SEACREST
COUNTRY DAY SCHOOL

Rising 7th Grade Summer Packet

Name: ______________________________

Please show ALL work to receive full credit.

The work in this packet is taken from the "Recall Prior Knowledge" sections in the 7th grade math textbook. It is designed to help students review key concepts that will support their success in next year's course. While much of the content reinforces material already covered, some topics may be unfamiliar. This is intentional and meant to give students a preview of upcoming concepts and an opportunity to stretch their thinking. We encourage students to try their best, and it's completely okay if they don't master every problem—just attempting the work is a valuable part of the learning process.

Have a great summer doing math!

SEACREST
COUNTRY DAY SCHOOL

June 2025

There are 5 chapter reviews to complete in June. Suggested pacing is below:

June 2-6:	Chapter 1
June 9-13:	Chapter 2-3
June 16-20:	Chapter 4
June 23-27:	Chapter 5

Chapter 1

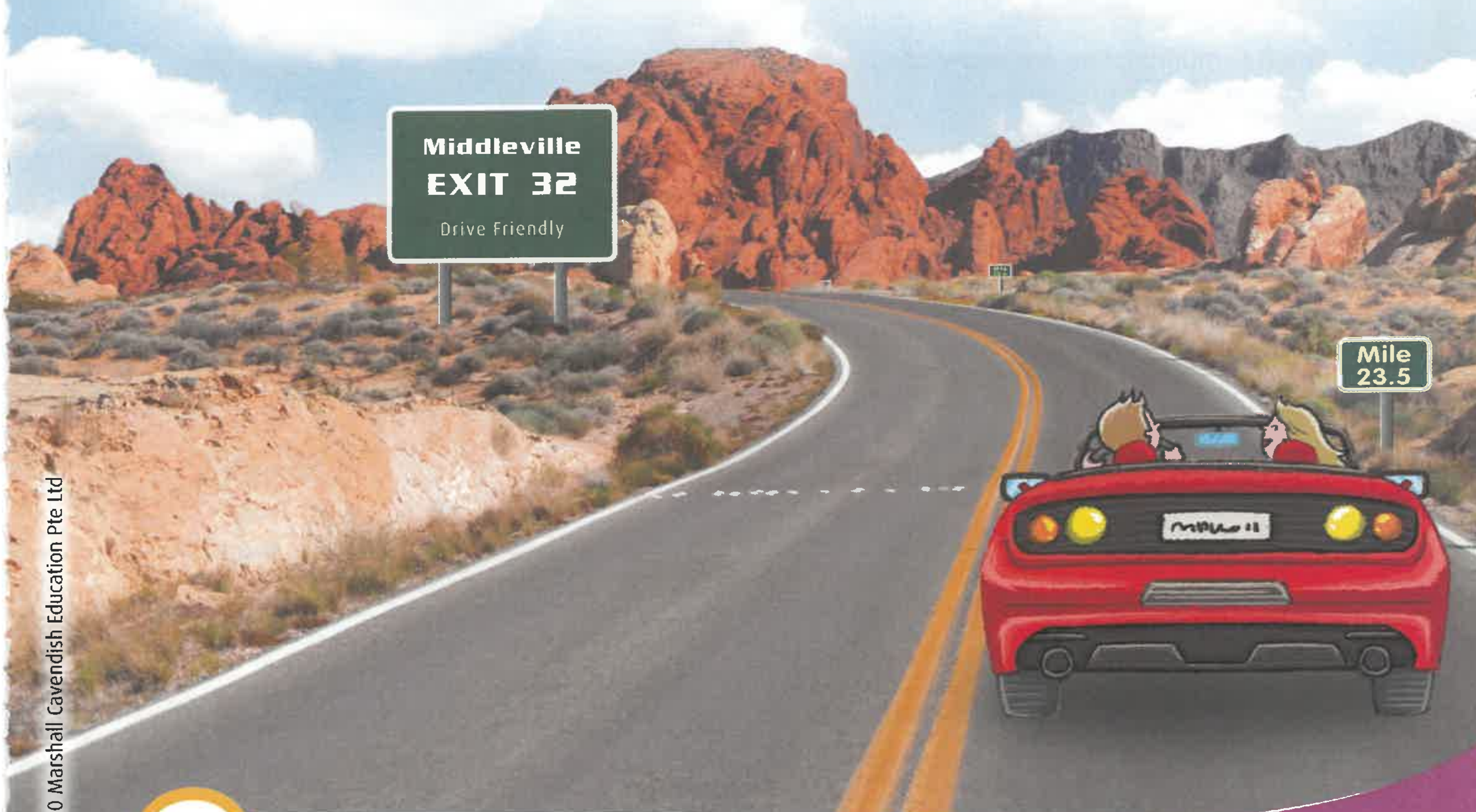
Rational Numbers

How far is it?

Have you ever been on a long road trip, perhaps even across state lines? Whether you stayed within your state or traveled to another, you probably noticed a variety of signs along the way. There are always speed-limit signs, of course. Some warn drivers not to travel too slowly. But most warn drivers not to go beyond a maximum driving speed.

Then, there are signs that alert drivers to how far away certain places are, like the next gas station, restaurant, or roadside attraction. There are also small, green signs called mile markers, which indicate the distance from a state line. If you think of a state line as 0 on a number line, then the mile markers are the tick marks on that number line. Emergency-service providers can use the signs to locate accident scenes. Ordinary drivers can use them to estimate the distance to an exit.

In this chapter, you will learn how to represent rational numbers on the number line. You will also learn to add, subtract, multiply, and divide rational numbers as you solve a variety of real-world problems.



How is adding, subtracting, multiplying, and dividing rational numbers similar to performing operations with whole numbers?

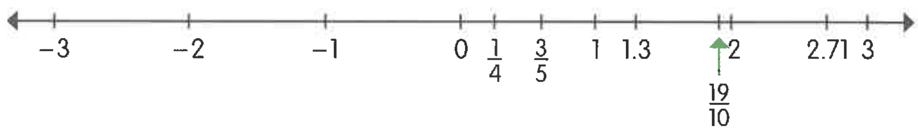
RECALL PRIOR KNOWLEDGE

Name: ______________________ Date: ____________

Recognizing types of numbers

Type of Number	Whole Numbers	Negative Numbers	Fractions	Decimals
Examples	0, 1, 2, 3	−1, −2, −3	$\frac{1}{4}, \frac{3}{5}, \frac{19}{10}$	1.3, 2.71

Graph the numbers in the table on a horizontal number line.



You can also graph the numbers on a vertical number line.

▶ Quick Check

Graph each number on a horizontal number line. Then, order the numbers from least to greatest.

1. $\frac{11}{17}, 1\frac{3}{5}, 0.3, 1.6, \frac{19}{10}$

Comparing decimals

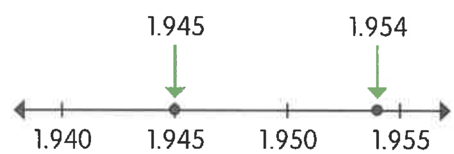
When comparing two decimals, 1.945 and 1.954, you may use a place value chart to determine which decimal is greater.

	Ones	Tenths	Hundredths	Thousandths
1.945	1 .	9	4	5
1.954	1 .	9	5	4

The two decimals have the same values in ones and tenths. So, we compare hundredths. In the hundredths place, 4 < 5. So, 1.954 is greater than 1.945.

You can also use a number line to compare the decimals.

From the number line, you can see that 1.954 lies to the right of 1.945. So, 1.954 > 1.945.



▶ Quick Check

Compare each pair of numbers using <, >, or =. Draw a number line to help you.

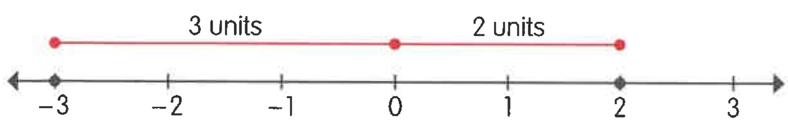
2. 3.87 ◯ 3.68
3. 0.982 ◯ 0.982
4. 5.23 ◯ 5.235

Determining absolute values

The absolute value of a number n is denoted by $|n|$.

Examples: $|2| = 2$, $|-3| = 3$

The absolute value of a number is a measure of its distance from 0.



The distance from –3 to 0 is 3 units.

The distance from 2 to 0 is 2 units.

Quick Check

Use the following set of numbers for 5 to 9.

34, –23, –54, 54, –60

5. Find the absolute value of each number.
6. Which number is closest to 0?
7. Which number is farthest from 0?
8. Name two numbers with the same absolute value.
9. Which number has the greatest absolute value?

Draw a number line to find the absolute value of each number.

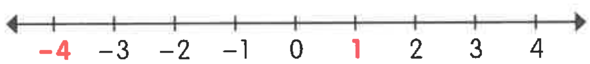
10. $|-15|$
11. $|6|$
12. $|-2.1|$

Compare each pair of numbers using <, >, or =.

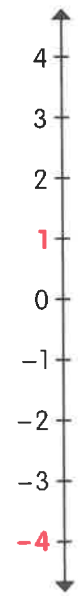
13. $|-7|$ ◯ $|-72|$
14. $|5|$ ◯ $|-5|$
15. $|-26|$ ◯ $|7|$

Comparing numbers on a number line

You can use a number line to compare numbers. On a horizontal number line, the lesser number lies to the left of the greater number. On a vertical number line, the lesser number lies below the greater number.



Horizontal Number Line



Vertical Number Line

$-4 < 1$, because -4 is to the left of 1 on the horizontal number line, and -4 is below 1 on the vertical number line.

Quick Check

Compare each pair of numbers using > or <. Draw a number line to help you.

16. $-3 \bigcirc 5$
17. $-7 \bigcirc -12$
18. $10 \bigcirc -16$
19. $-28 \bigcirc 0$
20. $\frac{1}{2} \bigcirc \frac{3}{4}$
21. $-1\frac{1}{4} \bigcirc 2\frac{2}{3}$
22. $0.15 \bigcirc 0.13$
23. $-1.23 \bigcirc -1.25$

RECALL PRIOR KNOWLEDGE

Using order of operations to simplify numerical expressions

STEP 1 Perform operations within parentheses.

STEP 2 Evaluate exponents.

STEP 3 Multiply and divide from left to right.

STEP 4 Add and subtract from left to right.

Evaluate $(58 - 16) + 7 \cdot 3$.

$(58 - 16) + 7 \cdot 3$
$= 42 + 7 \cdot 3$ Perform operations in parentheses.
$= 42 + 21$ Then, multiply.
$= 63$ Then, add.

Quick Check

Evaluate each expression.

24 $75 - (18 + 2) \cdot 3$

25 $15 \cdot (40 \div 8) + 72$

Expressing improper fractions and mixed numbers in other forms

You can express improper fractions as mixed numbers.

$\frac{19}{4} = \frac{16}{4} + \frac{3}{4}$ Rewrite the fraction as a sum.

$= 4 + \frac{3}{4}$ Write the improper fraction as a whole number.

$= 4\frac{3}{4}$ Then, write the sum as a mixed number.

You can express mixed numbers as improper fractions.

$2\frac{1}{5} = 2 + \frac{1}{5}$ Rewrite the mixed number as a sum.

$= \frac{10}{5} + \frac{1}{5}$ Write the whole number as a fraction.

$= \frac{11}{5}$ Then, write the sum as an improper fraction.

Quick Check

Express each improper fraction as a mixed number.

26 $\frac{12}{7}$

27 $\frac{19}{3}$

Express each mixed number as an improper fraction.

28 $4\frac{3}{5}$

29 $6\frac{7}{9}$

RECALL PRIOR KNOWLEDGE

Adding and subtracting fractions

You can add and subtract fractions with unlike denominators.

$5\frac{2}{3} + 1\frac{3}{4} = 5 + \frac{2}{3} + 1 + \frac{3}{4}$	Rewrite the sum.
$= 6 + \frac{2}{3} + \frac{3}{4}$	Add the whole numbers.
$= 6 + \frac{2 \cdot 4}{3 \cdot 4} + \frac{3 \cdot 3}{4 \cdot 3}$	Rewrite the fractions as fractions with a common denominator.
$= 6 + \frac{8}{12} + \frac{9}{12}$	Simplify the products.
$= 6 + \frac{17}{12}$	Add the fractions.
$= 6 + 1\frac{5}{12}$	Write the improper fraction as a mixed number.
$= 7\frac{5}{12}$	Write the sum as a mixed number.

Quick Check

Add or subtract. Express each answer in simplest form.

30 $\frac{2}{3} + \frac{5}{4}$

31 $\frac{7}{8} - \frac{2}{3}$

32 $1\frac{1}{4} + 3\frac{2}{5}$

Multiplying and dividing fractions

You can multiply two fractions.

Method 1

$\frac{2}{3} \cdot \frac{3}{4} = \frac{2 \cdot 3}{3 \cdot 4}$ Multiply the numerators. Multiply the denominators.

$= \frac{6}{12}$ Simplify the product.

$= \frac{1}{2}$ Write the fraction in simplest form.

Method 2

$\frac{2}{3} \cdot \frac{3}{4} = \frac{\cancel{2}^{1}}{3} \cdot \frac{3}{{}_{2}\cancel{4}}$ Divide a numerator and a denominator by the common factor, 2.

$= \frac{1}{{}_{1}\cancel{3}} \cdot \frac{\cancel{3}^{1}}{2}$ Divide a numerator and a denominator by the common factor, 3.

$= \frac{1 \cdot 1}{1 \cdot 2}$ Multiply the numerators. Multiply the denominators.

$= \frac{1}{2}$ Simplify the product.

You can divide a fraction by another fraction.

$\frac{3}{4} \div \frac{3}{8} = \frac{3}{4} \cdot \frac{8}{3}$ Rewrite using the reciprocal of the divisor.

$= \frac{3}{{}_{1}\cancel{4}} \cdot \frac{\cancel{8}^{2}}{3}$ Divide a numerator and a denominator by the common factor, 4.

$= \frac{\cancel{3}^{1}}{1} \cdot \frac{2}{{}_{1}\cancel{3}}$ Divide a numerator and a denominator by the common factor, 3.

$= \frac{1 \cdot 2}{1 \cdot 1}$ Multiply the numerators. Multiply the denominators.

$= 2$ Simplify the product.

Quick Check

Multiply or divide. Express each answer in simplest form.

33. $\frac{2}{9} \cdot \frac{3}{4}$

34. $1\frac{2}{3} \cdot 5$

35. $\frac{5}{8} \div \frac{21}{4}$

36. $\frac{3}{4} \div 1\frac{1}{2}$

Multiplying and dividing decimals

Ignore the decimal as you multiply. Then, decide where to place the decimal point in the product.

$$\begin{array}{rl} \overset{1}{3}.6\ 2 & \longleftarrow \quad 2 \text{ decimal places} \\ \times \quad 0.3 & \longleftarrow \quad + 1 \text{ decimal place} \\ \hline 1\ 0\ 8\ 6 & \\ 0\ 0\ 0 & \\ \hline 1.0\ 8\ 6 & \longleftarrow \quad 3 \text{ decimal places} \end{array}$$

You can express the division expression as a fraction when you divide by a decimal. Then, multiply the dividend and divisor by the same power of 10.

$17.8 \div 0.25 = \frac{17.8}{0.25}$ Write division as a fraction.

$= \frac{17.8 \cdot 100}{0.25 \cdot 100}$ Multiply both the numerator and the denominator by 100 to make the denominator a whole number.

$= \frac{1{,}780}{25}$ Simplify the product.

$= 71.2$ Divide as with whole numbers.

Quick Check

Multiply or divide.

37 $15.8 \cdot 2.7$

38 $8.82 \div 0.6$

Chapter 2

Algebraic Expressions

How much does it cost?

When is the last time you went on a school field trip? Where did you go? Perhaps you visited a local museum, an aquarium, or a national monument such as the Statue of Liberty National Monument. Or perhaps you visited one of the locations on the National Register of Historic Places. Those include places as small as a one-room schoolhouse in Iowa and as large as the Grand Canyon in Arizona.

Most field trips come with expenses. After all, you probably traveled by bus, paid for an entrance ticket, and took time for lunch. Before leaving, your teacher planned ahead, using algebraic expressions to calculate the costs for a given number of students.

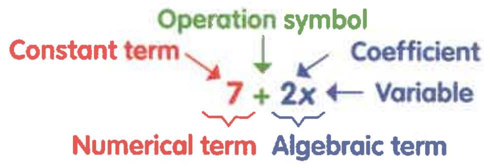
In this chapter, you will learn how to write algebraic expressions and to use algebraic reasoning to solve real-world problems, such as how much does it cost to go on a field trip.

How do you simplify, expand, or factor algebraic expressions?

Name: ______________________ Date: ____________

Recognizing parts of an algebraic expression

A variable can be used to represent an unknown value or quantity. An algebraic expression is a mathematical phrase that includes variables, numbers, and operation symbols.



Quick Check

Consider the algebraic expression 3x + 4. Then, answer each question.

1. How many terms are there?
2. What is the coefficient of the algebraic term?
3. What is the constant term?
4. What is the operation symbol?

Evaluating algebraic expressions

Evaluate an algebraic expression by replacing all its variables with their assigned values.

Given that $a = 5$ in the expression $2a - 3$, find the value of the expression.

$$\begin{aligned} 2a - 3 &= (2 \cdot 5) - 3 \\ &= 10 - 3 \\ &= 7 \end{aligned}$$

Quick Check

5. Fill in the table.

x	x + 9	7x	5x – 2
0	0 + 9 = 9		
2			
–1			
7			

Simplifying algebraic expressions

Simplify expressions by adding or subtracting the coefficients of like terms (terms that have the same variables with the same corresponding exponents). Algebraic terms cannot be added to or subtracted from constant terms.

Can be Simplified	Cannot be Simplified
• $4a + 3 + 6 = 4a + 9$ • $6x - 2x + 5 = 4x + 5$	• $4x + 3y + 7$ has no like terms. • $2a - b + 3$ has no like terms.

Quick Check

State whether each expression can be simplified. Explain your reasoning.

6 $2k - 3 + k$

7 $7x + 3 - 3y$

8 $6u + 5w - 1$

9 $4g - 3g - g$

Simplify each expression.

10 $4t + 1 + 6$

11 $5p - 5p$

12 $4y + 5y + 3$

13 $4m - 3m - 3$

Expanding algebraic expressions

Expand algebraic expressions by applying the distributive property to remove the parentheses.

$$\begin{aligned} 3(p + 2) &= 3(p) + 3(2) \\ &= 3p + 6 \end{aligned}$$

$$\begin{aligned} 6(w - 4) &= 6(w) - 6(4) \\ &= 6w - 24 \end{aligned}$$

Quick Check

Expand each expression.

14 $4(h + 2)$

15 $5(4 + 5c)$

16 $3(4x - 11)$

17 $7(3 - 5p)$

RECALL PRIOR KNOWLEDGE

Factoring algebraic expressions

Factoring is the inverse of expansion. Factor an algebraic expression by writing it as a product of its factors. Use the distributive property to factor expressions whose terms have a common factor.

$2x + 10 = 2(x) + 2(5)$ The common factor of $2x$ and 10 is 2.
$= 2(x + 5)$

Quick Check

Factor each expression.

18 $6m + 3$

19 $4v + 14$

20 $10p - 2$

21 $6 - 18c$

Recognizing equivalent expressions

Equivalent expressions are expressions that are equal for any values of the variables. Use an equal sign to relate equivalent expressions.

$4(x + 3)$ and $4x + 12$ are equivalent expressions because they are equal for all values of x. So, you can write $4x + 12 = 4(x + 3)$.

Quick Check

Choose an equivalent expression.

22 $6y - 3$ is equivalent to

a $3(3y - 1)$ b $3(2y - 1)$ c $3(2y - 3)$ d $6(3y - 1)$

Writing algebraic expressions to represent unknown quantities

Mason is 2 years older than his brother Evan.

- When Evan is 12 years old, Mason will be $(12 + 2) = 14$ years old.
- When Evan is x years old, Mason will be $(x + 2)$ years old.

Quick Check

***x* is an unknown number. Write an expression for each of the following.**

23 7 more than the number

24 Product of 8 and the number

25 5 less than twice the number

26 3 more than half the number

Chapter 3

Algebraic Equations and Inequalities

How much can you raise?

There are many good causes that you can walk, run, or swim to support. Participating in a sport for charity is good for you, and good for the organizations that receive the money you raise.

The first step is to find a charity you want to support. Perhaps you see a sign or receive an online notice. You register, and the organization sends you volunteer materials, including a fundraising form. You explain the purpose of the event to friends and family members, and you invite them to donate money. Some supporters donate a specific amount. Others donate an amount for every mile you walk, run, or swim. You can use algebraic equations to calculate how much you will need to collect from each supporter after the event.

In this chapter, you will learn how to use algebraic equations and inequalities to represent and solve a variety of real-world problems similar to this one.

How do you solve algebraic equations and inequalities?

Name: ________________________________ Date: ______________

Solving algebraic equations by balancing

You can use inverse operations to solve an equation. When you do, keep the equation balanced by performing addition, subtraction, multiplication, or division by the same nonzero number on both sides.

Addition ⟷ is the inverse of ⟷ Subtraction

Multiplication ⟷ is the inverse of ⟷ Division

Solve each equation.

a $x + 2 = 9$

$$x + 2 = 9$$
$$x + 2 - 2 = 9 - 2 \quad \text{Subtract 2 from both sides.}$$
$$x = 7 \quad \text{Simplify.}$$

b $\frac{2}{3}x = 2$

$$\frac{2}{3}x = 2$$
$$\frac{2}{3}x \div \frac{2}{3} = 2 \div \frac{2}{3} \quad \text{Divide both sides by } \frac{2}{3}.$$
$$\frac{2}{3}x \cdot \frac{3}{2} = 2 \cdot \frac{3}{2} \quad \text{Rewrite division as multiplication by the reciprocal of } \frac{2}{3}.$$
$$x = 3 \quad \text{Simplify.}$$

Quick Check

Solve each equation.

1. $x + 4 = 10$

2. $x - \frac{1}{2} = 2$

3. $\frac{1}{5}x = 3$

4. $1.2x = 2.4$

Solving algebraic equations by substitution

You can use substitution to solve an algebraic equation.

Solve $x + 6 = 8$.

If $x = 1$, $\quad x + 6 = 1 + 6$ $\quad$ Substitute 1 for x.
$\qquad\qquad\qquad = 7 \quad (\neq 8)$ $\quad$ 1 is not the solution.

If $x = 2$, $\quad x + 6 = 2 + 6$ $\quad$ Substitute 2 for x.
$\qquad\qquad\qquad = 8$ $\quad$ 2 is the solution.

The equation $x + 6 = 8$ is true when $x = 2$.
$x = 2$ gives the solution of the equation $x + 6 = 8$.

▶ Quick Check

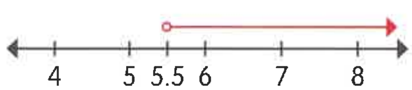
State whether each statement is True or False.

5. $x = 1$ gives the solution of the algebraic equation $3x + 5 = 8$.
6. $y = 2$ gives the solution of the algebraic equation $6y - 3 = 8$.
7. $z = 6$ gives the solution of the algebraic equation $\frac{z}{3} = 3$.
8. $w = 3$ gives the solution of the algebraic equation $2w = 6$.

Graphing inequalities on a number line

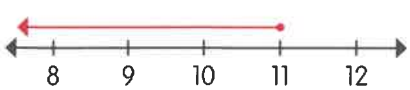
You can represent an inequality on a number line using circles and arrows.

$p > 5.5$



Use an empty circle to show that 5.5 is not a solution of the inequality.

$q \leq 11$



Use a shaded circle to show that 11 is a solution of the inequality.

▶ Quick Check

Draw a number line to represent each inequality.

9. $x \geq 3.5$
10. $y < \frac{1}{2}$

RECALL PRIOR KNOWLEDGE

Writing algebraic inequalities

Use $>$, $>$, $\geq$, $\leq$, or $\neq$ to compare unequal quantities or quantities that may not be equal.

Verbal Descriptions	Algebraic Inequality
The cost of an apple, *a*, is not $3.	$a \neq 3$
The cost of a greeting card, *c*, is less than $6.	$c < 6$
The mass of the strawberries, *s*, is more than 500 grams.	$s > 500$
The width of the pond, *w*, is at most 5 meters. OR The width of the pond, *w*, is no more than 5 meters. OR The width of the pond, *w*, is less than or equal to 5 meters.	$w \leq 5$
The length of the ribbon, *r*, is at least 10 inches. OR The length of the ribbon, *r*, is no less than 10 inches. OR The length of the ribbon, *r*, is greater than or equal to 10 inches.	$r \geq 10$

▶ Quick Check

Compare each pair of numbers or expressions using <, >, or =.

11. $11 \bigcirc -12$

12. $-9 \bigcirc -7$

13. $25 \cdot (-1) \bigcirc (-1) \cdot 25$

14. $3 \div (-1) \bigcirc (-1) \div 3$

Use *x* to represent the unknown quantity. Write an algebraic inequality for each statement.

15. The box can hold less than 70 pounds.

16. You have to be at least 17 years old to qualify for the contest.

17. The width of luggage that you can carry onto the plane is at most 17 inches.

18. There are more than 120 people standing in line for the roller coaster.

Chapter 4

Proportion and Percent of Change

What Do Muralists Do?

Some artists think big. Visit almost any large American city, and you are likely to find the work of muralists, fine artists who paint directly onto walls, ceilings, or both. While some of their paintings may be life-sized, others are much larger. And while some are decorative, others serve a different purpose. They may advertise products or deliver social messages.

Muralists are concerned with proportional relationships. Before they begin painting, muralists sketch their designs. An object only 3 inches tall in a sketch, for example, may ultimately be 100 times taller on a wall. The length of each object in the sketch increases proportionately by a certain percent. Muralists use the percent proportion to turn a sketch drawn on a piece of paper into art that covers walls. In this chapter, you will learn about proportional relationships to solve real-world problems.

What happens to the proportion when variables in direct or inverse proportion change?

Name: ______________________ Date: ____________

Comparing quantities using a ratio

A ratio compares two or more numbers or quantities. You can write a ratio of two quantities, such as 7 and 8, in three ways: 7 to 8, 7 : 8, or $\frac{7}{8}$. The numbers 7 and 8 are the terms of the ratio. You can express a ratio in simplest form by dividing its terms by their greatest common factor (GCF).

Quick Check

Write a ratio in simplest form to compare each of the following.

A store sells 60 headphones, 45 sets of earbuds, and 80 speakers.

1. The number of speakers to the number of sets of earbuds.

2. The number of headphones to the number of speakers.

Recognizing equivalent ratios

Equivalent ratios show the same comparison of numbers and quantities. They have the same ratio in simplest form. You can obtain equivalent ratios by multiplying or dividing both terms of a ratio by the same number.

× 2 (3 : 20 = 6 : 40) × 2

÷ 5 (15 : 100 = 3 : 20) ÷ 5

So, 3 : 20, 6 : 40, and 15 : 100 are equivalent ratios.
Since 3 and 20 have no common factors except 1, the ratio 3 : 20 is in simplest form.

Quick Check

State whether each pair of ratios are equivalent.

3. 9 : 11 and 18 : 22

4. $\frac{1}{33}$ and $\frac{33}{1}$

5. 3 to 6 and 9 to 18

State whether each ratio is in simplest form. Then, write two ratios that are equivalent to the given ratio.

6. 4 : 5

7. $\frac{15}{100}$

8. 7 to 14

RECALL PRIOR KNOWLEDGE

Finding rates and unit rates

A rate compares two quantities with different units.
A unit rate compares a quantity to one unit of another quantity. For example, speed is a unit rate that compares distance traveled to a given unit of time.

Mia reads 7 books in two weeks. Find her reading speed in books per day.

14 days ⟶ 7 books

1 day ⟶ $\frac{7}{14} = \frac{1}{2}$ book

Mia reads $\frac{1}{2}$ book per day.

Quick Check

Find the unit rate.

9. The winner of the first Tour de France bicycle race in 1903 was Maurice Garin. It took him over 94 hours to complete 2,428 kilometers. Find his approximate average speed. Round your answer to the nearest whole number.

Find and compare the unit rate for each item.

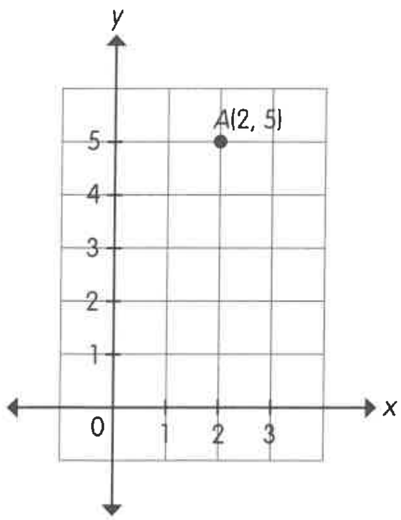
The cost of a food item at two different stores is shown. Find the unit price at each store and state where the item costs less.

10. Store A: $3.20 for 16 oz of walnuts.
Store B: $2.30 for 10 oz of walnuts.

11. Store C: $2.13 for 3 lb of potatoes.
Store D: $3.35 for 5 lb of potatoes.

RECALL PRIOR KNOWLEDGE

Identifying and plotting coordinates



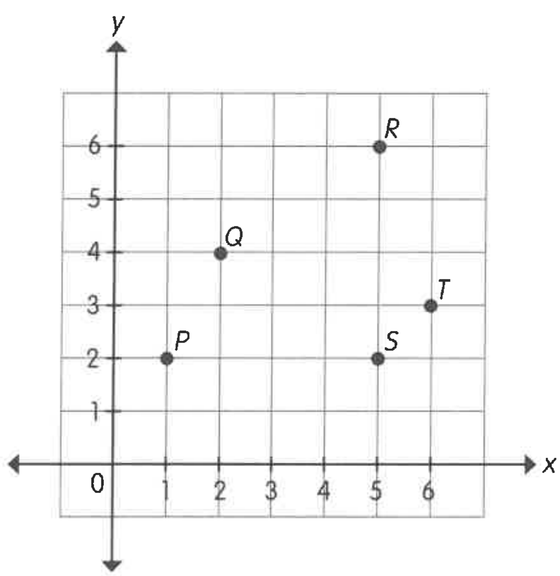
An ordered pair (*x*, *y*) is used to represent the location of a point on a graph.

Point *A* (2, 5) represents the location of a point that is 2 units to the right of the origin, and 5 units up from the origin. The *x*-coordinate of point *A* is 2 and the *y*-coordinate is 5.

The coordinates of the origin are (0, 0).

Quick Check

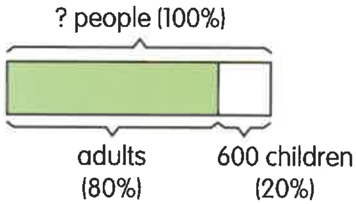
Use the coordinate plane below.



12 Give the coordinates of points *P*, *Q*, *R*, *S*, and *T*.

Solving percent problems

At an art exhibition, 80% of the people were adults, and the rest were children. Given that there were 600 children, how many people were at the art exhibition?



From the bar model,

20% ⟶ 600

1% ⟶ $\frac{600}{20} = 30$

100% ⟶ $30 \cdot 100 = 3{,}000$

There were 3,000 people at the art exhibition.

▶ Quick Check

Solve.

13. 45% of the beads in a box are blue. Given that there are 36 blue beads in the box, how many beads are there in all?

14. Taylor bought a model car priced at $72. She also had to pay a 5% sales tax. What was the total amount she paid?

Chapter 5

Angle Properties and Straight Lines

Can you make that basket?

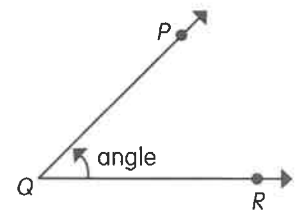
In basketball, the "launch angle" has a big effect on a player's chance of scoring. The launch angle is the acute angle the ball makes with the floor when the ball leaves the player's hands. The "release point," or the distance the player's hands are from the floor when the ball is released also affects the chances of scoring. Studies have shown that successful scorers tend to have a relatively high launch angle and release point. In this chapter, you will learn about various angle relationships.

What are some special properties formed by angles on a straight line, angles at a point, and parallel lines and a transversal?

Name: ______________________ Date: ______________

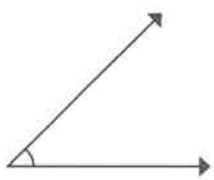
Classifying angles

An angle is formed by two rays that share a common endpoint called a vertex. Angles can be named by letters or numbers. You can name this angle $\angle Q$, $\angle PQR$, or $\angle RQP$.

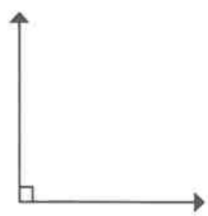


Angles are measured in degrees. The symbol for degrees is °. The statement $m\angle PQR = 45°$ means "the measure of angle PQR equals 45°."

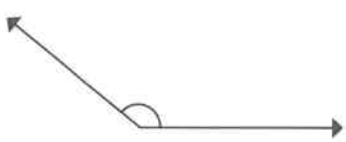
You can classify angles according to their measures.



This is an acute angle.
Its measure is less than 90°.



This is a right angle.
Its measure is exactly 90°.

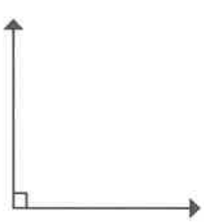


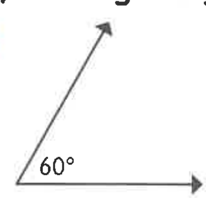
This is an obtuse angle.
Its measure is greater than 90° but less than 180°.

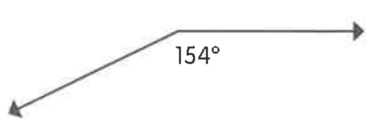
This is a straight angle.
Its measure is exactly 180°.

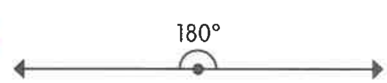
▶ Quick Check

State whether each angle is an acute, right, obtuse, or straight angle.

1. 

2. 

3. 

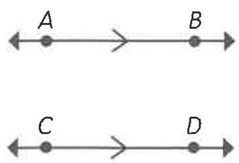
4. 

5. $m\angle w = 86°$

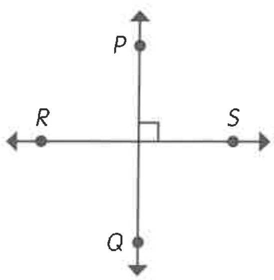
6. $m\angle y = 90°$

Identifying parallel lines and perpendicular lines

When two lines in the same plane do not intersect, they are parallel to each other. They are always the same distance apart. In the figure below, $\overleftrightarrow{AB}$ is parallel to $\overleftrightarrow{CD}$. You can write $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$.



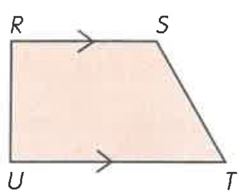
When two lines intersect to form a 90° angle, they are perpendicular to each other. In the figure below, $\overleftrightarrow{PQ}$ is perpendicular to $\overleftrightarrow{RS}$. So, you can write $\overleftrightarrow{PQ} \perp \overleftrightarrow{RS}$.



▶ Quick Check

Identify each pair of parallel line segments.

7



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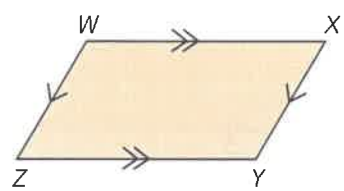
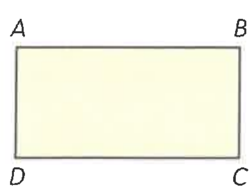


Identify each pair of perpendicular line segments.

9 *ABCD* is a rectangle.



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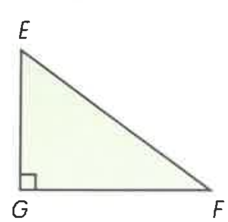

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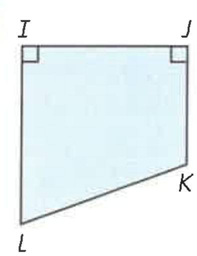
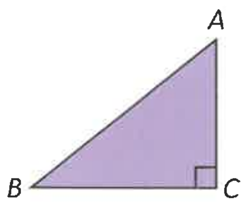


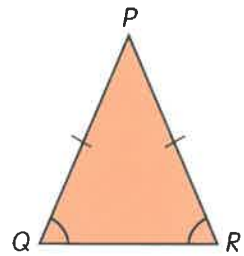
Identifying right, isosceles, and equilateral triangles

You can classify triangles according to their lengths of sides or angle measures.



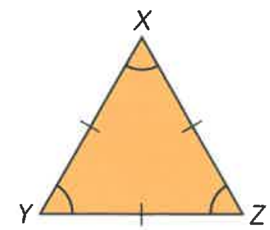
A right triangle has one right angle.

Triangle *ABC* is a right triangle. One of its angles is 90°.



In an isosceles triangle, the angles opposite the equal sides are equal.

In triangle *PQR*, *PQ* = *PR*. So, ∠*PQR* = ∠*PRQ*.



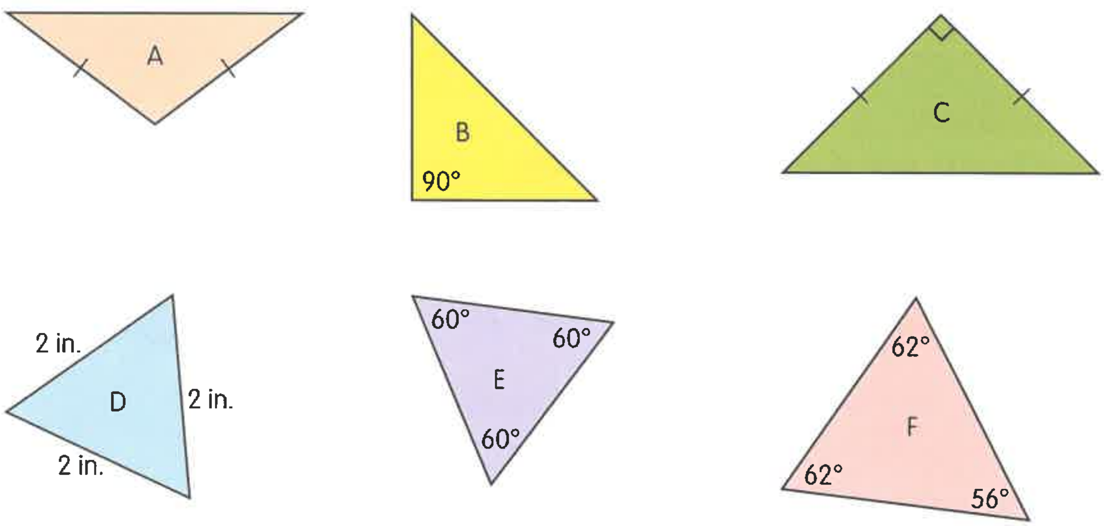
An equilateral triangle has three equal sides and three equal angles.

In triangle *XYZ*, *XY* = *YZ* = *XZ*. So, ∠*XYZ* = ∠*YZX* = ∠*ZXY*.

Quick Check

Classify the triangles. Then, fill in the table.

12



Right triangles	Isosceles triangles	Equilateral triangles

SEACREST
COUNTRY DAY SCHOOL

July 2025

There are 4 chapter reviews to complete in July. Suggested pacing is below:

July 7-11:	Chapter 6
July 14-18:	Chapter 7
July 21-25:	Chapter 8
July 28-31:	Chapter 9

Chapter 6

Geometric Construction

Have you ever seen a garden maze?

A landscape architect designs outdoor spaces such as gardens and parks. In some of the more interesting gardens, you will find mazes built out of stonewalls or hedging plants. To be able to design a garden maze, a landscape architect needs to understand how geometric shapes fit together, and how their lines and angles are related to each other. A landscape architect often uses a scale drawing to visualize and design the layout of a garden before it is built. In this chapter, you will learn about geometric constructions and scale drawings.

How can you use geometric constructions and scale drawings to solve real-world problems?

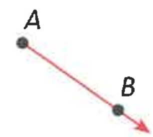
RECALL PRIOR KNOWLEDGE

Name: ______________________ Date: ____________

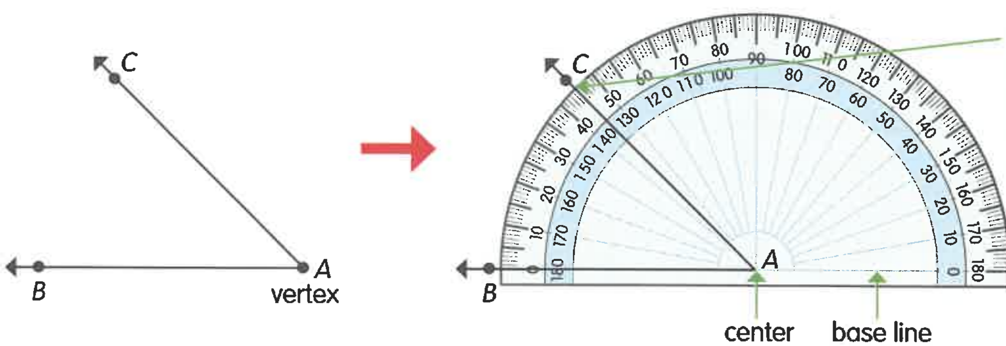
Using a protractor to measure an angle in degrees

A ray starts from one endpoint and extends infinitely in one direction. It is specified by a point and a direction. A ray has one endpoint that marks the position from where it begins.

A ray starting from point A and passing through B is called $\overrightarrow{AB}$, which is read as "ray AB." The endpoint is written and read first.



Use the following steps to find the measure of an angle with a protractor.



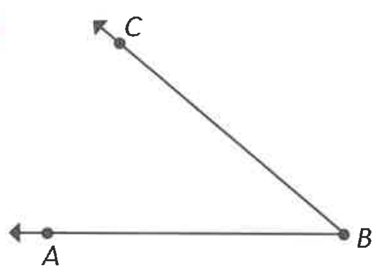
STEP 1 Place the base line of the protractor on ray $\overrightarrow{AB}$.

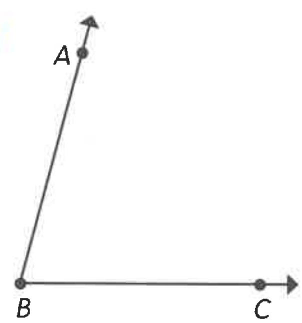
STEP 2 Place the center of the base line of the protractor at the vertex of the angle.

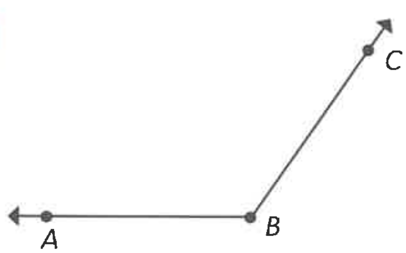
STEP 3 Read the outer scale. Ray $\overrightarrow{AC}$ passes through the 45° mark. So, the measure of the angle is 45°.

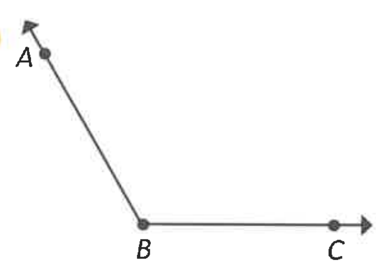
Quick Check

Use a protractor to find the measure of $\angle ABC$.

1. 

2. 

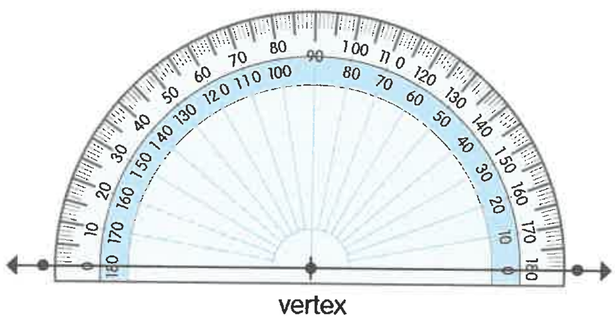
3. 

4. 

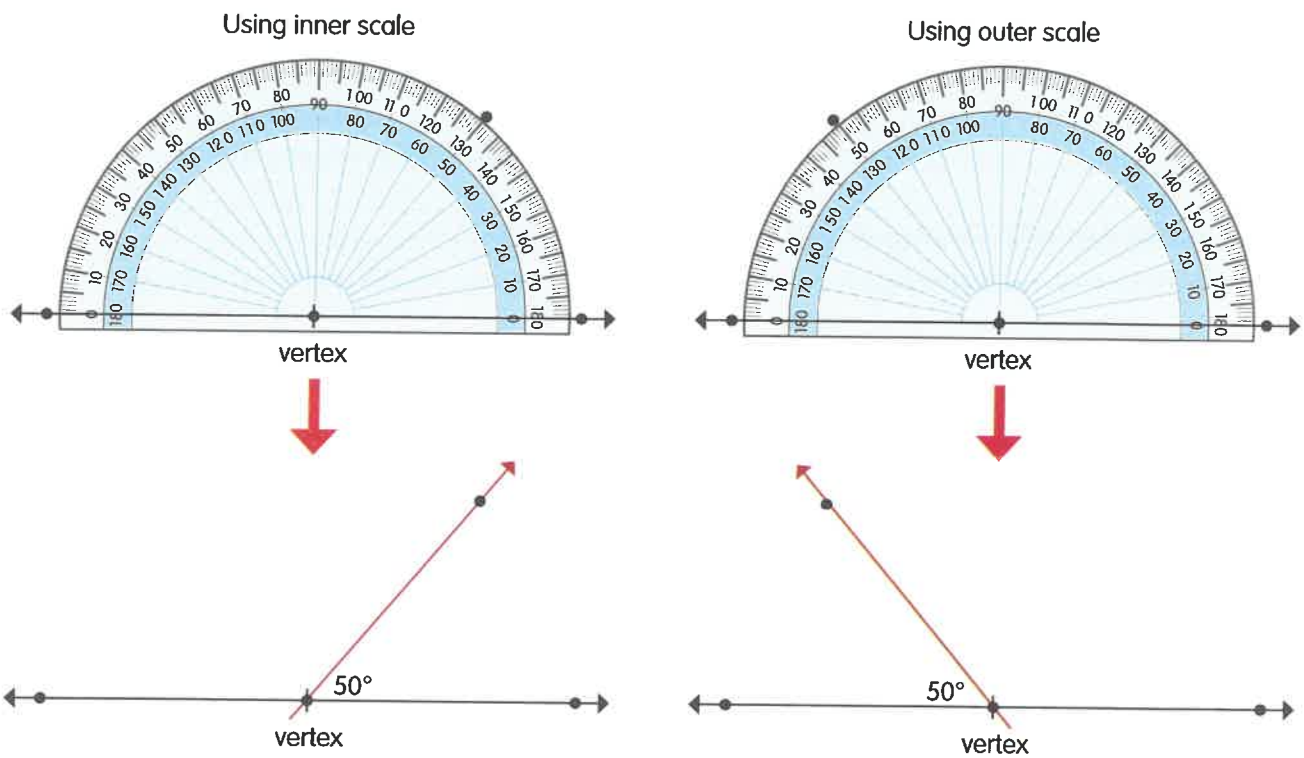
Using a protractor to draw angles

STEP 1 Draw a line and mark a point on the line. This point is the vertex.

STEP 2 Place the base line of the protractor on the line and the center of the base line on the vertex.



STEP 3 Use the inner scale or the outer scale to find the correct measure. For example, to draw an angle of 50°, find the 50° mark and draw a dot at that mark. Then, draw a ray from the vertex through the dot.



Quick Check

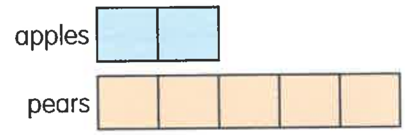
Use a protractor to draw each angle in two ways.

5. m∠DEF = 39°

6. m∠PQR = 146°

Relating ratio and fraction

You can write a ratio as a fraction.



There are 2 apples and 5 pears on a plate.
The ratio of the number of apples to the number of pears is 2 : 5.
The same ratio can be expressed as a fraction:

$$\frac{\text{Number of apples}}{\text{Number of pears}} = \frac{2}{5}$$

The number of apples is $\frac{2}{5}$ the number of pears.

▶ Quick Check

Write each fraction.

Rachel and Jack shared an amount of money in the ratio of 7 : 3.

7. The amount of money Jack has is ________ of the amount of money Rachel has.
8. The amount of money Rachel has is ________ of the amount of money Jack has.
9. The amount of money Rachel has is ________ of the total amount of money.

Finding rate

Rate is the amount of quantity per unit of another quantity. You can find rates given the two quantities, or find one of the quantities given the rate and the other quantity.

A machine cans 800 bottles of drinks in 10 minutes.

10 minutes ⟶ 800 bottles

1 minute ⟶ $\frac{800}{10}$ = 80 bottles

The machine cans bottles of drinks at a rate of 80 bottles per minute.

▶ Quick Check

Answer each question.

10. The cost of gas is $2.71 per gallon in a city. At this rate, what is the price of
    a. 10 gallons of gas?
    b. 45 gallons of gas?

Chapter 7

Circumference, Area, Volume, and Surface Area

How are crop circles made?

Crop circles are large geometric patterns of flattened crops, said to have first appeared in the countryside of the United Kingdom in the 1970s. The number of crop circle sightings peaked in the 1980s and 1990s, when increasingly elaborate circular patterns were discovered, including some that illustrated complex mathematical equations.

There are many theories as to how crop circles were created. One common belief is that they are messages from intelligent extraterrestrial life! However, many have proved to be the work of clever pranksters. In this chapter, you will learn to solve problems involving two- and three-dimensional figures such as circles and prisms, including many that you see in everyday life.

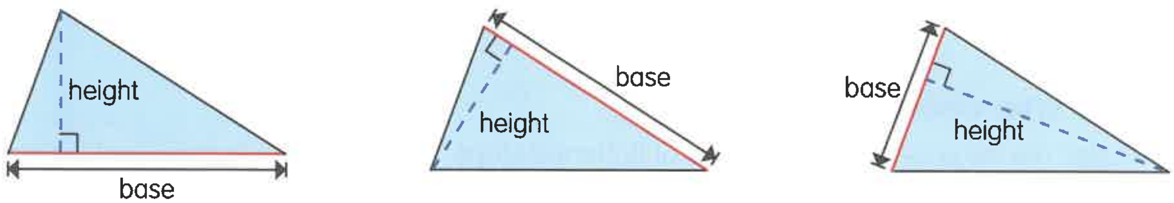
How can you use geometric figures such as circles and prisms to solve real-world problems?

RECALL PRIOR KNOWLEDGE

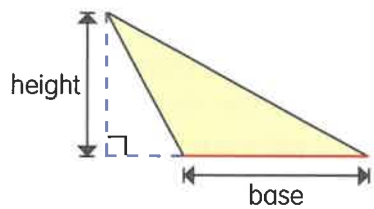
Name: ______________________ Date: ____________

Finding the area of a triangle

Any side of a triangle can be its base. The perpendicular distance from the opposite vertex to the base is the height of the triangle.



The height of a triangle may lie outside the triangle.



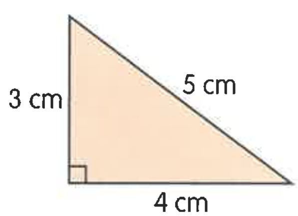
Area of triangle $= \frac{1}{2} \cdot \text{base} \cdot \text{height}$

$= \frac{1}{2}bh$

▶ Quick Check

Find the area of each shaded triangle.

1.



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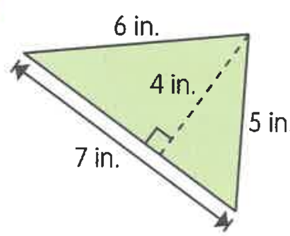

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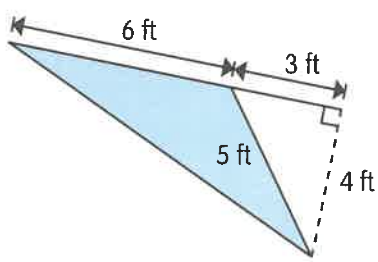

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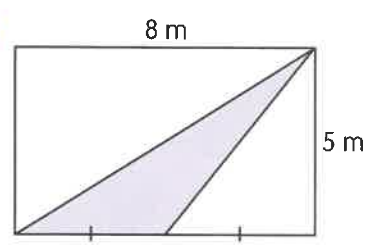
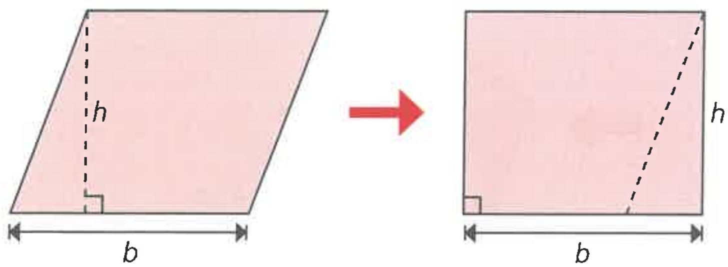


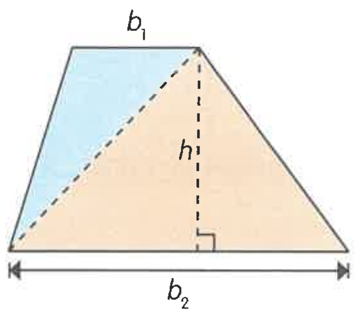
Finding the area of a parallelogram and a trapezoid

a In the parallelogram, b is the base and h is the height.



Area of parallelogram = bh

b In the trapezoid, b_1 and b_2 are the bases and h is the height.

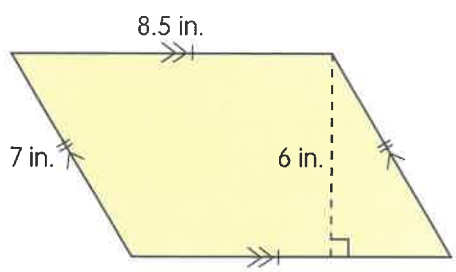


Area of trapezoid = $\frac{1}{2}h(b_1 + b_2)$

▶ Quick Check

Find the area of each parallelogram or trapezoid.

5.



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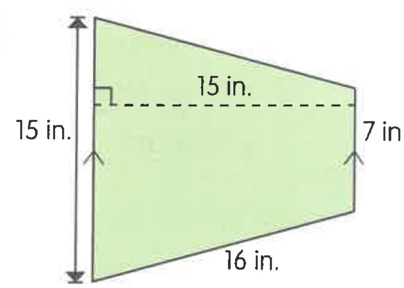

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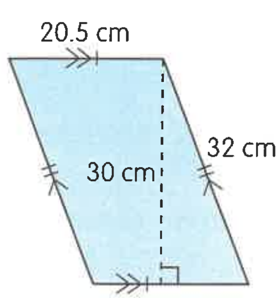

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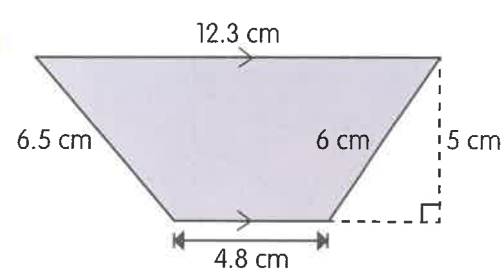
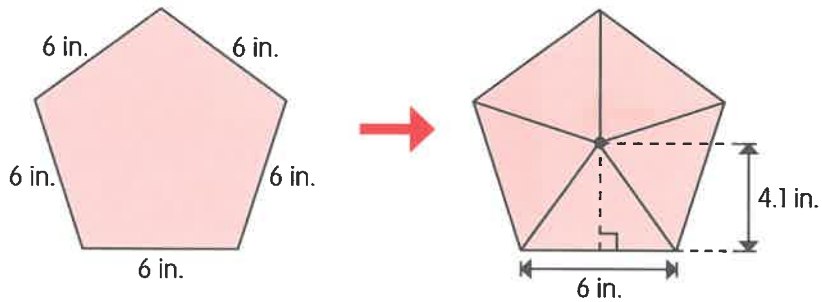


Finding the area of other polygons

a The area of a regular pentagon is the sum of the areas of 5 identical isosceles triangles.



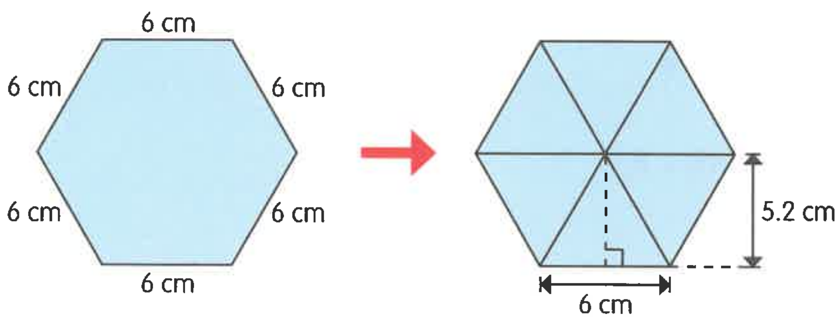
Area of pentagon $= 5 \cdot$ area of triangle

$= 5 \cdot \frac{1}{2}bh$

$= 5 \cdot \frac{1}{2} \cdot 6 \cdot 4.1$

$= 61.5 \text{ in}^2$

b The area of a regular hexagon is the sum of the areas of 6 identical equilateral triangles.



Area of hexagon $= 6 \cdot$ area of triangle

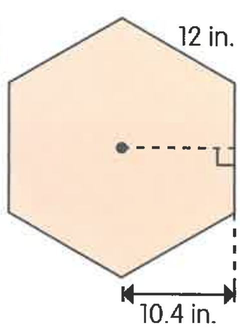
$= 6 \cdot \frac{1}{2} \cdot 6 \cdot 5.2$

$= 93.6 \text{ cm}^2$

▶ Quick Check

Find the area of each regular pentagon or hexagon.

9



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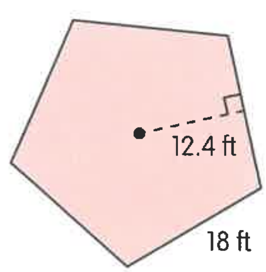
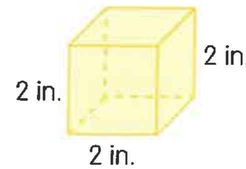
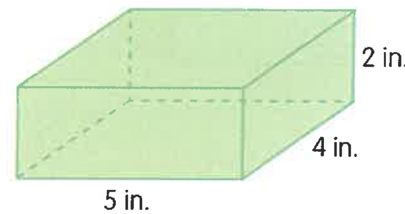


Finding the volume of cubes, rectangular prisms, and composite solids

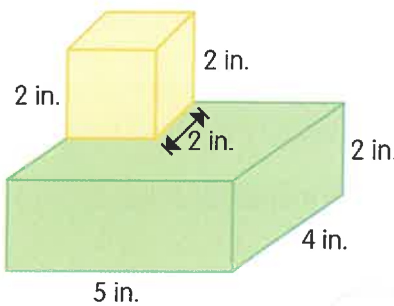
a Volume of a cube = edge • edge • edge
= 2 • 2 • 2
= 8 in^3



b Volume of a rectangular prism = length • width • height
= 5 • 4 • 2
= 40 in^3



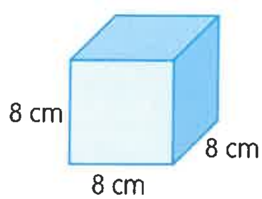
c Volume of a composite solid
= volume of cube + volume of rectangular prism
= 8 + 40
= 48 in^3



Quick Check

Find the volume of each cube or rectangular prism.

11



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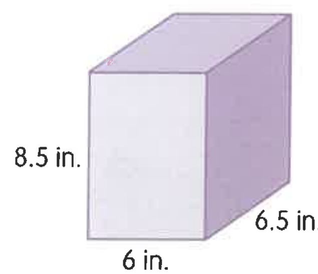
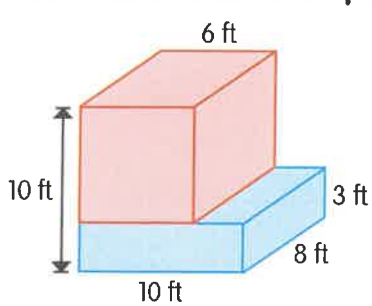


Find the volume of each composite solid.

13



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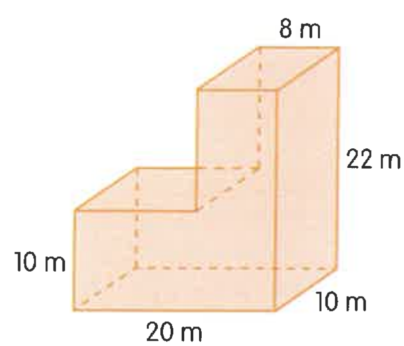
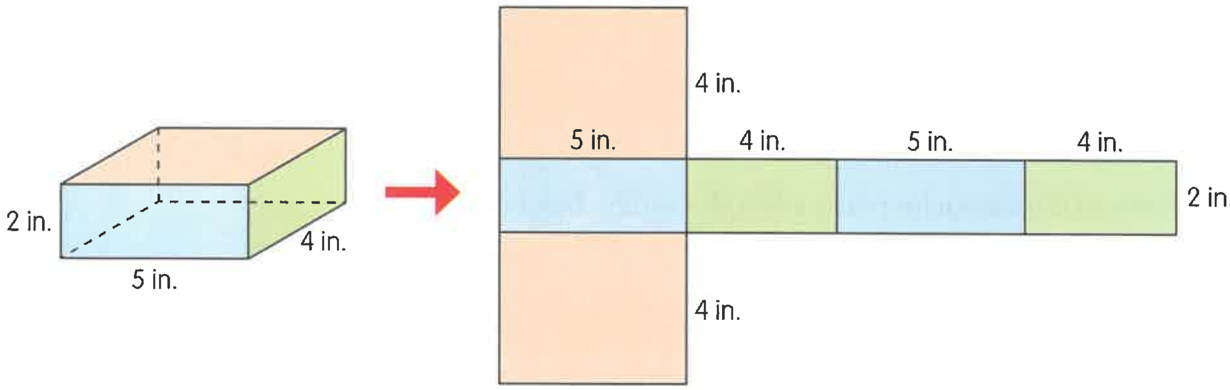


RECALL PRIOR KNOWLEDGE

Finding the surface area of a solid

The surface area of a solid is the area of its net.



The total area of the blue and green faces is equal to the area of the rectangle of length $5 + 4 + 5 + 4 = 18$ inches and width 2 inches.

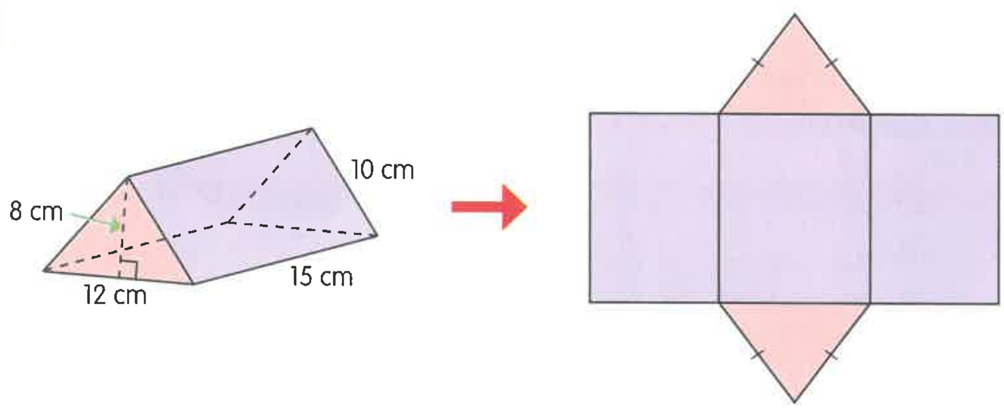
The surface area of a prism is equal to the perimeter of the base multiplied by the height, and then added to the sum of the areas of the two bases.

Surface area of rectangular prism $= 2 \cdot (5 + 4 + 5 + 4) + 2 \cdot (5 \cdot 4)$
$= 36 + 40$
$= 76 \text{ in}^2$

Quick Check

Find the surface area of the triangular prism.

15



Chapter 8

Statistics and Probability

How can you predict the future?

Will it be sunny next week? Based on data collected from current weather conditions and historical records, weather forecasters are able to predict the likelihood of a sunny day next week. Of course, weather conditions change all the time, so there might not be any sun at all.

What about seemingly random events such as predicting the outcome of a game? How can you predict the likelihood of winning a game of chance? In this chapter, you will learn to use data to make better predictions and informed decisions.

How do you collect data to gain meaningful information about a population and predict the likelihood of an event occurring?

Name: ______________________ Date: ____________

Finding the range, quartiles, and the interquartile range of a set of data

In statistics, you can measure how data values vary by finding the range, quartiles, and interquartile range of a set of data.

Consider the data set, {13, 18, 6, 1, 20, 11, 36, 45, 28, 27, 34, 7}.

To find the range, find the difference between the greatest and the least values.

Range = greatest value – least value
= 45 – 1
= 44

To find the quartiles of the data values, first arrange the values in ascending order.
Then, find the medians.

Lower half   Upper half

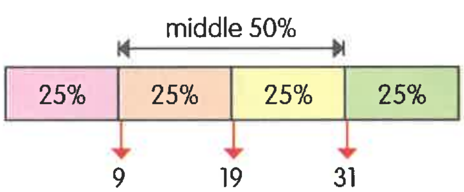
1 6 7 11 13 18 20 27 28 34 36 45

$Q_2 = \frac{18 + 20}{2} = 19$

$Q_1 = \frac{7 + 11}{2} = 9$ $Q_3 = \frac{28 + 34}{2} = 31$

The median of the lower half is called the first quartile (or lower quartile). It is written as Q_1.
The median of the set of data is called the second quartile. It is written as Q_2.
The median of the upper half is called the third quartile (or upper quartile). It is written as Q_3.

You can draw a diagram to show how the data are related to the quartiles. From the diagram, you can see that 50% of the values are between 9 and 31.



The range between the lower and the upper quartiles is called the interquartile range.

Interquartile range = upper quartile – lower quartile
= 31 – 9
= 22

Quick Check

The data below are the heights of some plants in inches.
Answer each question.

8.2	3.2	4.1	2.8	9	6	5
5.4	8.4	6.6	9.5	3.7	7	2.1

1. Find the range of the heights.

2. Find the three quartiles (Q_1, Q_2, Q_3) of the heights.

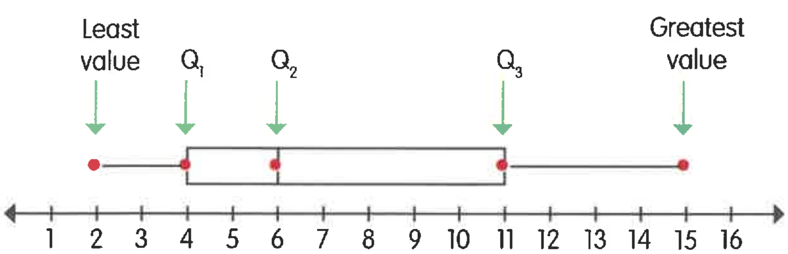
3. Find the interquartile range of the heights.

Interpreting box plots

Quartiles and interquartile ranges can be represented by a box plot (or box-and-whisker plot).
A box plot shows how data are clustered around the median and spread out along a number line.

You can draw a box plot using five values, collectively known as the 5-point summary.
Example:

- Least value = 2
- Lower quartile (Q_1) = 4
- Median (Q_2) = 6
- Upper quartile (Q_3) = 11
- Greatest value = 15



Quick Check

The data below are the scores of some students for a math quiz.
Answer each question.

8	6	7	8	6	5	6	9	8	5

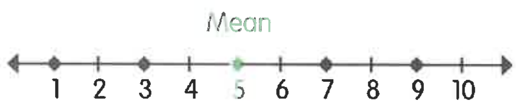
4. Draw a box plot of the scores and label it with the 5-point summary.

Finding and interpreting the mean absolute deviation of a set of data

The mean absolute deviation (MAD) of a set of data is the average distance of the data values from the mean of the data. It is the sum of the distances divided by the total number of data values.

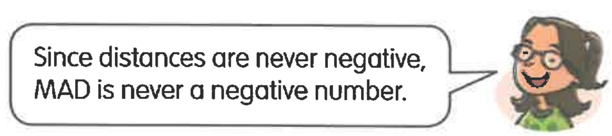
Consider the data set, {1, 3, 7, 9}. The mean of the data is $\frac{(1 + 3 + 7 + 9)}{4} = 5$.

Using a number line, you can find the distance of each data value from the mean.



Value	Distance from the mean
1	4 units
3	2 units
7	2 units
9	4 units

$$\text{MAD} = \frac{(4 + 2 + 2 + 4)}{4}$$
$$= 3$$



Data that are clustered near the mean will have a small MAD.
Data that are spread over a wide range will have a greater MAD.

Quick Check

The data below are the scores of some players for a game. Answer each question.

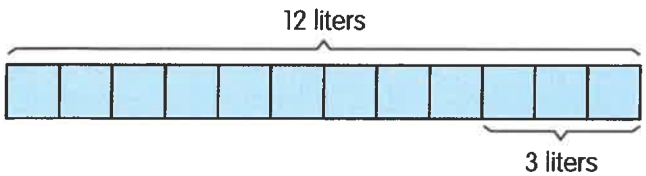
19	15	12	10	18
23	21	14	16	12

5. Find the mean of the scores.

6. Find the MAD of the scores.

Expressing a part of a whole as a fraction or a percent

Express 3 liters out of 12 liters as a fraction and as a percent.



$\frac{3}{12} = \frac{1}{4}$

To find the percent, rewrite $\frac{1}{4}$ as an equivalent fraction with a denominator of 100.

$$\begin{aligned}\frac{1}{4} &= \frac{1 \cdot 25}{4 \cdot 25}\\ &= \frac{25}{100}\\ &= 25\%\end{aligned}$$

So, 3 liters out of 12 liters can be expressed as the fraction $\frac{1}{4}$ or as 25%.

Express the remaining 9 liters out of 12 liters as a percent.

100% – 25% = 75% Subtract 25% from 100%.

So, 9 liters out of 12 liters as a percent is 75%.

Quick Check

Answer each question

7. Express 10 ounces out of 25 ounces of baking flour as a fraction in simplest form.

8. 12 out of 40 pieces of fruit in a basket are lemons. What fraction of the pieces of fruit are lemons? Write your answer in simplest form.

9. If there are 36 boys in a group of 50 students, what percent of the students are girls?

Expressing a fraction or a decimal as a percent, and vice versa

a Express $\frac{7}{9}$ as a percent. Round your answer to the nearest hundredth.

$\frac{7}{9} = \frac{7}{9} \cdot 100\%$ — Multiply the fraction by 100%.

$= \frac{700}{9}\%$ — Write as an improper fraction.

$= 77.78\%$ — Express the fraction as a decimal. Then, round.

b Express 55% as a fraction in simplest form.

$55\% = \frac{55}{100}$ — Express the percent as a fraction.

$= \frac{55 \div 5}{100 \div 5}$ — Divide both the numerator and denominator by the greatest common factor, 5.

$= \frac{11}{20}$

c $126\% = \frac{126}{100}$ — Express the percent as a fraction.

$= 1.26$ — Express the fraction as a decimal.

Quick Check

Write each percent as a fraction or a mixed number in simplest form.

10. 54%

11. 115%

12. 19.5%

13. 1.4%

Write each percent as a decimal.

14. 28%

15. 9%

16. 34.5%

17. 256%

Expressing a ratio as a fraction or a percent

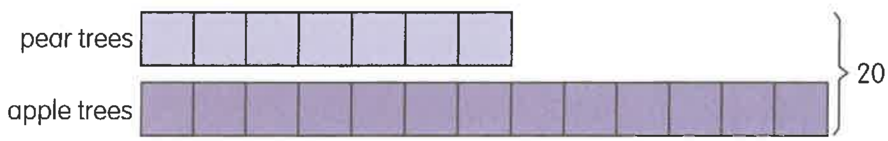
A ratio that compares a part to a whole can also be expressed as a fraction and as a percent.

The trees in an orchard are pear trees and apple trees. The ratio of pear trees to apple trees is 7 to 13.

a What fraction of the trees are pear trees?

b What percent of the trees are pear trees?

a



Number of pear trees = 7 units
Total number of trees = 7 + 13 = 20 units

$\frac{\text{Number of pear trees}}{\text{Total number of trees}} = \frac{7}{20}$

So, the fraction of pear trees to all the trees is $\frac{7}{20}$.

b $\frac{7}{20} \cdot 100\% = \frac{700}{20}\%$ Multiply the fraction by 100%.

$= 35\%$ Simplify.

So, 35% of the trees in the orchard are pear trees.

▶ Quick Check

Answer each question.

18 A bookcase holds 20 history books, 23 science fiction books, and 49 mystery books.

a What fraction of the books are science fiction books?

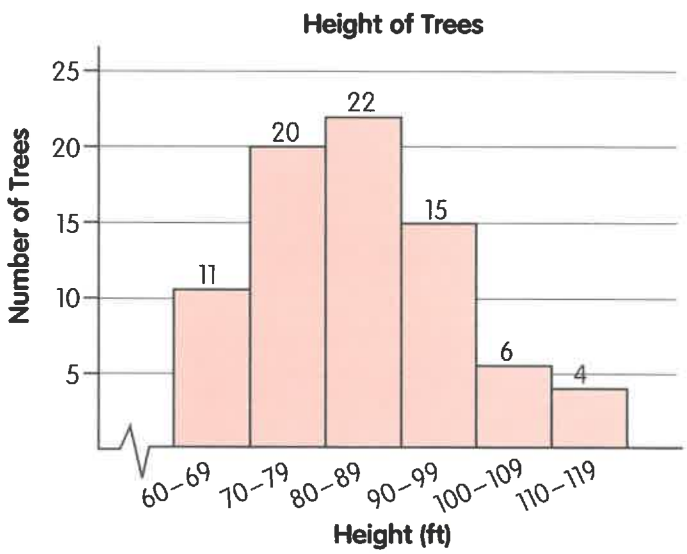
b What percent of the books are science fiction books?

Solving a histogram problem

The table shows the heights of 78 trees in a park rounded to the nearest foot.

Height (ft)	Number of Trees
60–69	11
70–79	20
80–89	22
90–99	15
100–109	6
110–119	4

The histogram displays the information about the heights of trees.



The heights of 25 trees are at least 90 feet. 42 of 78 trees have heights of 70 to 89 feet. So, about 54% of the trees are from 70 to 89 feet tall.

Quick Check

Answer each question.

19 The table shows the mass of 100 steel bars rounded to the nearest kilogram.

Mass (kg)	Number of Steel Bars
10–19	15
20–29	33
30–39	18
40–49	24
50–59	10

a Draw a histogram to display this information.

b How many steel bars have a mass from 10 to 39 kilograms?

c What percent of the steel bars have a mass of at least 20 kilograms, but less than 50 kilograms?

Chapter 9

Probability of Compound Events

What will be your next catch?

Suppose you are fishing in a pond stocked with largemouth bass and bluegill. You drop your line in the water and wonder which fish you will catch. If you know that there are 30 largemouth bass and 20 bluegill in the pond, you will know how to calculate the probability of catching a largemouth bass. What about the probability of catching three largemouth bass consecutively? In this chapter, you will learn how to calculate the probability of this and other compound events.

How do you find the probability of independent or dependent compound events?

Name: ____________________ Date: __________

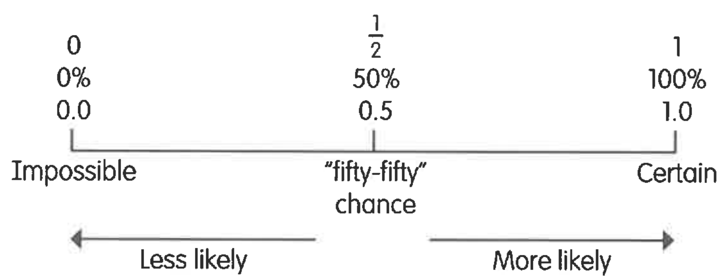
Finding the probability of events

The outcomes of an event are the possible results of an activity or experiment. The collection of all possible outcomes from an activity or experiment is known as the sample space.

Suppose the number of equally likely outcomes in the sample space is n and the number of outcomes favorable to an event E is m. The probability of event E occurring, $P(E)$ is:

$$P(E) = \frac{\text{Number of outcomes favorable to event } E}{\text{Total number of equally likely outcomes}} = \frac{m}{n}$$

The probability of an event can be expressed as a percent, a decimal, or a fraction between 0 and 1.



A probability closer to 1 means that the chances of an event happening are more likely.
A probability closer to 0 means that the chances of an event happening are less likely.
A probability of 0.5 means that the event is equally likely to happen or not happen.

Quick Check

Solve.

A box has 2 black balls, 7 red balls, and 3 green balls. A ball is randomly chosen from the box.

1. What is the probability of choosing a green ball?

2. What is the probability of choosing a black ball?

3. What is the probability of choosing a blue ball?

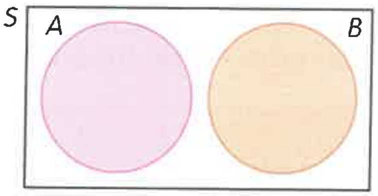
4. What is the probability of choosing a ball that is not red?

5. What is the probability of choosing a red or green ball?

Using Venn diagrams to show relationships of events

a Mutually exclusive events

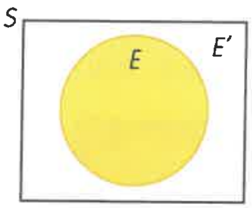
Two events that cannot occur at the same time are mutually exclusive. If event A occurs, event B cannot occur; if event B occurs, event A cannot occur. For example, rolling a 1 and rolling a 6 with a toss of a number die are mutually exclusive events.



You can use a Venn diagram to represent mutually exclusive events. The circles representing events A and B do not overlap to show that the events cannot happen at the same time.

b Complementary events

Given an event E, the complement of E is the event that E does not occur.
Events E and E' are mutually exclusive and their probabilities add up to 1: $P(E) + P(E') = 1$.
For example, getting heads and getting tails with a flip of a coin are complementary events. However, rolling a 1 and rolling a 6 are mutually exclusive events but they are not complementary. Rolling a 1 and rolling a number other than 1 are complementary events.



The Venn diagram shows event E and its complement, E', in the sample space. Event E is represented by the circle in the sample space. The complementary event, E', is the region outside the circle.

▶ Quick Check

Determine whether events X and Y are mutually exclusive or complementary.

6. A fair six-sided number die is rolled. X is the event of obtaining a 3. Y is the event of obtaining a 5.

7. Two fair six-sided number dice are tossed. X is the event that the sum of the scores is 6. Y is the event that the sum of the scores is 10.

8. A number is randomly selected from 1 to 20. X is the event of choosing a number that is a factor of 24. Y is the event of choosing a number that is a multiple of 6.

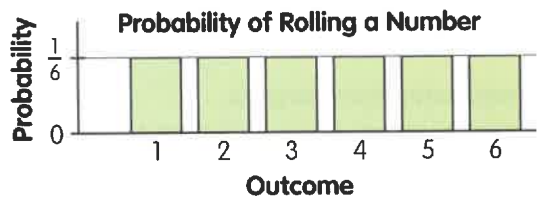
9. A fair six-sided number die is tossed. X is the event of obtaining an even number. Y is the event of obtaining an odd number.

Developing probability models

A probability model consists of a sample space of outcomes, events, and the probabilities of these outcomes and events. You can represent the outcomes of a sample space and their probabilities in a table or a graph. Such a presentation is known as a probability distribution.

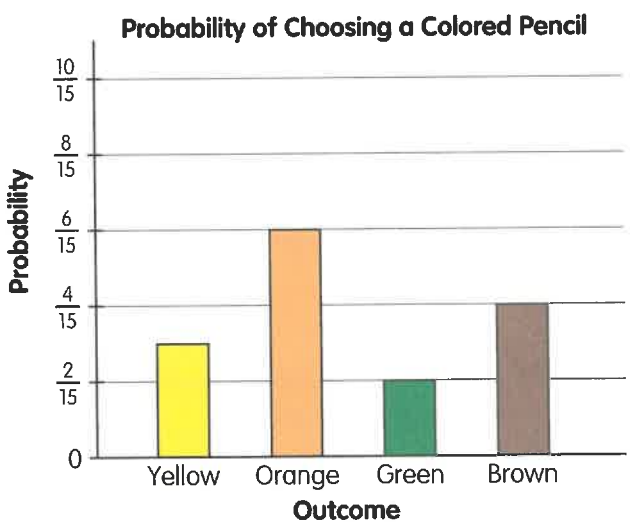
A probability model in which all the outcomes are equally likely to occur is called a uniform probability model. For example, rolling a fair 6-sided number die:

Value	1	2	3	4	5	6
Probability	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{6}$



A probability model in which outcomes do not have equal probabilities is called a nonuniform probability model. For example, randomly choosing a pencil from a box of 3 yellow, 6 orange, 2 green, and 4 brown pencils:

Color	Yellow	Orange	Green	Brown
Probability	$\frac{3}{15}$	$\frac{6}{15}$	$\frac{2}{15}$	$\frac{4}{15}$



▶ Quick Check

Solve.

There are 2 red, 5 blue, and 3 green pens in a box. Benjamin randomly selects a pen from the box.

10. Find the probability of randomly picking a blue pen.

11. Find the probability of randomly picking a pen that is not green.

12. Construct the probability model.