strategy you know.

Share and Show

MATH BOARD

1. Patty went to the shopping mall at 11:30 A.M. She shopped for 25 minutes. She spent 40 minutes eating lunch. Then she met a friend at a movie. At what time did Patty meet her friend?

   First, begin with _____ on the number line.

   Then, count forward _____ and _____.

   Think: I can break apart the times into shorter amounts of time that make sense.

11:30 A.M.

So, Patty met her friend at _____ _____M.

2. What if Patty goes to the mall at 11:30 A.M. and meets a friend at a movie at 1:15 P.M.? Patty wants to shop and have 45 minutes for lunch before meeting her friend. How much time can Patty spend shopping?

_____

3. Avery got on the bus at 1:10 P.M. The trip took 90 minutes. Then she walked for 32 minutes to get home. At what time did Avery arrive at home?

_____

On Your Own

4. GO DEEPER Kyle and Josh have a total of 64 CDs. Kyle has 12 more CDs than Josh. How many CDs does each boy have?

_____

5. Jamal spent 60 minutes using the computer. He spent a half hour of the time playing games and the rest of the time researching his report. How many minutes did Jamal spend researching his report?

6. THINK SMARTER When Caleb got home from school, he worked on his science project for 20 minutes. Then he studied for a test for 30 minutes. He finished at 4:35 P.M. At what time did Caleb get home from school?

7. MATHEMATICAL PRACTICE 6 Miguel played video games each day for a week. On Monday, he scored 83 points. His score went up 5 points each day. On what day did Miguel score 103 points? **Explain** how you found your answer.

8. THINK SMARTER When Laura arrived at the library, she spent 40 minutes reading a book. Then she spent 15 minutes reading a magazine. She left the library at 4:15 P.M.

Circle the time that makes the sentence true.

Laura arrived at the library at

- 3:20 P.M.
- 3:35 P.M.
- 5:10 P.M.

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

Choose the best term from the box.

Vocabulary
A.M.
minute
P.M.

1. In one _____, the minute hand moves from one mark to the next on a clock. (p. 407)

2. The times after noon and before midnight are written with _____. (p. 412)

Concepts and Skills

Write the time for the activity. Use A.M. or P.M. (3.MD.1)

3. play ball

_____

4. eat breakfast

_____

5. do homework

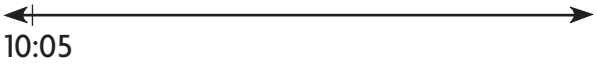
_____

6. sleep

_____

Find the elapsed time. (3.MD.1)

7. Start: 10:05 A.M. End: 10:50 A.M.



_____

8. Start: 5:30 P.M.
End: 5:49 P.M.

_____

Find the starting time or the ending time. (3.MD.1)

9. Starting time: _____
Elapsed time: 50 minutes
Ending time: 9:05 A.M.

10. Starting time: 2:46 P.M.
Elapsed time: 15 minutes

Ending time: _____

11. Veronica started walking to school at 7:45 A.M. She arrived at school 23 minutes later. At what time did Veronica arrive at school? (3.MD.1)

12. The clock shows the time the art class ends. At what time does it end? (3.MD.1)

13. Matt went to his friend's house. He arrived at 5:10 P.M. He left at 5:37 P.M. How long was Matt at his friend's house? (3.MD.1)

14. Brenda's train leaves at 7:30 A.M. She needs to arrive 10 minutes early to buy her ticket. It takes her 20 minutes to get to the train station. At what time should Brenda leave her house? (3.MD.1)

15. Write the time you get home from school. (3.MD.1)

Name _____

Measure Length

Essential Question How can you generate measurement data and show the data on a line plot?

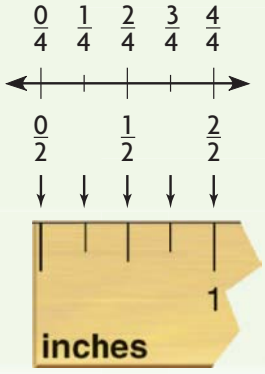
Measurement and Data—3.MD.4
MATHEMATICAL PRACTICES
MP.4, MP.5, MP.6

CONNECT You have learned how to measure length to the nearest inch. Sometimes the length of an object is not a whole unit. For example, a paper clip is more than 1 inch but less than 2 inches.

You can measure length to the nearest half inch or fourth inch. The half-inch markings on a ruler divide each inch into two equal parts. The fourth-inch markings divide each inch into four equal parts.

Math Idea

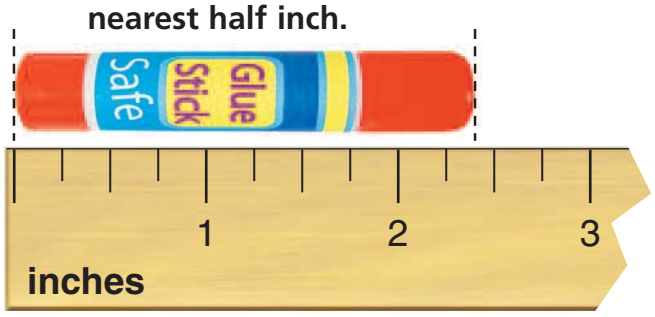
A ruler is like a number line.



Unlock the Problem

Real World

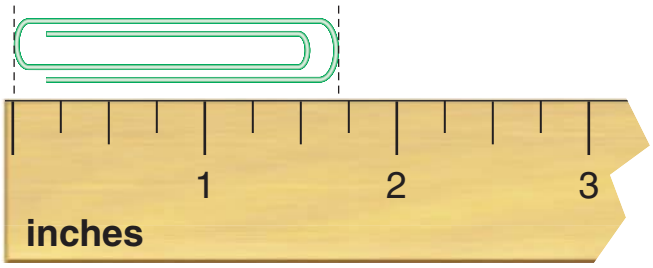
Example 1 Use a ruler to measure the glue stick to the nearest half inch.



- Line up the left end of the glue stick with the zero mark on the ruler.
- The right end of the glue stick is between the half-inch marks for _____ and _____.
- The mark that is closest to the right end of the glue stick is for _____ inches.

So, the length of the glue stick to the nearest half inch is _____ inches.

Example 2 Use a ruler to measure the paper clip to the nearest fourth inch.



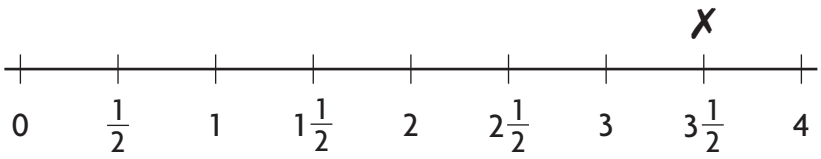
- Line up the left end of the paper clip with the zero mark on the ruler.
- The right end of the paper clip is between the fourth-inch marks for _____ and _____.
- The mark that is closest to the right end of the paper clip is for _____ inches.

So, the length of the paper clip to the nearest fourth inch is _____ inches.

Activity Make a line plot to show measurement data.

Materials ■ inch ruler ■ 10 crayons

Measure the length of 10 crayons to the nearest half inch. Complete the line plot. Draw an ✗ for each length.



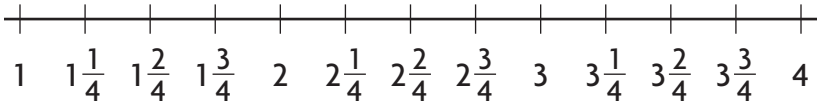
Length of Crayons Measured to the Nearest Half Inch

- Describe any patterns you see in your line plot.

_____

_____

Try This! **Measure the length of your fingers to the nearest fourth inch. Complete the line plot. Draw an ✗ for each length.**



Length of Fingers Measured to the Nearest Fourth Inch

Math Talk **Mathematical Practices**

How do you think your line plot compares to line plots your classmates made? **Explain**.

Share and Show

MATH BOARD

1. Measure the length to the nearest half inch. Is the key closest to $1\frac{1}{2}$ inches, 2 inches, or $2\frac{1}{2}$ inches?

_____ inches

Name _____

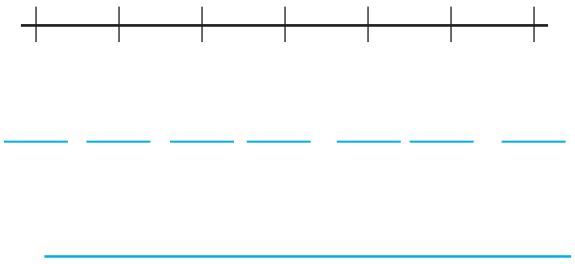
Measure the length to the nearest fourth inch.

2.  ____ inches

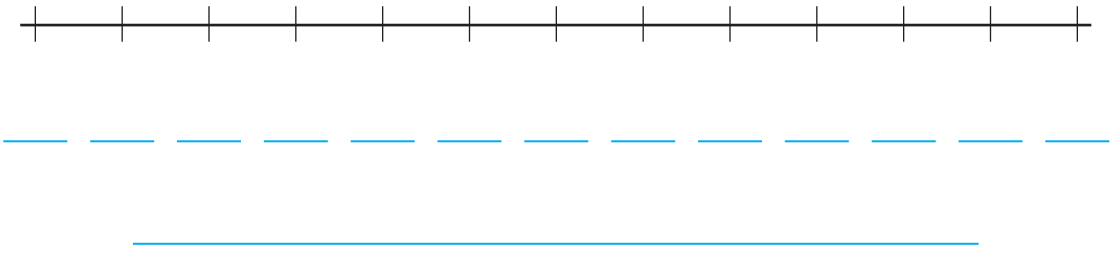
On Your Own

Use the lines for 3–4.

3. Measure the length of the lines to the nearest half inch and make a line plot.

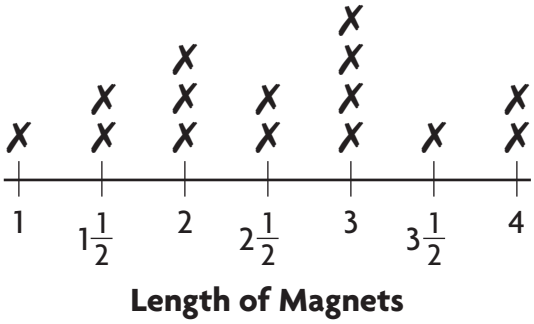


4. Measure the length of the lines to the nearest fourth inch and make a line plot.



Problem Solving • Applications

Use the line plot for 5–7.



Length of Magnets

5. GO DEEPER Tara has a magnet collection from places she visited. She measures the length of the magnets to the nearest half inch and records the data in a line plot. Are more magnets longer than $2\frac{1}{2}$ inches or shorter than $2\frac{1}{2}$ inches? Explain.

6. THINK SMARTER How many magnets measure a whole number of inches? How many magnets have a length between two whole numbers?

7. MATHEMATICAL PRACTICE 6 **Explain** why you think the line plot starts at 1 and stops at 4.

8. THINK SMARTER What is the length of the pencil to the nearest half inch?

_____ inches

Explain how you measured the pencil.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Estimate and Measure Liquid Volume

Essential Question How can you estimate and measure liquid volume in metric units?

Measurement and Data—3.MD.2

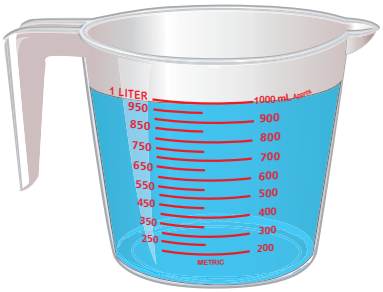
MATHEMATICAL PRACTICES
MP.4, MP.5, MP.6

Unlock the Problem

Real World

Hands On

Liquid volume is the amount of liquid in a container. The **liter (L)** is the basic metric unit for measuring liquid volume.



Activity 1

Materials ■ 1-L beaker ■ 4 containers ■ water ■ tape

STEP 1 Fill a 1-liter beaker with water to the 1-liter mark.

STEP 2 Pour 1 liter of water into a container. Mark the level of the water with a piece of tape. Draw the container below and name the container.

STEP 3 Repeat Steps 1 and 2 with three different-sized containers.

Container 1

Container 2

Container 3

Container 4

Math Talk

Mathematical Practices

What can you say about the amount of liquid volume in each container?

1. How much water did you pour into each container? _____

2. Which containers are mostly full? Describe them.

_____

3. Which containers are mostly empty? Describe them.

_____

Compare Liquid Volumes

A full glass holds less than 1 liter.

A water bottle holds about 1 liter.

A fish bowl holds more than 1 liter.

Activity 2 Materials ■ 1-L beaker ■ 5 different containers ■ water

STEP 1 Write the containers in order from the one you think will hold the least water to the one you think will hold the most water.

_____, _____, _____,

_____, _____

STEP 2 Estimate how much each container will hold. Write *more than 1 liter*, *about 1 liter*, or *less than 1 liter* in the table.

STEP 3 Pour 1 liter of water into one of the containers. Repeat until the container is full. Record the number of liters you poured. Repeat for each container.

Container	Estimate	Number of Liters

STEP 4 Write the containers in order from the least to the greatest liquid volume.

_____, _____, _____,

_____, _____

Math Talk Mathematical Practices

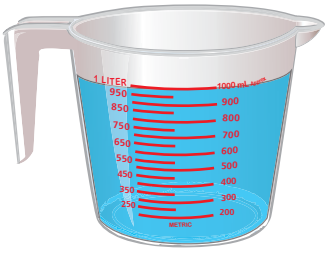
Was the order in Step 1 different than the order in Step 4? **Explain** why they may be different.

Name _____

Share and Show

MATH BOARD

1. The beaker is filled with water. Is the amount *more than 1 liter, about 1 liter,* or *less than 1 liter*?



_____

Estimate how much liquid volume there will be when the container is filled. Write *more than 1 liter, about 1 liter,* or *less than 1 liter*.

2. cup of tea

_____

3. kitchen sink

_____

4. teapot

_____

On Your Own

Estimate how much liquid volume there will be when the container is filled. Write *more than 1 liter, about 1 liter,* or *less than 1 liter*.

5. pitcher

_____

6. juice box

_____

7. punch bowl

_____

Math Talk — **Mathematical Practices**

Explain how you could estimate the liquid volume in a container.

Use the pictures for 8–10. Rosario pours juice into four bottles that are the same size.

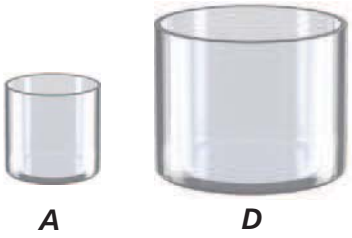
8. Did Rosario pour the same amount into each bottle? _____

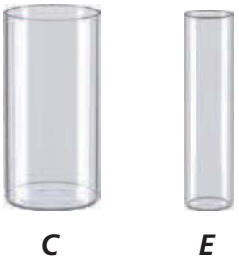
9. Which bottle has the least amount of juice? _____

10. Which bottle has the most juice? _____

Problem Solving • Applications

Use the containers for 11–13. Container *A* is full when 1 liter of water is poured into it.





11. GO DEEPER Estimate how many liters will fill Container *C* and how many liters will fill Container *E*. Which container will hold more water when filled?

12. MATHEMATICAL PRACTICE 6 Name two containers that will be filled with about the same number of liters of water. **Explain.**

13. THINK SMARTER **What's the Error?** Samuel says that you can pour more liters of water into Container *B* than into Container *D*. Is he correct? Explain.

Personal Math Trainer

14. THINK SMARTER + The bottle of tea holds about 1 liter. For numbers 14a–14e, choose Yes or No to tell whether it will hold more than 1 liter.

14a. teacup	○ Yes	○ No
14b. kitchen trash can	○ Yes	○ No
14c. small pool	○ Yes	○ No
14d. fish tank	○ Yes	○ No
14e. perfume bottle	○ Yes	○ No

FOR MORE PRACTICE: Standards Practice Book

Name _____

Estimate and Measure Mass

Essential Question How can you estimate and measure mass in metric units?

Measurement and Data—3.MD.2

MATHEMATICAL PRACTICES
MP.4, MP.5, MP.6, MP.7

Unlock the Problem

Real World

Hands On

Pedro has a dollar bill in his pocket. Should Pedro measure the mass of the dollar bill in grams or kilograms?

The **gram (g)** is the basic metric unit for measuring **mass**, or the amount of matter in an object. Mass can also be measured by using the metric unit **kilogram (kg)**.

A small paper clip has a mass of about 1 gram.

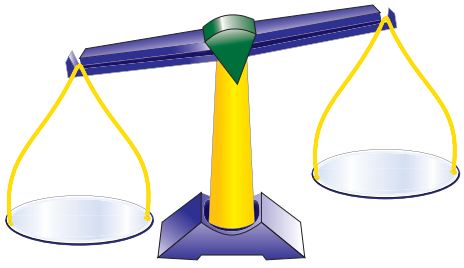
A box of 1,000 paper clips has a mass of about 1 kilogram.

Think: The mass of a dollar bill is closer to the mass of a small paper clip than it is to a box of 1,000 paper clips.

So, Pedro should measure the mass of the dollar bill in _____.

Activity 1

Materials ■ pan balance ■ gram and kilogram masses



You can use a pan balance to measure mass.

Do 10 grams have the same mass as 1 kilogram?

- Place 10 gram masses on one side of the balance.
- Place a 1-kilogram mass on the other side of the balance.

Think: If it is balanced, then the objects have the same mass. If it is not balanced, the objects do not have the same mass.

- Complete the picture of the balance above by drawing masses to show your balance.

  The pan balance is _____.

So, 10 grams and 1 kilogram _____ the same mass.

Math Talk **Mathematical Practices**

Which has a greater mass, 10 grams or 1 kilogram? **Explain**.

Hands On

Activity 2

Materials ■ pan balance ■ gram and kilogram masses ■ classroom objects

STEP 1 Use the objects in the table. Decide if the object should be measured in grams or kilograms.

STEP 2 Estimate the mass of each object. Record your estimates in the table.

STEP 3 Find the mass of each object to the nearest gram or kilogram. Place the object on one side of the balance. Place gram or kilogram masses on the other side until both sides are balanced.

STEP 4 Add the measures of the gram or kilogram masses. This is the mass of the object. Record the mass in the table.

▲ 189 marbles have a mass of 1 kilogram.

Mass		
Object	Estimate	Mass
crayon		
stapler		
eraser		
marker		
small notepad		
scissors		

Math Talk Mathematical Practices

How did your estimates compare with the actual measurements?

- Write the objects in order from greatest mass to least mass.

_____, _____, _____,

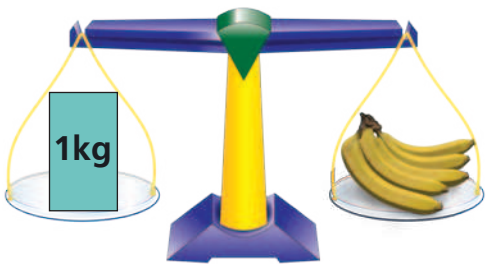
_____, _____, _____

Share and Show

MATH BOARD

1. Five bananas have a mass of about _____.

Think: The pan balance is balanced, so the objects on both sides have the same mass.



Name _____

Choose the unit you would use to measure the mass. Write *gram* or *kilogram*.

2. strawberry

_____

3. dog

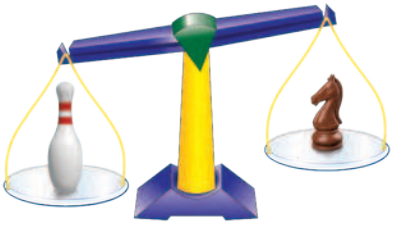
_____

Math Talk **Mathematical Practices**

Explain how you decided which unit to use to measure mass.

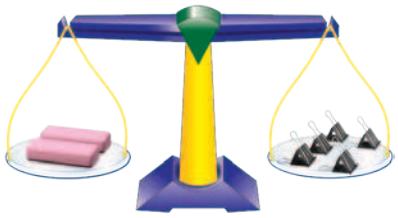
Compare the masses of the objects. Write *is less than, is the same as,* or *is more than*.

4.



The mass of the bowling pin _____ the mass of the chess piece.

5.



The mass of the erasers _____ the mass of the clips.

On Your Own

Choose the unit you would use to measure the mass. Write *gram* or *kilogram*.

6. chair

_____

7. sunglasses

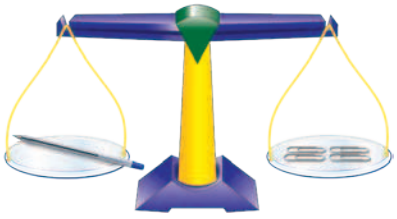
_____

8. watermelon

_____

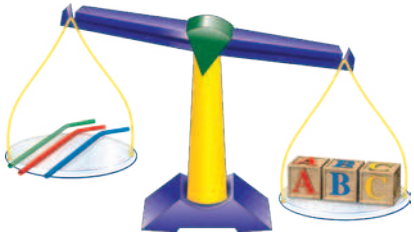
Compare the masses of the objects. Write *is less than, is the same as,* or *is more than*.

9.



The mass of the pen _____ the mass of the paper clips.

10.



The mass of the straws _____ the mass of the blocks.

Problem Solving • Applications

Golf ball

Table tennis ball

Bowling ball

Baseball

Tennis ball

11. GO DEEPER Put the sports balls shown at the right in order from greatest mass to least mass.

12. MATHEMATICAL PRACTICE 4 **Use Diagrams** Choose two objects that have about the same mass. Draw a balance with one of these objects on each side.

13. MATHEMATICAL PRACTICE 4 **Use Diagrams** Choose two objects that have different masses. Draw a balance with one of these objects on each side.

14. THINK SMARTER **Pose a Problem** Write a problem about the objects you chose in Exercise 13. Then solve your problem.

15. THINK SMARTER **Sense or Nonsense?** Amber is buying produce at the grocery store. She says that a Fuji apple and a green bell pepper would have the same mass because they are the same size. Does her statement make sense? Explain.

16. THINK SMARTER Select the objects with a mass greater than 1 kilogram. Mark all that apply.

- (A) skateboard
- (B) laptop computer
- (C) cell phone
- (D) egg
- (E) desk
- (F) pencil

FOR MORE PRACTICE: Standards Practice Book

Name _____

Solve Problems About Liquid Volume and Mass

Essential Question How can you use models to solve liquid volume and mass problems?

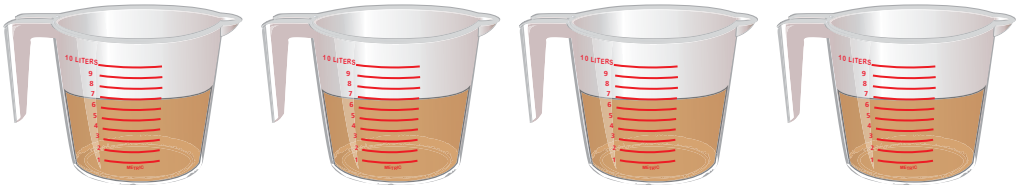
Measurement and Data—3.MD.2
Also 3.OA.7, 3.NBT.2

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4, MP.7

Unlock the Problem (Real World)

A restaurant serves iced tea from a large container that can hold 24 liters. Sadie will fill the container with the pitchers of tea shown below. Will Sadie have tea left over after filling the container?

Example 1 Solve a problem about liquid volume.



_____ L _____ L _____ L _____ L

Since there are _____ equal groups of _____ liters, you can multiply.

_____ ◯ _____ = _____

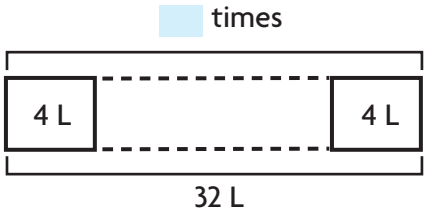
Circle the correct words to complete the sentences.

_____ liters is *greater than* / *less than* 24 liters.

So, Sadie *will* / *will not* have tea left over.

Try This! Use a bar model to solve.

Raul's fish tank contains 32 liters of water. He empties it with a bucket that holds 4 liters of water. How many times will Raul have to fill the bucket?



_____ ◯ _____ = _____

So, Raul will have to fill the bucket _____ times.

Hands On

Activity Solve a problem about mass.

Materials ■ pan balance ■ glue stick ■ gram masses

Jeff has a glue stick and a 20-gram mass on one side of a balance and gram masses on the other side. The pan balance is balanced. What is the mass of the glue stick?

STEP 1 Place a glue stick and a 20-gram mass on one side of the balance.

STEP 2 Place gram masses on the other side until the pans are balanced.

STEP 3 To find the mass of the glue stick, remove 20 grams from each side.

Think: I can remove 20 grams from both sides and the pan balance will still be balanced.

STEP 4 Then add the measures of the gram masses on the balance.

The gram masses have a measure of _____ grams.

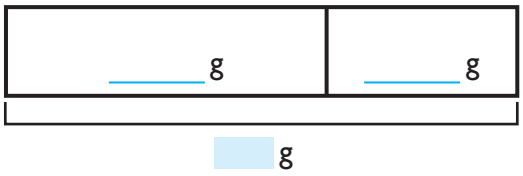
So, the glue stick has a mass of _____.

Math Talk **Mathematical Practices**

What equation can you write to find the mass of the glue stick? **Explain**.

Try This! Use a bar model to solve.

A bag of peas has a mass of 432 grams.
A bag of carrots has a mass of 263 grams.
What is the total mass of both bags?



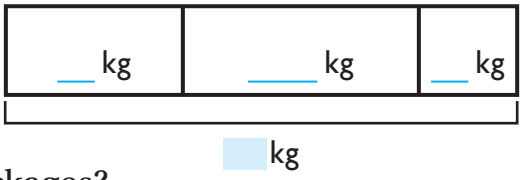
_____ ◯ _____ = _____

So, both bags have a total mass of _____ grams.

Share and Show

MATH BOARD

1. Ed's Delivery Service delivered three packages to Ms. Wilson. The packages have masses of 9 kilograms, 12 kilograms, and 5 kilograms. What is the total mass of the three packages? Use the bar model to help you solve.



_____

Name _____

Write an equation and solve the problem.

2. Ariel's recipe calls for 64 grams of apples and 86 grams of oranges. How many more grams of oranges than apples does the recipe call for?

_____ ◯ _____ = _____ _____

3. Dan's Clams restaurant sold 45 liters of lemonade. If it sold the same amount each hour for 9 hours, how many liters of lemonade did Dan's Clams sell each hour?

_____ ◯ _____ = _____ _____

Math Talk **Mathematical Practices**

Explain how you could model Exercise 2.

On Your Own

MATHEMATICAL PRACTICE 4 **Write an Equation** **Write an equation and solve the problem.**

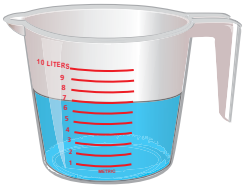
4. Sasha's box holds 4 kilograms of napkins and 29 kilograms of napkin rings. What is the total mass of the napkins and napkin rings?

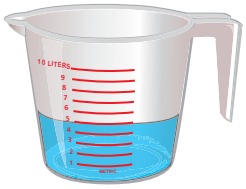
_____ ◯ _____ = _____ _____

5. Josh has 6 buckets for cleaning a restaurant. He fills each bucket with 4 liters of water. How many liters of water are in the buckets?

_____ ◯ _____ = _____ _____

6. THINK SMARTER Ellen will pour water into Pitcher *B* until it has 1 more liter of water than Pitcher *A*. How many liters of water will she pour into Pitcher *B*? Explain how you found your answer.

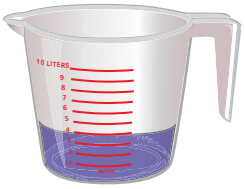

Pitcher *A*

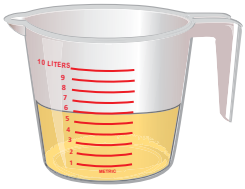

Pitcher *B*

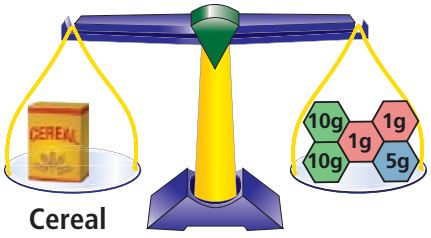
_____

_____

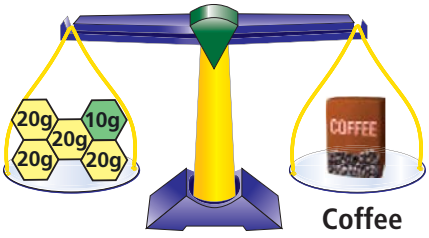
7. **Practice: Copy and Solve** **Use the pictures to write two problems. Then solve your problems.**


Grape Juice


Apple Juice



Cereal



Coffee

Unlock the Problem Real World

8. Ken's Café serves fruit smoothies. Each smoothie has 9 grams of fresh strawberries. How many grams of strawberries are in 8 smoothies?

a. What do you need to find? _____

b. What operation will you use to find the answer? _____

c. MATHEMATICAL PRACTICE 2 **Use Diagrams** Draw a diagram to solve the problem.

d. Complete the sentences.

There are _____ smoothies with _____ grams of strawberries in each.

Since each smoothie is an _____ group, you can _____.

_____ ◯ _____ = _____

So, there are _____ grams of strawberries in 8 smoothies.

9. GO DEEPER Arturo has two containers, each filled with 12 liters of water. Daniel has two containers, each filled with 16 liters of water. What is the total liquid volume of the boys' containers?

_____

10. THINK SMARTER A deli makes its own salad dressing. A small jar has 3 grams of spices. A large jar has 5 grams of spices. Will 25 grams of spices be enough to make 3 small jars and 3 large jars? Show your work.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 10 Review/Test

1. Yul and Sarah's art class started at 11:25 A.M. The class lasted 30 minutes. Yul left when the class was done. Sarah stayed an extra 5 minutes to talk with the teacher and then left.

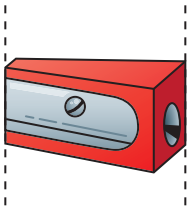
   Write the time that each student left. Explain how you found each time.

   _____

   _____

2. Julio measured an object that he found. It was $\frac{3}{4}$ inch wide.

   For numbers 2a–2d, choose Yes or No to tell whether the object could be the one Julio measured.

2a.  ○ Yes ○ No

2b.  ○ Yes ○ No

2c.  ○ Yes ○ No

2d.  ○ Yes ○ No

GO DIGITAL Assessment Options
Chapter Test

3. Dina started swimming at 3:38 P.M. She swam until 4:15 P.M. How long did Dina swim?

_____ minutes

4. Rita's class begins social studies at ten minutes before one in the afternoon. At what time does Rita's class begin social studies? Circle a time that makes the sentence true.

Rita's class begins social studies at

1:10 A.M.
1:10 P.M.
12:50 A.M.
12:50 P.M.

5. Select the objects with a mass greater than 1 kilogram. Mark all that apply.

Ⓐ bicycle Ⓒ eraser

Ⓑ pen Ⓓ math book

6. A chicken dish needs to bake in the oven for 35 minutes. The dish needs to cool for at least 8 minutes before serving. Scott puts the chicken dish in the oven at 5:14 P.M.

For numbers 6a–6d, select True or False for each statement.

6a. Scott can serve the dish at 5:51 P.M. ○ True ○ False

6b. Scott can serve the dish at 5:58 P.M. ○ True ○ False

6c. Scott should take the dish out of the oven at 5:51 A.M. ○ True ○ False

6d. Scott should take the dish out of the oven at 5:49 P.M. ○ True ○ False

Name _____

7. Anthony's family went out to dinner. They left at the time shown on the clock. They returned home at 6:52 P.M.

Part A

How long was Anthony's family gone?

_____ hour _____ minutes

Part B

Explain how you found your answer.

_____

_____

_____

_____

8. Tran checked the time on his watch after he finished his daily run.

Select the time that Tran finished running. Mark all that apply.

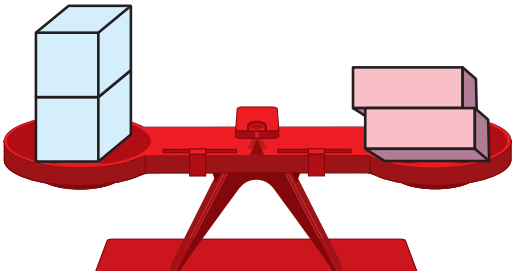
Ⓐ 14 minutes before nine

Ⓑ eight forty-six

Ⓒ quarter to nine

Ⓓ nine forty-six

9. Cara uses a balance scale to compare mass.



Circle a symbol that makes the comparison true.

The mass of the blocks $<$ / $>$ / $=$ the mass of the erasers.

10. A large bottle of water holds about 2 liters.

For numbers 10a–10e, choose Yes or No to tell whether the container will hold all of the water.

10a.	kitchen sink	○ Yes	○ No
10b.	water glass	○ Yes	○ No
10c.	ice cube tray	○ Yes	○ No
10d.	large soup pot	○ Yes	○ No
10e.	lunchbox thermos	○ Yes	○ No

11. Select the items that would be best measured in grams. Mark all that apply.

- (A) watermelon
- (B) lettuce leaf
- (C) grape
- (D) onion

12. Samir made a list of what he did on Tuesday. Write the letter for each activity next to the time he did it.

(A)	Get out of bed.	☐	8:05 A.M.
(B)	Walk to school.	☐	6:25 P.M.
(C)	Eat lunch.	☐	3:50 P.M.
(D)	Go to guitar lesson after school.	☐	11:48 A.M.
(E)	Eat dinner at home.	☐	6:25 A.M.

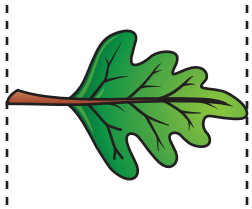
Name _____

13. Amy has 30 grams of flour. She puts 4 grams of flour in each pot of chowder that she makes. She puts 5 grams of flour in each pot of potato soup that she makes. She makes 4 pots of chowder. Does Amy have enough flour left over to make 3 pots of potato soup?

14. Use an inch ruler to measure.

Part A

What is the length of the leaf to the nearest fourth-inch?



Part B

Explain what happens if you line up the left side of the object with the 1 on the ruler.

_____

_____

15. Mrs. Park takes the 9:38 A.M. train to the city. The trip takes 3 hours and 20 minutes. What time does Mrs. Park arrive in the city?

_____

16. Hector buys two bags of gravel for his driveway. He buys a total of 35 kilograms of gravel. Select the bags he buys.

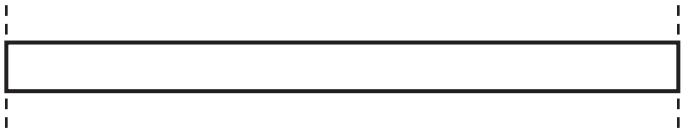
15 kg	17 kg	18 kg	19 kg
○	○	○	○

17. Ashley measures the shells she collects. She records the measurements in a chart.

Number of Shells	Length in Inches
1	1
2	$2\frac{1}{2}$
3	$1\frac{1}{2}$
1	2

Part A

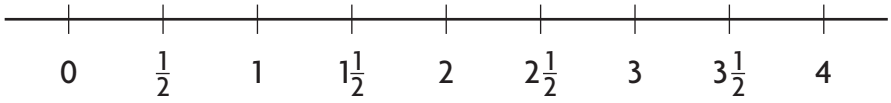
Ashley found a razor clam shell this long. Use an inch ruler to measure. Record the measurement in the chart.



_____ inches

Part B

Complete the line plot to show the data in the chart. How many shells are longer than 2 inches? Tell how you know.



Length of Shells Measured to the Nearest Half Inch

_____

_____

18. Lucy fills a bathroom sink with water. Is the amount of water *more than 1 liter, about 1 liter, or less than 1 liter*? Explain how you know.

_____

_____

_____

Chapter 11

Perimeter and Area

Show What You Know

Check your understanding of important skills.

Name _____

▶ Use Nonstandard Units to Measure Length

Use paper clips to measure the object.

1. 

about ____ 

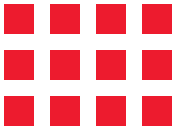
2. 

about ____ 

▶ Add 3 Numbers **Write the sum.**

3. $2 + 7 + 3 =$ ____ **4.** $3 + 5 + 2 =$ ____ **5.** $6 + 1 + 9 =$ ____

▶ Model with Arrays **Use the array. Complete.**

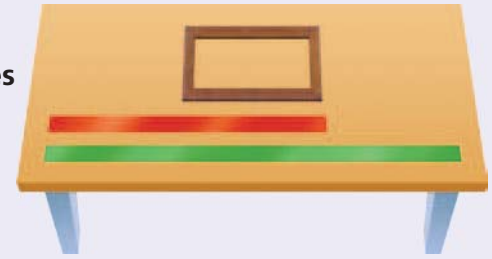
6.  3 rows of 4

____ × ____ = ____

7.  4 rows of 2

____ × ____ = ____

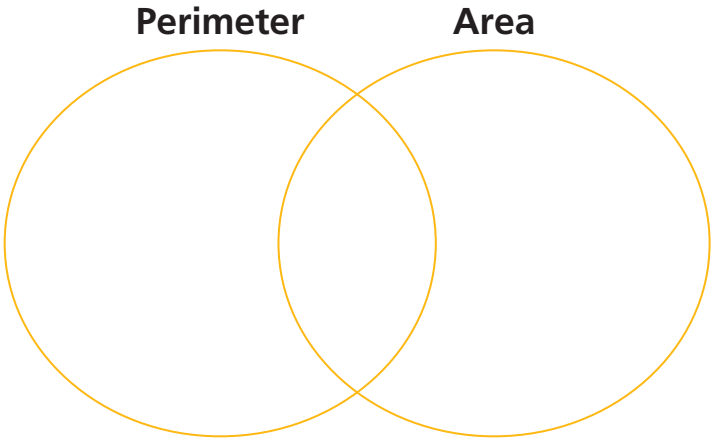
Julia has a picture frame with side lengths of 12 inches and 24 inches. She wants to cut and glue one color of ribbon that will fit exactly around the edge. The green ribbon is 72 inches long. The red ribbon is 48 inches long. Be a Math Detective to find which ribbon she should use to glue around the picture frame.



Vocabulary Builder

Visualize It

Sort the words with a ✔ into the Venn diagram.



Understand Vocabulary

Complete the sentences by using the review and preview words.

1. The distance around a shape is the _____.

2. The _____ is the measure of the number of unit squares needed to cover a surface.

3. You can count, use _____, or multiply to find the area of a rectangle.

4. A _____ is a square with a side length of 1 unit and is used to measure area.

5. The _____ shows that you can break apart a rectangle into smaller rectangles and add the area of each smaller rectangle to find the total area.

Review Words

- addition
- array
- centimeter (cm)
- Distributive Property
- foot (ft)
- inch (in.)
- inverse operations
- ✓ length
- meter (m)
- multiplication
- pattern
- rectangle
- repeated addition
- ✓ unit
- ✓ width

Preview Words

- area
- perimeter
- ✓ square unit (sq un)
- ✓ unit square

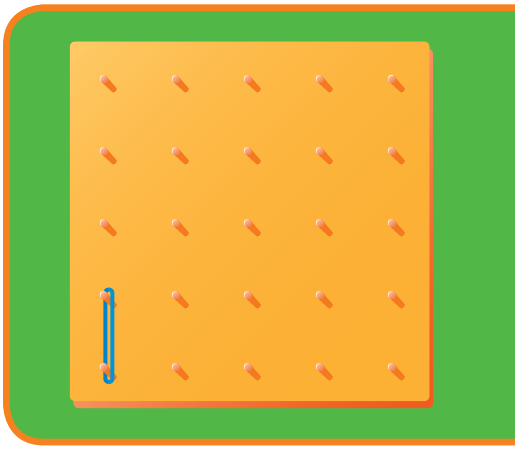
Name _____

Model Perimeter

Essential Question How can you find perimeter?

Measurement and Data—3.MD.8

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.7



Investigate

Hands On

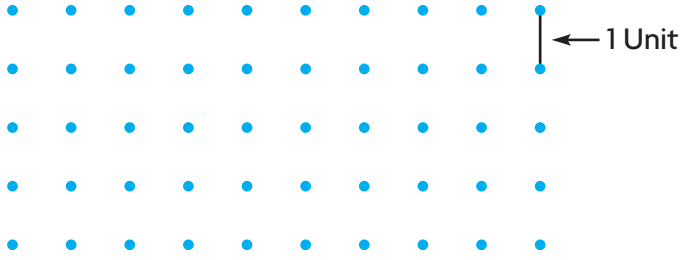
Perimeter is the distance around a figure.

Materials ■ geoboard ■ rubber bands

You can find the perimeter of a rectangle on a geoboard or on dot paper by counting the number of units on each side.

A. Make a rectangle on the geoboard that is 3 units on two sides and 2 units on the other two sides.

B. Draw your rectangle on this dot paper.



C. Write the length next to each side of your rectangle.

D. Add the number of units on each side.

_____ + _____ + _____ + _____ = _____

E. So, the perimeter of the rectangle is _____ units.

- How would the perimeter of the rectangle change if the length of two of the sides was 4 units instead of 3 units?

_____

_____

Draw Conclusions

1. Describe how you would find the perimeter of a rectangle that is 5 units wide and 6 units long.

2. THINK SMARTER A rectangle has two pairs of sides of equal length. Explain how you can find the unknown length of two sides when the length of one side is 4 units, and the perimeter is 14 units.

3. MATHEMATICAL PRACTICE 1 **Evaluate** Jill says that finding the perimeter of a figure with all sides of equal length is easier than finding the perimeter of other figures. Do you agree? Explain.

Make Connections

Hands On

Math Talk

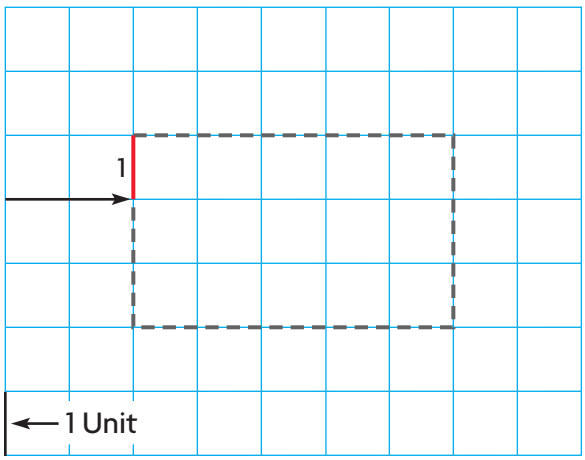
Mathematical Practices

If a rectangle has a perimeter of 12 units, how many units wide and how many units long could it be? **Explain**.

You can also use grid paper to find the perimeter of figures by counting the number of units on each side.

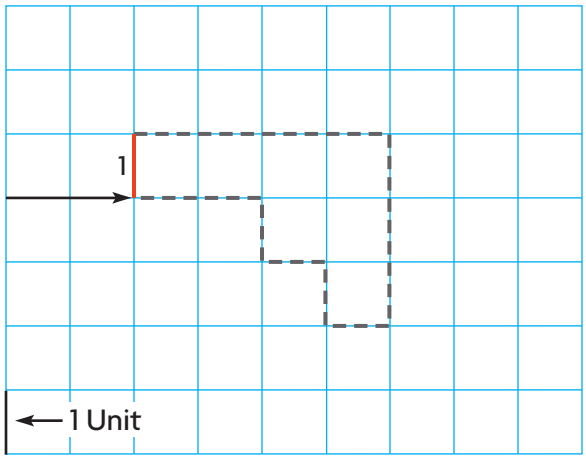
Start at the arrow and trace the perimeter. Begin counting with 1. Continue counting each unit around the figure until you have counted each unit.

A



Perimeter = _____ units

B



Perimeter = _____ units

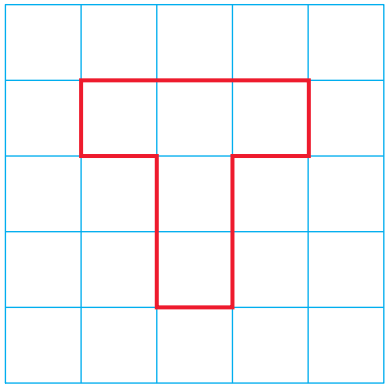
Name _____

Share and Show

MATH BOARD

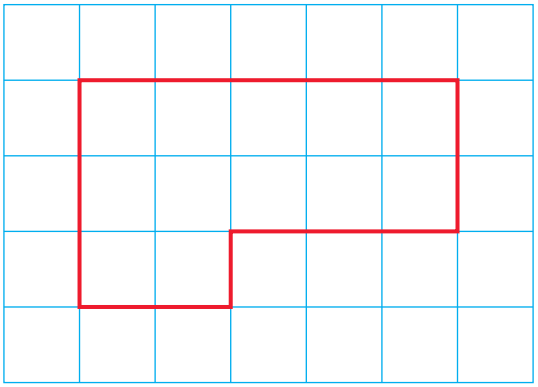
Find the perimeter of the figure. Each unit is 1 centimeter.

1.



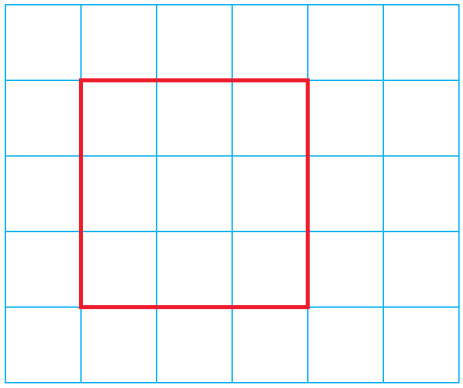
____ centimeters

2.



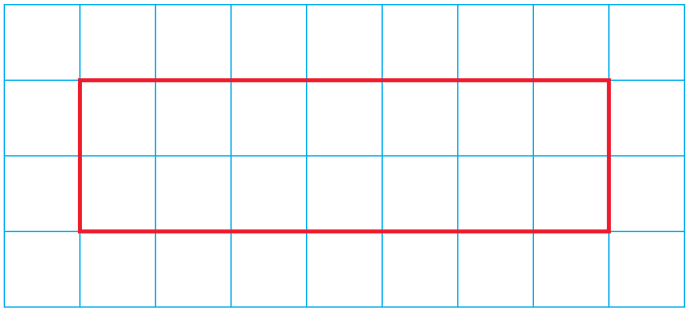
____ centimeters

3.



____ centimeters

4.



____ centimeters

Find the perimeter.

5. A figure with four sides that measure 4 centimeters, 6 centimeters, 5 centimeters, and 1 centimeter

____ centimeters

6. A figure with two sides that measure 10 inches, one side that measures 8 inches, and one side that measures 4 inches

____ inches

Problem Solving • Applications

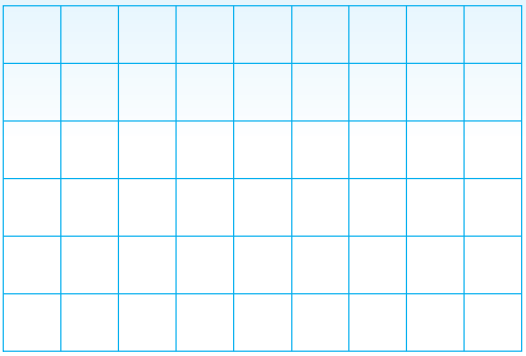
Real World

7. MATHEMATICAL PRACTICE 6 **Explain** how to find the length of each side of a triangle with sides of equal length, and a perimeter of 27 inches.

_____

_____

8. THINK SMARTER Luisa drew a rectangle with a perimeter of 18 centimeters. Select the rectangles that Luisa could have drawn. Mark all that apply. Use the grid to help you.



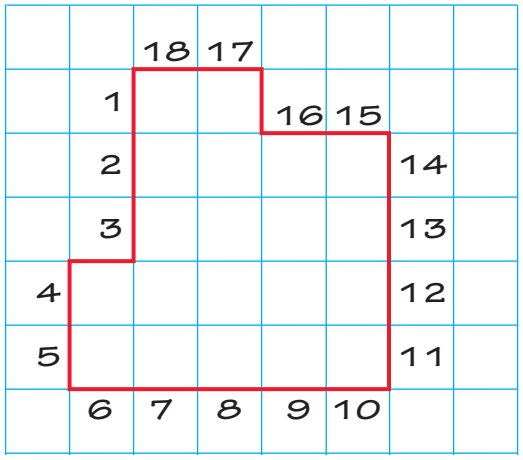
- (A) 9 centimeters long and 2 centimeters wide
- (B) 6 centimeters long and 3 centimeters wide
- (C) 4 centimeters long and 4 centimeters wide
- (D) 5 centimeters long and 4 centimeters wide
- (E) 7 centimeters long and 2 centimeters wide

9. THINK SMARTER **What's the Error?** Kevin is solving perimeter problems. He counts the units and says that the perimeter of this figure is 18 units.

Look at Kevin's solution.

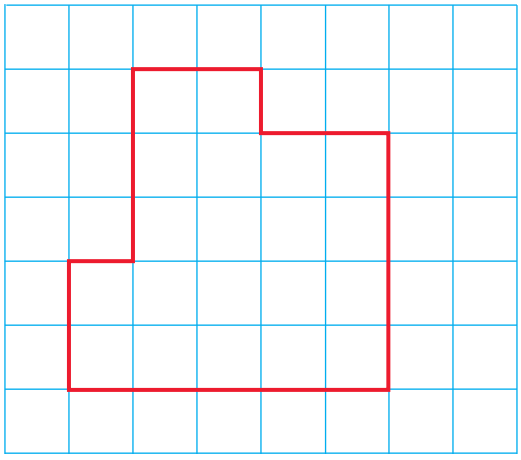
Find Kevin's error.

A



Perimeter = ____ units

B



Perimeter = ____ units

- GO DEEPER Describe the error Kevin made. Circle the places in the drawing of Kevin's solution where he made an error.

_____

_____

FOR MORE PRACTICE:
Standards Practice Book

Name _____

Find Perimeter

Essential Question How can you measure perimeter?

Measurement and Data—
3.MD.8 *Also 3.NBT.2, 3.MD.4*
MATHEMATICAL PRACTICES
MP.4, MP.5, MP.6, MP.7

You can estimate and measure perimeter in standard units, such as inches and centimeters.

Unlock the Problem

Real World

Hands On

Find the perimeter of the cover of a notebook.

Activity **Materials** ■ inch ruler

STEP 1 Estimate the perimeter of a notebook in inches. Record your estimate. _____ inches

STEP 2 Use an inch ruler to measure the length of each side of the notebook to the nearest inch.

STEP 3 Record and add the lengths of the sides measured to the nearest inch.

_____ + _____ + _____ + _____ = _____

So, the perimeter of the notebook cover measured to the nearest inch is _____ inches.

Math Talk **Mathematical Practices**

Explain how your estimate compares with your measurement.

Try This! Find the perimeter.

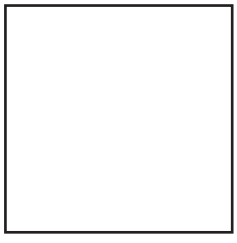
Use an inch ruler to find the length of each side.

Add the lengths of the sides:

_____ + _____ + _____ + _____ = _____

The perimeter is _____ inches.

Use a centimeter ruler to find the length of each side.



Add the lengths of the sides:

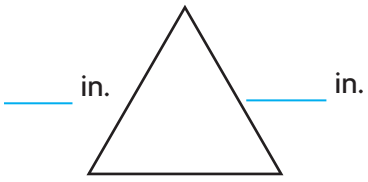
_____ + _____ + _____ + _____ = _____

The perimeter is _____ centimeters.

Share and Show

MATH BOARD

1. Find the perimeter of the triangle in inches.



Think: How long is each side?

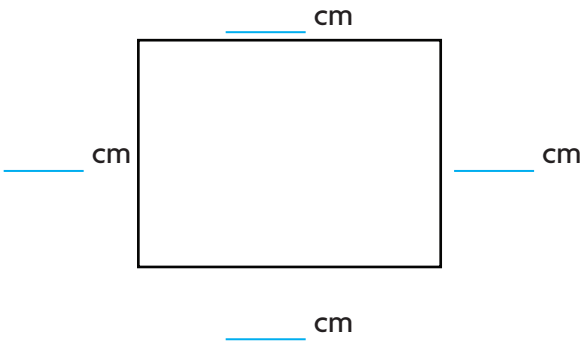
_____ inches

Math Talk — **Mathematical Practices**

Explain how many numbers you add together to find the perimeter of a figure.

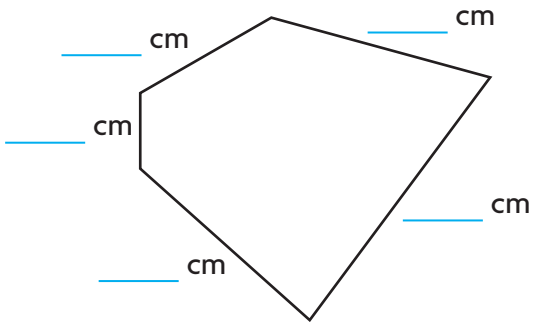
Use a centimeter ruler to find the perimeter.

2.



_____ centimeters

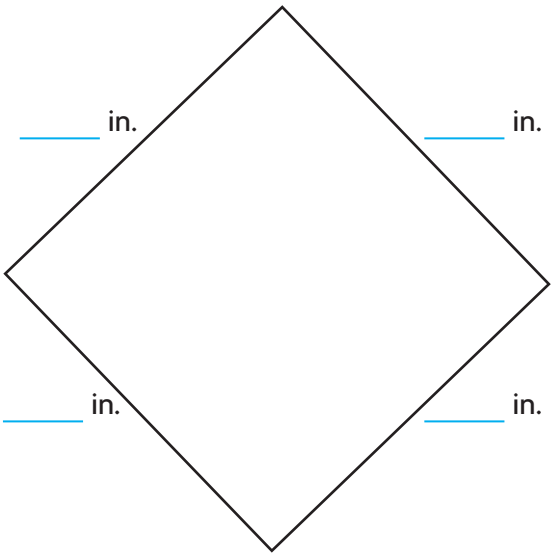
3.



_____ centimeters

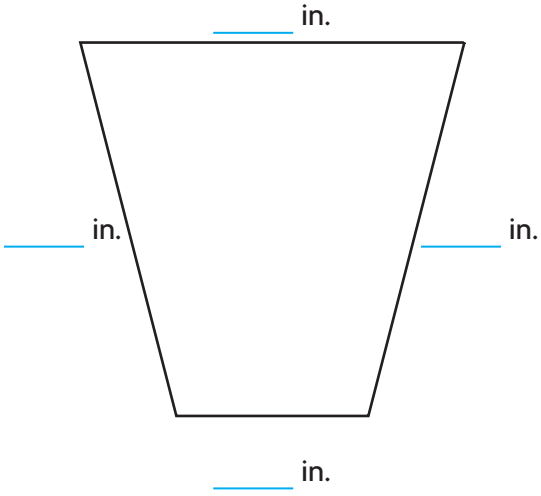
Use an inch ruler to find the perimeter.

4.



_____ inches

5.



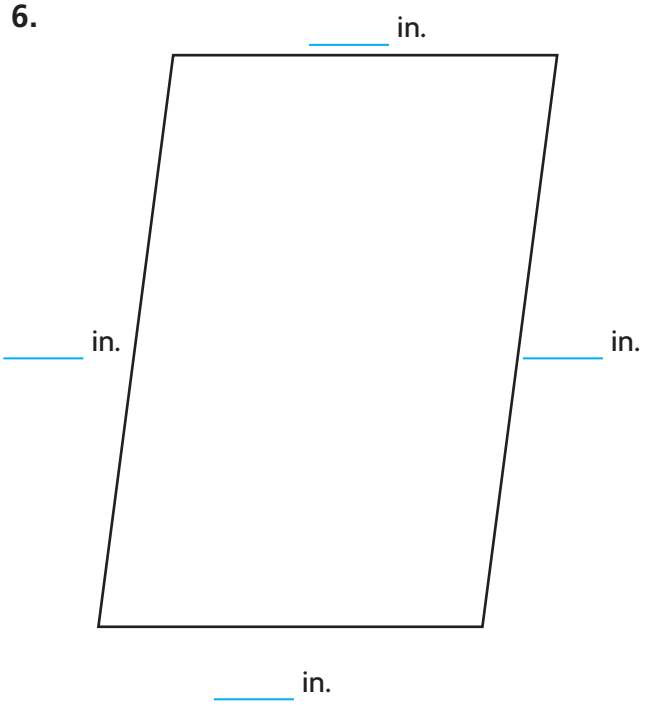
_____ inches

Name _____

On Your Own

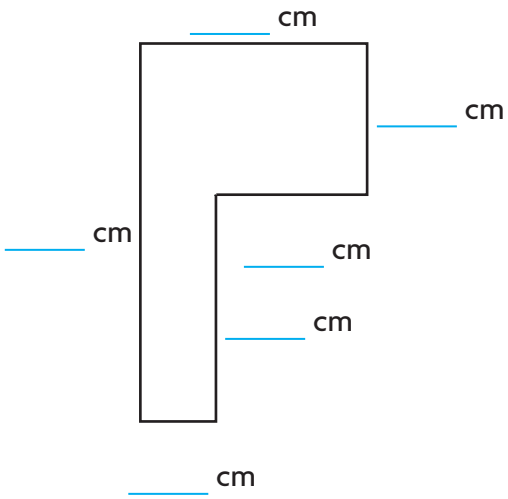
Use a ruler to find the perimeter.

6.



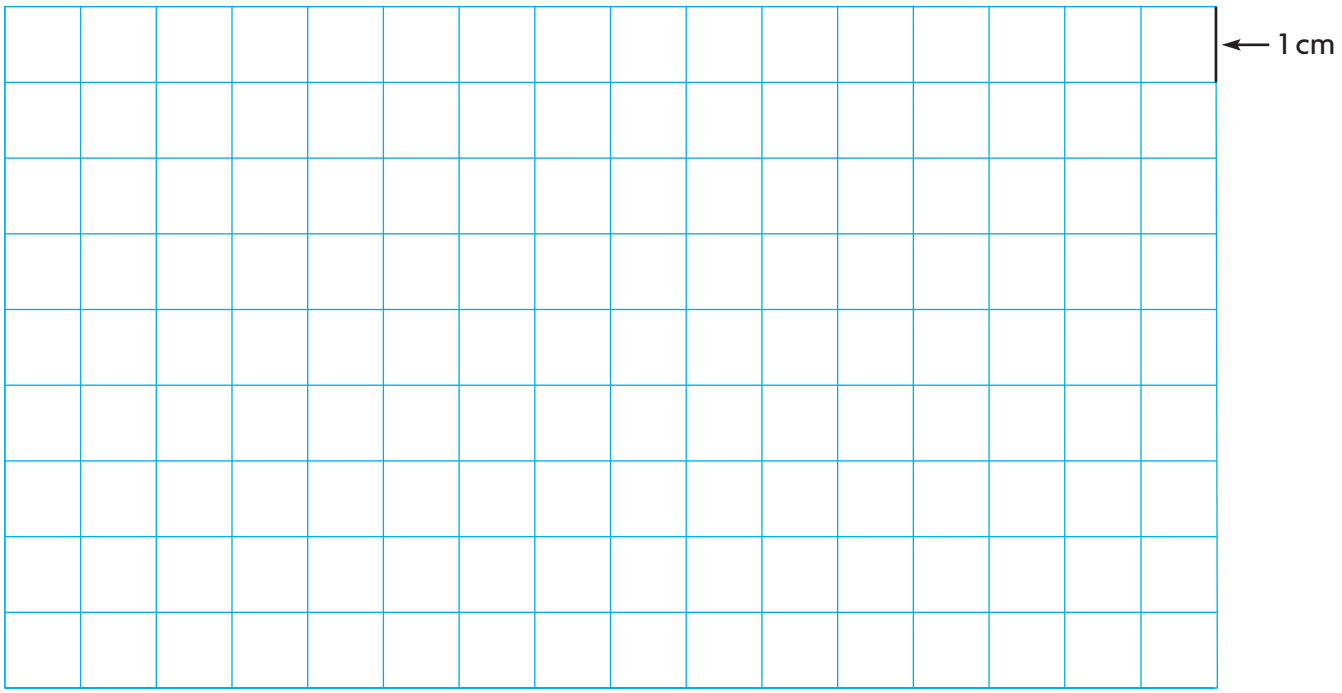
_____ inches

7.



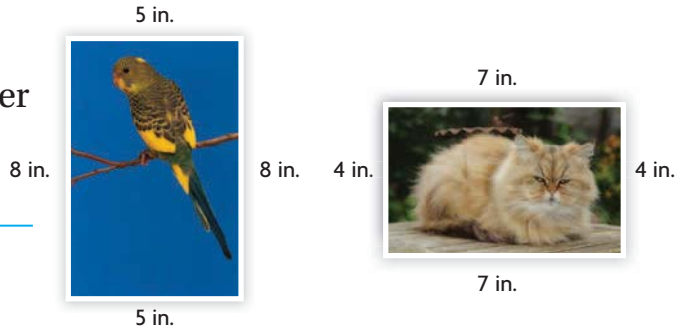
_____ centimeters

8. MATHEMATICAL PRACTICE 4 **Model Mathematics** Use the grid paper to draw a figure that has a perimeter of 24 centimeters. Label the length of each side.



Problem Solving • Applications

Use the photos for 9–10.



9. Which of the animal photos has a perimeter of 26 inches?

_____

10. GO DEEPER How much greater is the perimeter of the bird photo than the perimeter of the cat photo?

_____

WRITE Math • Show Your Work

11. THINK SMARTER Erin is putting a fence around her square garden. Each side of her garden is 3 meters long. The fence costs $5 for each meter. How much will the fence cost?

_____

12. WRITE Math Gary's garden is shaped like a rectangle with two pairs of sides of equal length, and it has a perimeter of 28 feet. Explain how to find the lengths of the other sides if one side measures 10 feet.

_____

_____

_____

_____

_____

13. THINK SMARTER Use an inch ruler to measure this sticker to the nearest inch. Then write an equation you can use to find its perimeter.

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Algebra • Find Unknown Side Lengths

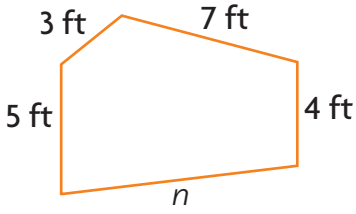
Essential Question How can you find the unknown length of a side in a plane figure when you know its perimeter?

Measurement and Data—
3.MD.8 *Also 3.NBT.2*

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.7, MP.8

Unlock the Problem

Chen has 27 feet of fencing to put around his garden. He has already used the lengths of fencing shown. How much fencing does he have left for the last side?



Find the unknown side length.

Write an equation for the perimeter.

$5 + 3 + \_\_ + \_\_ + n = 27$

Think: If I knew the length *n*, I would add all the side lengths to find the perimeter.

$5 + 3 + 7 + \underbrace{4}_{\_\_\_\_} + n = 27$

Add the lengths of the sides you know.

$\_\_\_\_ + n = 27$

Think: Addition and subtraction are inverse operations.

Write a related equation.

$n = 27 - 19$

So, Chen has _____ feet of fencing left.

$\_\_\_\_ = 27 - 19$

Math Idea

A symbol or letter can stand for an unknown side length.

Try This!

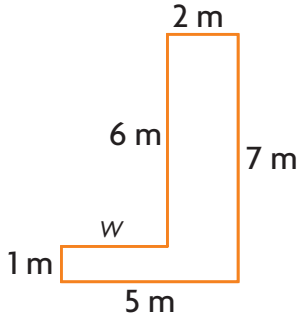
The perimeter of the figure is 24 meters. Find the unknown side length, *w*.

$\underbrace{\_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + \_\_\_\_ + w}_{\_\_\_\_} = \_\_\_\_$

$\_\_\_\_ + w = \_\_\_\_$

$w = \_\_\_\_ - \_\_\_\_$

$\_\_\_\_ = \_\_\_\_ - \_\_\_\_$



So, the unknown side length, *w*, is _____ meters.

Example Find unknown side lengths of a rectangle.

Lauren has a rectangular blanket. The perimeter is 28 feet. The width of the blanket is 5 feet. What is the length of the blanket?

Hint: A rectangle has two pairs of opposite sides that are equal in length.

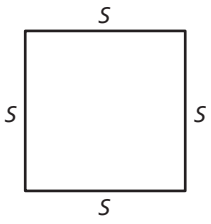
You can predict the length and add to find the perimeter. If the perimeter is 28 feet, then that is the correct length.

Predict	Check	Does it check?
$l = 7$ feet	5 + ____ + 5 + ____ = ____	**Think:** Perimeter is not 28 feet, so the length does not check.
$l = 8$ feet	5 + ____ + 5 + ____ = ____	**Think:** Perimeter is not 28 feet, so the length does not check.
$l = 9$ feet	5 + ____ + 5 + ____ = ____	**Think:** Perimeter is 28 feet, so the length is correct. ✓

So, the length of the blanket is _____ feet.

Try This! Find unknown side lengths of a square.

The square has a perimeter of 20 inches.
What is the length of each side of the square?



Think: A square has four sides that are equal in length.

You can multiply to find the perimeter.

- Write a multiplication equation for the perimeter. $4 \times s = 20$
- Use a multiplication fact you know to solve. $4 \times$ _____ $= 20$

So, the length of each side of the square is _____ inches.

Name _____

Share and Show

MATH BOARD

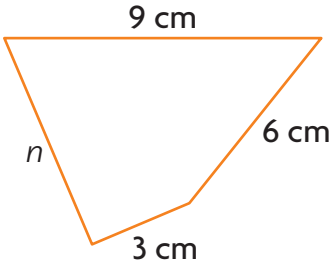
Find the unknown side lengths.

1. Perimeter = 25 centimeters

$9 + \_\_\_\_ + \_\_\_\_ + n = 25$

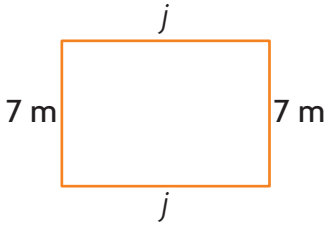
$\_\_\_\_ + n = 25$

$\_\_\_\_ = \_\_\_\_ - \_\_\_\_$



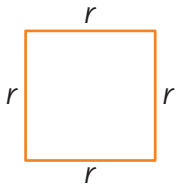
$n =$ _____ centimeters

2. Perimeter = 34 meters



$j =$ _____ meters

3. Perimeter = 12 feet

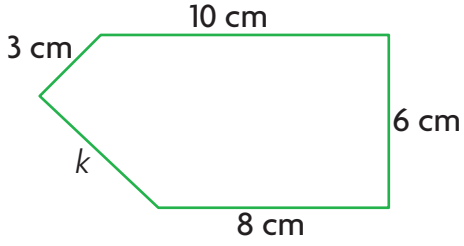


$r =$ _____ feet

On Your Own

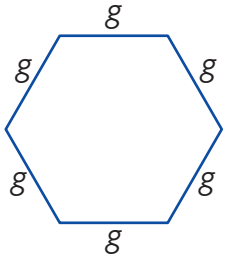
Find the unknown side lengths.

4. Perimeter = 32 centimeters



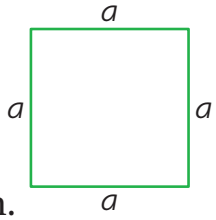
$k =$ _____ centimeters

5. THINK SMARTER Perimeter = 42 feet



$g =$ _____ feet

6. MATHEMATICAL PRACTICE 4 **Use a Diagram** Eleni wants to put up a fence around her square garden. The garden has a perimeter of 28 meters. How long will each side of the fence be? Explain.



_____

_____

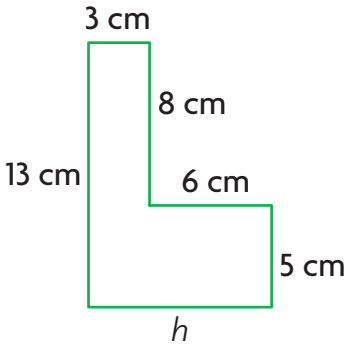
Math Talk **Mathematical Practices**

Explain how you can use division to find the length of a side of a square.

Unlock the Problem

Real World

7. GO DEEPER Latesha wants to make a border with ribbon around a figure she made and sketched at the right. She will use 44 centimeters of ribbon for the border. What is the unknown side length?



a. What do you need to find?

_____

b. How will you use what you know about perimeter to help you solve the problem?

_____

_____

c. Write an equation to solve the problem.

_____

d. So, the length of side h is _____ centimeters.

8. THINK SMARTER A rectangle has a perimeter of 34 inches. The left side is 6 inches long. What is the length of the top side?

_____

Personal Math Trainer

9. THINK SMARTER + Michael has 40 feet of fencing to make a rectangular dog run for his dog, Buddy. One side of the run will be 5 feet long. For numbers 9a–9d, choose Yes or No to show what the length of another side will be.

9a.	20 feet	○ Yes	○ No
9b.	15 feet	○ Yes	○ No
9c.	10 feet	○ Yes	○ No
9d.	8 feet	○ Yes	○ No

FOR MORE PRACTICE: Standards Practice Book

Name _____

Understand Area

Essential Question How is finding the area of a figure different from finding the perimeter of a figure.

Measurement and Data—
3.MD.5, 3.MD.5a *Also 3.MD.5b, 3.MD.6, 3.MD.8*

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5, MP.6

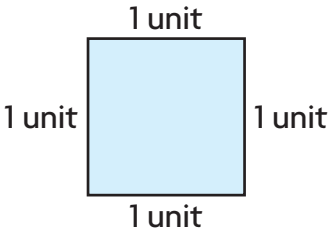
Unlock the Problem

Real World

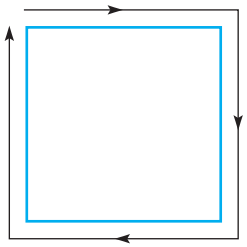
CONNECT You learned that perimeter is the distance around a figure. It is measured in linear units, or units that are used to measure the distance between two points.

Area is the measure of the number of unit squares needed to cover a flat surface. A **unit square** is a square with a side length of 1 unit. It has an area of 1 **square unit (sq un)**.

Unit Square

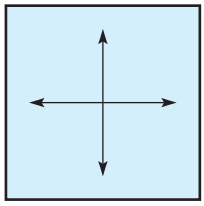


Perimeter



1 unit + 1 unit + 1 unit + 1 unit = 4 units

Area



1 square unit

Math Idea

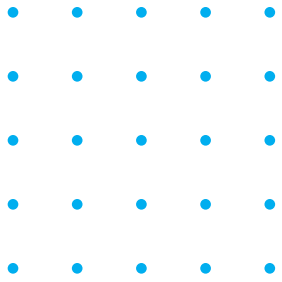
You can count the number of units on each side of a figure to find its perimeter. You can count the number of unit squares inside a figure to find its area in square units.

Activity

Materials ■ geoboard ■ rubber bands

Hands On

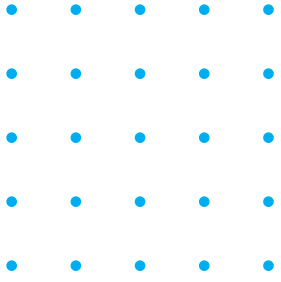
A Use your geoboard to form a figure made from 2 unit squares. Record the figure on this dot paper.



What is the area of this figure?

Area = _____ square units

B Change the rubber band so that the figure is made from 3 unit squares. Record the figure on this dot paper.



What is the area of this figure?

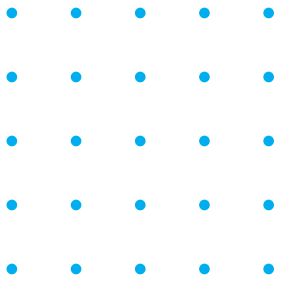
Area = _____ square units

Math Talk **Mathematical Practices**

For B, did your figure look like your classmate's figure? **Explain.**

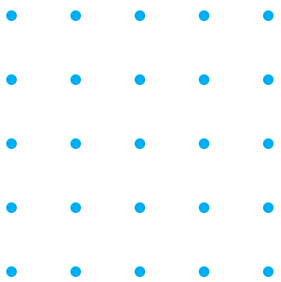
Try This! **Draw three different figures that are each made from 4 unit squares. Find the area of each figure.**

Figure 1



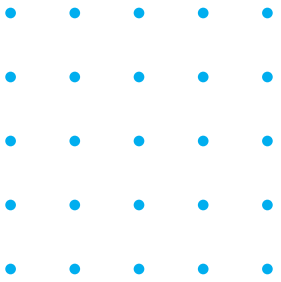
Area = _____ square units

Figure 2



Area = _____ square units

Figure 3



Area = _____ square units

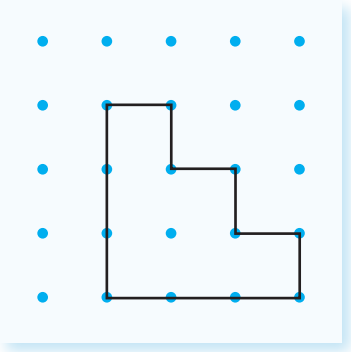
- How are the figures the same? How are the figures different?

Share and Show

MATH BOARD

Hands On

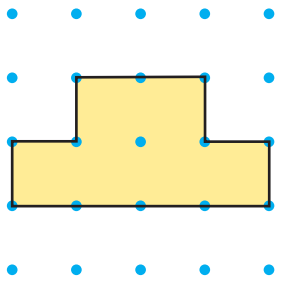
1. Shade each unit square in the figure shown. Count the unit squares to find the area.



Area = _____ square units

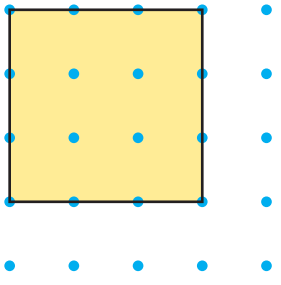
Count to find the area of the figure.

2.



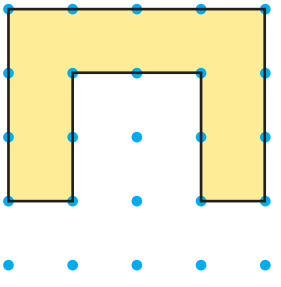
Area = _____ square units

3.



Area = _____ square units

4.



Area = _____ square units

Write *area* or *perimeter* for the situation.

5. buying a rug for a room

_____

6. putting a fence around a garden

_____

Math Talk **Mathematical Practices**

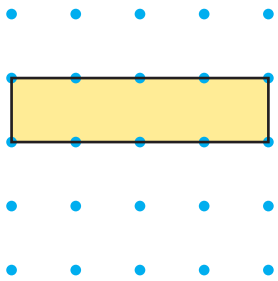
What are other situations where you need to find area?

Name _____

On Your Own

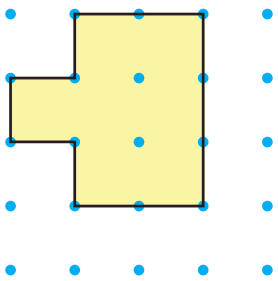
Count to find the area of the figure.

7.



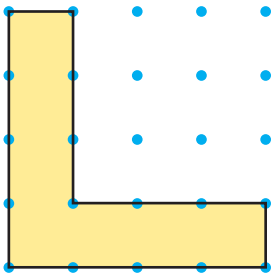
Area = _____ square units

8.



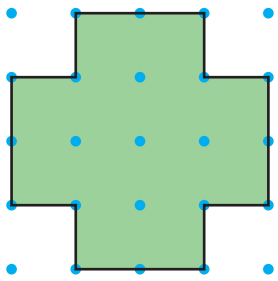
Area = _____ square units

9.



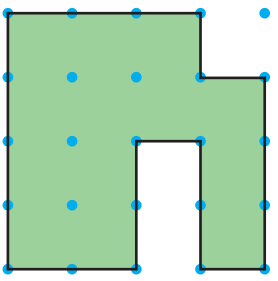
Area = _____ square units

10.



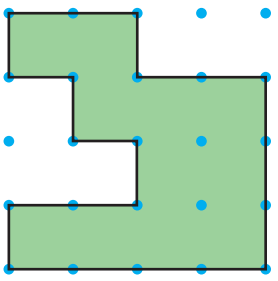
Area = _____ square units

11.



Area = _____ square units

12.



Area = _____ square units

Write *area* or *perimeter* for the situation.

13. painting a wall

_____

14. covering a patio with tiles

_____

15. putting a wallpaper border around a room

_____

16. gluing a ribbon around a picture frame

_____

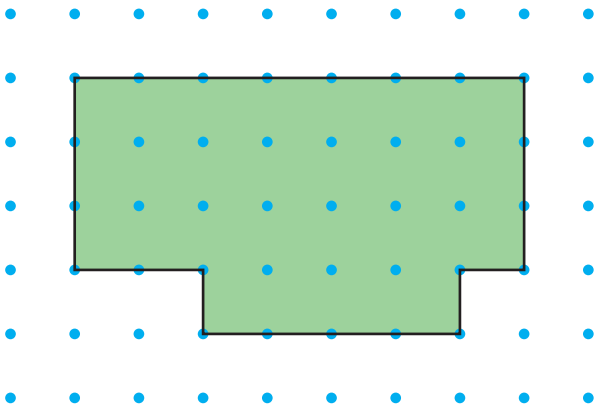
17. GO DEEPER Nicole's mother put tiles on a section of their kitchen floor. The section included 5 rows with 4 tiles in each row. Each tile cost $2. How much money did Nicole's father spend on the tiles?

_____

Problem Solving • Applications

Juan is building an enclosure for his small dog, Eli. Use the diagram for 18–19.

Eli's Enclosure



18. Juan will put fencing around the outside of the enclosure. How much fencing does he need for the enclosure?

_____

19. MATHEMATICAL PRACTICE 5 **Use Appropriate Tools** Juan will use grass sod to cover the ground in the enclosure. How much grass sod does Juan need?

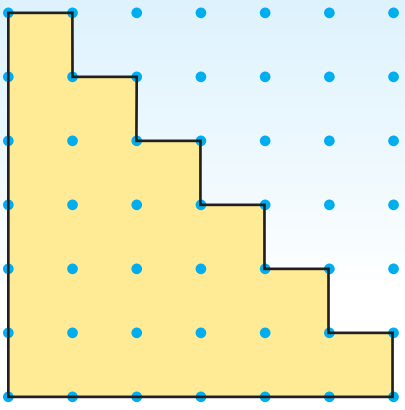
_____

20. THINK SMARTER Draw two different figures, each with an area of 10 square units.

21. THINK SMARTER What is the perimeter and area of this figure? Explain how you found the answer.

Perimeter _____ units

Area _____ square units



_____

_____

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Measure Area

Essential Question How can you find the area of a plane figure?

Measurement and Data—
3.MD.5b, 3.MD.6 *Also 3.MD.5, 3.MD.5a, 3.MD.7, 3.MD.7a*

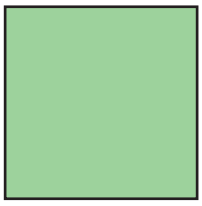
MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5, MP.6

Unlock the Problem

Hands On

Jaime is measuring the area of the rectangles with 1-inch square tiles.

1 square inch



Activity 1

Materials ■ 1-inch grid paper ■ scissors

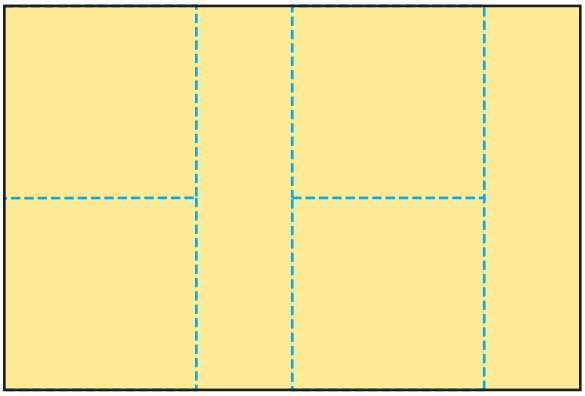
Cut out eight 1-inch squares. Use the dashed lines as guides to place tiles for *A*–*C*.

A Place 4 tiles on Rectangle *A*.

- Are there any gaps? _____
- Are there any overlaps? _____
- Jaime says that the area is 4 square inches. Is Jaime's measurement correct? _____

So, when you measure area, there can be no space between the tiles, or no gaps.

Rectangle *A*

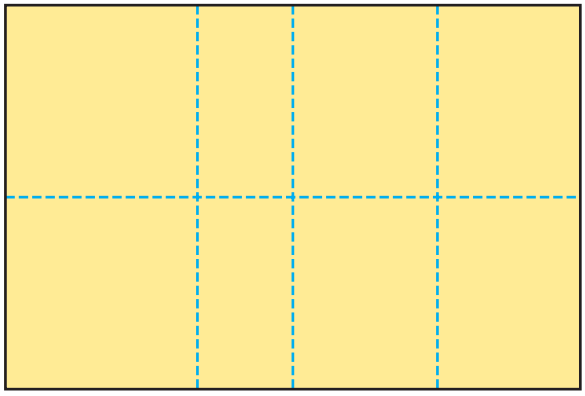


B Place 8 tiles on Rectangle *B*.

- Are there any gaps? _____
- Are there any overlaps? _____
- Jaime says that the area is 8 square inches. Is Jaime's measurement correct? _____

So, when you measure the area, the tiles cannot overlap.

Rectangle *B*



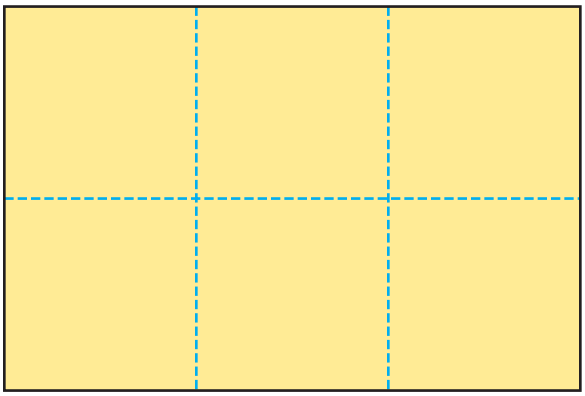
C Place 6 tiles on Rectangle *C*.

- Are there any gaps? _____
- Are there any overlaps? _____
- Jaime says that the area is 6 square inches. Is Jaime's measurement correct? _____

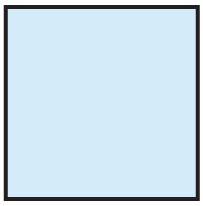
So, the area of the rectangles is

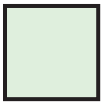
_____ square inches.

Rectangle *C*



Activity 2 Materials ■ green and blue paper ■ scissors





ERROR Alert

Be sure that there are no gaps or overlaps when you use square tiles to find area.

STEP 1	Estimate the number of blue square tiles it will take to cover the gray figure.	_____ blue square tiles
STEP 2	Estimate the number of green tiles it will take to cover the gray figure.	_____ green square tiles
STEP 3	Trace the blue square pattern ten times and cut out the squares.	
STEP 4	Trace the green square pattern thirty-six times and cut out the squares.	
STEP 5	Cover the gray figure with blue square tiles. Count and write the number of blue square tiles you used. Record the area of the figure.	_____ blue square tiles Area = ____ blue square units
STEP 6	Cover the gray figure with green square tiles. Count and write the number of green square tiles you used. Record the area of the figure.	_____ green square tiles Area = ____ green square units

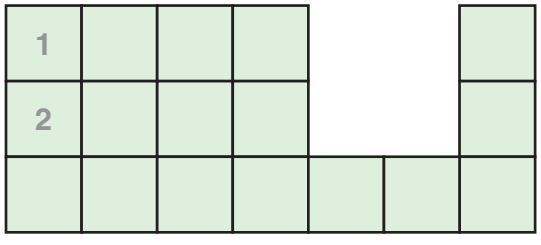
Math Talk **Mathematical Practices**

Explain why the number of green square tiles needed to cover the figure is different than the number of blue square tiles needed.

Try This! Count to find the area of the figure.

 is 1 square centimeter.

There are _____ unit squares in the figure.



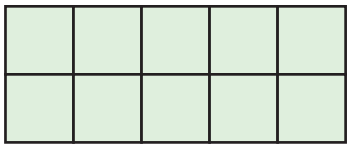
So, the area is _____ square centimeters.

Name _____

Share and Show

MATH BOARD

1. Count to find the area of the figure. Each unit square is 1 square centimeter.



Think: Are there any gaps? Are there any overlaps?

There are _____ unit squares in the figure.

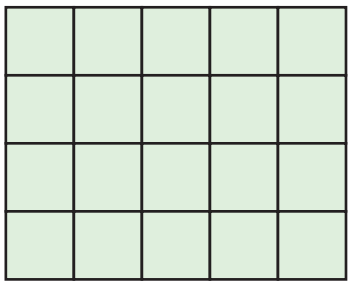
So, the area is _____ square centimeters.

Math Talk **Mathematical Practices**

Explain how you can use square centimeters to find the area of the figures in Exercises 2 and 3.

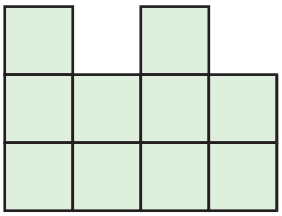
Count to find the area of the figure.
Each unit square is 1 square centimeter.

2.



Area = _____ square centimeters

3.

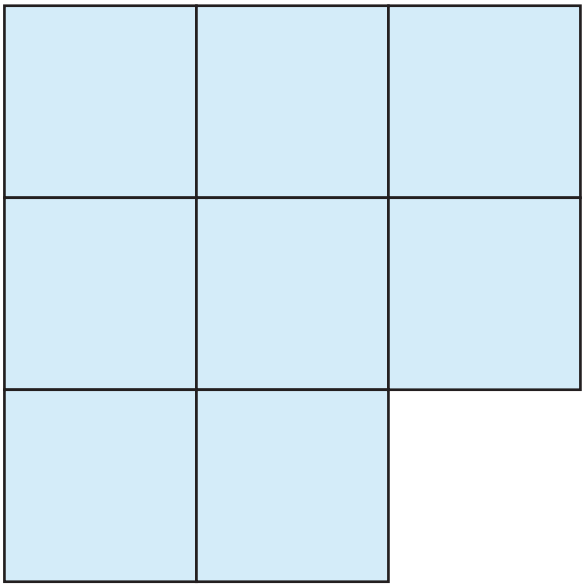


Area = _____ square centimeters

On Your Own

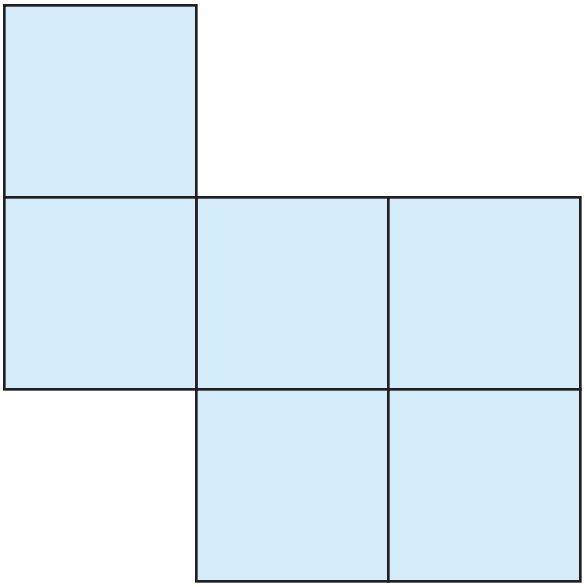
Count to find the area of the figure.
Each unit square is 1 square inch.

4.



Area = _____ square inches

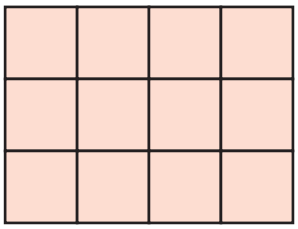
5.



Area = _____ square inches

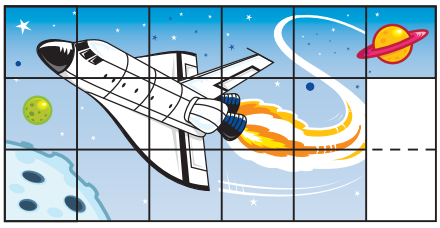
Problem Solving • Applications Real World

6. MATHEMATICAL PRACTICE 4 **Use a Diagram** Danny is placing tiles on the floor of an office lobby. Each tile is 1 square meter. The diagram shows the lobby. What is the area of the lobby?



_____

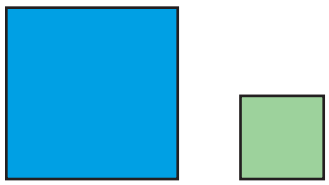
7. GO DEEPER Angie is painting a space shuttle mural on a wall. Each section is one square foot. The diagram shows the unfinished mural. How many more square feet has Angie painted than NOT painted on her mural?



_____

8. THINK SMARTER You measure the area of a table top with blue unit squares and green unit squares. Which unit square will give you a greater number of square units for area? **Explain.**

Rectangle *A*



_____

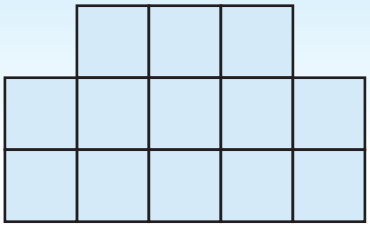
_____

_____

_____

9. THINK SMARTER How many squares need to be added to this figure so that it has the same area as a square with a side length of 5 units?

_____ squares



FOR MORE PRACTICE: Standards Practice Book

Name _____

Use Area Models

Essential Question Why can you multiply to find the area of a rectangle?

Measurement and Data—3.MD.7, 3. MD.7a *Also 3.MD.5, 3.MD.5a, 3.MD.5b, 3.MD.6, 3.MD.7b, 3.OA.3, 3.OA.7, 3.NBT.2*

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.6, MP.8

Unlock the Problem

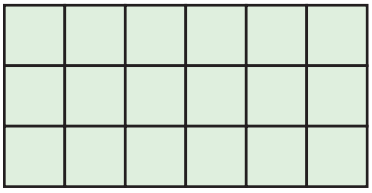
Real World

Cristina has a garden that is shaped like the rectangle below. Each unit square represents 1 square meter. What is the area of her garden?

- Circle the shape of the garden.

One Way Count unit squares.

Count the number of unit squares in all.



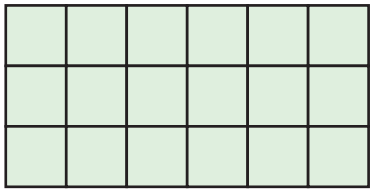
There are _____ unit squares.

So, the area is _____ square meters.

Other Ways

A Use repeated addition.

Count the number of rows. Count the number of unit squares in each row.



_____ unit squares

_____ unit squares

_____ unit squares

_____ rows of _____ = ■

Write an addition equation.

_____ + _____ + _____ = _____

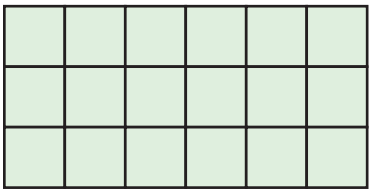
So, the area is _____ square meters.

B Use multiplication.

Count the number of rows. Count the number of unit squares in each row.

_____ unit squares in each row

_____ rows



_____ rows of _____ = ■

This rectangle is like an array. How do you find the total number of squares in an array?

_____

_____ × _____ = _____

Write a multiplication equation.

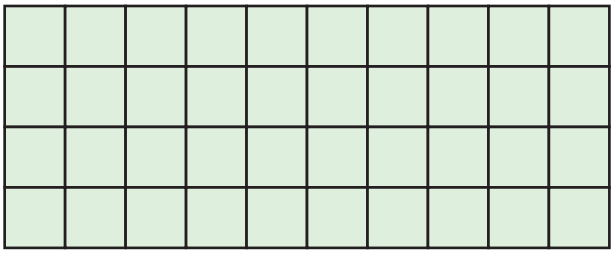
So, the area is _____ square meters.

Math Talk Mathematical Practices

Explain when you can use different methods to find the same area.

Try This!

Find the area of the figure.
Each unit square is 1 square foot.



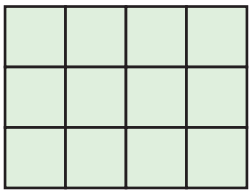
Think: There are 4 rows of 10 unit squares.

_____ × _____ = _____

So, the area is _____ square feet.

Share and Show

MATH BOARD



1. Look at the figure.

_____ rows of _____ = ■

Add. _____ + _____ + _____ = _____

Multiply. _____ × _____ = _____

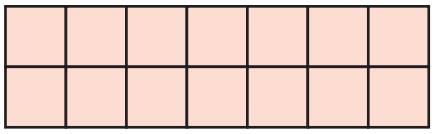
What is the area of the figure?

_____ square units

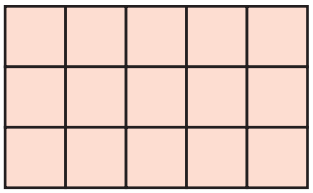
Math Talk Mathematical Practices

Which method do you prefer using? **Explain.**

Find the area of the figure.
Each unit square is 1 square foot.

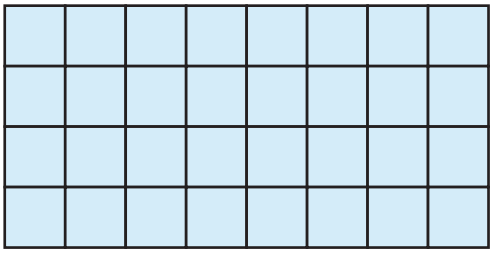
2. 

_____

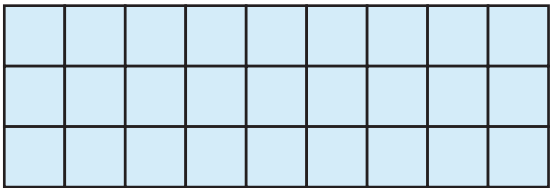
3. 

_____

Find the area of the figure.
Each unit square is 1 square meter.

4. 

_____

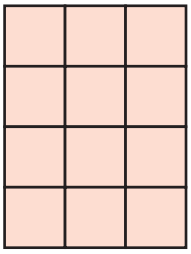
5. 

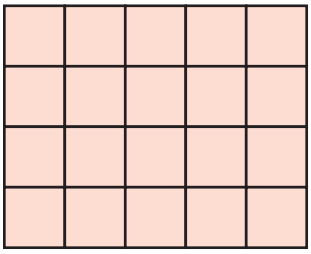
_____

Name _____

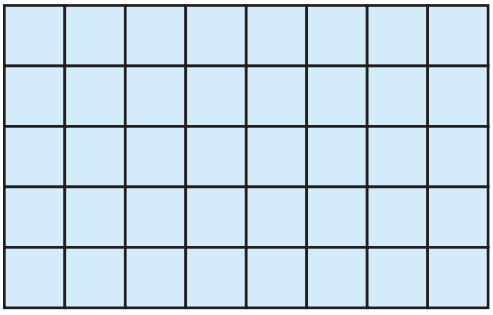
On Your Own

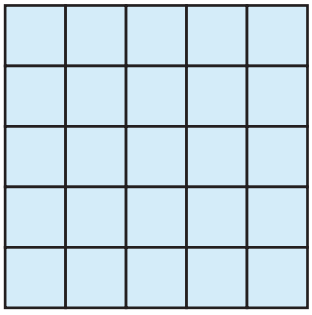
Find the area of the figure.
Each unit square is 1 square foot.

6. 

7. 

Find the area of the figure.
Each unit square is 1 square meter.

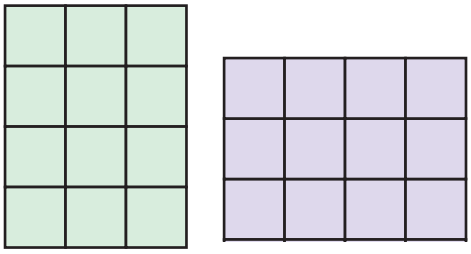
8. 

9. 

10. MATHEMATICAL PRACTICE 4 **Use Diagrams** Draw and shade three rectangles with an area of 24 square units. Then write an addition or multiplication equation for each.

Problem Solving • Applications

11. GO DEEPER Compare the areas of the two rugs at the right. Each unit square represents 1 square foot. Which rug has the greater area? Explain.



_____

_____

_____

12. THINK SMARTER A tile company tiled a wall using square tiles. A mural is painted in the center. The drawing shows the design. The area of each tile used is 1 square foot.

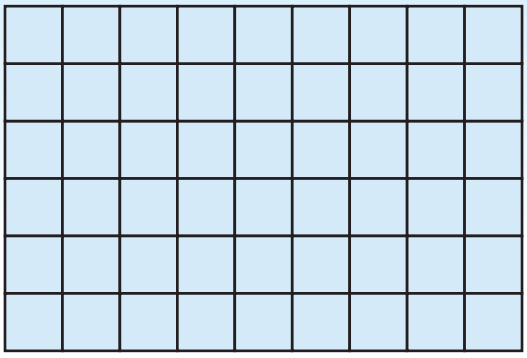
Write a problem that can be solved by using the drawing. Then solve your problem.

_____

_____

_____

13. THINK SMARTER Colleen drew this rectangle. Select the equation that can be used to find the area of the rectangle. Mark all that apply.



- (A) $9 \times 6 = n$
- (B) $9 + 9 + 9 + 9 + 9 + 9 = n$
- (C) $9 + 6 = n$
- (D) $6 \times 9 = n$
- (E) $6 + 6 + 6 + 6 + 6 + 6 = n$

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

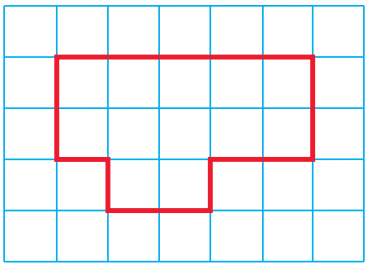
Choose the best term from the box.

Vocabulary
area
perimeter
square unit

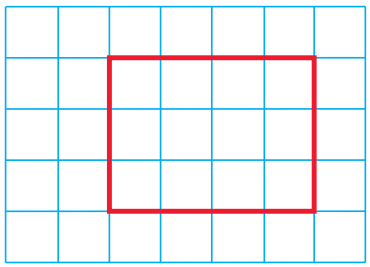
1. The distance around a figure is the _____. (p. 453)
2. The measure of the number of unit squares needed to cover a figure with no gaps or overlaps is the _____. (p. 465)

Concepts and Skills

Find the perimeter of the figure. Each unit is 1 centimeter. (3.MD.8)

3. 

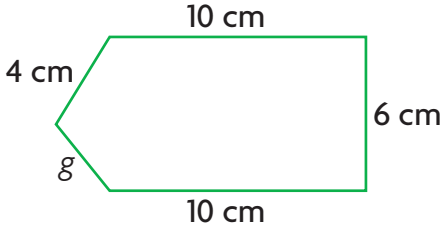
_____ centimeters

4. 

_____ centimeters

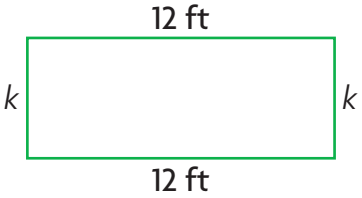
Find the unknown side lengths. (3.MD.8)

5. Perimeter = 33 centimeters



g = _____ centimeters

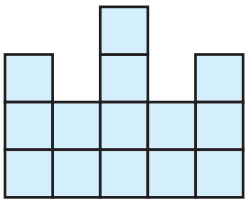
6. Perimeter = 32 feet



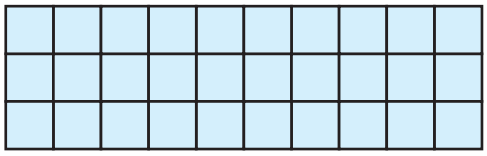
k = _____ feet

Find the area of the figure. Each unit square is 1 square meter.

(3.MD.5, 3.MD.5a, 3.MD.5b, 3.MD.6, 3.MD.7, 3.MD.7a)

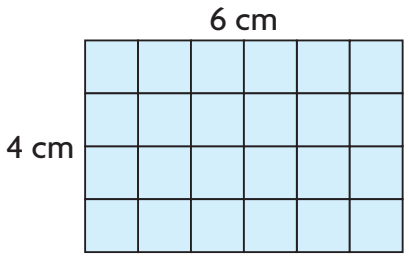
7. 

_____ square meters

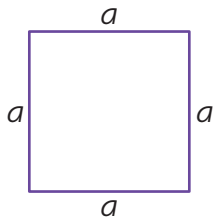
8. 

_____ square meters

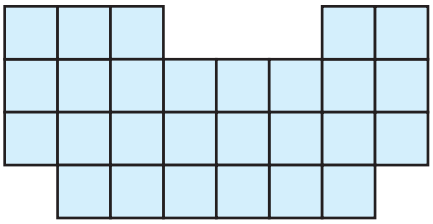
9. Ramona is making a lid for her rectangular jewelry box. The jewelry box has side lengths of 6 centimeters and 4 centimeters. What is the area of the lid Ramona is making? (3.MD.7, 3.MD.7a)



10. Adrienne is decorating a square picture frame. She glued 36 inches of ribbon around the edge of the frame. What is the length of each side of the picture frame? (3.MD.8)



11. Margo will sweep a room. A diagram of the floor that she needs to sweep is shown at the right. What is the area of the floor? (3.MD.5b, 3.MD.6)



12. Jeff is making a poster for a car wash for the Campout Club. What is the perimeter of the poster? (3.MD.8)

13. A rectangle has two side lengths of 8 inches and two side lengths of 10 inches. What is the perimeter of the rectangle? (3.MD.8)

Name _____

Problem Solving • Area of Rectangles

Essential Question How can you use the strategy *find a pattern* to solve area problems?

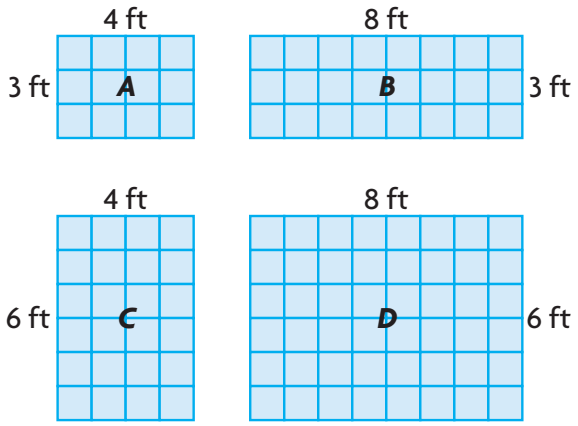
Measurement and Data—3.MD.7b
Also 3.OA.3, 3.OA.7, 3.OA.9

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.6, MP.7

Unlock the Problem

Mr. Koi wants to build storage buildings, so he drew plans for the buildings. He wants to know how the areas of the buildings are related. How does the area change from the area of Building *A* to the area of Building *B*? How does the area change from the area of Building *C* to the area of Building *D*?

Use the graphic organizer to help you solve the problem.



Read the Problem

What do I need to find?

I need to find how the areas will change from *A* to *B* and from _____ to _____.

What information do I need to use?

I need to use the _____ and _____ of each building to find its area.

How will I use the information?

I will record the areas in a table. Then I will look for a pattern to see how the _____ will change.

Solve the Problem

I will complete the table to find patterns to solve the problem.

	Length	Width	Area		Length	Width	Area
Building *A*	3 ft			Building *C*		4 ft	
Building *B*	3 ft			Building *D*		8 ft	

I see that the lengths will be the same and the widths will be doubled.

The areas will change from _____ to _____ and from _____ to _____.

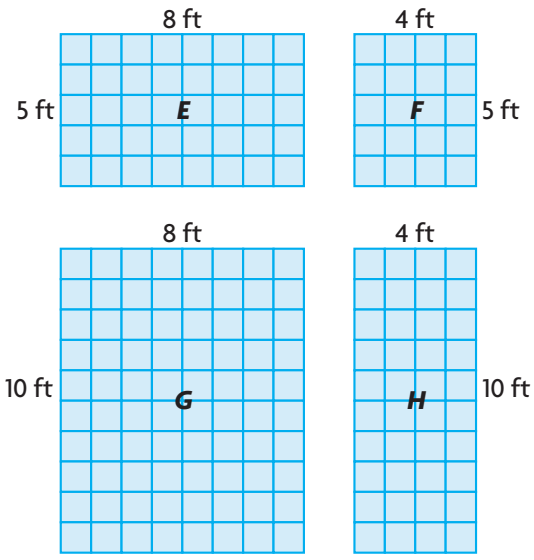
So, when the lengths are the same and the widths are doubled,

the areas will be _____.

Try Another Problem

Mr. Koi is building more storage buildings. He wants to know how the areas of the buildings are related. How does the area change from the area of Building *E* to the area of Building *F*? How does the area change from the area of Building *G* to the area of Building *H*?

Use the graphic organizer to help you solve the problem.



Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?

Solve the Problem

	Length	Width	Area		Length	Width	Area
Building *E*				Building *G*			
Building *F*				Building *H*			

- How did your table help you find a pattern?

Math Talk Mathematical Practices

What if the length of both sides is doubled? How would the areas change?

Name _____

Share and Show

MATH BOARD

Use the table for 1–2.

Swimming Pool Sizes			
Pool	Length (in feet)	Width (in feet)	Area (in square feet)
A	8	20	
B	8	30	
C	8	40	
D	8	50	

1. Many pools come in rectangular shapes. How do the areas of the swimming pools change when the widths change?

First, complete the table by finding the area of each pool.

Think: I can find the area by multiplying the length and the width.

Then, find a pattern of how the lengths change and how the widths change.

The _____ stays the same. The widths _____.

Last, describe a pattern of how the area changes.

The areas _____ by ____ square feet.

2. What if the length of each pool was 16 feet? Explain how the areas would change.

_____

On Your Own

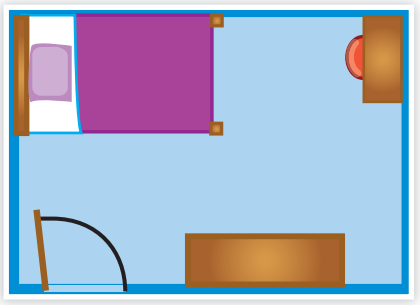
3. MATHEMATICAL PRACTICE 7 **Look for a Pattern** If the length of each pool in the table is 20 feet, and the widths change from 5, to 6, to 7, and to 8 feet, describe the pattern of the areas.

_____

_____

4. MATHEMATICAL PRACTICE 1 **Analyze Relationships** Jacob has a rectangular garden with an area of 56 square feet. The length of the garden is 8 feet. What is the width of the garden?

5. GO DEEPER A diagram of Paula's bedroom is at the right. Her bedroom is in the shape of a rectangle. Write the measurements for the other sides. What is the perimeter of the room? (Hint: The two pairs of opposite sides are equal lengths.)



6. THINK SMARTER Elizabeth built a sandbox that is 4 feet long and 4 feet wide. She also built a flower garden that is 4 feet long and 6 feet wide and a vegetable garden that is 4 feet long and 8 feet wide. How do the areas change?

7. THINK SMARTER Find the pattern and complete the chart.

Total Area (in square feet)	50	60	70	80	
Length (in feet)	10	10		10	
Width (in feet)	5	6	7		

How can you use the chart to find the length and width of a figure with an area of 100 square feet?

FOR MORE PRACTICE: Standards Practice Book

Name _____

Area of Combined Rectangles

Essential Question How can you break apart a figure to find the area?

Measurement and Data—
3.MD.7c, 3.MD.7d

Also 3.MD.5, 3.MD.5a, 3.MD.5b, 3.MD.7b, 3.OA.3, 3.OA.5, 3.OA.7, 3.NBT.2

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.6, MP.7

Unlock the Problem

Real World

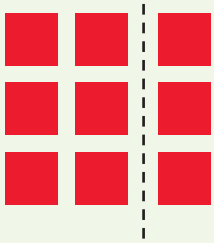
Hands On

Anna's rug has side lengths of 4 feet and 9 feet. What is the area of Anna's rug?

Remember

You can use the Distributive Property to break apart an array.

$3 \times 3 = 3 \times (2 + 1)$



Activity Materials ■ square tiles

STEP 1 Use square tiles to model 4×9.

STEP 2 Draw a rectangle on the grid paper to show your model.

STEP 3 Draw a vertical line to break apart the model to make two smaller rectangles.

The side length 9 is broken into _____ plus _____.

STEP 4 Find the area of each of the two smaller rectangles.

Rectangle 1: _____ × _____ = _____

Rectangle 2: _____ × _____ = _____

STEP 5 Add the products to find the total area.

_____ + _____ = _____ square feet

STEP 6 Check your answer by counting the number of square feet.

_____ square feet

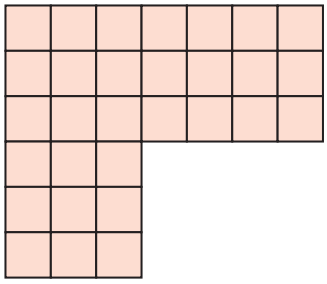
So, the area of Anna's rug is _____ square feet.

Math Talk **Mathematical Practices**

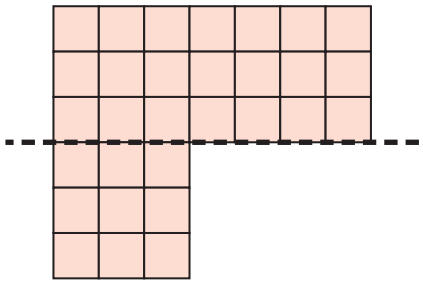
Did you draw a line in the same place as your classmates? **Explain** why you found the same total area.

CONNECT Using the Distributive Property, you found that you could break apart a rectangle into smaller rectangles, and add the area of each smaller rectangle to find the total area.

How can you break apart this figure into rectangles to find its area?



One Way Use a horizontal line.



STEP 1 Write a multiplication equation for each rectangle.

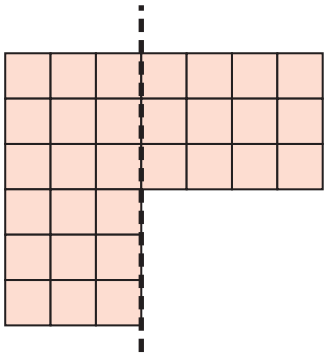
Rectangle 1: ____ × ____ = ____

Rectangle 2: ____ × ____ = ____

STEP 2 Add the products to find the total area.

____ + ____ = ____ square units

Another Way Use a vertical line.



STEP 1 Write a multiplication equation for each rectangle.

Rectangle 1: ____ × ____ = ____

Rectangle 2: ____ × ____ = ____

STEP 2 Add the products to find the total area.

____ + ____ = ____ square units

So, the area is _____ square units.

Math Talk **Mathematical Practices**

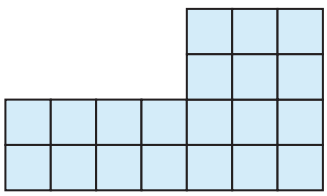
Explain how you can check your answer.

Share and Show

MATH BOARD

1. Draw a line to break apart the figure into rectangles. Find the total area of the figure.

Think: I can draw vertical or horizontal lines to break apart the figure to make rectangles.



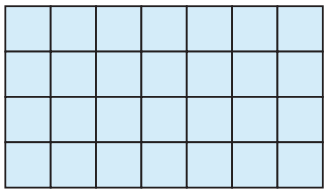
Rectangle 1: ____ × ____ = ____

Rectangle 2: ____ × ____ = ____

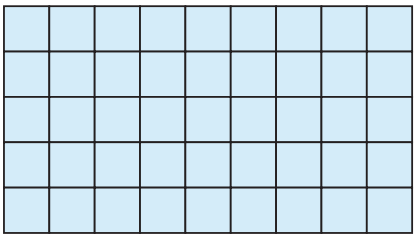
____ + ____ = ____ square units

Name _____

Use the Distributive Property to find the area. Show your multiplication and addition equations.

2. 

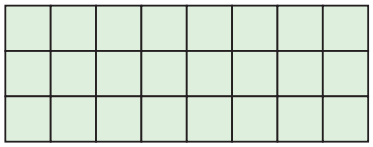
_____ square units

3. 

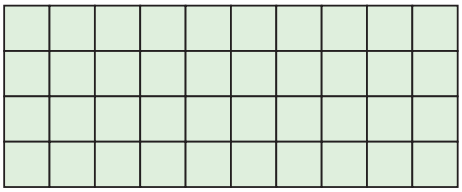
_____ square units

On Your Own

Use the Distributive Property to find the area. Show your multiplication and addition equations.

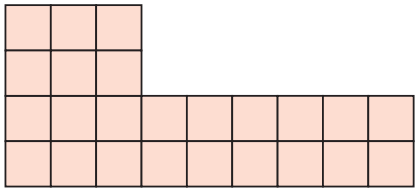
4. 

_____ square units

5. 

_____ square units

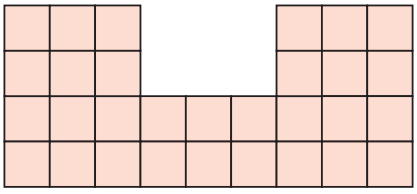
Draw a line to break apart the figure into rectangles. Find the area of the figure.

6. 

Rectangle 1: ___ × ___ = ___

Rectangle 2: ___ × ___ = ___

___ + ___ = ___ square units

7. GO DEEPER 

Rectangle 1: ___ × ___ = ___

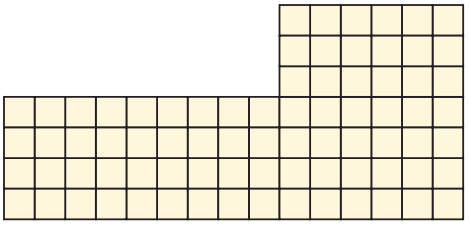
Rectangle 2: ___ × ___ = ___

Rectangle 3: ___ × ___ = ___

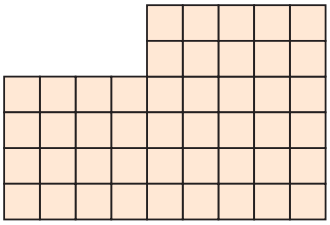
___ + ___ + ___ = ___ square units

Problem Solving • Applications

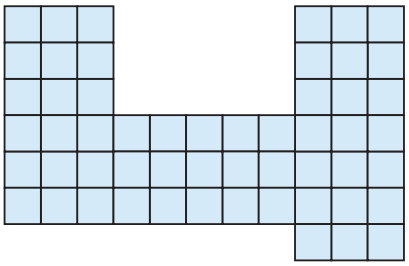
8. A model of Ms. Lee's classroom is at the right. Each unit square is 1 square foot. Draw a line to break apart the figure into rectangles. What is the total area of Ms. Lee's classroom?



9. David has a rectangular bedroom with a rectangular closet. Each unit square is 1 square foot. Draw a line to break apart the figure into rectangles. What is the total area of David's bedroom?

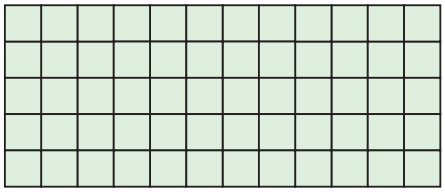


10. THINK SMARTER **Explain** how to break apart the figure to find its area.



1 unit square = 1 square meter

11. MATHEMATICAL PRACTICE 4 **Interpret a Result** Use the Distributive Property to find the area of the figure at the right. Write your multiplication and addition equations.



1 unit square = 1 square centimeter

Personal Math Trainer

12. THINK SMARTER + Pete drew a diagram of his backyard on grid paper. Each unit square is 1 square meter. The area surrounding the patio is grass.

How much more of the backyard is grass than patio? Show your work.

_____ more square meters

FOR MORE PRACTICE: Standards Practice Book

Name _____

Same Perimeter, Different Areas

Essential Question How can you use area to compare rectangles with the same perimeter?

Measurement and Data—3.MD.8
Also 3.MD.5, 3.MD.5a, 3.MD.5b, 3.MD.7b, 3.OA.3, 3.OA.7, 3.NBT.2.

MATHEMATICAL PRACTICES
MP.1, MP.3, MP.4, MP.7

Unlock the Problem

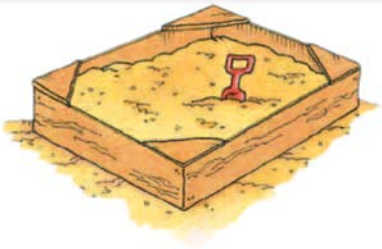
Real World

Hands On

Toby has 12 feet of boards to put around a rectangular sandbox. How long should he make each side so that the area of the sandbox is as large as possible?

- What is the greatest perimeter Toby can make for his sandbox?

_____



Activity

Materials ■ square tiles

Use square tiles to make all the rectangles you can that have a perimeter of 12 units. Draw and label the sandboxes. Then find the area of each.

Sandbox 1

1 ft

5 ft

Sandbox 2

___ ft

___ ft

Sandbox 3

___ ft

___ ft

Find the perimeter and area of each rectangle.

	Perimeter	Area
Sandbox 1	5 + 1 + 5 + 1 = 12 feet	1 × 5 = ___ square feet
Sandbox 2	___ + ___ + ___ + ___ = ___ feet	___ × ___ = ___ square feet
Sandbox 3	___ + ___ + ___ + ___ = ___ feet	___ × ___ = ___ square feet

The area of Sandbox ____ is the greatest.

So, Toby should build a sandbox that is

____ feet wide and ____ feet long.

Math Talk Mathematical Practices

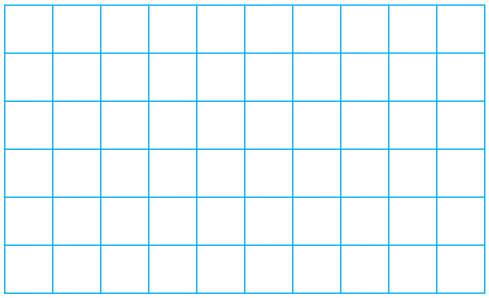
How are the sandboxes alike? How are the sandboxes different?

Examples Draw rectangles with the same perimeter and different areas.

A Draw a rectangle that has a perimeter of 20 units and an area of 24 square units.

The sides of the rectangle measure

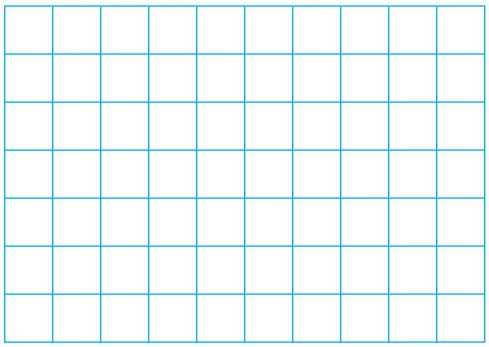
____ units and ____ units.



B Draw a rectangle that has a perimeter of 20 units and an area of 25 square units.

The sides of the rectangle measure

____ units and ____ units.



Math Talk Mathematical Practices

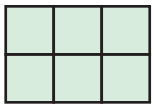
Explain how the perimeters of Example *A* and Example *B* are related. **Explain** how the areas are related.

Share and Show

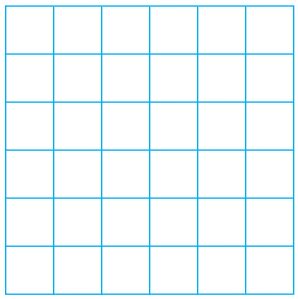
MATH BOARD

1. The perimeter of the rectangle at the right is

____ units. The area is ____ square units.



2. Draw a rectangle that has the same perimeter as the rectangle in Exercise 1 but with a different area.



3. The area of the rectangle in Exercise 2 is

____ square units.

4. Which rectangle has the greater area?

_____

5. If you were given a rectangle with a certain perimeter, how would you draw it so that it has the greatest area?

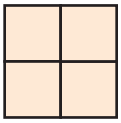
_____

Math Talk Mathematical Practices

Explain how you knew what the rectangle for Exercise 5 would look like.

Name _____

Find the perimeter and the area. Tell which rectangle has a greater area.

6. 

A

B

A: Perimeter = _____; Area = _____

B: Perimeter = _____; Area = _____

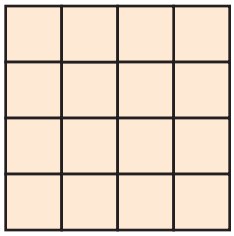
Rectangle _____ has a greater area.

On Your Own

Find the perimeter and the area. Tell which rectangle has a greater area.

7. 

A



B

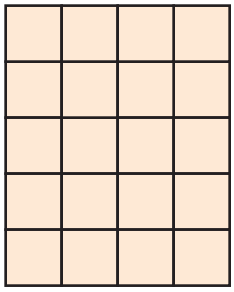
A: Perimeter = _____;

Area = _____

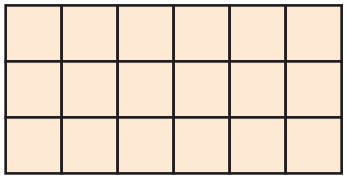
B: Perimeter = _____;

Area = _____

Rectangle ___ has a greater area.

8. 

A



B

A: Perimeter = _____;

Area = _____

B: Perimeter = _____;

Area = _____

Rectangle ___ has a greater area.

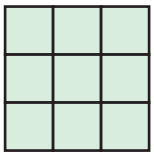
9. MATHEMATICAL PRACTICE 6 **Use Math Vocabulary** Todd's flower garden is 4 feet wide and 8 feet long. If the answer is 32 square feet, what is the question?

_____

Problem Solving • Applications

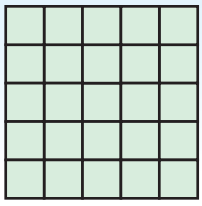
10. THINK SMARTER Draw a rectangle with the same perimeter as Rectangle *C*, but with a smaller area. What is the area?

Area = _____



C

11. THINK SMARTER Which figure has a perimeter of 20 units and an area of 16 square units?



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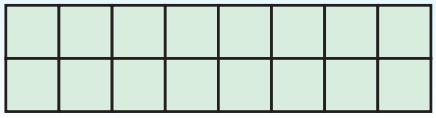

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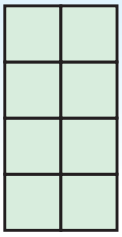

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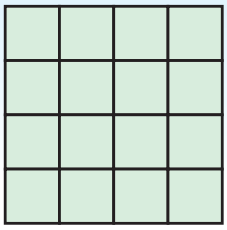


Ⓓ

Connect to Reading

Cause and Effect

Sometimes one action has an effect on another action. The *cause* is the reason something happens. The *effect* is the result.

12. GO DEEPER Sam wanted to print a digital photo that is 3 inches wide and 5 inches long. What if Sam accidentally printed a photo that is 4 inches wide and 6 inches long?

Sam can make a table to understand cause and effect.

Cause	Effect
The wrong size photo was printed.	Each side of the photo is a greater length.

Use the information and the strategy to solve the problems.

a. What effect did the mistake have on the perimeter of the photo?

_____

_____

b. What effect did the mistake have on the area of the photo?

_____

_____

FOR MORE PRACTICE: Standards Practice Book

Name _____

Same Area, Different Perimeters

Essential Question How can you use perimeter to compare rectangles with the same area?

Measurement and Data—3.MD.8
Also 3.MD.5, 3.MD.5a, 3.MD.5b, 3.MD.7b, 3.OA.3, 3.OA.7, 3.NBT.2

MATHEMATICAL PRACTICES
MP.2, MP.3, MP.4

Unlock the Problem

Real World

Hands On

Marcy is making a rectangular pen to hold her rabbits. The area of the pen should be 16 square meters with side lengths that are whole numbers. What is the least amount of fencing she needs?

- What does the least amount of fencing represent?

_____

Activity

Materials ■ square tiles

Use 16 square tiles to make rectangles. Make as many different rectangles as you can with 16 tiles. Record the rectangles on the grid, write the multiplication equation for the area shown by the rectangle, and find the perimeter of each rectangle.

Math Talk Mathematical Practices

Explain how you found the rectangles.

Area: _____ × _____ = 16 square meters Perimeter: _____ meters

Area: _____ × _____ = 16 square meters Perimeter: _____ meters

Area: _____ × _____ = 16 square meters Perimeter: _____ meters

To use the least amount of fencing, Marcy should make a rectangular pen with side lengths of _____ meters and _____ meters.

So, _____ meters is the least amount of fencing Marcy needs.

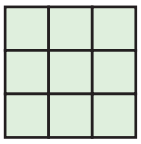
Try This!

Draw three rectangles that have an area of 18 square units on the grid. Find the perimeter of each rectangle. Shade the rectangle that has the greatest perimeter.

Share and Show

MATH BOARD

1. The area of the rectangle at the right is _____ square units. The perimeter is _____ units.



2. Draw a rectangle that has the same area as the rectangle in Exercise 1 but with a different perimeter.

3. The perimeter of the rectangle in Exercise 2 is _____ units.

4. Which rectangle has the greater perimeter?

_____

5. If you were given a rectangle with a certain area, how would you draw it so that it had the greatest perimeter?

_____

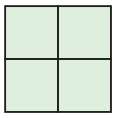
Math Talk **Mathematical Practices**

Did you and your classmate draw the same rectangle for Exercise 2? **Explain**.

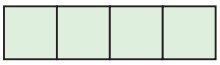
Name _____

Find the perimeter and the area. Tell which rectangle has a greater perimeter.

6.



A



B

A: Area = _____; Perimeter = _____

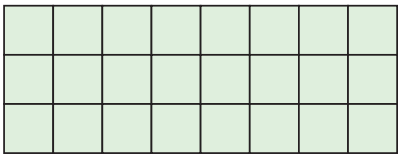
B: Area = _____; Perimeter = _____

Rectangle ____ has a greater perimeter.

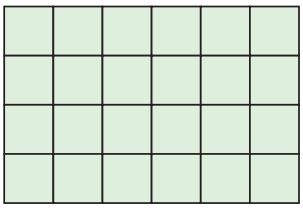
On Your Own

Find the perimeter and the area. Tell which rectangle has a greater perimeter.

7.



A



B

A: Area = _____;

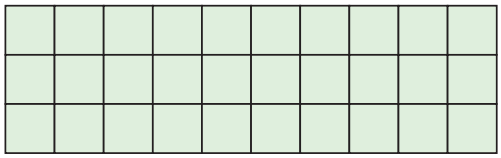
Perimeter = _____

B: Area = _____;

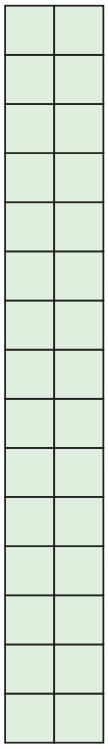
Perimeter = _____

Rectangle ____ has a greater perimeter.

8.



A



B

A: Area = _____;

Perimeter = _____

B: Area = _____;

Perimeter = _____

Rectangle ____ has a greater perimeter.

9. THINK SMARTER **Sense or Nonsense?** Dora says that of all the possible rectangles with the same area, the rectangle with the largest perimeter will have two side lengths that are 1 unit. Does her statement make sense? Explain.

_____

Unlock the Problem Real World

10. Roberto has 12 tiles. Each tile is 1 square inch. He will arrange them into a rectangle and glue 1-inch stones around the edge. How can Roberto arrange the tiles so that he uses the least number of stones?

a. MATHEMATICAL PRACTICE 6 **Explain a Method** How will you use what you know about area and perimeter to help you solve the problem? _____

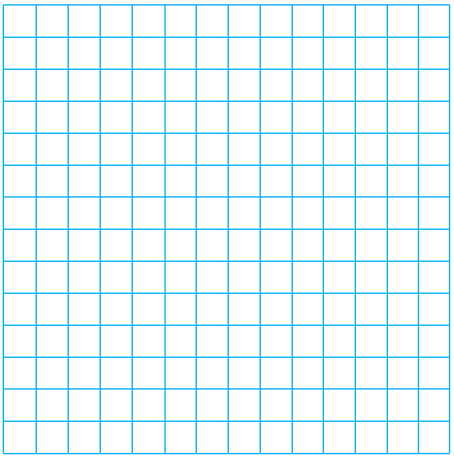
_____

_____

b. GO DEEPER Draw possible rectangles to solve the problem, and label them *A*, *B*, and *C*.

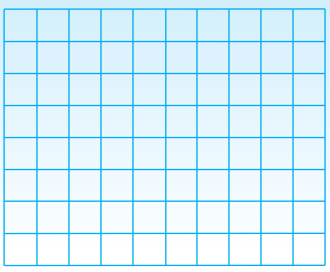
_____

_____



c. So, Roberto should arrange the tiles like Rectangle _____.

11. THINK SMARTER Draw 2 different rectangles with an area of 20 square units. What is the perimeter of each rectangle you drew?



Area = 20 square units

Perimeter = _____ units

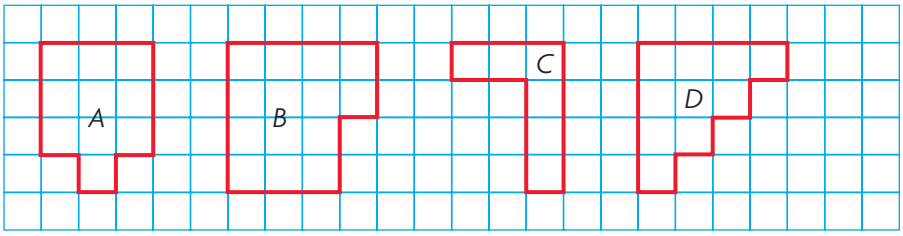
Perimeter = _____ units

FOR MORE PRACTICE: Standards Practice Book

Name _____

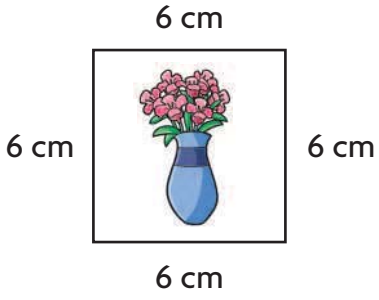
Chapter 11 Review/Test

1. Find the perimeter of each figure on the grid. Identify the figure that have a perimeter of 14 units. Mark all that apply.



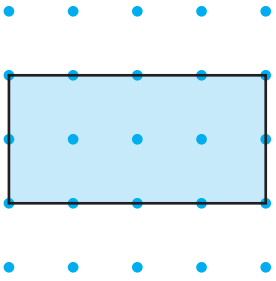
Ⓐ Ⓑ Ⓒ Ⓓ

2. Kim wants to put trim around a picture she drew. How many centimeters of trim does Kim need for the perimeter of the picture?



_____ centimeters

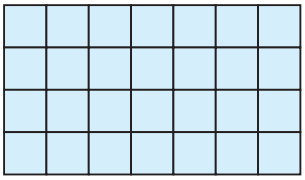
3. Sophia drew this rectangle on dot paper. What is the area of the rectangle?



_____ square units

GO DIGITAL Assessment Options
Chapter Test

4. The drawing shows Seth's plan for a fort in his backyard. Each unit square is 1 square foot.



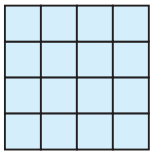
Which equations can Seth use to find the area of the fort? Mark all that apply.

- (A) $4 + 4 + 4 + 4 = 16$
- (B) $7 + 4 + 7 + 4 = 22$
- (C) $7 + 7 + 7 + 7 = 28$
- (D) $4 \times 4 = 16$
- (E) $7 \times 7 = 49$
- (F) $4 \times 7 = 28$

5. Which rectangle has a number of square units for its area equal to the number of units of its perimeter?

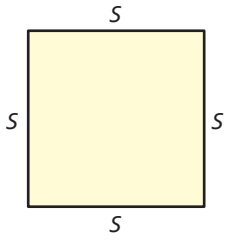
(A) 

(C) 

(B) 

(D) 

6. Vanessa uses a ruler to draw a square. The perimeter of the square is 12 centimeters. Select a number to complete the sentence.

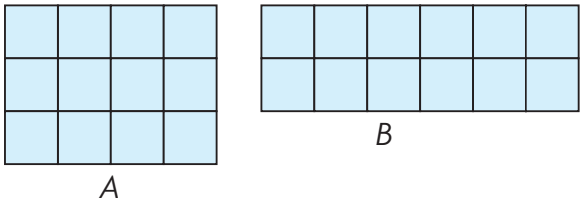


The square has a side length of [3 / 4 / 5 / 6] centimeters.

Name _____

7. Tomas drew two rectangles on grid paper.

Circle the words that make the sentence true.



Rectangle *A* has an area that is

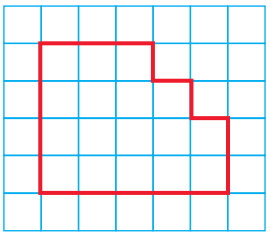
less than
the same as
greater than

the area of Rectangle *B*, and a perimeter that is

less than
the same as
greater than

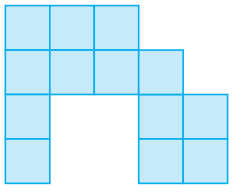
the perimeter of Rectangle *B*.

8. Yuji drew this figure on grid paper. What is the perimeter of the figure?



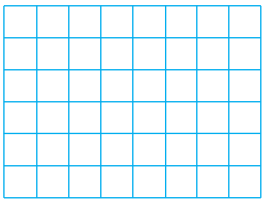
_____ units

9. What is the area of the figure shown? Each unit square is 1 square meter.



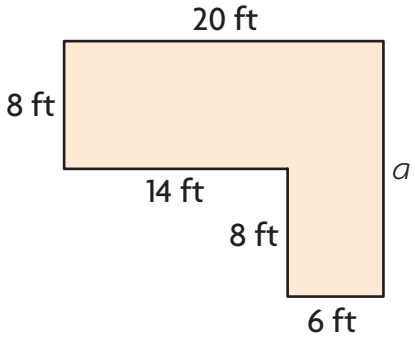
_____ square meters

10. Shawn drew a rectangle that was 2 units wide and 6 units long. Draw a different rectangle that has the same perimeter but a different area.



11. Mrs. Rios put a wallpaper border around the room shown below. She used 72 feet of wallpaper border.

What is the unknown side length? Show your work.



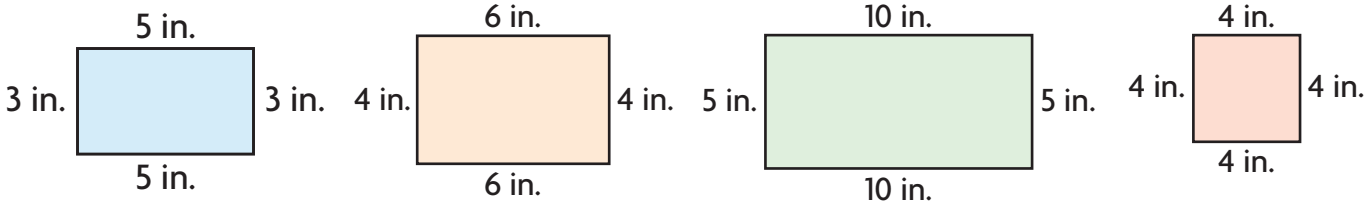
_____ feet

12. Elizabeth has two gardens in her yard. The first garden is 8 feet long and 6 feet wide. The second garden is half the length of the first garden. The area of the second garden is twice the area of the first garden. For numbers 12a–12d, select True or False.

12a.	The area of the first garden is 48 square feet.	○ True	○ False
12b.	The area of the second garden is 24 square feet.	○ True	○ False
12c.	The width of the second garden is 12 feet.	○ True	○ False
12d.	The width of the second garden is 24 feet.	○ True	○ False

Name _____

13. Marcus bought some postcards. Each postcard had a perimeter of 16 inches. Which could be one of the postcards Marcus bought? Mark all that apply.



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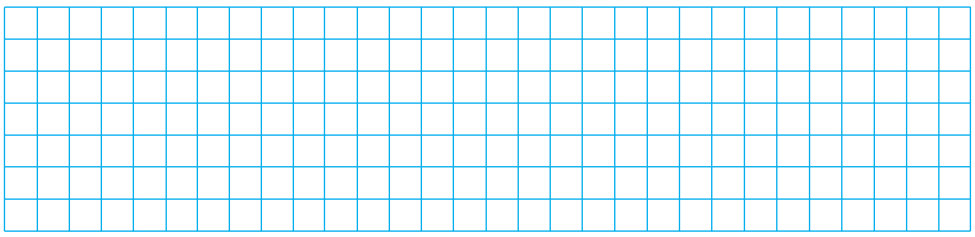
14. Anthony wants to make two different rectangular flowerbeds, each with an area of 24 square feet. He will build a wooden frame around each flowerbed. The flowerbeds will have side lengths that are whole numbers.

Part A

Each unit square on the grid below is 1 square foot. Draw two possible flowerbeds. Label each with a letter.



Part B

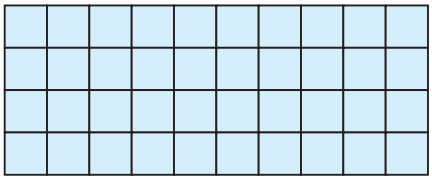
Which of the flowerbeds will take more wood to frame? Explain how you know.

_____

_____

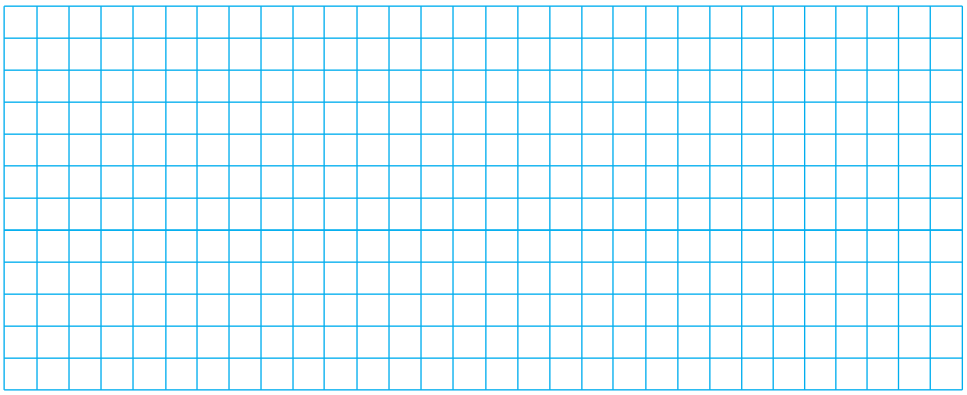
_____

15. Keisha draws a sketch of her living room on grid paper. Each unit square is 1 square meter. Write and solve a multiplication equation that can be used to find the area of the living room in square meters.



_____ square meters

16. Mr. Wicks designs houses. He uses grid paper to plan a new house design. The kitchen will have an area between 70 square feet and 85 square feet. The pantry will have an area between 4 square feet and 15 square feet. Draw and label a diagram to show what Mr. Wicks could design. Explain how to find the total area.



Critical Area Geometry

CRITICAL AREA Describing and analyzing two-dimensional shapes

Students at Dommerich Elementary helped design and construct a mosaic to show parts of their community and local plants and animals.

Project

Make a Mosaic

Have you ever worked to put puzzle pieces together to make a picture or design? Pieces of paper can be put together to make a colorful work of art called a mosaic.

Get Started

Materials ■ construction paper ■ glue ■ ruler ■ scissors

Work with a partner to make a paper mosaic. Use the Important Facts to help you.

- Draw a simple pattern on a piece of paper.
- Cut out shapes, such as rectangles, squares, and triangles of the colors you need from construction paper. The shapes should be about 1 inch on each side.
- Glue the shapes into the pattern. Leave a little space between each shape to make the mosaic effect.

Describe and compare the shapes you used to make your mosaic.

Important Facts

- Mosaics is the art of using small pieces of materials, such as tiles or glass, to make a colorful picture or design.
- Mosaic pieces can be small plane shapes, such as rectangles, squares, and triangles.
- Mosaic designs and patterns can be anything from simple flower shapes to common objects found in your home or patterns in nature.

Completed by _____

Chapter 12

Two-Dimensional Shapes

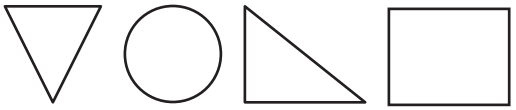
Show What You Know

Check your understanding of important skills.

Name _____

▶ Plane Shapes

1. Color the triangles blue.



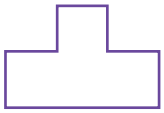
2. Color the rectangles red.

▶ Number of Sides **Write the number of sides.**

3.

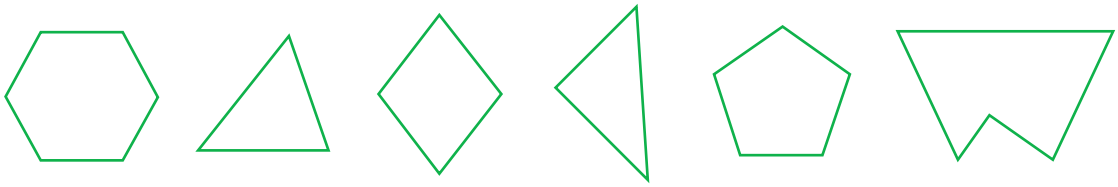
____ sides

4.



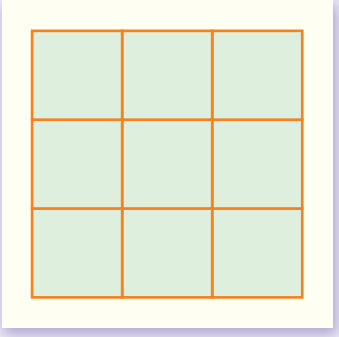
____ sides

5. Circle the shapes that have 4 or more sides.



Math Detective

Whitney found this drawing that shows 9 small squares. Be a Math Detective to find larger squares in the drawing. How many squares are there in all? Explain.



Vocabulary Builder

Visualize It

Complete the tree map by using the words with a ✓.

Understand Vocabulary

Draw a line to match the word with its definition.

1. closed shape •	• A part of a line that includes two endpoints and all the points between them
2. line segment •	• A shape formed by two rays that share an endpoint
3. right angle •	• A shape that starts and ends at the same point
4. hexagon •	• An angle that forms a square corner
5. angle •	• A closed plane shape made up of line segments
6. polygon •	• A polygon with 6 sides and 6 angles

Preview Words

- angle
- closed shape
- hexagon
- intersecting lines
- line
- line segment
- open shape
- parallel lines
- perpendicular lines
- point
- polygon
- ✓ quadrilateral
- ray
- ✓ rectangle
- ✓ rhombus
- right angle
- ✓ square
- ✓ trapezoid
- ✓ triangle
- Venn diagram
- vertex

Name _____

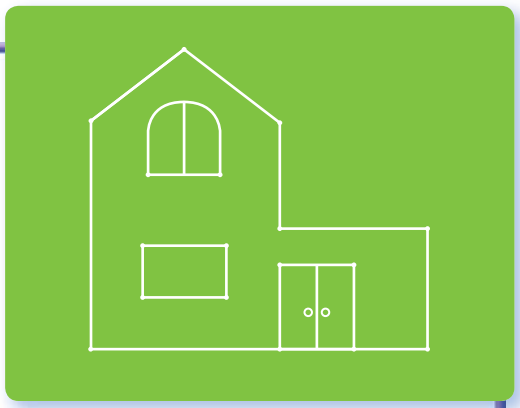
Describe Plane Shapes

Essential Question What are some ways to describe two-dimensional shapes?

Geometry—3.G.1

MATHEMATICAL PRACTICES
MP.5, MP.6, MP.7

Unlock the Problem

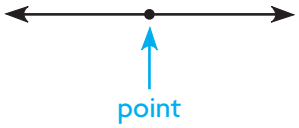


An architect draws plans for houses, stores, offices, and other buildings. Look at the shapes in the drawing at the right.

A **plane shape** is a shape on a flat surface. It is formed by points that make curved paths, line segments, or both.

point

- is an exact position or location



line

- is a straight path
- continues in both directions
- does not end

endpoints

- points that are used to show segments of lines

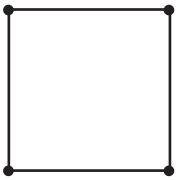
line segment

- is straight
- is part of a line
- has 2 endpoints

ray

- is straight
- is part of a line
- has 1 endpoint
- continues in one direction

Some plane shapes are made by connecting line segments at their endpoints. One example is a square. Describe a square using math words.



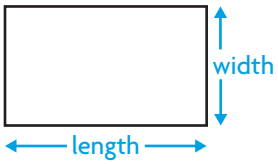
Think: How many line segments and endpoints does a square have?

A square has ____ line segments. The line segments meet only at their _____.

Math Talk **Mathematical Practices**

Explain why you cannot measure the length of a line.

Plane shapes have length and width but no thickness, so they are also called **two-dimensional shapes**.

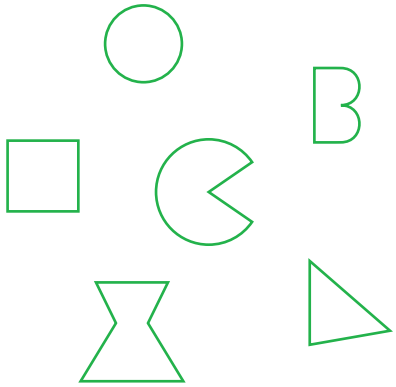


Try This! Draw plane shapes.

Hands On

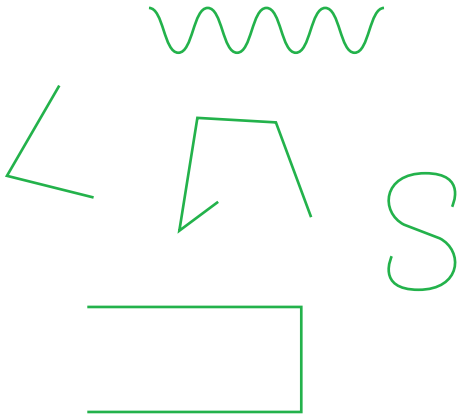
Plane shapes can be open or closed.

A **closed shape** starts and ends at the same point.



In the space below, draw more examples of closed shapes.

An **open shape** does not start and end at the same point.



In the space below, draw more examples of open shapes.

Math Talk **Mathematical Practices**

Explain whether a shape with a curved path must be a closed shape, an open shape, or can be either.

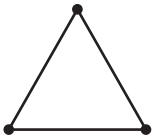
- Is the plane shape at the right a closed shape or an open shape? Explain how you know.

Name _____

Share and Show

MATH BOARD

1. Write how many line segments the shape has. _____

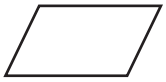


Circle all the words that describe the shape.

2.

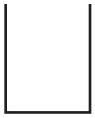
ray

point

3. 

open shape

closed shape

4. 

open shape

closed shape

5. 

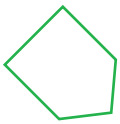
line

line segment

Write whether the shape is *open* or *closed*.

6. 

7. 

8. 

9. 

Math Talk Mathematical Practices

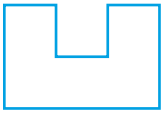
Explain how you know whether a shape is open or closed.

On Your Own

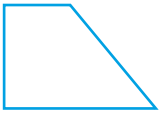
Write how many line segments the shape has.

10. 

_____ line segments

11. 

_____ line segments

12. 

_____ line segments

13. 

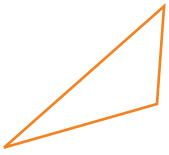
_____ line segments

Write whether the shape is *open* or *closed*.

14. 

15. 

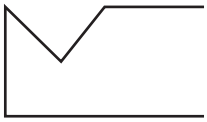
16. 

17. 

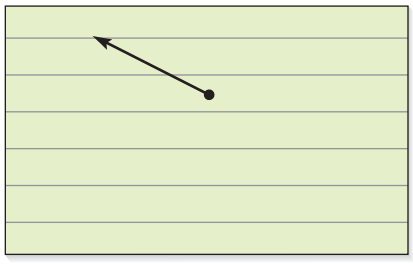
Problem Solving • Applications

18. **What's the Error?** Brittany says there are two endpoints in the shape shown at the right. Is she correct? Explain.

19. MATHEMATICAL PRACTICE 6 **Explain** how you can make the shape at the right a closed shape. Change the shape so it is a closed shape.



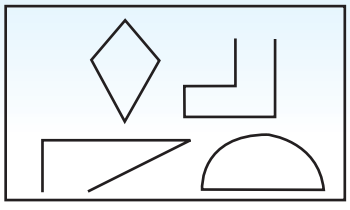
20. GO DEEPER Look at Carly's drawing at the right. What did she draw? How is it like a line? How is it different? Change the drawing so that it is a line.



21. THINK SMARTER Draw a closed shape in the workspace by connecting 5 line segments at their endpoints.

22. THINK SMARTER Draw each shape where it belongs in the table.

Closed Shape	Open Shape



FOR MORE PRACTICE: Standards Practice Book

Name _____

Describe Angles in Plane Shapes

Essential Question How can you describe angles in plane shapes?

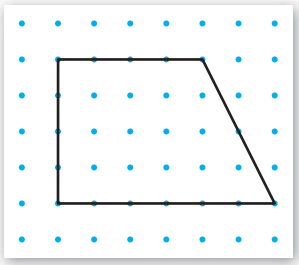
Geometry—3.G.1

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.5

Unlock the Problem

An **angle** is formed by two rays that share an endpoint. Plane shapes have angles formed by two line segments that share an endpoint. The shared endpoint is called a **vertex**. The plural of *vertex* is *vertices*.

Jason drew this shape on dot paper.



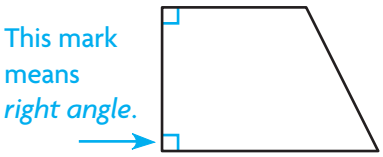
- How many angles are in Jason's shape?

_____

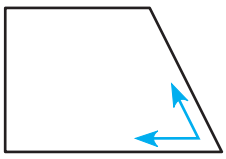
Look at the angles in the shape that Jason drew.

How can you describe the angles?

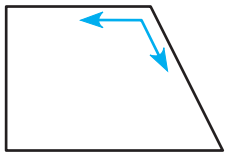
Describe angles.



A **right angle** is an angle that forms a square corner.



Some angles are less than a right angle.



Some angles are greater than a right angle.

Look at Jason's shape.

Two angles are _____ angles, _____ angle is _____ a right angle, and _____ angle is _____ a right angle.

Math Talk **Mathematical Practices**

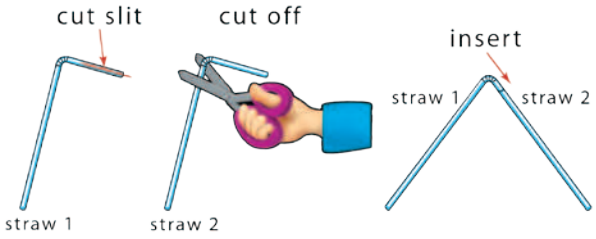
Find examples of each type of angle in your classroom. **Describe** each angle.

Activity Model angles.

Hands On

Materials ■ bendable straws ■ scissors ■ paper ■ pencil

- Cut a small slit in the shorter section of a bendable straw. Cut off the shorter section of a second straw and the bendable part. Insert the slit end of the first straw into the second straw.



- Make an angle with the straws you put together. Compare the angle you made to a corner of the sheet of paper.
- Open and close the straws to make other types of angles.

In the space below, trace the angles you made with the straws. Label each *right angle*, *less than a right angle*, or *greater than a right angle*.

Share and Show

MATH BOARD

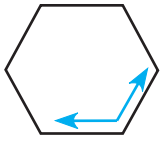
1. How many angles are in the triangle at the right?

Math Talk

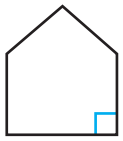
Mathematical Practices

Explain how you know an angle is greater than or less than a right angle.

Use the corner of a sheet of paper to tell whether the angle is a *right angle*, *less than a right angle*, or *greater than a right angle*.

2. 

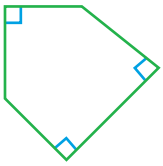
3. 

4. 

Name _____

Write how many of each type of angle the shape has.

5.

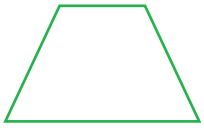


____ right

____ less than a right

____ greater than a right

6.

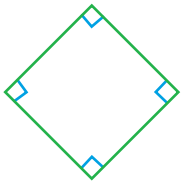


____ right

____ less than a right

____ greater than a right

7.



____ right

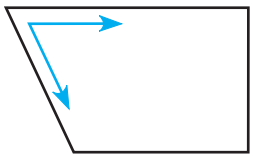
____ less than a right

____ greater than a right

On Your Own

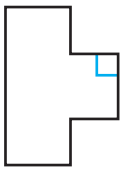
Use the corner of a sheet of paper to tell whether the angle is a *right angle, less than a right angle,* or *greater than a right angle.*

8.



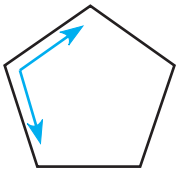
_____

9.



_____

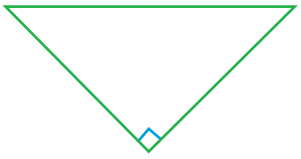
10.



_____

MATHEMATICAL PRACTICE 1 **Analyze Relationships** **Write how many of each type of angle the shape has.**

11.



____ right

____ less than a right

____ greater than a right

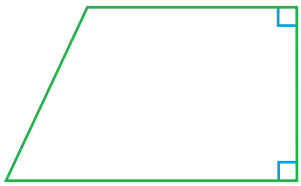
12.

____ right

____ less than a right

____ greater than a right

13.



____ right

____ less than a right

____ greater than a right

14. THINK SMARTER Describe the types of angles formed when you divide a circle into 4 equal parts.

_____

Unlock the Problem Real World

15. GO DEEPER Holly drew the four shapes below. Which shape does NOT have a right angle?

a. What do you need to know? _____

b. Tell how you might use a sheet of paper to solve the problem.

_____

_____

c. Shape *Q* has ____ right angle(s), ____ angle(s) greater than a right angle, and ____ angle(s) less than a right angle.

Shape *R* has ____ right angle(s), ____ angle(s) greater than a right angle, and ____ angle(s) less than a right angle.

Shape *S* has ____ right angle(s), ____ angle(s) greater than a right angle, and ____ angle(s) less than a right angle.

Shape *T* has ____ right angle(s), ____ angle(s) greater than a right angle, and ____ angle(s) less than a right angle.

So, shape ____ does not have a right angle.

16. THINK SMARTER Circle a number or word from each box to complete the sentence to describe this shape.

There are [2 / 3 / 4] right angles and [2 / 3 / 4] angles [less / greater] than a right angle.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Identify Polygons

Essential Question How can you use line segments and angles to make polygons?

Geometry—3.G.1

MATHEMATICAL PRACTICES
MP.2, MP.6, MP.7

CONNECT In earlier lessons, you learned about line segments and angles. In this lesson, you will see how line segments and angles make polygons.

A **polygon** is a closed plane shape that is made up of line segments that meet only at their endpoints. Each line segment in a polygon is a **side**.

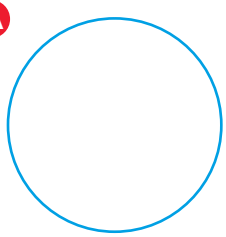
Math Idea
All polygons are closed shapes. Not all closed shapes are polygons.

Unlock the Problem

Real World

Circle all the words that describe the shape.

A

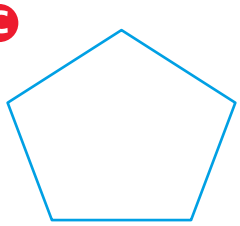


plane shape
open shape
closed shape
curved paths
line segments
polygon

B

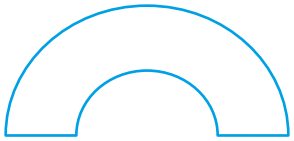
plane shape
open shape
closed shape
curved paths
line segments
polygon

C



plane shape
open shape
closed shape
curved paths
line segments
polygon

D



plane shape
open shape
closed shape
curved paths
line segments
polygon

Try This!

Fill in the blanks with *sometimes*, *always*, or *never*.

Polygons are _____ plane shapes.

Polygons are _____ closed shapes.

Polygons are _____ open shapes.

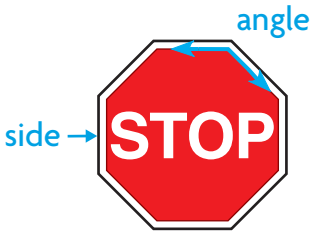
Plane shapes are _____ polygons.

Math Talk Mathematical Practices

Explain why not all closed shapes are polygons.

Name Polygons Polygons are named by the number of sides and angles they have.

Some traffic signs are in the shape of polygons. A stop sign is in the shape of which polygon?



Count the number of sides and angles.

triangle

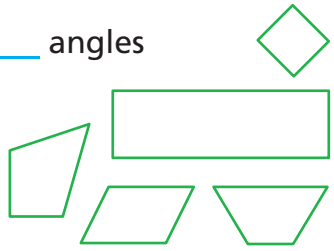
3 sides

3 angles

quadrilateral

4 sides

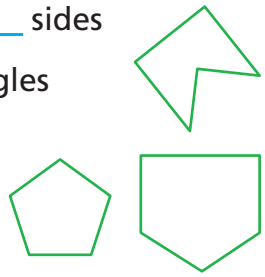
_____ angles



pentagon

_____ sides

5 angles



hexagon

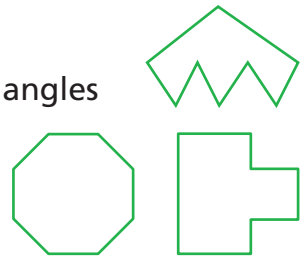
_____ sides

6 angles

octagon

8 sides

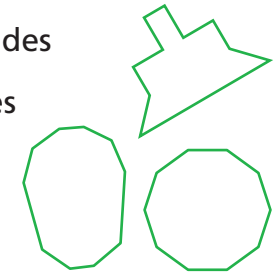
_____ angles



decagon

_____ sides

10 angles



How many sides does the stop sign have? _____

How many angles? _____

So, a stop sign is in the shape of an _____.

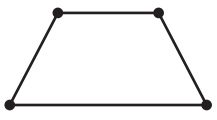
Math Talk **Mathematical Practices**

Compare the number of sides and angles. What is a true statement about all polygons?

Share and Show

MATH BOARD

1. The shape at the right is a polygon. Circle all the words that describe the shape.



plane shape open shape closed shape pentagon

curved paths line segments hexagon quadrilateral

Name _____

Is the shape a polygon? Write *yes* or *no*.

2. 

3. 

4. 

Math Talk **Mathematical Practices**

Explain what shape you will create if you draw a line segment to close Exercise 4.

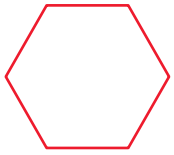
Write the number of sides and the number of angles. Then name the polygon.

5. 

_____ sides

_____ angles

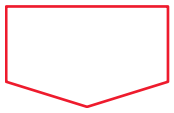
_____

6. 

_____ sides

_____ angles

_____

7. 

_____ sides

_____ angles

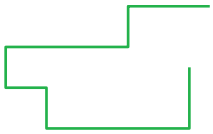
_____

On Your Own

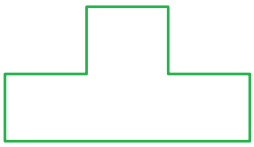
Is the shape a polygon? Write *yes* or *no*.

8. 

_____

9. 

_____

10. 

_____

Write the number of sides and the number of angles. Then name the polygon.

11. 

_____ sides

_____ angles

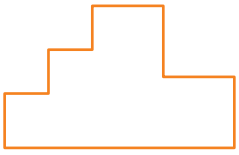
_____

12. 

_____ sides

_____ angles

_____

13. 

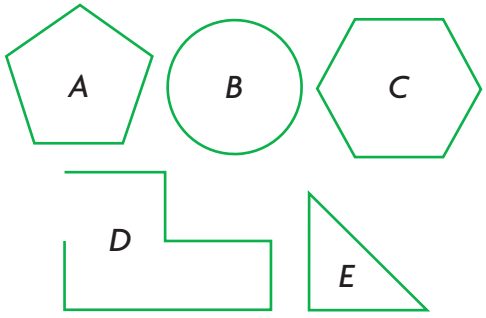
_____ sides

_____ angles

_____

Problem Solving • Applications

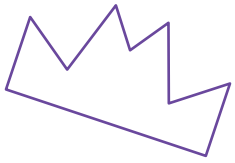
14. WRITE *Math* Jake said Shapes *A*—*E* are all polygons. Does this statement make sense? Explain your answer.



15. GO DEEPER I am a closed shape made of 6 line segments. I have 2 angles less than a right angle and no right angles. What shape am I? Draw an example in the workspace.

16. THINK SMARTER Is every closed shape a polygon? Use a drawing to help explain your answer.

17. MATHEMATICAL PRACTICE 3 **Make Arguments** Ivan says that the shape at the right is an octagon. Do you agree or disagree? Explain.



18. THINK SMARTER For numbers 18a–18d, select True or False for each description of this shape.

18a.	polygon	○ True	○ False
18b.	open shape	○ True	○ False
18c.	hexagon	○ True	○ False
18d.	pentagon	○ True	○ False

FOR MORE PRACTICE: Standards Practice Book

Name _____

Describe Sides of Polygons

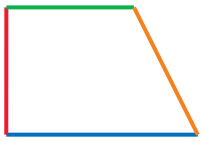
Essential Question How can you describe line segments that are sides of polygons?

Geometry—3.G.1

MATHEMATICAL PRACTICES
MP.1, MP.4, MP.8

Unlock the Problem

Look at the polygon. How many pairs of sides are parallel?



- How do you know the shape is a polygon?

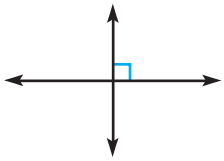
_____

_____

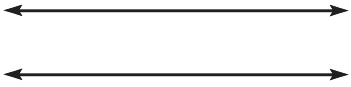
TYPES OF LINES

Lines that cross or meet are **intersecting lines**. Intersecting lines form angles.

Intersecting lines that cross or meet to form right angles are **perpendicular lines**.

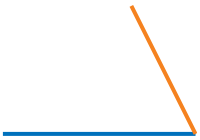


Lines that appear to never cross or meet and are always the same distance apart are **parallel lines**. They do not form any angles.



So, the polygon above has _____ pair of parallel sides.

TYPES OF LINE SEGMENTS



The orange and blue line segments meet and form an angle. So, they are _____.

The red and blue line segments meet to form a right angle. So, they are _____.

The green and blue line segments would never cross or meet. They are always the same distance apart. So, they appear to be _____.

Math Talk **Mathematical Practices**

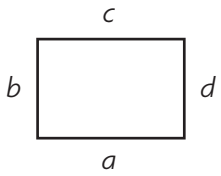
Why can't parallel lines ever cross?

Try This! **Draw a polygon with only 1 pair of parallel sides. Then draw a polygon with 2 pairs of parallel sides. Outline each pair of parallel sides with a different color.**

Share and Show

MATH BOARD

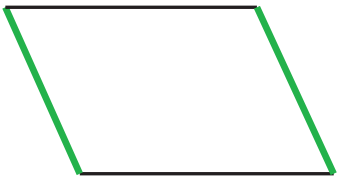
1. Which sides appear to be parallel?



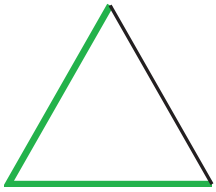
Think: Which pairs of sides appear to be the same distance apart?

Look at the green sides of the polygon. Tell if they appear to be *intersecting*, *perpendicular*, or *parallel*. Write all the words that describe the sides.

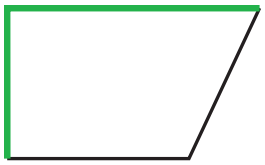
2.



3.



4.



Math Talk **Mathematical Practices**

Explain how intersecting and perpendicular lines are alike and how they are different.

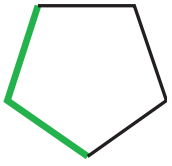
On Your Own

Look at the green sides of the polygon. Tell if they appear to be *intersecting*, *perpendicular*, or *parallel*. Write all the words that describe the sides.

5.

6.

7.

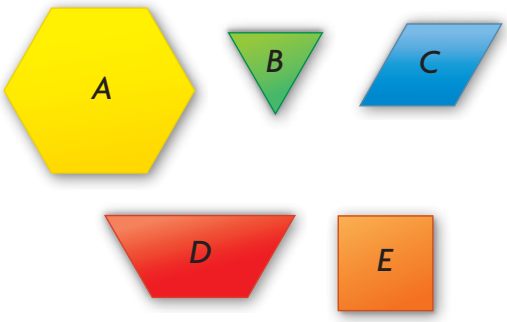


Name _____

Problem Solving • Applications

Use pattern blocks *A*–*E* for 8–11.

Chelsea wants to sort pattern blocks by the types of sides.



8. Which blocks have intersecting sides?

_____

9. Which blocks have parallel sides?

_____

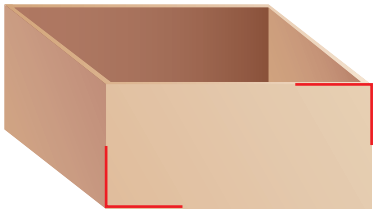
10. Which blocks have perpendicular sides?

_____

11. Which blocks have neither parallel nor perpendicular sides?

_____

12. GO DEEPER How many pairs of perpendicular line segments are in the box at the right?



▲ The red line segments show 1 pair of perpendicular line segments.

_____

13. THINK SMARTER Can the same two lines be parallel, perpendicular, and intersecting at the same time? Explain your answer.

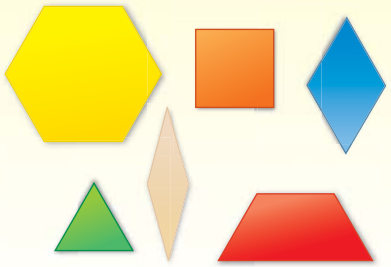
_____

_____

_____

Unlock the Problem

14. MATHEMATICAL PRACTICE 3 **Compare Representations** I am a pattern block that has 2 fewer sides than a hexagon. I have 2 pairs of parallel sides and 4 right angles. Which shape am I?



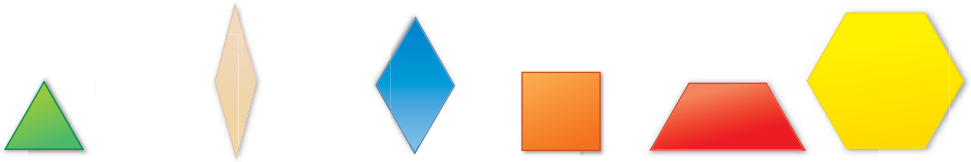
a. What do you need to know? _____

_____

b. How can you find the answer to the riddle? _____

_____

c. Write *yes* or *no* in the table to solve the riddle.



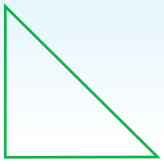
2 fewer sides than a hexagon						
2 pairs of parallel sides						
4 right angles						

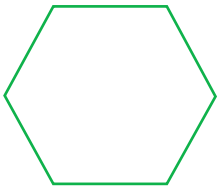
So, the _____ is the shape.

15. THINK SMARTER Select the shapes that have at least one pair of parallel sides. Mark all that apply.

Ⓐ 

Ⓑ 

Ⓒ 

Ⓓ 

FOR MORE PRACTICE: Standards Practice Book

Name _____

Mid-Chapter Checkpoint

Vocabulary

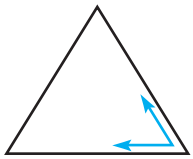
Choose the best term from the box to complete the sentence.

Vocabulary
angle
point
polygon
right angle

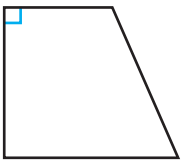
1. An _____ is formed by two rays that share an endpoint. (p. 509)
2. A _____ is a closed shape made up of line segments. (p. 513)
3. A _____ forms a square corner. (p. 509)

Concepts and Skills

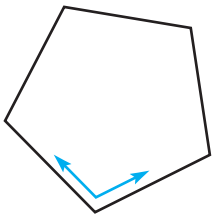
Use the corner of a sheet of paper to tell whether the angle is a *right angle, less than a right angle,* or *greater than a right angle.* (3.G.1)

4. 

_____

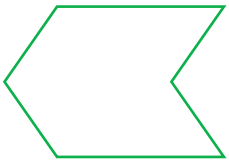
5. 

_____

6. 

_____

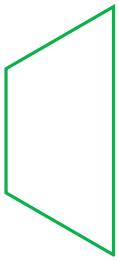
Write the number of sides and the number of angles. Then name the polygon. (3.G.1)

7. 

_____ sides

_____ angles

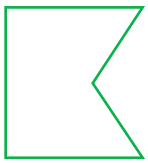
_____

8. 

_____ sides

_____ angles

_____

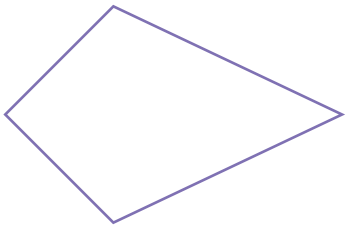
9. 

_____ sides

_____ angles

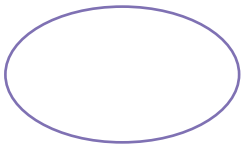
_____

10. Anne drew the shape at the right. Is her shape an open shape or a closed shape? (3.G.1)



11. This sign tells drivers there is a steep hill ahead. Write the number of sides and the number of angles in the shape of the sign. Then name the shape. (3.G.1)

12. Why is this closed plane shape NOT a polygon? (3.G.1)



13. Sean drew a shape with 2 fewer sides than an octagon. Which shape did he draw? (3.G.1)

14. John drew a polygon with two line segments that meet to form a right angle. Circle the words that describe the line segments. (3.G.1)

intersecting
curved
parallel
perpendicular

Name _____

Classify Quadrilaterals

Essential Question How can you use sides and angles to help you describe quadrilaterals?

Geometry—3.G.1

MATHEMATICAL PRACTICES
MP.2, MP.4, MP.6

Unlock the Problem

Real World

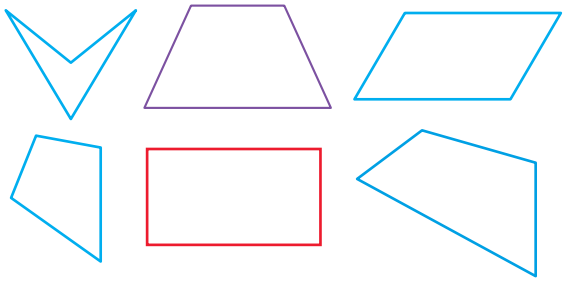
Quadrilaterals are named by their sides and their angles.

Describe quadrilaterals.

quadrilateral

_____ sides

_____ angles



ERROR Alert

Some quadrilaterals cannot be classified as a trapezoid, rectangle, square, or rhombus.

trapezoid

exactly _____ pair of opposite sides that are parallel

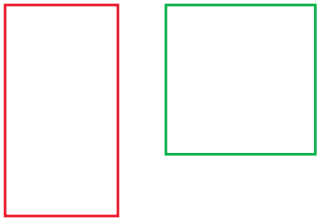
lengths of sides could be the same

rectangle

_____ pairs of opposite sides that are parallel

_____ pairs of sides that are of equal length

_____ right angles



square

_____ pairs of opposite sides that are parallel

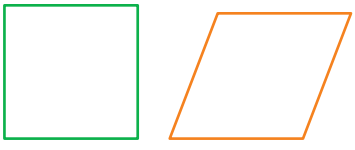
_____ sides that are of equal length

_____ right angles

rhombus

_____ pairs of opposite sides that are parallel

_____ sides that are of equal length



Math Talk

Mathematical Practices

Explain why a square can also be named a rectangle or a rhombus.

Share and Show

MATH BOARD

Look at the quadrilateral at the right.

1. Outline each pair of opposite sides that are parallel with a different color. How many pairs of opposite sides appear to be parallel? _____

2. Look at the parallel sides you colored.

   The sides in each pair are of _____ length.

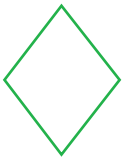
Think: All the angles are right angles.

3. Name the quadrilateral. _____

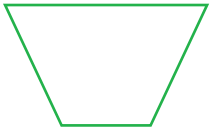
Circle all the words that describe the quadrilateral.

4. 

   rectangle
   rhombus
   square
   trapezoid

5. 

   rhombus
   quadrilateral
   square
   rectangle

6. 

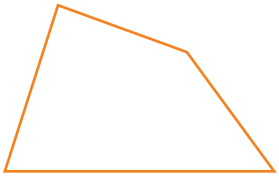
   rectangle
   rhombus
   trapezoid
   quadrilateral

Math Talk — **Mathematical Practices**

Explain how you can have a rhombus that is not a square.

On Your Own

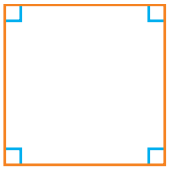
Circle all the words that describe the quadrilateral.

7. 

   rectangle
   trapezoid
   quadrilateral
   rhombus

8. 

   rectangle
   rhombus
   trapezoid
   square

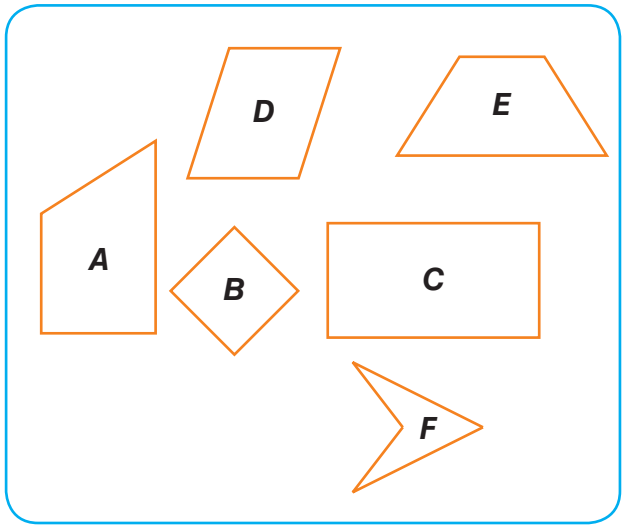
9. 

   quadrilateral
   square
   rectangle
   rhombus

Name _____

Problem Solving • Applications

Use the quadrilaterals at the right for 10–12.



10. Which quadrilaterals appear to have 4 right angles?

_____

11. Which quadrilaterals appear to have 2 pairs of opposite sides that are parallel?

_____

12. Which quadrilaterals appear to have no right angles?

_____

Write *all* or *some* to complete the sentence for 13–18.

13. The opposite sides of _____ rectangles are parallel.

14. _____ sides of a rhombus are the same length.

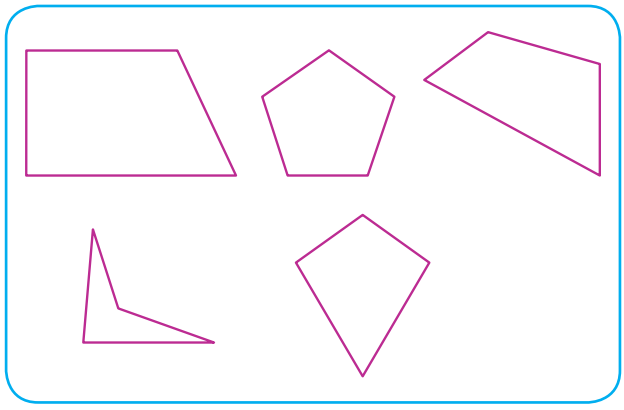
15. _____ squares are rectangles.

16. _____ rhombuses are squares.

17. _____ quadrilaterals are polygons.

18. _____ polygons are quadrilaterals.

19. MATHEMATICAL PRACTICE 6 Circle the shape at the right that is not a quadrilateral. **Explain** your choice.



_____

_____

_____

20. THINK SMARTER I am a polygon that has 4 sides and 4 angles. At least one of my angles is less than a right angle. Circle all the shapes that I could be.

quadrilateral rectangle square rhombus trapezoid

21. THINK SMARTER Identify the quadrilateral that can have two pairs of parallel sides and no right angles.

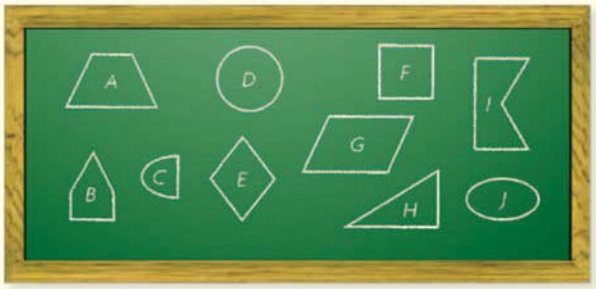
Ⓐ rhombus Ⓑ square Ⓒ trapezoid

Connect to Reading

Compare and Contrast

When you *compare*, you look for ways that things are alike. When you *contrast*, you look for ways that things are different.

Mr. Briggs drew some shapes on the board. He asked the class to tell how the shapes are alike and how they are different.



GO DEEPER **Complete the sentences.**

- Shapes _____, _____, _____, _____, _____, _____, and _____ are polygons.
- Shapes _____, _____, and _____ are not polygons.
- Shapes _____, _____, _____, and _____ are quadrilaterals.
- Shapes _____, _____, and _____ appear to have only 1 pair of opposite sides that are parallel.
- Shapes _____, _____, and _____ appear to have 2 pairs of opposite sides that are parallel.
- All 4 sides of shapes _____ and _____ appear to be the same length.
- In these polygons, all sides do not appear to be the same length. _____
- These shapes can be called rhombuses. _____
- Shapes _____ and _____ are quadrilaterals, but cannot be called rhombuses.
- Shape _____ is a rhombus and can be called a square.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Draw Quadrilaterals

Essential Question How can you draw quadrilaterals?

Geometry—3.G.1

MATHEMATICAL PRACTICES
MP.3, MP.6, MP.7, MP.8

Unlock the Problem

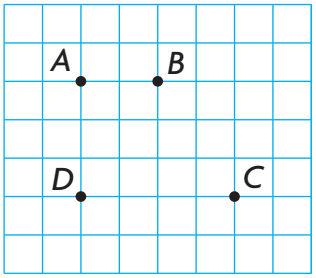
Hands On

CONNECT You have learned to classify quadrilaterals by the number of pairs of opposite sides that are parallel, by the number of pairs of sides of equal length, and by the number of right angles.

How can you draw quadrilaterals?

Activity 1 Use grid paper to draw quadrilaterals.

Materials ■ ruler



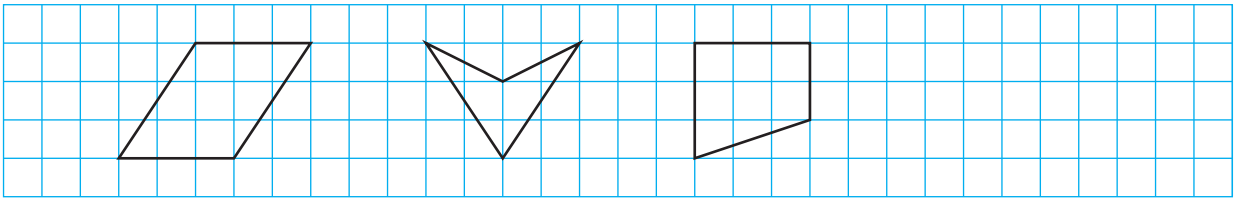
- Use a ruler to draw line segments from points A to B, from B to C, from C to D, and from D to A.
- Write the name of your quadrilateral.

_____

Activity 2 Draw a shape that does not belong.

Materials ■ ruler

A **Here are three examples of a quadrilateral. Draw an example of a polygon that is not a quadrilateral.**

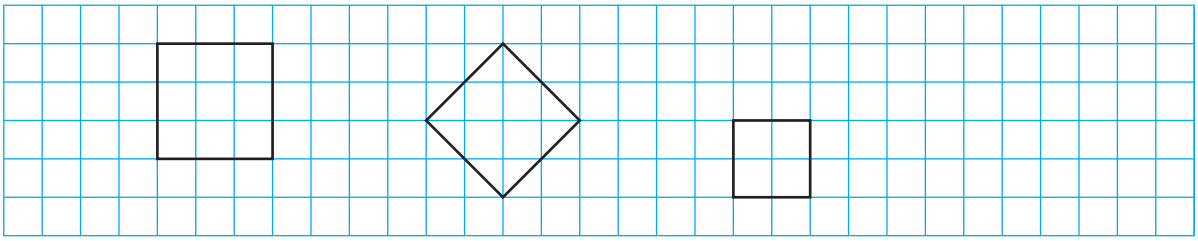


- Explain why your polygon is not a quadrilateral.

_____

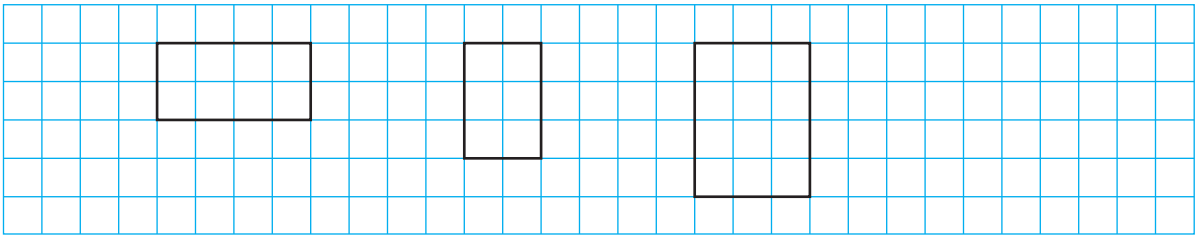
_____

B **Here are three examples of a square.**
Draw a quadrilateral that is not a square.



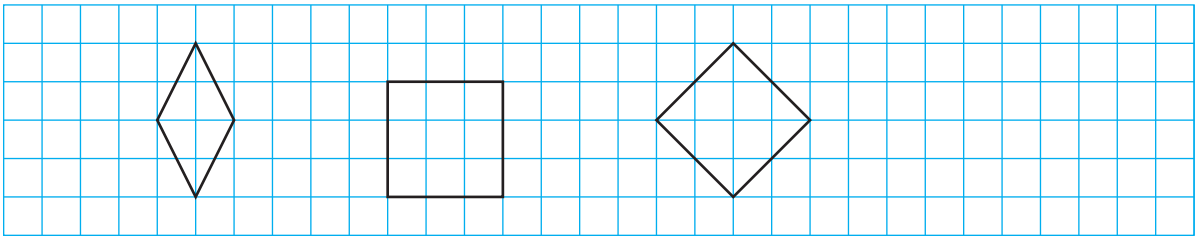
- Explain why your quadrilateral is not a square.

C **Here are three examples of a rectangle.**
Draw a quadrilateral that is not a rectangle.



- Explain why your quadrilateral is not a rectangle.

D **Here are three examples of a rhombus.**
Draw a quadrilateral that is not a rhombus.



- Explain why your quadrilateral is not a rhombus.

Math Talk **Mathematical Practices**

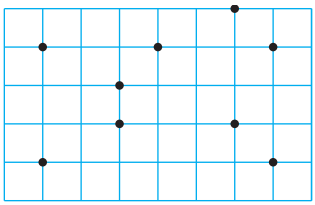
Compare your drawings with your classmates. **Explain** how your drawings are alike and how they are different.

Name _____

Share and Show

MATH BOARD

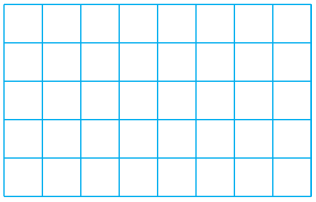
1. Choose four endpoints that connect to make a rectangle.



Think: A rectangle has 2 pairs of opposite sides that are parallel, 2 pairs of sides of equal length, and 4 right angles.

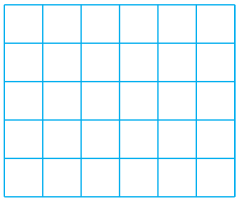
Draw a quadrilateral that is described.
Name the quadrilateral you drew.

2. 2 pairs of equal sides



Name _____

3. 4 sides of equal length



Name _____

Math Talk **Mathematical Practices**

Explain one way the quadrilaterals you drew are alike and one way they are different.

On Your Own

Practice: Copy and Solve **Use grid paper to draw a quadrilateral that is described. Name the quadrilateral you drew.**

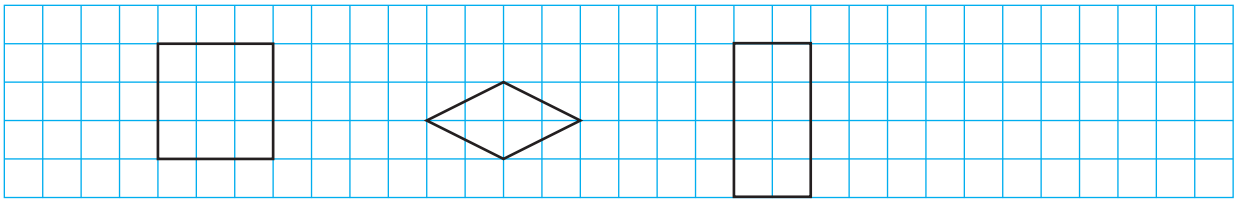
4. exactly 1 pair of opposite sides that are parallel

5. 4 right angles

6. 2 pairs of sides of equal length

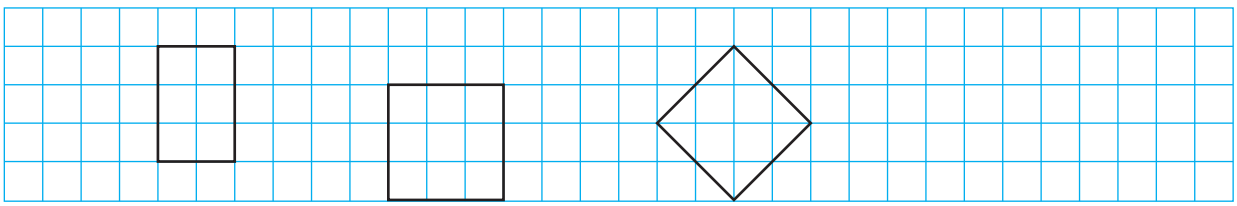
Draw a quadrilateral that does not belong. Then explain why.

7.



_____

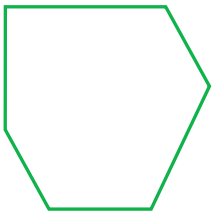
8.



_____

Problem Solving • Applications

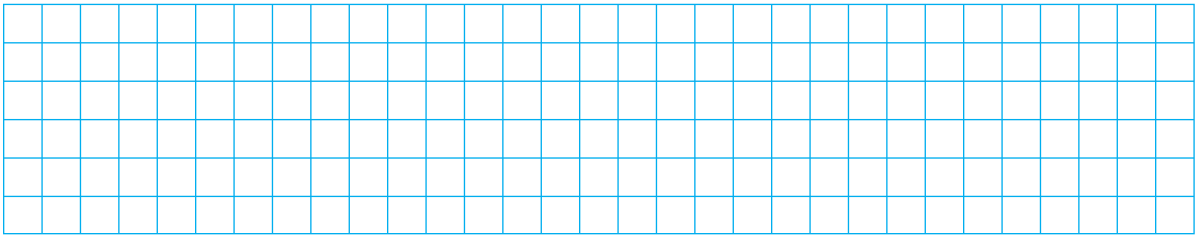
9. MATHEMATICAL PRACTICE 3 **Make Arguments** Jacki drew the shape at the right. She said it is a rectangle because it has 2 pairs of opposite sides that are parallel. Describe her error.



_____

_____

10. GO DEEPER Adam drew three quadrilaterals. One quadrilateral had no pairs of parallel sides, one quadrilateral had 1 pair of opposite sides that are parallel, and the last quadrilateral had 2 pairs of opposite sides that are parallel. Draw the three quadrilaterals that Adam could have drawn. Name the quadrilaterals.



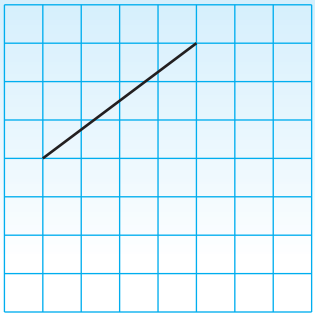
_____ _____ _____

11. THINK SMARTER Amy has 4 straws of equal length. Name the quadrilaterals that can be made using these 4 straws.

_____ Amy cuts one of the straws in half. She uses the two halves and two of the other straws to make a quadrilateral. Name a quadrilateral that can be made using these 4 straws. _____

Personal Math Trainer

12. THINK SMARTER + Jordan drew one side of a quadrilateral with 2 pairs of opposite sides that are parallel. Draw the other 3 sides to complete Jordan's quadrilateral.



FOR MORE PRACTICE: Standards Practice Book

Name _____

Describe Triangles

Essential Question How can you use sides and angles to help you describe triangles?

Geometry—3.G.1

MATHEMATICAL PRACTICES
MP.4, MP.5, MP.7, MP.8

Unlock the Problem

Real World

Hands On

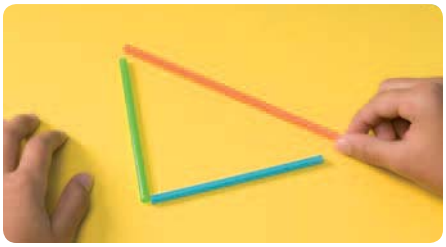
How can you use straws of different lengths to make triangles?

Activity **Materials** ■ straws ■ scissors ■ MathBoard

STEP 1 Cut straws into different lengths.

STEP 2 Find straw pieces that you can put together to make a triangle. Draw your triangle on the MathBoard.

STEP 3 Find straw pieces that you cannot put together to make a triangle.



1. Compare the lengths of the sides. Describe when you can make a triangle.

_____

_____

Math Talk

Mathematical Practices

What if you had three straws of equal length? Can you make a triangle? **Explain.**

2. MATHEMATICAL PRACTICE 1 **Describe** when you cannot make a triangle.

_____

_____

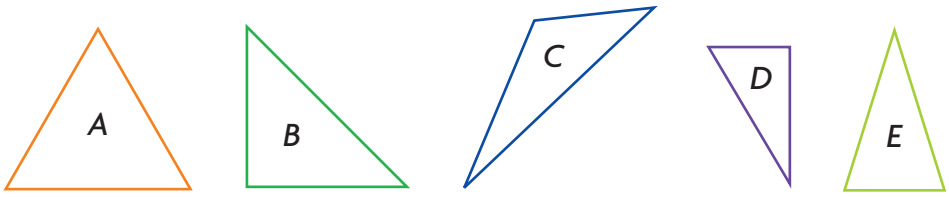
_____

3. Explain how you can change the straw pieces in Step 3 to make a triangle. _____

_____

Ways to Describe Triangles

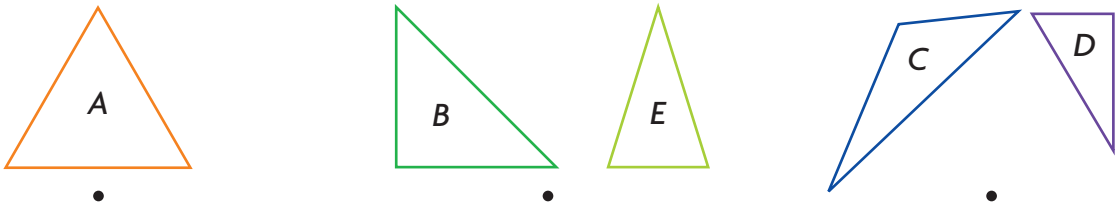
What are two ways triangles can be described?



One Way

Triangles can be described by the number of sides that are of equal length.

Draw a line to match the description of the triangle(s).



No sides are equal in length.

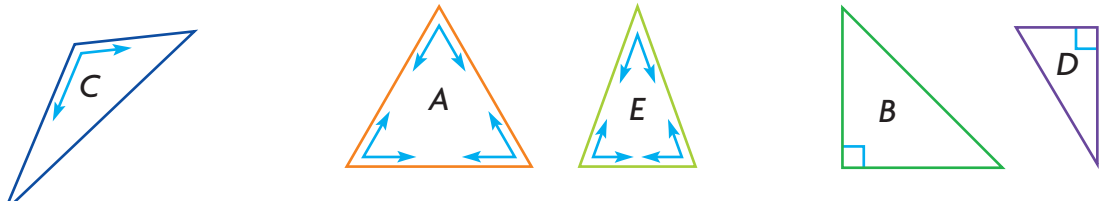
Two sides are equal in length.

Three sides are equal in length.

Another Way

Triangles can be described by the types of angles they have.

Draw a line to match the description of the triangle(s).



One angle is a right angle.

One angle is greater than a right angle.

Three angles are less than a right angle.

Math Talk **Mathematical Practices**

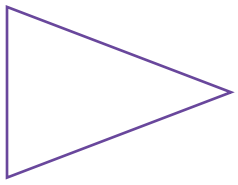
Can a triangle have two right angles? **Explain.**

Name _____

Share and Show

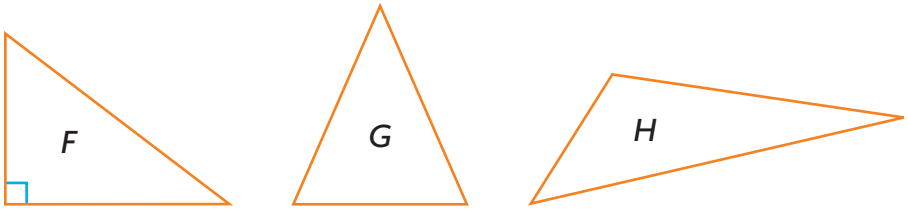
MATH BOARD

1. Write the number of sides of equal length the triangle appears to have.



_____

Use the triangles for 2–4. Write *F*, *G*, or *H*.



2. Triangle _____ has 1 right angle.

3. Triangle _____ has 1 angle greater than a right angle.

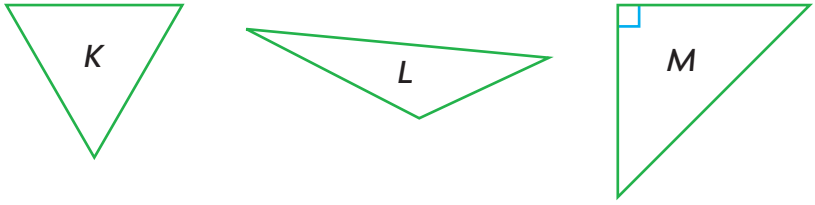
4. Triangle _____ has 3 angles less than a right angle.

Math Talk Mathematical Practices

Explain another way you can describe triangle *H*.

On Your Own

Use the triangles for 5–7. Write *K*, *L*, or *M*. Then complete the sentences.



5. Triangle _____ has 1 right angle and appears to have _____ sides of equal length.

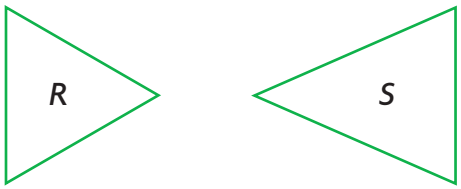
6. Triangle _____ has 3 angles less than a right angle and appears to have _____ sides of equal length.

7. Triangle _____ has 1 angle greater than a right angle and appears to have _____ sides of equal length.

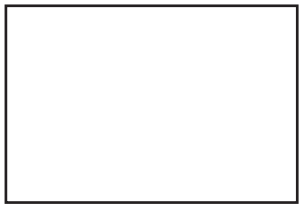
Problem Solving • Applications

8. MATHEMATICAL PRACTICE 1 **Make Sense of Problems** Martin said a triangle can have two sides that are parallel. Does his statement make sense? Explain.

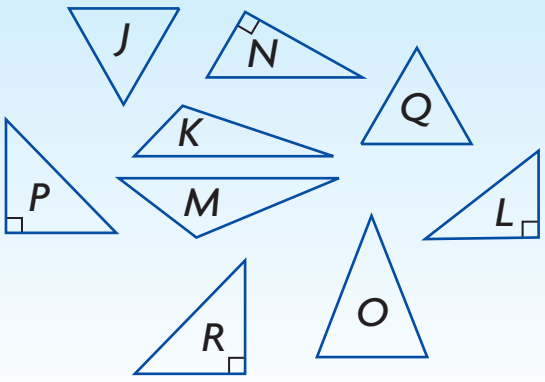
9. GO DEEPER Compare Triangles *R* and *S*. How are they alike? How are they different?



10. THINK SMARTER Use a ruler to draw a straight line from one corner of this rectangle to the opposite corner. What shapes did you make? What do you notice about the shapes?



11. THINK SMARTER Write the name of each triangle where it belongs in the table. Some triangles might belong in both parts of the table. Some triangles might not belong in either part.



Has 1 Right Angle	Has at Least 2 Sides of Equal Length

FOR MORE PRACTICE: Standards Practice Book

Name _____

Problem Solving • Classify Plane Shapes

Essential Question How can you use the strategy *draw a diagram* to classify plane shapes?

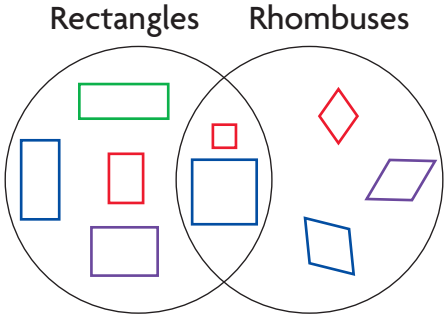
Geometry—3.G.1

MATHEMATICAL PRACTICES
MP.1, MP.2, MP.4, MP.7

Unlock the Problem

A **Venn diagram** shows how sets of things are related. In the Venn diagram at the right, one circle has shapes that are rectangles. Shapes that are rhombuses are in the other circle. The shapes in the section where the circles overlap are both rectangles and rhombuses.

What type of quadrilateral is in both circles?



Read the Problem

What do I need to find?

_____

_____

What information do I need to use?

the circles labeled _____ and _____

How will I use the information?

_____

_____

_____

Solve the Problem

What is true about all quadrilaterals?

_____

Which quadrilaterals have 2 pairs of opposite sides that are parallel?

_____

Which quadrilaterals have 4 sides of equal length? _____

Which quadrilaterals have 4 right angles?

_____

The quadrilaterals in the section where the circles overlap have _____ pairs of opposite sides that are parallel, _____ sides of equal length, and _____ right angles.

So, _____ are in both circles.

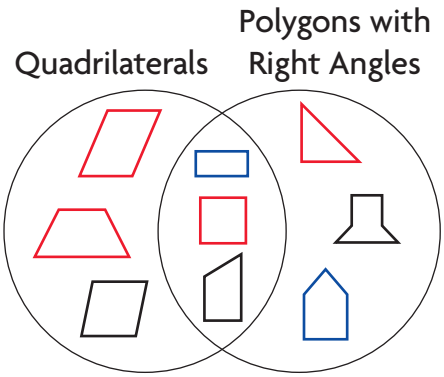
Math Talk

Mathematical Practices

Does a ▱ fit in the Venn diagram? **Explain.**

Try Another Problem

The Venn diagram shows the shapes Andrea used to make a picture. Where would the shape shown below be placed in the Venn diagram?



Read the Problem	Solve the Problem
What do I need to find?	**Record the steps you used to solve the problem.**
What information do I need to use?	
How will I use the information?	

1. How many shapes do not have right angles?

   _____

2. How many red shapes have right angles but are not quadrilaterals? _____

3. MATHEMATICAL PRACTICE 2 **Reason Abstractly** What is a different way to sort the shapes?

   _____

   _____

Math Talk

Mathematical Practices

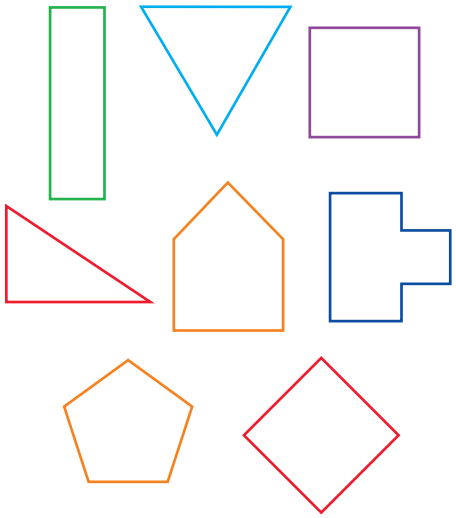
What name can be used to describe all the shapes in the Venn diagram? **Explain** how you know.

Name _____

Share and Show

MATH BOARD

Use the Venn diagram for 1–3.



1. Jordan is sorting the shapes at the right in a Venn diagram. Where does the ◇ go?

First, look at the sides and angles of the polygons.

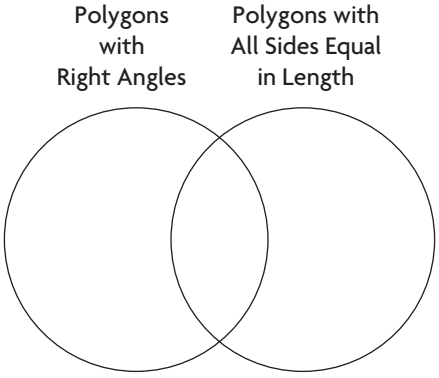
Next, draw the polygons in the Venn diagram.

The shape has _____ sides of equal length

and _____ right angles.

So, the shape goes in the

_____.



2. Where would you place a ⬠?

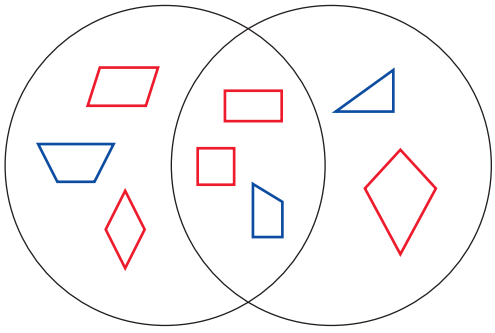
_____

3. What if Jordan sorted the shapes by Polygons with Right Angles and Polygons with Angles Less Than a Right Angle? Would the circles still overlap? Explain.

_____

_____

4. GO DEEPER Eva drew the Venn diagram below. What labels could she have used for the diagram?



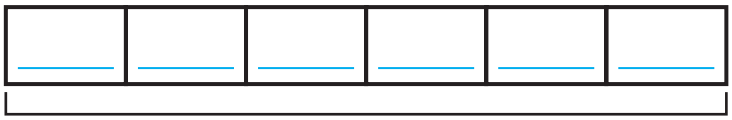
_____ _____

_____ _____

On Your Own

5. Ben and Marta are both reading the same book. Ben has read $\frac{1}{3}$ of the book. Marta has read $\frac{1}{4}$ of the book. Who has read more? _____

6. MATHEMATICAL PRACTICE 2 **Represent a Problem** There are 42 students from 6 different classes in the school spelling bee. Each class has the same number of students in the spelling bee. Use the bar model to find how many students are from each class.



_____ students ÷ _____ classes = _____ students

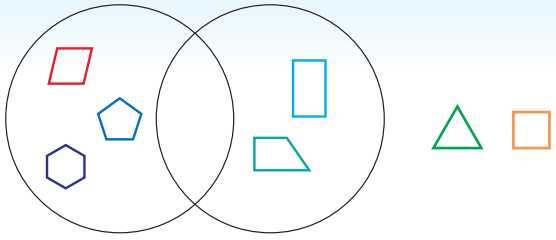
7. THINK SMARTER Draw and label a Venn diagram to show one way you can sort a parallelogram, a rectangle, a square, a trapezoid, and a rhombus.

8. Ashley is making a quilt with squares of fabric. There are 9 rows with 8 squares in each row. How many squares of fabric are there?

_____

Personal Math Trainer

9. THINK SMARTER + Sketch where to place these shapes in the Venn diagram.



Polygons with All Sides of Equal Length

Quadrilaterals with Right Angles

FOR MORE PRACTICE: Standards Practice Book

Name _____

Relate Shapes, Fractions, and Area

Essential Question How can you divide shapes into parts with equal areas and write the area as a unit fraction of the whole?

Geometry—3.G.2
Also 3.NF.1, 3.NF.3d, 3.MD.5

MATHEMATICAL PRACTICES
MP.4, MP.6, MP.7, MP.8

Investigate

Hands On

Materials ■ pattern blocks ■ color pencils ■ ruler

CONNECT You can use what you know about combining and separating plane shapes to explore the relationship between fractions and area.

A. Trace a hexagon pattern block.

B. Divide your hexagon into two parts with equal area.

C. Write the names of the new shapes. _____

D. Write the fraction that names each part of the whole you divided. ____
Each part is $\frac{1}{2}$ of the whole shape's area.

E. Write the fraction that names the whole area. ____

Math Idea
Equal parts of a whole have equal area.

Draw Conclusions

1. Explain how you know the two shapes have the same area.

_____

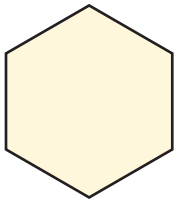
_____

2. Predict what would happen if you divide the hexagon into three shapes with equal area. What fraction names the area of each part of the divided hexagon? What fraction names the whole area?

_____

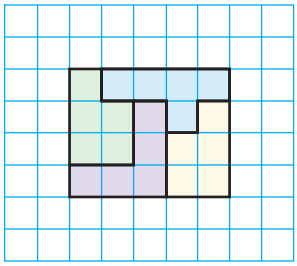
3. THINK SMARTER Show how you can divide the hexagon into four shapes with equal area.

Each part is ____ of the whole shape's area.



Make Connections

The rectangle at the right is divided into four parts with equal area.



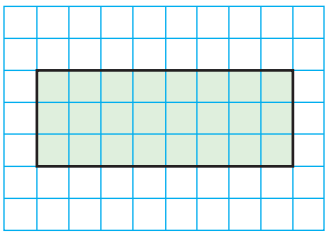
- Write the unit fraction that names each part of the divided whole. _____
- What is the area of each part? _____
- How many $\frac{1}{4}$ parts does it take to make one whole? _____
- Is the shape of each of the $\frac{1}{4}$ parts the same? _____
- Is the area of each of the $\frac{1}{4}$ parts the same? Explain how you know.

_____

_____

Divide the shape into equal parts.

Draw lines to divide the rectangle below into six parts with equal area.



Math Talk — **Mathematical Practices**

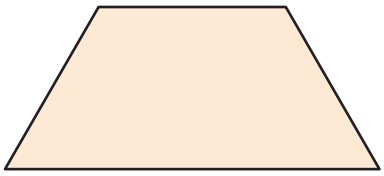
Explain how you know the areas of all the parts are equal.

- Write the fraction that names each part of the divided whole. _____
- Write the area of each part. _____
- Each part is _____ of the whole shape's area.

Share and Show

MATH BOARD

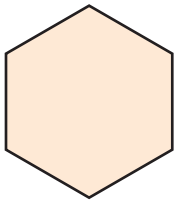
1. Divide the trapezoid into 3 parts with equal area. Write the names of the new shapes. Then write the fraction that names the area of each part of the whole.



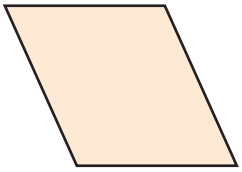
_____

Name _____

Draw lines to divide the shape into equal parts that show the fraction given.

2. 

$\frac{1}{6}$

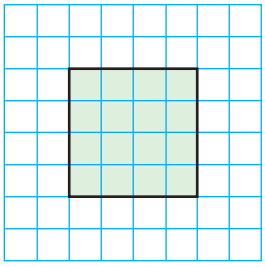
3. 

$\frac{1}{2}$

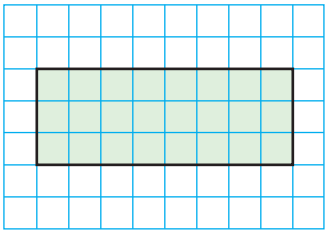
4. 

$\frac{1}{8}$

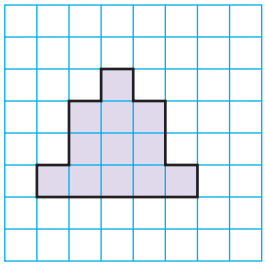
Draw lines to divide the shape into parts with equal area. Write the area of each part as a unit fraction.

5. 

8 equal parts

6. 

6 equal parts

7. 

4 equal parts

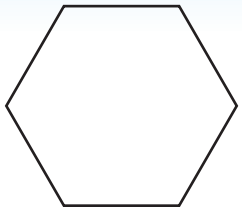
Problem Solving • Applications

8. MATHEMATICAL PRACTICE 2 **Use Reasoning** If the area of three ◇ is equal to the area of one ⬡, the area of how many ◇ equals four ⬡? Explain your answer.

_____

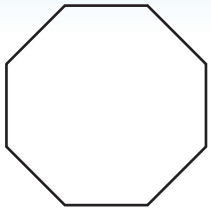
9. THINK SMARTER Divide each shape into the number of equal parts shown. Then write the fraction that describes each part of the whole.

2 equal parts



_____

4 equal parts



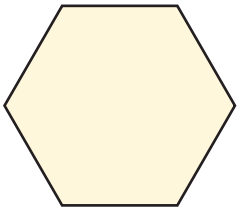
_____

6 equal parts

_____

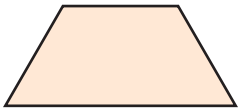
10. THINK SMARTER Sense or Nonsense?

Divide the hexagon into six equal parts.



Which pattern block represents $\frac{1}{6}$ of the whole area?

Divide the trapezoid into three equal parts.



Which pattern block represents $\frac{1}{3}$ of the whole area?

Alexis said the area of $\frac{1}{3}$ of the trapezoid is greater than the area of $\frac{1}{6}$ of the hexagon because $\frac{1}{3} > \frac{1}{6}$. Does her statement make sense? Explain your answer.

- Write a statement that makes sense.

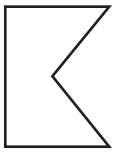
- GO DEEPER What if you divide the hexagon into 3 equal parts? Write a sentence that compares the area of each equal part of the hexagon to each equal part of the trapezoid.

FOR MORE PRACTICE: Standards Practice Book

Name _____

Chapter 12 Review/Test

1. Which words describe this shape? Mark all that apply.



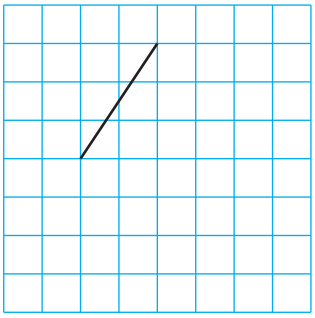
   (A) polygon

   (B) open shape

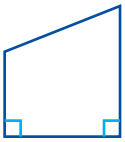
   (C) pentagon

   (D) quadrilateral

2. Umberto drew one side of a quadrilateral with 4 equal sides and no right angles. Draw the other 3 sides to complete Umberto's shape.



3. Mikael saw a painting that included this shape.

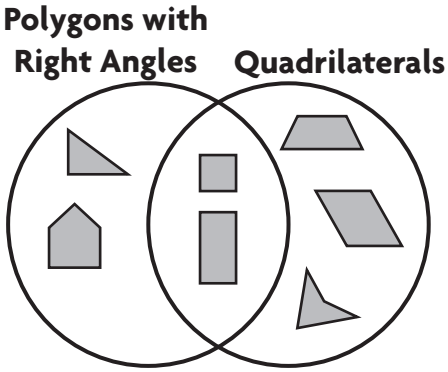


For numbers 3a–3d, select True or False for each statement about the shape.

3a.	The shape has no right angles.	○ True	○ False
3b.	The shape has 2 angles greater than a right angle.	○ True	○ False
3c.	The shape has 2 right angles.	○ True	○ False
3d.	The shape has 1 angle greater than a right angle.	○ True	○ False

GO DIGITAL Assessment Options
Chapter Test

4. Fran used a Venn Diagram to sort shapes.



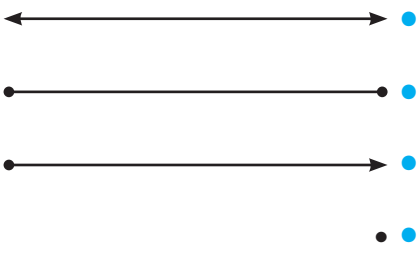
Part A

Draw another plane shape that belongs inside the left circle of the diagram but NOT in the section where the circles overlap.

Part B

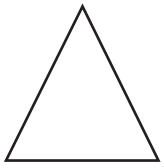
How can you describe the shapes in the section where the circles overlap?

5. Match each object in the left column with its name in the right column.



- point
- line
- ray
- line segment

6. Describe the angles and sides of this triangle.



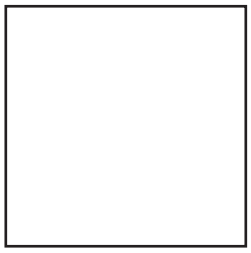
Name _____

7. Which words describe this shape. Mark all that apply.

rectangle (A) rhombus (B) quadrilateral (C) square (D)

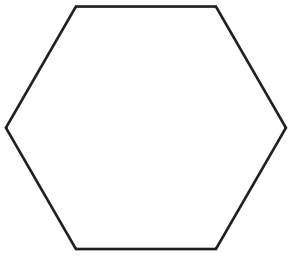
8. Divide each shape into the number of equal parts shown. Then write the fraction that describes each part of the whole.

3 equal parts



_____

6 equal parts



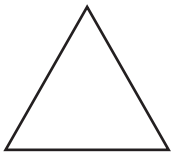
_____

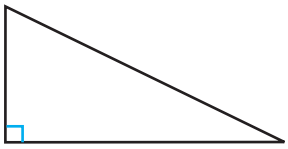
8 equal parts

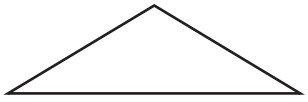
_____

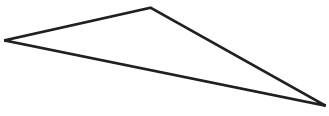
9. Han drew a triangle with 1 angle greater than a right angle.

For numbers 9a–9d, choose Yes or No to tell whether the triangle could be the triangle Han drew.

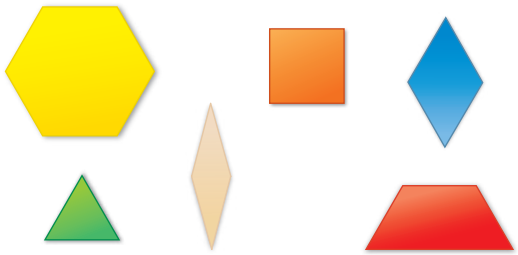
9a.  ○ Yes ○ No

9b.  ○ Yes ○ No

9c.  ○ Yes ○ No

9d.  ○ Yes ○ No

10. Look at this group of pattern blocks.



Part A

Sort the pattern blocks by sides. How many groups did you make? Explain how you sorted the shapes.

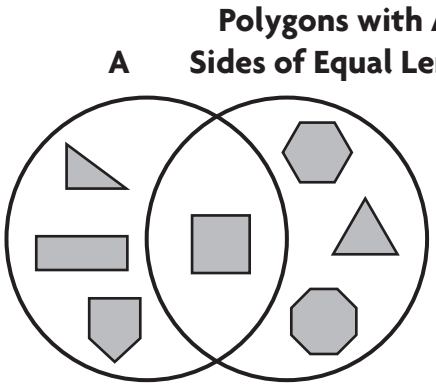
Part B

Sort the pattern blocks by angles. How many groups did you make? Explain how you sorted the shapes.

11. Teresa drew a quadrilateral that had 4 sides of equal length and no right angles. What quadrilateral did she draw?

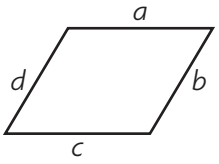
Name _____

12. Rhea used a Venn diagram to sort shapes. What label could she use for circle *A*?



13. Colette drew lines to divide a rectangle into equal parts that each represent $\frac{1}{6}$ of the whole area. Her first line is shown. Draw lines to complete Colette's model.

14. Brad drew a quadrilateral. Select the pairs of sides that appear to be parallel. Mark all that apply.



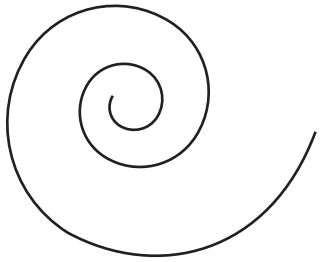
Ⓐ *a* and *b*

Ⓑ *b* and *d*

Ⓒ *c* and *a*

Ⓓ *d* and *c*

15. Give two reasons that this shape is **not** a polygon.



16. A triangle has 1 angle greater than a right angle. What must be true about the other angles? Mark all that apply.

- (A) At least one must be less than a right angle.
- (B) One could be a right angle.
- (C) Both must be less than a right angle.
- (D) One must be greater than a right angle.

17. Ava drew a quadrilateral with 2 pairs of opposite sides that are parallel. The shape has at least 2 right angles. Draw a shape that Ava could have drawn.

18. For 18a–18d, select True or False for each description of a ray.

18a.	straight	○ True	○ False
18b.	has 2 endpoints	○ True	○ False
18c.	part of a line	○ True	○ False
18d.	continues in 1 direction	○ True	○ False

Glossary

Pronunciation Key

a	**a**dd, m**a**p	f	**f**it, hal**f**	n	**n**ice, ti**n**	p	**p**it, sto**p**	û(r)	b**u**rn, t**e**rm
ā	**a**ce, r**a**te	g	**g**o, lo**g**	ng	ri**ng**, so**ng**	r	**r**un, poo**r**	yo͞o	f**u**se, f**e**w
â(r)	c**a**re, **a**ir	h	**h**ope, **h**ate	o	**o**dd, h**o**t	s	**s**ee, pa**ss**	v	**v**ain, e**v**e
ä	p**a**lm, f**a**ther	i	**i**t, g**i**ve	ō	**o**pen, s**o**	sh	**sh**ure, ru**sh**	w	**w**in, a**w**ay
b	**b**at, ru**b**	ī	**i**ce, wr**i**te	ô	**o**rder, ja**w**	t	**t**alk, si**t**	y	**y**et, **y**earn
ch	**ch**eck, ca**tch**	j	**j**oy, le**dg**e	oi	**oi**l, b**oy**	th	**th**in, bo**th**	z	**z**est, mu**s**e
d	**d**og, ro**d**	k	**c**ool, ta**k**e	ou	p**ou**t, n**ow**	th	**th**is, ba**th**e	zh	vi**s**ion, plea**s**ure
e	**e**nd, p**e**t	l	**l**ook, ru**l**e	o͝o	t**oo**k, f**u**ll	u	**u**p, d**o**ne		
ē	**e**qual, tr**ee**	m	**m**ove, se**em**	o͞o	p**oo**l, f**oo**d	ù	p**u**ll, b**oo**k		

ə the schwa, an unstressed vowel representing the sound spelled *a* in ***a**bove*, *e* in *sick**e**n*, *i* in *poss**i**ble*, *o* in *mel**o**n*, *u* in *circ**u**s*

Other symbols:
- • separates words into syllables
- ′ indicates stress on a syllable

A

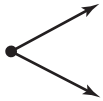
addend [a′dend] **sumando** Any of the numbers that are added in addition
Examples: 2 + 3 = 5
addend addend

addition [ə•dish′ən] **suma** The process of finding the total number of items when two or more groups of items are joined; the opposite operation of subtraction

A.M. [ā•em] **a.m.** The time after midnight and before noon

analog clock [an′ə•log kläk] **reloj analógico** A tool for measuring time, in which hands move around a circle to show hours and minutes
Example:

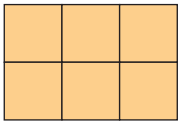
angle [ang′gəl] **ángulo** A shape formed by two rays that share an endpoint
Example:



Word History

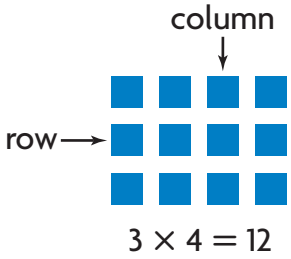
When the letter *g* is replaced with the letter *k* in the word ***angle***, the word becomes *ankle*. Both words come from the same Latin root, *angulus*, which means "a sharp bend."

area [âr′ē•ə] **área** The measure of the number of unit squares needed to cover a surface
Example:



Area = 6 square units

array [ə•rā′] **matriz** A set of objects arranged in rows and columns
Example:

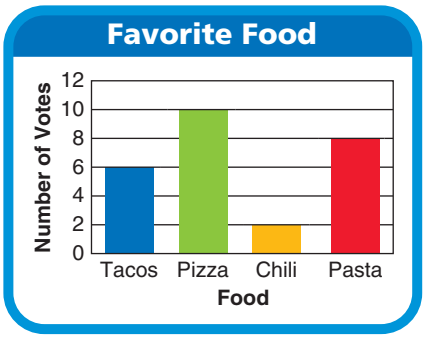


Associative Property of Addition [ə•sō′shē•āt•iv präp′ər•tē əv ə•dish′ən] **propiedad asociativa de la suma** The property that states that you can group addends in different ways and still get the same sum
Example:
4 + (2 + 5) = 11
(4 + 2) + 5 = 11

Associative Property of Multiplication [ə•sō′shē•āt•iv präp′ər•tē əv mul•tə•pli•kā′shən] **propiedad asociativa de la multiplicación** The property that states that when the grouping of factors is changed, the product remains the same
Example:
(3 × 2) × 4 = 24
3 × (2 × 4) = 24

B

bar graph [bär graf] **gráfica de barras** A graph that uses bars to show data
Example:

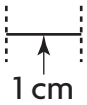


C

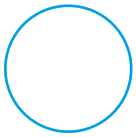
capacity [kə•pas′i•tē] **capacidad** The amount a container can hold
Example:
1 liter = 1,000 milliliters

cent sign (¢) [sent sīn] **símbolo de centavo** A symbol that stands for *cent* or *cents*
Example: 53¢

centimeter (cm) [sen′tə•mēt•ər] **centímetro (cm)** A metric unit that is used to measure length or distance
Example:



circle [sûr′kəl] **círculo** A round closed plane shape
Example:



closed shape [klōzd shāp] **figura cerrada** A shape that begins and ends at the same point
Examples:

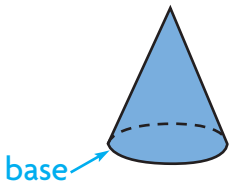
Commutative Property of Addition [kə•myōōt′ə•tiv präp′ər•tē əv ə•dish′ən] **propiedad conmutativa de la suma** The property that states that you can add two or more numbers in any order and get the same sum
Example: 6 + 7 = 13
7 + 6 = 13

Commutative Property of Multiplication [kə•myōōt′ə•tiv präp′ər•tē əv mul•tə•pli•kā′shən] **propiedad conmutativa de la multiplicación** The property that states that you can multiply two factors in any order and get the same product
Example: 2 × 4 = 8
4 × 2 = 8

compare [kəm•pâr′] **comparar** To describe whether numbers are equal to, less than, or greater than each other

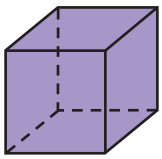
compatible numbers [kəm•pat′ə•bəl num′bərz] **números compatibles** Numbers that are easy to compute with mentally

cone [kōn] **cono** A three-dimensional, pointed shape that has a flat, round base
Example:

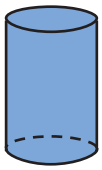


counting number [kount'ing num'bər] **número natural** A whole number that can be used to count a set of objects (1, 2, 3, 4 . . .)

cube [kyōōb] **cubo** A three-dimensional shape with six square faces of the same size
Example:



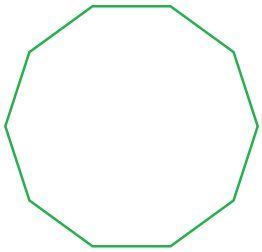
cylinder [sil'ən•dər] **cilindro** A three-dimensional object that is shaped like a can
Example:



D

data [dāt'ə] **datos** Information collected about people or things

decagon [dek'ə•gän] **decágono** A polygon with ten sides and ten angles
Example:



decimal point [des'ə•məl point] **punto decimal** A symbol used to separate dollars from cents in money
Example: \$4.52
↑ decimal point

denominator [dē•näm'ə•nāt•ər] **denominador** The part of a fraction below the line, which tells how many equal parts there are in the whole or in the group
Example: $\frac{3}{4}$ ← denominator

difference [dif'ər•əns] **diferencia** The answer to a subtraction problem
Example: $6 - 4 = 2$
↑ difference

digital clock [dij'i•təl kläk] **reloj digital** A clock that shows time to the minute, using digits
Example:

digits [dij'its] **dígitos** The symbols 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9

dime [dīm] **moneda de 10¢** A coin worth 10 cents and with a value equal to that of 10 pennies; 10¢
Example:

Distributive Property [di•strib'yōō•tiv präp'ər•tē] **propiedad distributiva** The property that states that multiplying a sum by a number is the same as multiplying each addend by the number and then adding the products
Example:
$5 \times 8 = 5 \times (4 + 4)$
$5 \times 8 = (5 \times 4) + (5 \times 4)$
$5 \times 8 = 20 + 20$
$5 \times 8 = 40$

divide [də•vīd'] **dividir** To separate into equal groups; the opposite operation of multiplication

dividend [div'ə•dend] **dividendo** The number that is to be divided in a division problem
Example: $35 \div 5 = 7$
↑ dividend

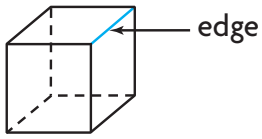
division [də•vizh'ən] **división** The process of sharing a number of items to find how many groups can be made or how many items will be in a group; the opposite operation of multiplication

divisor [de•vī'zər] **divisor** The number that divides the dividend
Example: 35 ÷ 5 = 7
↑ divisor

dollar [däl'ər] **dólar** Paper money worth 100 cents and equal to 100 pennies; $1.00
Example:

E

edge [ej] **arista** A line segment formed where two faces meet



eighths [ātths] **octavos**

These are eighths

elapsed time [ē•lapst' tīm] **tiempo transcurrido** The time that passes from the start of an activity to the end of that activity

endpoint [end'point] **extremo** The point at either end of a line segment

equal groups [ē'kwəl grōōpz] **grupos iguales** Groups that have the same number of objects

equal parts [ē'kwəl pärts] **partes iguales** Parts that are exactly the same size

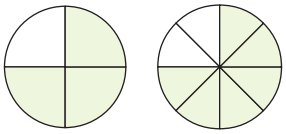
equal sign (=) [ē'kwəl sīn] **signo de igualdad** A symbol used to show that two numbers have the same value
Example: 384 = 384

equal to (=) [ē'kwəl tōō] **igual a** Having the same value
Example: 4 + 4 is equal to 3 + 5.

equation [ē•kwā'zhən] **ecuación** A number sentence that uses the equal sign to show that two amounts are equal
Examples:
3 + 7 = 10
4 − 1 = 3
6 × 7 = 42
8 ÷ 2 = 4

equivalent [ē•kwiv'ə•lənt] **equivalente** Two or more sets that name the same amount

equivalent fractions [ē•kwiv'ə•lənt frak'shənz] **fracciones equivalentes** Two or more fractions that name the same amount
Example:



$$\frac{3}{4} = \frac{6}{8}$$

estimate [es'tə•māt] *verb* **estimar** To find about how many or how much

estimate [es'tə•mit] *noun* **estimación** A number close to an exact amount

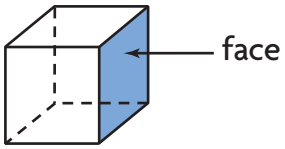
even [ē'vən] **par** A whole number that has a 0, 2, 4, 6, or 8 in the ones place

expanded form [ek•span'did fôrm] **forma desarrollada** A way to write numbers by showing the value of each digit
Example: 721 = 700 + 20 + 1

experiment [ek•sper'ə•mənt] **experimento** A test that is done in order to find out something

F

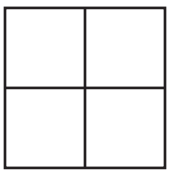
face [fās] **cara** A polygon that is a flat surface of a solid shape



factor [fak'tər] **factor** A number that is multiplied by another number to find a product
Examples: $3 \times 8 = 24$
factor factor

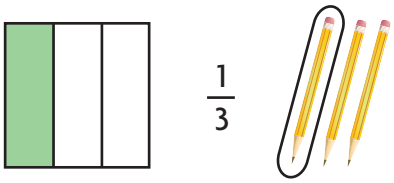
foot (ft) [fo͝ot] **pie** A customary unit used to measure length or distance;
1 foot = 12 inches

fourths [fôrths] **cuartos**

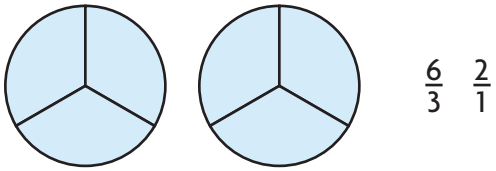


These are fourths

fraction [frak'shən] **fracción** A number that names part of a whole or part of a group
Examples:



fraction greater than 1 [frak'shən grāt'ər than wun] **fracción mayor que 1** A number which has a numerator that is greater than its denominator
Examples:



frequency table [frē'kwən•sē tā'bəl] **tabla de frecuencia** A table that uses numbers to record data
Example:

Favorite Color	
Color	**Number**
Blue	10
Green	8
Red	7
Yellow	4

G

gram (g) [gram] **gramo (g)** A metric unit that is used to measure mass;
1 kilogram = 1,000 grams

greater than (>) [grāt'ər than] **mayor que** A symbol used to compare two numbers when the greater number is given first
Example:
Read $6 > 4$ as "six is greater than four."

Grouping Property of Addition [gro͞op'ing präp'ər•tē əv ə•dish'ən] **propiedad de agrupación de la suma** *See* Associative Property of Addition.

Grouping Property of Multiplication [gro͞op'ing präp'ər•tē əv mul•tə•pli•kā'shən] **propiedad de agrupación de la multiplicación** *See* Associative Property of Multiplication.

Word History

Often, a ***fraction*** is a part of a whole that is broken into pieces. *Fraction* comes from the Latin word *frangere*, which means "to break."

H

half dollar [haf dol'ər] **moneda de 50¢** A coin worth 50 cents and with a value equal to that of 50 pennies; 50¢
Example:

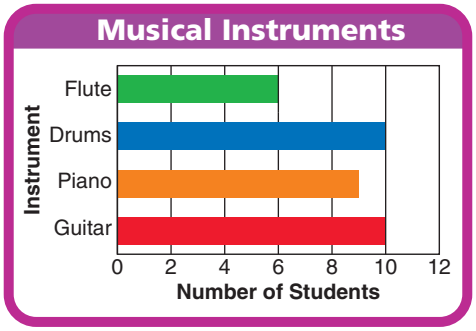
half hour [haf our] **media hora** 30 minutes
Example: Between 4:00 and 4:30 is one half hour.

halves [havz] **mitades**

These are halves

hexagon [hek'sə•gän] **hexágono** A polygon with six sides and six angles
Examples:

horizontal bar graph [hôr•i•zänt'l bär graf] **gráfica de barras horizontales** A bar graph in which the bars go from left to right
Examples:



hour (hr) [our] **hora (h)** A unit used to measure time; in one hour, the hour hand on an analog clock moves from one number to the next; 1 hour = 60 minutes

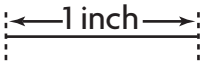
hour hand [our hand] **horario** The short hand on an analog clock

I

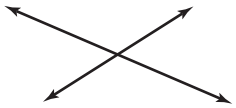
Identity Property of Addition [ī•den'tə•tē präp'ər•tē əv ə•dish'ən] **propiedad de identidad de la suma** The property that states that when you add zero to a number, the result is that number
Example: $24 + 0 = 24$

Identity Property of Multiplication [ī•den'tə•tē präp'ər•tē əv mul•tə•pli•kā'shən] **propiedad de identidad de la multiplicación** The property that states that the product of any number and 1 is that number
Examples: $5 \times 1 = 5$
$1 \times 8 = 8$

inch (in.) [inch] **pulgada (pulg.)** A customary unit used to measure length or distance
Example:



intersecting lines [in•tər•sekt'ing līnz] **líneas secantes** Lines that meet or cross
Example:



inverse operations [in'vûrs äp•ə•rā'shənz] **operaciones inversas** Opposite operations, or operations that undo one another, such as addition and subtraction or multiplication and division

K

key [kē] **clave** The part of a map or graph that explains the symbols

kilogram (kg) [kil'ō•gram] **kilogramo (kg)** A metric unit used to measure mass; 1 kilogram = 1,000 grams

L

length [lengkth] **longitud** The measurement of the distance between two points

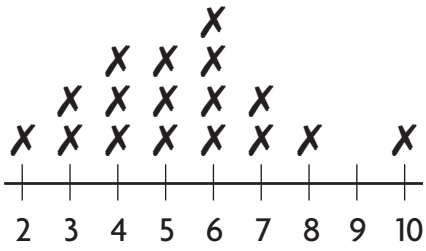
less than (<) [les than] **menor que** A symbol used to compare two numbers when the lesser number is given first
Example:
Read $3 < 7$ as "three is less than seven."

line [līn] **línea** A straight path extending in both directions with no endpoints
Example:

Word History

The word *line* comes from *linen*, a thread spun from the fibers of the flax plant. In early times, thread was held tight to mark a straight line between two points.

line plot [līn plät] **diagrama de puntos** A graph that records each piece of data on a number line
Example:



Height of Bean Seedlings to the Nearest Centimeter

line segment [līn seg'mənt] **segmento** A part of a line that includes two points, called endpoints, and all of the points between them
Example:

liquid volume [lik'wid väl'yo͞om] **volumen de un líquido** The amount of liquid in a container

liter (L) [lēt'ər] **litro (L)** A metric unit used to measure capacity and liquid volume; 1 liter = 1,000 milliliters

M

mass [mas] **masa** The amount of matter in an object

meter (m) [mēt'ər] **metro (m)** A metric unit used to measure length or distance; 1 meter = 100 centimeters

midnight [mid'nīt] **medianoche** 12:00 at night

milliliter (mL) [mil'i•lēt•ər] **mililitro (mL)** A metric unit used to measure capacity and liquid volume

minute (min) [min'it] **minuto (min)** A unit used to measure short amounts of time; in one minute, the minute hand on an analog clock moves from one mark to the next

minute hand [min'it hand] **minutero** The long hand on an analog clock

multiple [mul'tə•pəl] **múltiplo** A number that is the product of two counting numbers
Examples:

6	6	6	6	counting
× 1	× 2	× 3	× 4	← numbers
6	12	18	24	← multiples of 6

multiplication [mul•tə•pli•kā'shən] **multiplicación** The process of finding the total number of items in two or more equal groups; the opposite operation of division

multiply [mul'tə•plī] **multiplicar** To combine equal groups to find how many in all; the opposite operation of division

N

nickel [nik'əl] **moneda de 5¢** A coin worth 5 cents and with a value equal to that of 5 pennies; 5¢
Example:

noon [no͞on] **mediodía** 12:00 in the day

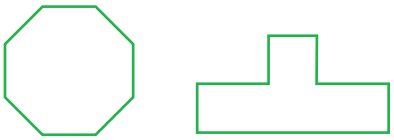
number line [num'bər līn] **recta numérica**
A line on which numbers can be located
Example:

number sentence [num'bər sent'ns] **enunciado numérico** A sentence that includes numbers, operation symbols, and a greater than symbol, a less than symbol, or an equal sign
Example: 5 + 3 = 8

numerator [nōō'mər•āt•ər] **numerador** The part of a fraction above the line, which tells how many parts are being counted
Example: $\frac{3}{4}$ ← numerator

O

octagon [äk'tə•gän] **octágono** A polygon with eight sides and eight angles
Examples:



odd [od] **impar** A whole number that has a 1, 3, 5, 7, or 9 in the ones place

open shape [ō'pən shāp] **figura abierta** A shape that does not begin and end at the same point
Examples:

order [ôr'dər] **orden** A particular arrangement or placement of numbers or things, one after another

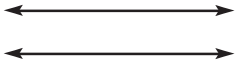
order of operations [ôr'dər əv äp•ə•rā'shənz] **orden de las operaciones** A special set of rules that gives the order in which calculations are done

Order Property of Addition [ôr'dər präp'ər•tē əv ə•dish'ən] **propiedad de orden de la suma** *See* Commutative Property of Addition.

Order Property of Multiplication [ôr'dər präp'ər•tē əv mul•tə•pli•kā'shən] **propiedad de orden de la multiplicación** *See* Commutative Property of Multiplication.

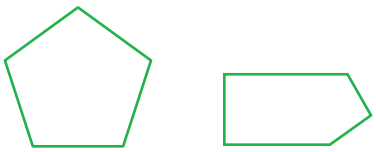
P

parallel lines [pâr'ə•lel līnz] **líneas paralelas** Lines in the same plane that never cross and are always the same distance apart
Example:

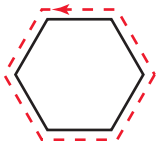


pattern [pat'ərn] **patrón** An ordered set of numbers or objects in which the order helps you predict what will come next
Examples:
2, 4, 6, 8, 10

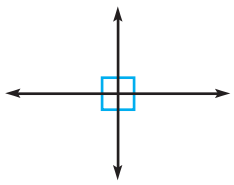
pentagon [pen'tə•gän] **pentágono** A polygon with five sides and five angles
Examples:



perimeter [pə•rim'ə•tər] **perímetro** The distance around a shape
Example:



perpendicular lines [pər•pən•dik'yōō•lər līnz] **líneas perpendiculares** Lines that intersect to form right angles
Example:



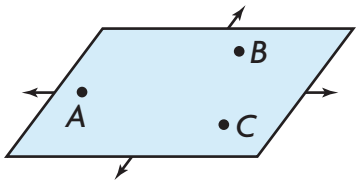
picture graph [pik'chər graf] **gráfica con dibujos** A graph that uses pictures to show and compare information
Example:

How We Get to School	
Walk	❁ ❁ ❁
Ride a Bike	❁ ❁ ❁ ❁
Ride a Bus	❁ ❁ ❁ ❁ ❁ ❁
Ride in a Car	❁ ❁

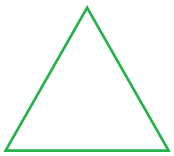
Key: Each ❁ = 10 students.

place value [plās val'yōō] **valor posicional** The value of each digit in a number, based on the location of the digit

plane [plān] **plano** A flat surface that extends without end in all directions
Example:



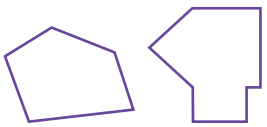
plane shape [plān shāp] **figura plana** A shape in a plane that is formed by curves, line segments, or both
Example:



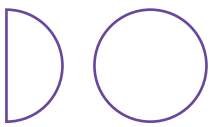
P.M. [pē•em] **p.m.** The time after noon and before midnight

point [point] **punto** An exact position or location

polygon [päl'i•gän] **polígono** A closed plane shape with straight sides that are line segments
Examples:



polygons



not polygons

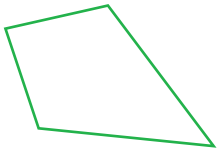
Word History

Did you ever think that a ***polygon*** looks like a bunch of knees that are bent? This is how the term got its name. *Poly-* is from the Greek word *polys*, which means "many." The ending *-gon* is from the Greek word *gony*, which means "knee."

product [präd'əkt] **producto** The answer in a multiplication problem
Example: $3 \times 8 = 24$
product

Q

quadrilateral [kwäd•ri•lat'ər•əl] **cuadrilátero** A polygon with four sides and four angles
Example:



quarter [kwôrt'ər] **moneda de 25¢** A coin worth 25 cents and with a value equal to that of 25 pennies; 25¢
Example:

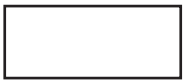
quarter hour [kwôrt'ər our] **cuarto de hora** 15 minutes
Example: Between 4:00 and 4:15 is one quarter hour.

quotient [kwō'shənt] **cociente** The number, not including the remainder, that results from division
Example: $8 \div 4 = 2$
quotient

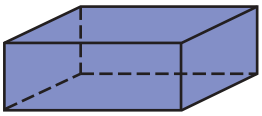
R

ray [rā] **semirrecta** A part of a line, with one endpoint, that is straight and continues in one direction
Example:

rectangle [rek'tang•gəl] **rectángulo** A quadrilateral with two pairs of parallel sides, two pairs of sides of equal length, and four right angles
Example:



rectangular prism [rek•tang'gyə•lər priz'əm] **prisma rectangular** A three-dimensional shape with six faces that are all rectangles
Example:



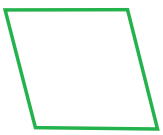
regroup [rē•grōōp'] **reagrupar** To exchange amounts of equal value to rename a number
Example: 5 + 8 = 13 ones or 1 ten 3 ones

related facts [ri•lāt'id fakts] **operaciones relacionadas** A set of related addition and subtraction, or multiplication and division, number sentences
Examples: $4 \times 7 = 28$ $28 \div 4 = 7$
$7 \times 4 = 28$ $28 \div 7 = 4$

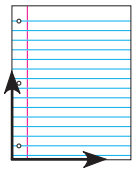
remainder [ri•mān'dər] **residuo** The amount left over when a number cannot be divided evenly

results [ri•zults'] **resultados** The answers from a survey

rhombus [räm'bəs] **rombo** A quadrilateral with two pairs of parallel sides and four sides of equal length
Example:



right angle [rīt ang'gəl] **ángulo recto** An angle that forms a square corner
Example:



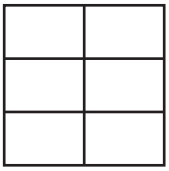
round [round] **redondear** To replace a number with another number that tells about how many or how much

S

scale [skāl] **escala** The numbers placed at fixed distances on a graph to help label the graph

side [sīd] **lado** A straight line segment in a polygon

sixths [siksths] **sextos**

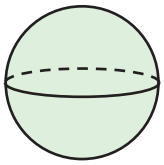


These are sixths

skip count [skip kount] **contar salteado** A pattern of counting forward or backward
Example: 5, 10, 15, 20, 25, 30, . . .

solid shape [sä'lid shāp] **cuerpo geométrico**
See three-dimensional shape.

sphere [sfir] **esfera** A three-dimensional shape that has the shape of a round ball
Example:



square [skwâr] **cuadrado** A quadrilateral with two pairs of parallel sides, four sides of equal length, and four right angles
Example:

square unit [skwâr yo͞o'nit] **unidad cuadrada** A unit used to measure area such as square foot, square meter, and so on

standard form [stan'dərd fôrm] **forma normal** A way to write numbers by using the digits 0–9, with each digit having a place value
Example: 345 ← standard form

subtraction [səb•trak'shən] **resta** The process of finding how many are left when a number of items are taken away from a group of items; the process of finding the difference when two groups are compared; the opposite operation of addition

sum [sum] **suma o total** The answer to an addition problem
Example: 6 + 4 = 10
↑ sum

survey [sûr'vā] **encuesta** A method of gathering information

T

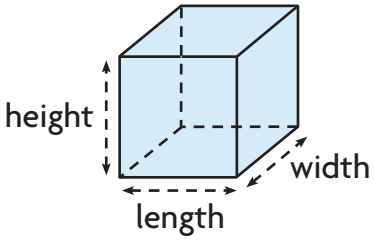
tally table [tal'ē tā'bəl] **tabla de conteo** A table that uses tally marks to record data
Example:

Favorite Sport	
Sport	**Tally**
Soccer	𝍸 |||
Baseball	|||
Football	𝍸
Basketball	𝍸 |

thirds [thûrdz] **tercios**

These are thirds

three-dimensional shape [thrē də•men'shə•nəl shāp] **figura tridimensional** A shape that has length, width, and height
Example:

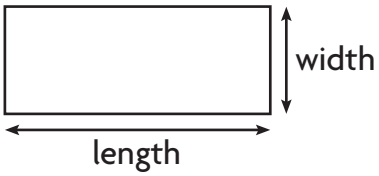


time line [tīm līn] **línea cronológica** A drawing that shows when and in what order events took place

trapezoid [trap'i•zoid] **trapecio** A quadrilateral with exactly one pair of parallel sides
Example:

triangle [trī'ang•gəl] **triángulo** A polygon with three sides and three angles
Examples:

two-dimensional shape [to͞o də•men'shə•nəl shāp] **figura bidimensional** A shape that has only length and width
Example:



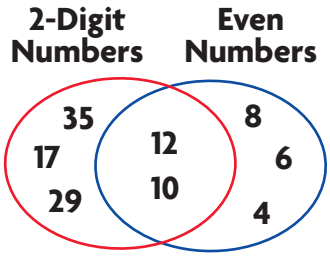
U

unit fraction [yo͞o'nit frak'shən] **fracción unitaria** A fraction that has 1 as its top number, or numerator
Examples: $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

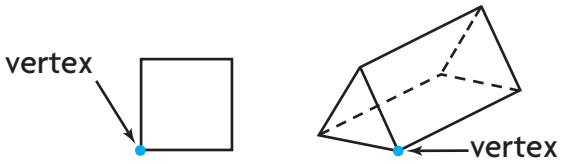
unit square [yo͞o'nit skwâr] **cuadrado de una unidad** A square with a side length of 1 unit, used to measure area

V

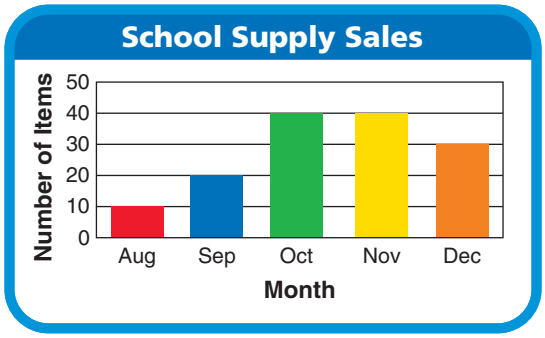
Venn diagram [ven dī'ə•gram] **diagrama de Venn** A diagram that shows relationships among sets of things
Example:



vertex [vûr'teks] **vértice** The point at which two rays of an angle or two (or more) line segments meet in a plane shape or where three or more edges meet in a solid shape
Examples:

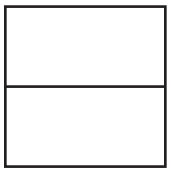


vertical bar graph [vûr'ti•kəl bär graf] **gráfica de barras verticales** A bar graph in which the bars go up from bottom to top



W

whole [hōl] **entero** All of the parts of a shape or group
Example:



$\frac{2}{2} = 1$

This is one whole.

whole number [hōl num'bər] **número entero** One of the numbers 0, 1, 2, 3, 4, . . . The set of whole numbers goes on without end

word form [wûrd fôrm] **en palabras** A way to write numbers by using words
Example: The word form of 212 is two hundred twelve.

Z

Zero Property of Multiplication [zē'rō präp'ər•tē əv mul•tə•pli•kā'shən] **propiedad del cero de la multiplicación** The property that states that the product of zero and any number is zero
Example: $0 \times 6 = 0$

CALIFORNIA COMMON CORE STATE STANDARDS

Standards You Will Learn

		Student Edition Lessons
Mathematical Practices		
MP.1	Make sense of problems and persevere in solving them.	Lessons 1.1, 2.1, 2.4, 5.3, 6.4, 7.2, 9.1, 10.3, 11.3
MP.2	Reason abstractly and quantitatively.	Lessons 1.4, 1.5, 3.7, 5.2, 6.8, 7.2, 10.9, 11.4, 12.8
MP.3	Construct viable arguments and critique the reasoning of others.	Lessons 2.6, 4.7, 5.3, 7.5, 9.1, 10.4, 10.5, 11.1, 12.6
MP.4	Model with mathematics.	Lessons 1.12, 2.2, 3.2, 5.2, 6.1, 8.2, 10.3, 11.3, 12.2
MP.5	Use appropriate tools strategically.	Lessons 1.2, 2.1, 4.1, 5.2, 7.1, 7.3, 9.1, 11.4, 12.7
MP.6	Attend to precision.	Lessons 1.3, 2.1, 2.3, 5.2, 6.6, 7.1, 9.4, 10.1, 12.6
MP.7	Look for and make use of structure.	Lessons 1.1, 2.4, 3.2, 5.1, 6.5, 8.2, 9.3, 10.9, 12.3
MP.8	Look for and express regularity in repeated reasoning.	Lessons 1.5, 2.2, 3.6, 5.5, 6.8, 7.2, 9.2, 11.3, 12.4
Domain: Operations and Algebraic Thinking		
Represent and solve problems involving multiplication and division.		
3.OA.1	Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each.	Lessons 3.1, 3.2
3.OA.2	Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each.	Lessons 6.2, 6.3, 6.4

Standards You Will Learn

		Student Edition Lessons
Domain: Operations and Algebraic Thinking		
Represent and solve problems involving multiplication and division.		
3.OA.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.	Lessons 3.3, 3.5, 4.1, 4.2, 4.3, 6.1, 6.5, 6.6, 7.1, 7.3, 7.8
3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers.	Lessons 5.2, 7.8
Understand properties of multiplication and the relationship between multiplication and division.		
3.OA.5	Apply properties of operations as strategies to multiply and divide. *Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)*	Lessons 3.6, 3.7, 4.4, 4.6, 6.9
3.OA.6	Understand division as an unknown-factor problem.	Lesson 6.7
Multiply and divide with 100.		
3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.	Lessons 4.5, 4.8, 4.9, 6.8, 7.2, 7.4, 7.5, 7.6, 7.7, 7.9

Standards You Will Learn

		Student Edition Lessons
Domain: Operations and Algebraic Thinking		
Solve problems involving the four operations, and identify and explain patterns in arithmetic.		
3.OA.8	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding.	Lessons 1.12, 3.4, 4.10, 7.10, 7.11
3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations.	Lessons 1.1, 4.7, 5.1
Domain: Number and Operations in Base Ten		
Use place value understanding and properties of operations to perform multi-digit arithmetic.		
3.NBT.1	Use place value understanding to round whole numbers to the nearest 10 or 100.	Lessons 1.2, 1.3
3.NBT.2	Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.	Lessons 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 1.10, 1.11
3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., 9×80, 5×60) using strategies based on place value and properties of operations.	Lessons 5.3, 5.4, 5.5

Standards You Will Learn

		Student Edition Lessons
Domain: Number and Operations—Fractions		
Develop understanding of fractions as numbers.		
3.NF.1	Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.	Lessons 8.1, 8.2, 8.3, 8.4, 8.7, 8.8, 8.9
3.NF.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram.	
	a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.	Lesson 8.5
	b. Represent a fraction *a*/*b* on a number line diagram by marking off *a* lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.	Lesson 8.5

Standards You Will Learn

		Student Edition Lessons
Domain: Number and Operations—Fractions		
Develop understanding of fractions as numbers.		
3.NF.3	Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.	
	a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.	Lesson 9.6
	b. Recognize and generate simple equivalent fractions, e.g., $1/2 = 2/4$, $4/6 = 2/3$). Explain why the fractions are equivalent, e.g., by using a visual fraction model.	Lesson 9.7
	c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.	Lesson 8.6
	d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols $>$, $=$, or $<$, and justify the conclusions, e.g., by using a visual fraction model.	Lessons 9.1, 9.2, 9.3, 9.4, 9.5

Standards You Will Learn

		Student Edition Lessons
Domain: Measurement and Data		
Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.		
3.MD.1	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.	Lessons 10.1, 10.2, 10.3, 10.4, 10.5
3.MD.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.	Lessons 10.7, 10.8, 10.9
Represent and interpret data.		
3.MD.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs.	Lessons 2.1, 2.2, 2.3, 2.4, 2.5, 2.6
3.MD.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters.	Lessons 2.7, 10.6

Standards You Will Learn

		Student Edition Lessons
Domain: Measurement and Data		
Geometric measurement: understand concepts of area and relate area to multiplication and to addition.		
3.MD.5	Recognize area as an attribute of plane figures and understand concepts of area measurement.	Lesson 11.4
	a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.	Lesson 11.4
	b. A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units.	Lesson 11.5
3.MD.6	Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).	Lesson 11.5
3.MD.7	Relate area to the operations of multiplication and addition.	Lesson 11.6
	a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.	Lesson 11.6
	b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.	Lesson 11.7
	c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.	Lesson 11.8
	d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.	Lesson 11.8

Standards You Will Learn

		Student Edition Lessons
Domain: Measurement and Data		
Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.		
3.MD.8	Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.	Lessons 11.1, 11.2, 11.3, 11.9, 11.10
Domain: Geometry		
Reason with shapes and their attributes.		
3.G.1	Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.	Lessons 12.1, 12.2, 12.3, 12.4, 12.5, 12.6, 12.7, 12.8
3.G.2	Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole.	Lesson 12.9

Index

Act It Out, 219–222, 303–306, 367–370

Activities.
- Activity, 5, 6, 90, 101, 119, 120, 123, 151, 165, 166, 203, 207, 223, 231, 232, 249, 265, 266, 337, 351, 385, 386, 430, 433, 434, 437, 438, 442, 457, 465, 469, 470, 483, 487, 491, 510, 527, 531
- Cross-Curricular Activities and Connections. *See* Cross-Curricular Activities and Connections
- Investigate, 219–222, 303–306, 367–370
- *Math Detective,* 3, 61, 99, 137, 187, 217, 263, 319, 365, 405, 451, 503

Addition
- with addition tables, 5–6
- bar models, 51–54
- break apart strategy, 19, 25–28, 30, 40
- with compatible numbers, 13–16, 18–19
- draw a diagram, 51–54
- elapsed time, 415–418
- estimate sums, 13–16
- with friendly numbers, 18–20
- as inverse operations, 43, 461
- of liquid volume, 441–444
- of mass, 442–444
- mental math strategies, 17–20
- on number lines, 17–20, 415–416, 419–421, 423–425
- place value strategy, 29–32
- properties of
  - Associative, 21–24, 161
  - Commutative, 6, 21–24
  - Identity, 5, 21–24
- regrouping, 29–31
- related to area, 465–468, 469–472, 473–476, 483–486
- related to multiplication, 105–108
- rounding and, 13–16
- three-digit numbers, 13–16, 17–20, 25–28, 29–32
- of time intervals, 415–418, 419–422, 423–425
- two-digit numbers, 17–20, 21–24

Addition tables, 5, 6

Algebra
- addition
  - Associative Property of Addition, 21–24, 161
  - Commutative Property of Addition, 6, 21–24
  - describe a number pattern, 5–8, 189–192
  - Identity Property of Addition, 5, 21–24
  - patterns on the addition table, 5–8
  - related to area, 473–476, 483–486
  - related to multiplication, 105–108
  - unknown digits, 31
- area, 199–202, 465–468, 473–476
- division
  - factors, 281–284, 286–287, 299–302
  - related facts, 249–252
  - related to subtraction, 235–238
  - relate multiplication to division, 245–248, 249–252, 270–272, 278–280, 282–284, 286–288, 292–294, 295–298, 300–302
  - rules for one and zero, 253–256
  - unknown divisor, 296
- equations, 193–196, 423
- input/output tables, 165–168, 189–192
- inverse operations, 43, 245–248
- multiplication
  - area models, 199–202, 473–476, 479–482
  - arrays, 119–122, 151–154, 161, 193–194, 246–248
  - Associative Property of Multiplication, 161–164, 170
  - Commutative Property of Multiplication, 123–126, 155, 162
  - describe a number pattern, 165–168, 189–192
  - Distributive Property, 151–154, 155, 173, 199–202, 483–486
  - factors, 105–108
  - Identity Property of Multiplication, 127–130
  - number pattern, 165–168, 189–192
  - with one and zero, 127–130
  - order of operations, 307–310
  - patterns on a multiplication table, 165–168

related to addition, 105–108
related to area, 473–476, 479–482, 483–486
unknown factors, 125, 163, 193–196, 209, 283, 286–287
Zero Property of Multiplication, 127–130
order of operations, 307–310
patterns
on the addition table, 5–8
area, 479–482
describing, 5–8, 165–168, 174, 189–192
even and odd numbers, 5–8, 165–168, 170
explaining, using properties, 5–8, 165–168, 170
number, 5–8, 165–168
on the multiplication table, 165–168
perimeter
finding unknown side length, 461–464
measuring, 457–460
modeling, 453–456
solving problems, 465–468
using letters and symbols for an unknown number, 193–196, 282, 461–464
subtraction
related to division, 235–238, 269, 295
unknown subtrahend, 45

A.M., 411–414

Analog clocks, 407–410, 411–413, 416–417, 419–422

Angles
classifying, 509–512
defined, 509
describing, 509–512, 535–538
modeling, 510
of plane shapes, 509–512
of polygons, 514–516, 535–538
of quadrilaterals, 523–526
right, 509–512, 523–526, 529, 532–534
of triangles, 514–515, 531–534
types of, 509–512
vertex of, 509

Area
area models. *See* Area models
of combined rectangles, 483–486
count unit squares, 465–468, 469–472, 473
defined, 465
Distributive Property, 483–486
equal areas, 491–494
partitioning shapes to make, 539–542
of equal parts of a shape, 539–542
finding, 465–468, 469–472, 473–476, 479–482, 483–486, 487–490, 491–494
find unknown side lengths, 487–490, 491–494
measuring, 469–472
partitioning, 321–324, 325–328, 329–332, 333–336, 343–346, 351–354, 371–374, 375–378, 389–392, 393–396, *467*
of rectangles, 479–482, 487–490
same area, different perimeters, 491–494
same perimeter, different areas, 487–490
related to addition, 473–476
related to multiplication, 473–476, 479–482, 483–486
related to perimeter, 465–468
related to shapes and fractions, 539–542
solving problems, 479–482
square units, 465–468, 473, 484–485, 488–490, 492–493
tiling, 469–472, 483, 487, 491
unit squares, 465–468, 469–472, 473–476

Area models, 199–202, 321–324, 325–328, 329–332, 333–336, 343–346, 351–354, 371–374, 375–378, 389–392, 393–396, 465–468, 469–472, 473–476, 479–482, 483–486, 487–490, 491–494, 539–542

Arrays
Associative Property of Multiplication, 161
Commutative Property of Multiplication, 123–126, 155, 162
defined, 119
Distributive Property, 151–154, 155, 483–466
find factors, 119–122
find unknown factors, 193–196
modeling with,
division, 241–244, 246–248, 281–284, 291–294
multiplication, 119–122, *125*, 151–154, 245–248
related facts, 249–252
square tiles, 119–122, 193–196, 241–244, 249–252

Assessment
Show What You Know, 3, 61, 99, 137, 187, 217, 263, 319, 365, 405, 451, 503

Mid-Chapter Checkpoint. 33–34, 75–76, 113–114, 159–160, 197–198, 239–240, 289–290, 341–342, 383–384, 427–428, 477–478, 521–522
Chapter Review/Test. 55–60, 93–98, 131–136, 181–186, 211–216, 257–262, 311–316, 359–364, 397–402, 445–450, 495–500, 543–548
Constructed Response, 60, 98, 136, 186, 216, 262, 316, 364, 402, 450, 500, 548
Performance Task, 60, 98, 136, 186, 216, 262, 316, 364, 402, 450, 500, 548

Associative Property
Addition, 21–24, 161
Multiplication, 161–164, 170

B

Bar graphs
defined, 77
drawing, 81–84
horizontal, 78
interpret data in, 77–80, 85–88
making, 81–84
solving problems, 85–88
vertical, 78

Bar models, 51–54, 115–117, 143–146, 231–234, 245–248, 441–444

Beakers, 433, 434

Break apart strategy
addition, 25–28, 30, 40
multiplication, 151–154, 205

C

California Common Core State Standards, H13–H20

Centimeters, 457–460

Chapter Openers, 3, 61, 99, 137, 187, 217, 263, 319, 365, 405, 451, 503

Chapter Review/Test, 55–60, 93–98, 131–136, 181–186, 211–216, 257–262, 311–316, 359–364, 397–402, 445–450, 495–500, 543–548

Checkpoint, Mid-Chapter. *See* Mid-Chapter Checkpoint

Classifying
angles, 509–512
plane shapes, 505–508, 535–538
polygons, 513–516
quadrilaterals, 523–526
triangles, 531–534

Clocks
analog, 407–410, 411–414, 416–417, 419–421
digital, 409, 412–413
elapsed time, 415–418, 419–422
telling time, 407–410, 411–414
time intervals, 415–418, 419–422

Closed shapes, 506–508, 513–516

Combine place values strategy, 47–50

Commutative Property
Addition, 6, 21–24
Multiplication, 123–126, 155, 162

Comparing
angles, 509–512
area, 465–465, 479–482, 487–490, 491–494
equal to, 367–370
fractions, 367–370, 379–382, 385–388, 389–392
act it out, 367–370
fraction strips, 371–374, 375–378
of a group, 371–374
on a number line, 371–374
using same denominator strategy, 371–374, 379–382, 385–388
using same numerator strategy, 375–378, 379–382, 385–388
using missing pieces strategy, 379–382
using models, 367–370, 375–378, 387, 389–392, 393–396
using reasoning, 371–374, 375–378
of a whole, 371–374
greater than, 367–370
less than, 367–370
liquid volume, 433–436, 441–444
mass, 437–440, 441–444
perimeter, 465–468, 487–490, 491–494
plane shapes, 505–508
polygons, 513–516
quadrilaterals, 523–526
triangles, 531–534
whole numbers
with base-ten blocks, 203, 207
with a number line, 337, 343

Compatible numbers
defined, 13
estimate differences, 35–38
estimate sums, 13–16
Connect, 21, 85, 161, 227, 307, 344, 429, 465, 484, 513, 527, 539
Constructed Response, 60, 98, 136, 186, 216, 262, 316, 364, 402, 450, 500, 548
Correlations,
California Common Core State Standards, H13–H20
Counting
back
on clocks, 408–410, 419–422
on number lines, 39–42, 236–238, 269–271, 273–275, 278, 419–422, 423–426
elapsed time, 415–418, 419–422, 423–426
equal groups, 101–104, 105–108, 109–112, 139–142, 219–222, 223–226, 227–230, 231–234, 241–244, 245–248, 249–252, 265–268, 277–280, 281, 285–288, 291–294, 299–302
number lines, 17–19, 109–112, 415–418, 419–422, 423–426
on
on clocks, 407–410, 415–418
on number lines, 17–20
skip counting, 140
equal groups, 101–104, 105–108, 109–112, 219–222
by fives, 143–146, 148
by sixes, 147–150
by tens, 143–146, 202–206
by threes, 147–150
by twos, 140–142
tens and ones, 17–19, 39–42
time intervals, 415–418, 419–422, 423–426
up
by fives, 273–275
on number lines, 39–42, 274–275, 419–422, 423–426

Counting numbers, 203, 408, 416, 453
Cross-Curricular Activities and Connections
Connect to Reading, 42, 92,158, 256, 392, 490, 526
Connect to Science, 172, 422
Connect to Social Studies, 310
Customary units
for length
feet, 109
inches, 90, 429–432, 457–469
for liquid volume and capacity, cups, 157
for weight, ounces, 108

Data, represent and interpret
bar graphs, 77–80, 81–84, 85–88
making, 81–84
using, 77–80, 85–88
collect data, 90
dot plots. *See* Line plots
experiments, 72, 83
frequency tables, 63–66
generating measurement data, 90, 429–432
key, 67
line plots, 89–92
making, 89–92
using, 89–92
shape of, 90
make a table, 63–66, 177–180
organizing data, 63–66
picture graphs, 67–70, 71–74, 81–84
making, 71–74
using, 67–70
scale, 77
solving problems, 85–88
surveys, 67, 69, 72, 78, 81, 89
tally tables, 63–66, 73
use a table, 12, 16, 28, 38, 46, 50, 109, 122, 130, 146, 150, 157, 171, 175, 189–192, 196, 205, 222, 226, 234, 248, 252, 268, 280, 284, 298, 354, 370, 422, 481
Decagons, 514–516
Denominators, 333
comparing fractions with same, 371–374, 379–382
defined, 333
fraction greater than 1, 343–346
ordering fractions with same, 385–388
Diagrams. *See also* Graphic Organizers
Draw a Diagram, 51–54, 115–118, 199–202, 355–358, 423–426, 535–538
Venn diagrams, 4, 264, 452, 535–538
Digital clocks, 409, 412–413

Distributive Property
area, 483–486
multiplication, 151–154, 155, 173, 199–202, 483–486
Divide, 223
Dividends, 232
Division
act it out, 219–222, 303–306
with arrays, 241–244, 246–247, 249–252, 281–283, 291–294
bar models, 231–234, 245–248
count back on number line, 236–238, 269, 273, 278
dividend, 232
dividing by
eight, 295–298
five, 273–276
four, 281–284
nine, 299–302
one, 253–256
seven, 291–294
six, 285–288
ten, 269–272
three, 277–280
two, 265–268
dividing with zero, 253–256
divisors, 232, 296
doubles, 274
equal groups, 219–222, 223–226, 227–230, 231–234, 241–244, 265–268, 277–280, 281, 285–288, 291–294, 299–302
equations, 232–234, 235–238, 242–243, 245–248, 249–252, 253–256, 265–268, 283
as inverse operation, 245–248
of liquid volume, 441–444
of mass, 441–444
with measurement quantities, 296, 441–444
modeling, 219–222, 231–234
number lines, 236–238, 269, 278
quotients, 232
related facts, 249–252
related to multiplication, 245–248, 249–252, 270–272, 278–280, 282–284, 286–288, 292–294, 295–298, 300–302
repeated (successive) subtraction as, 235–238, 269–272, 295–298
rules for one and zero, 253–256
unknown factor problem, 270–272, 278, 282, 286, 292, 295, 300
using factors, 296
using related multiplication fact, 249–252, 270–274, 278, 282, 286, 292, 295, 300
Divisors, 232, 296
Doubles, 139–142, 148, 169
Draw a bar graph, 81–84
Draw a Diagram, 51–54, 115–118, 199–202, 355–358, 423–426, 535–538
Draw a picture graph, 71–74
Drawing
bar models, 51–53, 144–146, 231–234, 441–444
draw a bar graph, 81–84
draw a diagram, 51–54, 115–118, 199–202, 355–358, 535–538
draw a picture graph, 71–74
number lines, 17–20, 39–42, 107, 203–206
quadrilaterals, 505–508, 527–530
quick pictures, 107, 123–126, 127–130, 207–208, 225, 228, 253–256, 267, 323, 325, 328
shapes, 147, 506, 516, 518, 527–530, 539–542
solving problems, 51–54, 115–118, 343, 355–358

Eighths, 321–324
Elapsed time, 415–418, 419–422, 423–426
on clocks, 415–418, 419–422
defined, 415
find end time, 419–422, 423–426
find start time (begin), 419–422, 423–426
on number lines, 415–418, 419–422, 423–425
using subtraction, 416
Endpoints, 505
Equal groups
counting, 101–104, 105–108, 139–142, 219–222, 223–226, 227–230, 231–234, 241–244, 265–268, 277–280, 281–284, 285–288, 291–294, 299–302
defined, 101
division and, 219–222, 223–226, 227–230, 231–234, 241–244, 265–268, 277–280, 281–284, 285–288, 291–294, 299–302

multiplication and, 101–104, 105–108, 109–112, 245–248
number of, 227–230
size of, 223–226
skip counting, 101–104, 109–112
Equal parts, 321–324, 539–542
Equal parts of a whole, 321–324
Equal shares, 325–328
Equal-sized pieces in the whole, 321–324, 325–328, 329–332, 333–336, 343–346, 351–354
Equal to (=)
comparing to greater than and less than, 175, 367
fractions and, 367–370, 371–374, 375–378, 379–382
Equations
addition, 443, 461–464, 473–476, 483–486
defined, 193
division, 232–234, 235–238, 241–243, 245–248, 249–252, 253–256, 265–268, 280, 283, 288, 443
multiplication, 193–196, 245–248, 249–252, 443, 462, 473–476, 483–486, 491
subtraction, 305, 443, 464
Equivalent
defined, 389
fractions, 389–392, 393–396
Equivalent fractions
defined, 389
describing, 389–392, 393–396
generating, 389–392
greater than 1, 394–396
modeling, 389–392, 393–396
on a number line, 390–391
to whole numbers, 394–396
Error Alert, 29, 83, 128, 169, 189, 235, 278, 295, 322, 376, 408, 470, 523
Estimate, 13, 35–38
Estimation
addition, 13–16, 25–28, 29–32
compatible numbers and, 13–16, 35–38
liquid volume, 433–436
mass, 438–439
perimeter, 457–460
rounding, 13–16, 35–38
subtraction, 35–38, 43–46, 47–49
Even numbers, 5–8, 166–168, 169–170
Expanded form, 18, 25–28, 30, 40
Experiments, 72, 83

F

Factors
defined, 106
find unknown, 193–196
multiplication, 106–108, 141
eight, 169–172
five, 143–146, 148
four, 139–142
nine, 173–176
one, 127–130
seven, 155–158
six, 147–150
ten, 143–146
three, 147–150
two, 139–142
unknown factors, 125, 145, 149, 163, 193–196, 286–287, 299–302
zero, 127–130
Feet, 109
Foot. *See* Feet
Fourths, 321–324
measure to nearest fourth inch, 429–432
Fractions, 539–542
area models, 321–324, 325–328, 329–332, 333–336, 343–346, 351–354, 371–374, 375–378, 389–392, 399–396
common denominators, 371–374
common numerators, 375–378
comparing, 367–370, 379–382, 385–388
act it out, 367–370
fraction strips, 371–374, 375–378
of a group, 371–374
on a number line, 371–374
using same denominator strategy, 371–374, 379–382, 385–388
using same numerator strategy, 375–378, 379–382, 385–388
using missing pieces strategy, 379–382
using models, 367–370, 375–378, 389–392, 393–396
using reasoning, 371–374, 375–378
of a whole, 371–374
defined, 329
denominator of, 333
draw a diagram, 355–358
eighths, 321
equal areas, 539–542
equal parts of whole, 321–324, 333–336

equal shares and, 325–328
equal sized pieces in the whole, 321–324, 325–328, 329–332, 333–336, 343–346, 351–354
equivalent, 389
defined, 389
describing, 389–392, 393–396
generating, 389–392
greater than 1, 394–396
modeling, 389–392, 393–396
on a number line, 390–391
to whole numbers, 394–396
find part of a group, 347–350, 351–354
fourths, 321
fractions greater than 1, 343–346, 348–349
of a group, 347–350, 351–354
halves, 321
linear models, 337–340, 343–346, 372–373, 385–388, 390–391
on number line, 337–340, 343–346, 372–373, 390–391
numerator of, 333
ordering, 385–388
using fraction strips, 385–388
using same denominators, 385–388
using same numerators, 385–388
part of a set, 347–350, 351–354
part of a whole, 321–324, 329–332, 333–336
related to shapes and area, 539–542
related to whole numbers, 343–346
representing
equal to 1, 389–392, 393–396
equal to whole number, 343–346
greater than 1, 343–346, 348–349
less than 1, 329–332, 333–336, 337–340
on a number line, 337–340
representations of fraction equivalence, 389–392, 393–396
set models, 347–350, 351–354
sixths, 321
thirds, 321
unit fractions, 329–332, 351–354, 355–358, 539–542
of a whole, 321–324, 333–336
writing, as whole numbers, 333–336, 343–346, 348–349

Fractions greater than 1, 343–346, 348–349

Frequency tables, 63–66

Geometric patterns, 479–482

Geometry
angles. *See* Angles
attributes of, 505–508, 509–512, 513–516, 517–520, 523–526, 527–530, 531–534, 535–538, 539–542
classifying plane shapes, 505–508, 535–538
closed shapes, 506–508
comparing plane shapes, 505–508, 523–526
decagons, 513–516
describing plane shapes, 505–508
drawing, 527–530
endpoints, 505
hexagons, 513–516
lines
defined, 505
intersecting, 517–520
parallel, 517–520
perpendicular, 517–520
line segments, 505
open shapes, 506–508
partitioning shapes to make equal areas, 539–542
plane shapes, 505–508, 509–512, 535–538
See also Two-dimensional shapes
points, 505
quadrilaterals
angles of, 523–526
classifying, 523–526
drawing, 527–530
rectangles, 523–526, 527–530
rhombuses, 523–526, 527–530
sides of, 523–526
squares, 523–526, 527–530
trapezoids, 523–526, 527–530
rays, 505
triangles
angles of, 531–534
classifying, 531–534
modeling, 531
sides of, 523–524, 531–534
two-dimensional shapes. *See also* Two-dimensional shapes

Glossary, H1–H12

Go Deeper, In some Student Edition lessons. Some examples are: 9, 84, 157, 238, 288, 346, 374, 410, 476, 534

Grams
defined, 437
as metric unit, 437–440
solving problems in, 437–440, 441–444

Graphic Organizers. *See also* Tables and charts
Bubble Map, 62, 218, 320
Flow Map, 366
problem solving, 51–52, 63–64, 115–116, 177–178, 199–200, 219–220, 303–306, 355–356, 367–368, 423–424, 479–480, 535–536
Tree Map, 100, 138, 188, 504
Venn diagram, 4, 264, 452

Graphs
bar graphs
analyzing and constructing, 77–80, 81–84
defined, 77
horizontal bar graphs, 77–78, 80–81, 84–87
scale, 77–80, 81–84
vertical bar graphs, 78–79, 82–83, 86–87, 88
key, 67
line plots
analyzing and constructing, 89–92
defined, 89
generating measurement data, 90, 429–432
picture graphs
analyzing and constructing, 67–70, 71–74, 81–84
defined, 67
key, 67
solving problems, 85–88

Greater than (>)
angles and, 509–512
comparing with less than and equal to, 175, 367
fractions and, 367–370, 371–374, 375–378, 379–382

Grouping Property of Multiplication, 161–164

Groups
equal groups. *See* Equal groups
fractions of, 347–350, 351–354, 355–358

H

Half hours, 407, 411–414, 419, 423

Half symbol, 68

Halves, 321–324
measure to the nearest half inch, 429–432

Hexagons
angles of, 514–516
sides of, 514–516

Horizontal bar graphs, 77–78, 80–81, 84–87

Hour hand, 407–410

Hours
half, 405, 411–414, 419, 423
minutes after hour, 408
minutes before hour, 408

Hundreds
place value, 9–12, 14–16, 29–32, 36–38, 43–46, 47–50, 204–206, 208
round to nearest, 9–12

I

Identity Property
Addition, 5, 21–24
Multiplication, 127–130

Inches
as customary unit, 429–432
generating data in, 90, 429–432
measure to nearest fourth inch, 429–432
measure to nearest half inch, 429–432
measure to nearest inch, 90

Intersecting lines, 517–520

Inverse operations, 43, 245

Investigate, 241–244, 307–310, 389–392, 453–456, 539–542

K

Keys, 67–70, 71–74, 82, 118, 272

Kilograms
defined, 437
as metric unit, 437–440
solving problems in, 437–440, 441–444

L

Length
customary units for
feet, 109, 459, 461–464
inches, 429–432, 459

measure in centimeters, 457–460
measure to nearest fourth inch, 429–432
measure to nearest half inch, 429–432
measure to nearest inch, 90
metric units for
centimeters, 65, 457–460

Less than (<)
angles and, 509–512
comparing with greater than and equal to, 175, 367
fractions and, 367–370, 371–374, 375–378, 379–382

Line plots
defined, 89
generating measurement data for, 90, 429–432
making, 89–92
read and interpret data in, 89–92

Lines
defined, 505
intersecting, 517–520
parallel, 517–520
perpendicular, 517–520

Line segments, 505
describing, 507, 517–520

Liquid volume. *See also* Measurement; Units
defined, 433
estimating and measuring, 433–436
liters, 433–436
metric units for, 433–436
solving problems, 433–436, 441–444

Liters
defined, 433
estimating and measuring, 433–436
as metric unit, 433–436
solving problems in, 433–436, 441–444

M

Make a table, 177–180

Make Connections, 242, 308, 390, 454, 540

Manipulatives and materials
addition tables, 5, 6
base-ten blocks, 203, 207
beakers, 433, 434
clock faces, 407–408, 411–414
containers, 433, 434
counters, 101, 223, 231, 265, 351
crayons, 5–6, 166, 389, 430
dot paper, 453
fraction strips, 337, 353, 367
geoboards, 453, 465
glue stick, 443
gram masses, 437, 438, 442
1-inch grid paper, 469
kilogram masses, 437, 438
MathBoard. *See* MathBoard
measuring tape, 90
multiplication table, 165
number lines, 9–12, 19, 39, 203–205, 337–340, 343–346, 372–373, 390–391, 394, 415–418
pan balance, 437, 438, 442
pattern blocks, 539
pitchers. *See* Beakers
rubber bands, 453, 465
rulers, 88, 90, 430, 457, 527, 539
centimeter, 457–460
inch, 429–432, 457–460
square tiles, 119, 120, 123, *125,* 151, 241, 249, 483, 487, 491
straws, 510, 531
two-color counters, 351

Mass. *See also* Measurement; Units
defined, 437
estimating and measuring, 437–440
metric units for, 437–440
solving problems, 437–440, 441–444

MathBoard, In every lesson. Some examples are: 31, 274, 296, 529, 540

Math Detective, 3, 61, 99, 137, 187, 217, 263, 319, 365, 405, 451, 503

Mathematical Practices
1. Make sense of problems and persevere in solving them. In many lessons. Some examples are: 17, 63, 77, 199, 231, 269, 367, 415, 461
2. Reason abstractly and quantitatively. In many lessons. Some examples are: 17, 21, 127, 193, 249, 269, 441, 465, 535
3. Construct viable arguments and critique the reasoning of others. In many lessons. Some examples are: 85, 165, 199, 281, 367, 419, 423, 453, 527
4. Model with mathematics. In many lessons. Some examples are: 51, 67, 105, 193, 219, 325, 415, 461, 509
5. Use appropriate tools strategically. In many lessons. Some examples are: 9, 63, 139, 193, 265, 273, 367, 465, 531

6. Attend to precision. In many lessons. Some examples are: 13, 63, 71, 193, 241, 265, 379, 407, 527
7. Look for and make use of structure. In many lessons. Some examples are: 5, 77, 105, 189, 235, 325, 375, 441, 513
8. Look for and express regularity in repeated reasoning. In many lessons. Some examples are: 21, 67, 123, 207, 249, 269, 371, 461, 517

Math Idea, 17, 21, 43, 68, 124, 161, 207, 242, 266, 333, 337, 343, 371, 390, 429, 461, 465, 513, 539

Math on the Spot Videos, In every Student Edition lesson. Some examples are: 20, 74, 146, 191, 276, 340, 392, 482, 516

Math Talk, In every lesson. Some examples are: 5, 31, 273, 295, 517, 539

Measurement
- area
  - defined, 465
  - finding, 465–468, 469–472, 473–476, 483–486
  - patterns and, 479–482
  - perimeter related to, 465–468, 487–490, 491–494
  - solving problems, 479–482
  - unknown lengths and, 487–490, 491–494
- customary units,
  - for length
    - feet, 109
    - inches, 90, 429–432, 457–459
  - for liquid volume and capacity, cups, 157
  - for weight, ounces, 108
- distinguish between linear and area, 453–456, 457–460, 461–464, 465–468, 469–472, 473–476, 487–490, 491–494
- length
  - customary units for
    - feet, 109
    - inches, 90, 429–432, 457–459
  - measure in centimeters, 457–460
  - measure to nearest half inch, 429–432
  - measure to nearest fourth inch, 429–432
  - measure to nearest inch, 90
  - metric units for
    - centimeters, 65, 455, 457–460
- liquid volume
  - defined, 433
  - measuring, 433–436
  - liters, 433–436
  - solving problems, 433–436, 441–444
- mass
  - defined, 437
  - grams, 437–440
  - kilograms, 437–440
  - measuring, 437–440
  - solving problems, 437–440, 441–444
- metric units
  - for length
    - centimeters, 65, 455, 457–460
  - for liquid volume and capacity, liters, 433–436
  - for mass
    - grams, 437–440
    - kilograms, 437–440
- perimeter
  - area related to, 465–468, 487–490, 491–494
  - defined, 453
  - estimate and measure, 457–460
  - modeling, 453–456
  - unknown side lengths and, 461–464
- Table of Measures, H39
- weight
  - ounces, 108

Metric units
- for length
  - centimeters, 65, 455, 457–460
- for liquid volume and capacity, liters, 433–436
- for mass
  - grams, 437–440
  - kilograms, 437–440

Mid-Chapter Checkpoint, 33–34, 75–76, 113–114, 159–160, 197–198, 239–240, 289–290, 341–342, 383–384, 427–428, 477–478, 521–522

Midnight, 411

Minute hand, 407–410

Minutes, 407–410
- add and subtract, 415–418, 419–422
- after the hour, 408
- before the hour, 408
- defined, 407
- elapsed time in, 415–418, 419–422, 423–426
- time intervals in, 415–418, 419–422, 423–426

Modeling
- analog clock, 407–410, 411–414, 416–417, 420–421

angles, 509–512
area, 465–468, 473–476
area models, 241–244, 465–468, 473–476
bar models, 51–53, 85–88, 115–117, 144–146, 231–234, 245–248, 441–444
with base-ten blocks, 203, 207
with counters, 139–142, 219–222, 223–226, 227–230, 231–234, 265–268, 277–280, 285–286, 299–300, 347–350, 351–354, 355–358
division with arrays, 241–244, 246–248, 281–283, 291–294
equivalent fractions, 389–392, 393–396
fractions
with fraction circles, 368, 375–378, 379–382
with fraction strips, 337–340, 367, 371–374, 376–378, 385–388, 390
fractions greater than 1, 343–346, 348–349
multiplication, 115–118
multiplication with arrays, 119–122, 151–154, 246–248
multiplication with base-ten blocks, 203, 207
with number lines. *See* Number lines
part of a group, 347–350, 351–354
perimeter, 453–456
with square tiles, 119–122, 123–126, 193–194, 241–244, 249–252, 280, 291, 469, 483
triangles, 531–534

Money, 66, 104, 144, 164, 180, 190,196, 202, 205, 248, 273, 284, 303–306, 308–310

Multiples
defined, 143
of ten, 199–202, 203–206, 207–210

Multiplication
area models, 199–202, 473–476, 479–482
with arrays, 119–122, *125*, 151–154, 161, 193–194, 245–248
bar models, 115–117, 143–146, 245–248
describe a number pattern, 165–168
doubles, 139–142, 148, 169
draw a diagram, 115–118, 199–202
of equal groups, 101–104, 105–108, 109–112, 219–222, 223–226
factors, 106
eight, 169–172
five, 143–146, 148
four, *129,* 139–142
nine, 173–176
one, 127–130
seven, 155–158
six, 147–150
ten, 143–146
three, *129,* 147–150
two, 139–142
unknown factors, 125, 149, 163, 193–196, 286–287, 299–302
zero, 127–130
as inverse operation, 245–248
of liquid volume, 441–444
of mass, 441–444
with measurement quantities, 441–444
with multiples of ten, 199–202, 203–206, 207–210
with multiplication table, 148
with number lines, 109–112, 143–144, 169, 203–205
place value strategy, 203–206
products, 106
properties of
Associative Property of Multiplication, 161–164, 170
Commutative Property of Multiplication, 123–126,155, 162
Distributive Property, 151–154, 155, 173, 199–202, 483–486
Grouping Property of Multiplication, 161–164
Identity Property of Multiplication, 127–130
Zero Property of Multiplication, 127–130
regrouping, 207–210
related facts, 249–252
related to addition, 105–108
related to area, 473–476, 479–482, 483–486
related to division, 245–248
related to perimeter, 462
strategies, 203–206

Multiply, 106

Multiplication tables, 148
find unknown divisor, 296
find unknown factor, 193–196
make a table, 177–180
patterns on the, 165–168

Nickels, 273

Noon, 412

Number lines
add and subtract minutes, 415, 420
adding with, 17–20, 415–418, 419
comparing fractions on, 372–373
counting back on, 39, 236–238, 269–272, 273–277, 278
counting up on, 274–275
dividing with, 235–238, 269, 273–276, 278
elapsed time. *See* Time
fractions greater than 1, 357–361
fractions on, 337–340
multiplying with, 109–112, 143–146, 169, 203–206
number line for hours in a day, 411
round numbers and, 9–12
skip counting, 109–112
by eights, 169
by fives, 143–144
by sixes, 109
by tens, 143–144
time intervals. *See* Time
by twos, 140
subtracting with, 39–42
take away tens and ones, 39–42
use to represent
distances, 337–340
elapsed time, 415–417, 419–422, 423–426
whole numbers on, 337–340, 343–346

Number patterns, 5–8, 165–168, 174, 189–192

Numbers
compatible, 13–16, 18–19, 35–38
counting, 203, 408, 316, 453
even, 5–8, 165–168, 169–170
expanded form of, 18, 25–28, 30, 40
fractions, 321–324, 325–328, 315–318, 329–332, 337–340, 343–346, 347–350, 351–354, 355–358, 367–370, 371–374, 375–378, 379–382, 385–388, 389–392, 393–396
hundreds, 9–12, 14–16, 25–28, 29–32, 36–38, 40–41, 43–46, 47–50, 203–206, 207–210
odd, 5–8, 165–168, 169–172
ones, 17–20, 21–24, 25–28, 29–32, 36–38, 39–42, 43–46, 47–50, 127–130, 253–256
ordering, 385–388
rounding, 9–12, 13–16
standard form of, 26
tens, 9–12, 17–20, 21–24, 25–28, 29–32, 39–42, 43–46, 47–50, 143–146, 207–210
unknown, 45, 141, 145, 163, 193–196, 267, 282–283, 286–287, 292–293, 296–297, 301, 309
zero, 127–130, 253–256

Numerators, 333
comparing fractions with same, 375–378, 379–382
defined, 333
fractions greater than 1, 344–346
ordering fractions with same, 385–388

O

Octagons
angles of, 513–516
sides of, 513–516

Odd numbers, 5–8, 165–168, 169–170

Ones, 10–12, 17–20, 21–24, 25–28, 29–32, 36–38, 39–42, 43–46, 47–50, 127–130, 207–210

On Your Own, In most lessons. Some examples are: 7, 31, 275, 297, 529, 538

Open shapes, 506–508

Ordering
fractions, 385–388
fraction strips, 385–388
liquid volume, 434
mass, 438

Order of operations, 307–310

Organize data, 63–66

P

Parallel lines, 517–520

Partitioning
fractions, 321–324, 325–328
shapes, 539–542

Patterns
addition, 5–8, 189–192
on the addition table, 5–8
arithmetic, 5–8, 165–168, 189–192
defined, 5
describing, 189–192
explaining using properties, 5–8, 165–168, 170
finding, 479–482
multiplication, 165–168, 174, 189–192
on the multiplication table, 165–168
with nine, 173–176

number, 5–8, 165–168
in a table, 189–192

Pentagons
angles of, 514–516
sides of, 514–516

Performance Task, 60, 98, 136, 186, 216, 262, 316, 364, 402, 450, 500, 548

Perimeter
area related to, 465–468
defined, 453
estimate and measure, 457–460
find unknown side length, 461–464
modeling, 453–456
of polygons, 461–464
of rectangles, 487–490
same area, different perimeters, 491–494
same perimeter, different areas, 487–490
solving problems, 465–468

Perpendicular lines, 517–520

Personal Math Trainer, In all Student Edition chapters. Some examples are: 3, 38, 70, 99, 167, 210, 217, 288, 365, 436, 486, 503

Picture graphs
defined, 67
drawing, 71–74
half symbol, 68
key, 67
making, 71–74
read and interpret data in, 71–74
show data in, 81–84
solving problems, 67–70, 71–74

Place value
addition and, 13–16, 17–20, 21–24, 25–28, 29–32
expanded form, 18, 25–28, 30, 40
hundreds, 9–12, 13–16, 25–28, 29–32, 36–38, 40–41, 43–46, 47–50, 204–206
multiplication and, 203–206, 207–210
ones, 10–12, 17–20, 21–24, 25–28, 29–32, 36–38, 39–42, 43–46, 47–50
rounding and, 10, 13–16, 35–38
standard form, 26
subtraction and, 35–38, 39–42, 43–46, 47–50
tens, 9–12, 17–20, 21, 25–28, 29–32, 39–42, 43–46, 47–50

Plane shapes. *See* Two-dimensional shapes

P.M., 411–414

Points, 505

Polygons
angles of, 514–516, 517–520
classifying, 513–516
comparing, 514
decagons, 514
defined, 513
describing, 513
hexagons, 514
identifying, 513–516
line segments of, 513–516
octagons, 514
pentagons, 514
perimeter of, 461–464
quadrilaterals, 514
sides of, 513–516, 517–520
triangles, 514

Pose a Problem, 54, 74, 276, 288, 309, 336, 388, 440, 472, 476

Pounds, 38

Practice
More Practice, For, In every lesson. Some examples are: 8, 32, 272, 298, 530, 542
Practice: Copy and Solve, 27, 31, 45, 49, 163, 209, 233, 255, 279, 283, 431, 443, 529

Prerequisite skills
Show What You Know, 3, 61, 99, 137, 187, 217, 263, 319, 365, 405, 451, 503

Problem solving applications. *See also* Cross-Curricular Activities and Connections
Investigate, 241–244, 307–310, 389–392, 453–456, 539–542
Pose a Problem, 53, 74, 79, 112, 171, 234, 248, 252, 272, 276, 288, 309, 336, 388, 440, 472, 476
Real World Problem Solving, In most lessons. Some examples are, 12, 38, 272, 298, 530, 542
Real World Unlock the Problem, In most lessons. Some examples are, 9, 29, 273, 295, 483, 535
Think Smarter problems, In every lesson. Some examples are: 7, 31, 272, 297, 530, 542

Try This!, In some lessons. Some examples are: 10, 30, 282, 322, 513, 518
What's the Error?. *See* What's the Error?

Problem solving strategies
act it out, 219–222, 303–306, 367–370
draw a diagram, 51–54, 115–118, 199–202, 355–358, 423–426, 535–538

find a pattern, 479–482
make a table, 63–66, 177–180
Products, 106
Projects, 1–2, 317–318, 403–404, 501–502
Properties
Associative Property of Addition, 21–24, 161
Associative Property of Multiplication, 161–164, 170
Commutative Property of Addition, 6, 21–24
Commutative Property of Multiplication, 123–126, 155, 162
Distributive Property, 151–154, 155, 173, 199–202, 483–486
Grouping Property of Multiplication, 161–164
Identity Property of Addition, 5, 21–24
Identity Property of Multiplication, 127–130
Zero Property of Multiplication, 127–130

Quadrilaterals
angles of, 514–516, 523–526
classifying, 523–526, 535
comparing, 523–526, 535
defined, 514
describing, 514–517, 523–526
drawing, 527–530
sides of, 514–516, 523–526
Quick pictures, 123–126, 127–130, 207–210, 321–324, 325–328
Quotients, 232

Rays, 505
Reading
Connect to Reading, 42, 92, 158, 256, 392, 490, 526
Read/Solve the Problem, 51–52, 63–64, 115–116, 177–178, 199–200, 219 –220, 303–304, 355–356, 367–368, 423–424, 479–480, 535–536
Strategies
Cause and Effect, 490
Compare and Contrast, 42, 256, 526
Make an Inference, 92
Summarize, 158, 392
Visualize It, 4, 62, 100, 138, 188, 218, 264, 320, 366, 406, 452, 504
Real World
Problem Solving, In most lessons. Some examples are, 12, 38, 272, 298, 530, 542
Unlock the Problem, In most lessons. Some examples are, 9, 29, 273, 295, 491, 535
Reasonableness of an answer, 26, 29, 43, 47, 52, 407, 424
Rectangles
angles of, 523–526
area of, 469–472, 473–476, 479–482, 483–486, 487–490, 491–494
drawing, 487–490, 527–530
find unknown side length, 462
perimeter of, 487–490
sides of, 523–526
Related facts
defined, 249
multiplication and division facts, 249–252
using, 249–252, 270, 278, 282, 286, 292, 295, 300
Relationships, mathematical
addition to multiplication, 105–108
area to fractions and shapes, 539–542
area to multiplication, 473–476, 479–482, 483–486
area to perimeter, 465–468
division
to multiplication, 245–248, 269, 278, 282, 286
to subtraction, 235–238, 269–272, 295–298
fractions to shapes and area, 539–542
multiplication
to addition, 105–108
to division, 245–248, 269, 278, 282, 286
number of equal parts in a whole
to size of the parts, 321–324, 325–328, 329–332, 333–336, 343–346, 351–354
part-whole, 321–324, 329–332, 333–336, 351–354
perimeter to area, 465–468
shapes to fractions and area, 539–542
subtraction to division, 235–238, 269–272, 295–298

Remember, 6, 14, 18, 92, 151, 203, 250, 282, 344, 367, 385, 483

Repeated addition, 105–108, 473–476

Repeated subtraction, 235–238, 269–272, 295–298

Represent fractions
area models, 321–324, 325–328, 329–332, 333–336, 343–346, 351–354, 371–374, 375–378, 389–392, 393–396
linear models, 337–340, 343–346, 372–373, 385–388, 390–391
on a number line, 337–340
set models, 347–350, 351–354

Review and test. *See also* Assessment
Chapter Review/Test. Chapter Review/Test
Mid-Chapter Checkpoint. Mid-Chapter Checkpoint
Review Words, 4, 62, 100, 138, 188, 218, 264, 366, 406, 452
Show What You Know, 3, 61, 99, 137, 187, 217, 263, 319, 365, 405, 451, 503

Rhombuses
angles of, 523–526
drawing, 527–530
sides of, 523–526

Right angles, 509–512

Rounding
defined, 9
estimate differences, 35–38
estimate sums, 13–16
to nearest ten and hundred, 9–12
number line to, 9–12

Rules for dividing with one and zero, 253–256

Scales, 77–80, 81–84, 85–88

Science
Connect to Science, 172, 422

Sense or Nonsense?, 8, 46, 80, 108, 153, 164, 168, 209, 272, 324, 354, 377, 440, 493, 516, 534, 542

Shapes, 539–542. *See also* Two-dimensional shapes
closed, 506–508, 513–516
open, 506–508, 513–516
partition, 539–542

Share and Show, In every lesson. Some examples are:
7, 31, 274, 296, 529, 540

Show data in table, 63–65, 71–74, 80, 81–84, 90–91

Show What You Know, 3, 61, 99, 137, 187, 217, 263, 319, 365, 405, 451, 503

Sides
defined, 513
of polygons, 513–516, 517–520, 535–538
of quadrilaterals, 514, 523–526, 527–530
of triangles, 514, 531–534

Sixths, 321–324

Skip counting
by eights, 169
elapsed time, 415–418, 419–422
equal groups, 101–104, 109–112, 219–222
by eights, 169
by fives, 143–146
by fours, 140
by sixes, 109,147
by tens, 143–144
by threes, 147
time intervals, 407
by twos, 140

Social Studies
Connect to Social Studies, 310

Solve the Problem, 51–52, 63–64, 115–116, 177–178, 199–200, 219–220, 303–304, 355–356, 367–368, 423–424, 479–480, 535–536

Squares
angles of, 523–526
drawing, 527–530
find unknown side length, 462
sides of, 523–526

Square units, 465–468, 474–475, 484–485, 487–490, 492–494
centimeters, 470–471
defined, 465
feet, 474–476, 479–482, 483, 486, 487–490
inches, 469, 471, 490, 494
meters, 472, 473–475, 491

Standard form, 26, 204

Student help
Error Alert. *See* Error Alert
Math Idea. *See* Math Idea
Read Math, 344
Remember, 6, 14, 18, 92, 151, 203, 250, 282, 367, 385, 483

Subtraction
bar models, 51–53
break apart strategy, 40–41
combining place values strategy, 47–50
with compatible numbers, 35–38
draw a diagram, 51–54
elapsed time, 416
equations, 305, 443, 464
estimate differences, 35–38
with friendly numbers, 39–42
as inverse operations, 43
of liquid volume, 441–444
of mass, 441–444
mental math strategies, 39–42
modeling, 39–42, 51–54
place value strategy, 35–38, 39–42, 43–46
regrouping, 43–46, 47–50
related to division, 235–238
repeated subtraction and division, 235–238, 269–272, 295–298
rounding and, 35–38
three-digit numbers, 35–38, 39–42, 43–46, 47–50, 51–54
of time intervals, 415–418, 419–422, 423–426
two-digit numbers, 35–38, 39–42
using number lines, 39–42

Surveys, 67, 69, 72, 75, 78, 81, 89, 118

T

Table of Measures, H39

Tables and charts. *See also* Graphic Organizers
addition tables, 5–6
completing tables, 63–65, 177–180, 479–482
frequency tables, 63–66
input/output tables, 167, 189–192
make a table, 177–180
making, 177–180
multiplication tables, 148, 165–168
for multiplying, 177–180
patterns in, 5–8, 189–192, 479–482
place-value charts, 35–38, 39–42, 43–46, 207–210
show data in, 71–73, 81–84
Table of Measures, H39
tally tables, 63–66, 73

Tally tables, 63–66, 73

Technology and digital resources
Go Digital, *In most lessons. Some examples are:* 5, 63, 139, 321, 407, 505. *See also* Chapter Review/Test; Show What You Know; Vocabulary Builder
Math on the Spot Videos, In every Student Edition lesson. Some examples are: 20, 74, 146, 191, 276, 340, 392, 482, 516
Multimedia eGlossary, *access through the Go Math! Interactive* 4, 62, 98, 138, 188, 218, 264, 320, 366, 406, 452, 504

Tens
round to nearest, 9–12, 36

Test and Review. *See* Review and test

Think Smarter, In every Student Edition lesson. Some examples are: 12, 73, 117, 167, 196, 226, 284, 336, 390, 421, 468, 511

Think Smarter +, In all Student Edition chapters. Some examples are: 3, 38, 70, 99, 167, 210, 217, 288, 365, 436, 486, 503

Thirds, 321–324

Three-digit numbers
addition, 13–16, 17–20, 25–28, 29–32
combining place values strategy, 47–50
subtraction, 35–38, 39–42, 43–46, 47–50, 51–54

Time
adding and subtracting, 415–418, 419–422, 423–426
after midnight, 411
after noon, 412
A.M., 411–414
clocks
analog, 407–410, 411–413, 416–417, 419–421
digital, 409, 412–413
telling time, 407–410, 411–414
elapsed, 415–418, 419–422, 423–426
on clocks, 415–418, 419–422
defined, 415
find end time, 419–422, 423–426
find start time (begin), 419–422, 423–426
on number lines, 415–418, 419–422
using subtraction, 416
to half hour, 411–414
to hour, 407–408, 411–414
intervals
adding, 415–418, 419–422, 423–426

measure in minutes, 415–418, 419–422, 423–426
on a number line, 415–418, 419–422, 423–426
subtracting, 415–418, 419–422, 423–426
measure in minutes, 407–410
to minute, 407–410, 411–414
number line, 411, 415–418, 419–422
P.M., 411–414
reading time, 407–410
time lines, 411
telling time, 407–410, 411–414
writing time, 407–410, 411–414

Time intervals. *See* Elapsed time; Time

Trapezoids
angles of, 523–526
drawing, 527–530
sides of, 523–526

Triangles
angles of, 506–507, 532–534
classifying, 531–534
comparing, 532–534
describing, 531–534
drawing, 531–534
modeling, 531
sides of, 514–515, 531–534

Try Another Problem, 52, 64, 116, 178, 200, 220, 304, 356, 368, 424, 480, 536

Try This!, In some lessons. Some examples are: 10, 30, 282, 322, 513, 518

Two-digit numbers
addition, 14–16, 17–20, 21–24
subtraction, 35–38, 39–42

Two-dimensional shapes
angles. *See* Angles
area. *See* Area
attributes of, 505–508, 509–512, 513–516, 517–520, 523–526, 527–530, 531–534, 535–538, 539–545
classifying, 505–508, 523–526, 535–538
comparing, 503–508, 523–526
defined, 506
describing, 505–508
draw a diagram, 535–538
drawing, 506, 516, 518, 527–530
partitioning shapes to make equal areas, 539–542
perimeter. *See* Perimeter
plane shapes, 505–508, 509–512, 535–539
circles, 506, 513, 516
decagons, 513–516
hexagons, 513–516
octagons, 513–516
open or closed shapes, 506–508, 513–516
pentagons, 513–516
polygons, 513–516
quadrilaterals, 513–516, 523–526
rectangles, 523–526
rhombuses, 523–526
squares, 523–526
trapezoids, 523–526
triangles, 513–516, 531–534
polygons, *See* Polygons
quadrilaterals, 513
angles of, 523–526
classifying, 523–526
drawing, 527–530
rectangles, 523–526, 527–530
rhombuses, 523–526, 527–530
sides of, 523–526
squares, 523–526, 527–530
trapezoids, 523–526, 527–530
sides
defined, 513
describing, 517–520
of polygons, 514–516
of quadrilaterals, 514–515, 523–526
of triangles, 514–515, 531–534
vertex, 509

Two-step problems, 51–54, 115–118, 303–306, 307–310

Understand Vocabulary, 4, 62, 100, 138, 188, 218, 264, 320, 366, 406, 452, 504

Unit fractions, 329–332, 333, 337–340, 351–354, 355–358, 539–542

Unit squares, 465

Units
customary units
for area
square feet, 474–476, 479–482, 483
square inches, 469, 471
for length
feet, 109
inches, 429–432, 457–459
for liquid volume and capacity, cups, 157
for mass, grams, 437–440
for weight, ounces, 108

metric units
for area
square centimeters, 470–471
square meters, 473–475, 491
for length, centimeters, 65, 455, 457–460
for liquid volume and capacity, liters, 433–436
for mass
grams, 437–440
kilograms, 437–440
square units, 465–468, 469–472, 473–476, 479–482, 483–486, 487–490, 491–494

Unlock the Problem, In most lessons. Some examples are: 5, 29, 273, 295, 517, 535

Unlock the Problem Tips, 53, 201, 221, 305, 357, 369, 425

V

Variables
using letters and symbols, 193–196, 282, 461–464

Venn diagrams, 4, 264, 452, 535–538

Vertical bar graphs, 78

Vertices (vertex)
of angles, 509

Visualize It, 4, 62, 100, 138, 188, 218, 264, 320, 366, 406, 452, 504

Vocabulary
Chapter Review/Test. 55–60, 93–98, 131–136, 181–186, 211–216, 257–262, 311–316, 359–364, 397–402, 445–450, 495–500, 543–548
Mid-Chapter Checkpoint. 33–34, 75–76, 113–114, 159–160, 197–198, 239–240, 289–290, 341–342, 383–384, 427–428, 477–478, 521–522
Multimedia *e*Glossary, 4, 62, 100, 138, 188, 218, 264, 320, 366, 406, 452, 504
Understand Vocabulary. 4, 62, 100, 138, 188, 218, 264, 320, 366, 406, 452, 504

Vocabulary Builder, 4, 62, 100, 138, 188, 218, 264, 320, 366, 406, 452, 504

W

Weight, 38, 108

What if, 42, 50, 53, 65, 67, 73, 74, 77, 79, 86, 87, 101, 102, 109, 117, 126, 127, 150, 178, 179, 196, 201, 221, 228, 245, 273, 278, 305, 351, 357, 369, 396, 410, 425, 436, 480, 481, 490, 516, 537, 542

What's the Error?, 12, 28, 41, 69, 146, 154, 202, 252, 288, 336, 346, 374, 381, 432, 436, 456, 508, 516, 530

What's the Question?, 38, 87, 130, 175, 205, 238, 280, 350, 370, 418

Wholes, 321–324, 329–332, 333–336, 371, 379, 539–542

Whole numbers
unknown, 45, 141, 193–196, 267, 282–283, 287, 293, 297, 301, 309
using place value, 9–12, 13–16, 17–20, 21–24, 25–28, 35–38, 39–42, 43–46, 47–50, 203–206, 207–210
writing, as fractions, 333–336, 343–346, 348–350

Write Math, Opportunities to write about mathematics appear in every exercise set. Some examples are: 108, 272, 332, 432, 541

Writing
Write Math, Opportunities to write about mathematics appear in every exercise set. Some examples are: 108, 272, 332, 432, 541

Z

Zero Property of Multiplication, 127–130

Table of Measures

METRIC	CUSTOMARY
Length	
1 centimeter (cm) = 10 millimeters (mm)	
1 decimeter (dm) = 10 centimeters (cm)	1 foot (ft) = 12 inches (in.)
1 meter (m) = 100 centimeters	1 yard (yd) = 3 feet, or 36 inches
1 meter (m) = 10 decimeters	1 mile (mi) = 1,760 yards, or 5,280 feet
1 kilometer (km) = 1,000 meters	
Capacity and Liquid Volume	
1 liter (L) 5 1,000 milliliters (mL)	1 pint (pt) = 2 cups (c)
	1 quart (qt) = 2 pints
	1 gallon (gal) = 4 quarts
Mass/Weight	
1 kilogram (kg) = 1,000 grams (g)	1 pound (lb) = 16 ounces (oz)

TIME	
1 minute (min) = 60 seconds (sec)	1 year (yr) = 12 months (mo), or about 52 weeks
1 hour (hr) = 60 minutes	
1 day = 24 hours	1 year = 365 days
1 week (wk) = 7 days	1 leap year = 366 days
	1 decade = 10 years
	1 century = 100 years

MONEY
1 penny = 1 cent (¢)
1 nickel = 5 cents
1 dime = 10 cents
1 quarter = 25 cents
1 half dollar = 50 cents
1 dollar ($) = 100 cents

SYMBOLS
$<$ is less than
$>$ is greater than
$=$ is equal to