Divide Three-Digit Numbers

LESSON 14

Math Tools

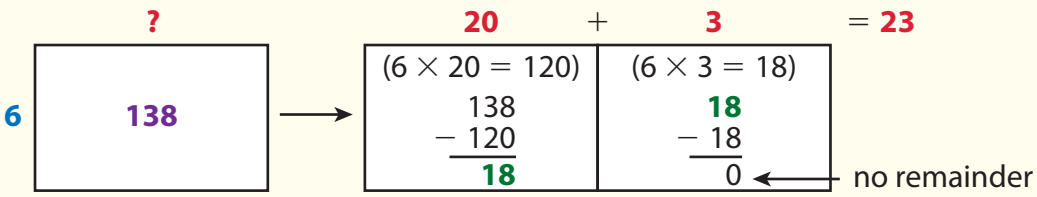
- Base-Ten Blocks
- Multiplication Models

Dear Family,

This week your child is learning to divide three-digit numbers by one-digit numbers.

Your child is learning about division. They are also learning terminology related to division. You may hear your child use the terms dividend, divisor, and quotient. The **dividend** is the number being divided, the **divisor** is the number by which the dividend is divided, and the quotient is the result of the division. If the dividend is not a whole number multiple of the divisor, the amount left is called the remainder.

Your child is learning to divide a three-digit number by a one-digit number. One way your child can divide is by using an area model. With this strategy, your child divides by breaking apart the problem into smaller parts and using repeated subtraction. The problem below shows how to divide 138 by 6.



Altogether, there are 20 + 3, or 23, groups of 6 in 138, so **138** ÷ **6** = **23**. Your child is also learning to check the answer by multiplying the quotient, **23**, by the divisor, **6**, to make sure that the product is equal to the dividend of **138**. Check: **23** × **6** = **138**, so the answer is correct.

Invite your child to share what they know about dividing three-digit numbers by doing the following activity together.

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ACTIVITY DIVIDING THREE-DIGIT NUMBERS

Do this activity with your child to divide three-digit numbers.

Materials book with a number of pages in the hundreds

- With your child, choose a favorite book and look at the number of pages it has.
- Tell your child that you want to read the entire book in 1 week. Ask your child to help you figure out how many pages you would need to read each day to finish the book in 1 week.
- Have your child use division to find the answer. For example, if the book has 157 pages, your child would divide 157 by 7. (157 ÷ 7 = 22 R 3, which means that there are 22 groups of 7 in 157 and a remainder of 3.)
- You and your child can check the answer to the division problem by using multiplication. If you have a remainder, remember to add the remainder to the product.
- Decide what to do if you have a remainder. Will you read one extra page each day for the number of days shown by the remainder, or will you read all the remaining pages on the last day?
- Repeat this activity with other favorite books at least three more times.



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Explore Dividing Three-Digit Numbers

You learned about division as equal sharing and about the relationship between multiplication and division. Use what you know to try to solve the problem below.



Cameron is helping out at his uncle's barbershop. Cameron has a pile of 78 towels. He needs to put the same number of towels next to each of the 3 barber chairs. How many towels should Cameron put next to each barber chair? Show your work.

TRY IT

Math Toolkit

- base-ten blocks
- counters
- bowls
- paper plates
- grid paper
- multiplication models

DISCUSS IT

Ask your partner: How did you get started?

Tell your partner: At first, I thought . . .

Learning Targets

- Divide a two-digit or three-digit number by a one-digit number.
- Use multiplication to estimate a quotient.
- Explain the strategy used to divide.

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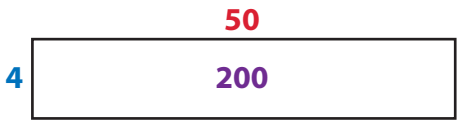
CONNECT IT

1 LOOK BACK

Explain how you found the number of towels Cameron puts next to each chair.

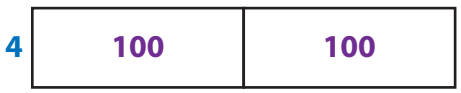
2 LOOK AHEAD

You can solve division problems in many ways. You can use place value, rectangular arrays, area models, equations, and the relationship between multiplication and division. The area model below shows 200 ÷ 4.



An area model shows both multiplication (**4** × **50** = **200**) and division (**200** ÷ **4** = **50**). You can also use area models to break apart a problem into smaller parts. Fill in the missing labels on two other area models for 200 ÷ 4.

a.



b.



3

a. Sometimes there is a remainder left over when you divide. Fill in the remainder for 21 ÷ 4 in the box at the right.

$$4\overline{)21}\quad 5\,\mathrm{R}\,\square$$

b. The **dividend** is ....., the number you are dividing.

c. The **divisor** is ....., the number you are dividing by.

d. The quotient is ....., the result of the division problem.

4 REFLECT

Explain how an area model shows both multiplication and division.

.....

.....

.....

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Prepare for Dividing Three-Digit Numbers

1 Think about what you know about division. Fill in each box. Use words, numbers, and pictures. Show as many ideas as you can.

Word	In My Own Words	Example
division		
dividend		
divisor		
quotient		
remainder		

2 Use the term *equal groups* to describe the division problem shown below.

$123 \div 5 = 24 \text{ R } 3$

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3 Solve the problem. Show your work.

A total of 91 players sign up to play soccer. The players are split into 7 teams, with the same number of players on each team. How many players are on each team? Show your work.



Solution

4 Check your answer. Show your work.

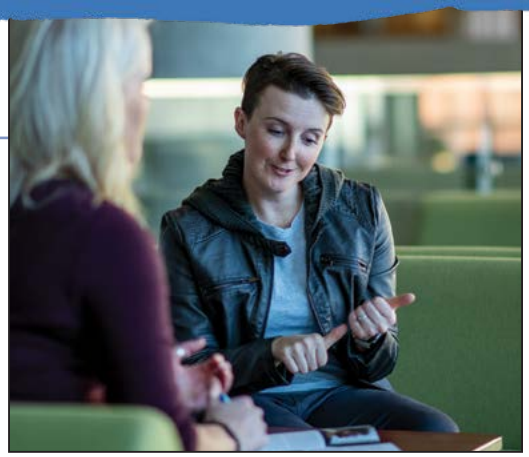
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Develop Dividing with Arrays and Area Models

Read and try to solve the problem below.

Soledad is in a play written for actors who are deaf. She will sign her lines using American Sign Language. Soledad has 4 weeks to learn 136 lines for the play. She wants to learn the same number of lines each week. How many lines should Soledad learn each week?



TRY IT

Math Toolkit

- base-ten blocks
- counters
- bowls
- paper plates
- grid paper
- multiplication models

DISCUSS IT

Ask your partner: Why did you choose that strategy?

Tell your partner: I do not understand how . . .

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Explore different ways to understand dividing three-digit numbers by one-digit numbers.

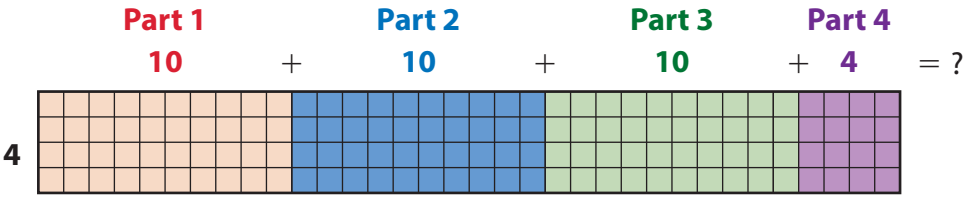
Soledad is in a play written for actors who are deaf. She will sign her lines using American Sign Language. Soledad has 4 weeks to learn 136 lines for the play. She wants to learn the same number of lines each week. How many lines should Soledad learn each week?

MODEL IT

You can use a rectangular array to help you break apart the problem.

The array shows a rectangle divided into 136 squares in 4 rows.

You can use what you know about multiplication and subtraction to break apart 136 and divide the lesser numbers by 4.



(4 × 10 = 40)	(4 × 10 = 40)	(4 × 10 = 40)	(4 × 4 = 16)
136	96	56	16
− 40	− 40	− 40	− 16
96	56	16	0

MODEL IT

You can use an area model to help you break apart the problem.

This area model uses multiplication and repeated subtraction. You can break apart 136 and divide the lesser numbers by 4.

	?		10	+	10	+	10	+	4	= ?
4	136	→ 4	(4 × 10 = 40) 136 − 40 96		(4 × 10 = 40) 96 − 40 56		(4 × 10 = 40) 56 − 40 16		(4 × 4 = 16) 16 − 16 0	

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CONNECT IT

Now you will use the problem from the previous page to help you understand how to use a rectangular array and an area model to divide a three-digit number by a one-digit number.

1 Look at the first **Model It**. Why do you think Parts 1, 2, and 3 of the array show multiplying the divisor, 4, by 10?

2 Why is the area model in the second **Model It** broken into four parts?

3 What is 136 ÷ 4? _____ How do the **Model Its** show how to find the quotient of 136 ÷ 4 in a similar way?

4 Explain how using an array and an area model can help you divide.

5 How can you use multiplication to check that your answer is correct?

6 REFLECT

Look back at your **Try It**, strategies by classmates, and **Model Its**. Which models or strategies do you like best for dividing a three-digit number by a one-digit number? Explain.

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APPLY IT

Use what you just learned to solve these problems.

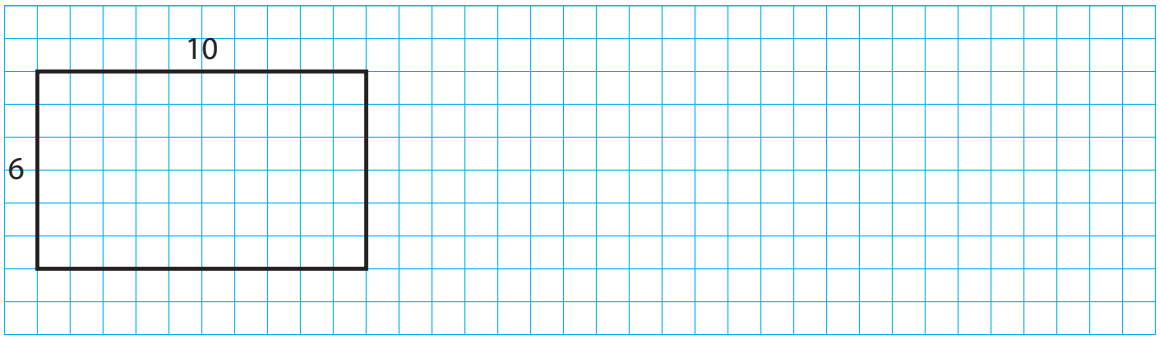
7 Complete the area model below to find 132 ÷ 3.

20 + ☐ + ☐ = ☐

3			
	132 − 60 ☐	72 − ☐ ☐	12 − ☐ ☐

Solution

8 Complete the array to find 198 ÷ 6. Use multiplication to check your answer. Show your work.



Solution

9 What is 224 divided by 7?

Ⓐ 30 Ⓑ 31

Ⓒ 32 Ⓓ 42

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Practice Dividing with Arrays and Area Models

Study the Example showing one way to divide a three-digit number by a one-digit number. Then solve problems 1–5.

EXAMPLE

What is 260 divided by 4?

Use an area model.

	50	+	10	+	5	= 65
4	$(4 \times 50 = 200)$ 260 − 200 60		$(4 \times 10 = 40)$ 60 − 40 20		$(4 \times 5 = 20)$ 20 − 20 0	

Use multiplication to check:

$4 \times 65 = (4 \times 60) + (4 \times 5)$

$= 240 + 20$

$= 260$

$260 \div 4 = 65$

1 Complete this area model to find $135 \div 5$.

	□	+	□	+	□	=	□
5	135 − □ □		85 − □ □		35 − □ □		

Solution .....

2 Identify the dividend, divisor, and quotient.

a. $900 \div 3 = 300$

dividend: ..... divisor: ..... quotient: .....

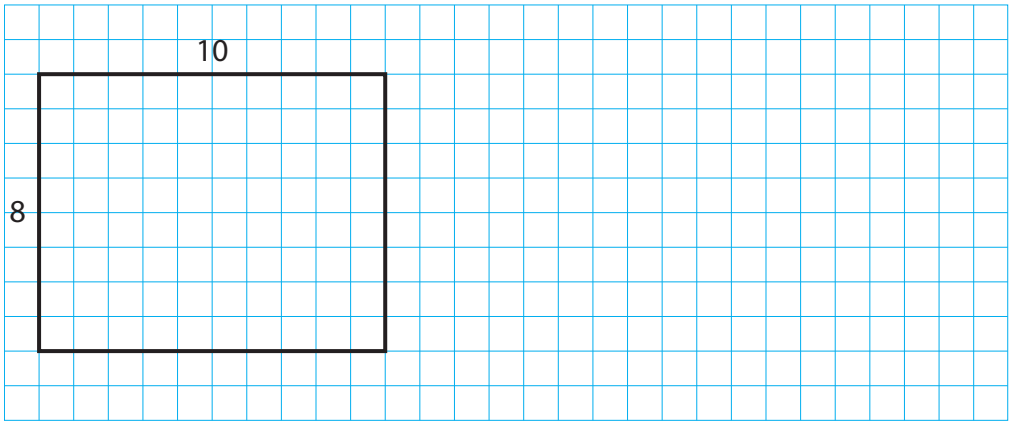
b. $120 = 600 \div 5$

dividend: ..... divisor: ..... quotient: .....

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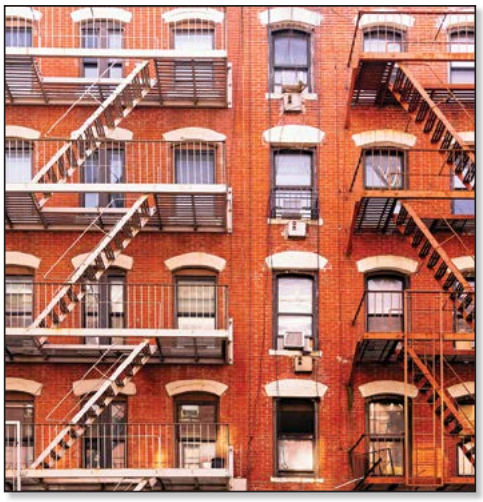
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3 Complete the array to find 208 ÷ 8. Show your work.



Solution

4 Issay's apartment building has 7 floors. Each floor has the same number of apartments. There are 154 apartments in all. How many apartments are on each floor? Use an area model to solve the problem. Show your work.



Solution

5 Explain how to use multiplication to check your answer in problem 4.

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Develop Dividing with Estimation and Area Models

Read and try to solve the problem below.

There are 232 people waiting in line for an amusement park ride. Each car on the ride will be filled with 5 people. How many cars are needed to hold all the people waiting in line?



TRY IT

Math Toolkit

- base-ten blocks
- grid paper
- multiplication models

DISCUSS IT

Ask your partner: Do you agree with me? Why or why not?

Tell your partner: I disagree with this part because . . .

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Explore how to estimate a quotient and how to use the estimate to divide with an area model.

There are 232 people waiting in line for an amusement park ride. Each car on the ride will be filled with 5 people. How many cars are needed to hold all the people waiting in line?

MODEL IT

You can use the relationship between multiplication and division to estimate the quotient in a division problem with a one-digit divisor.

$232 \div 5 = ?$ and $5 \times ? = 232$

Find the products of 5 and multiples of 10. Make a table.

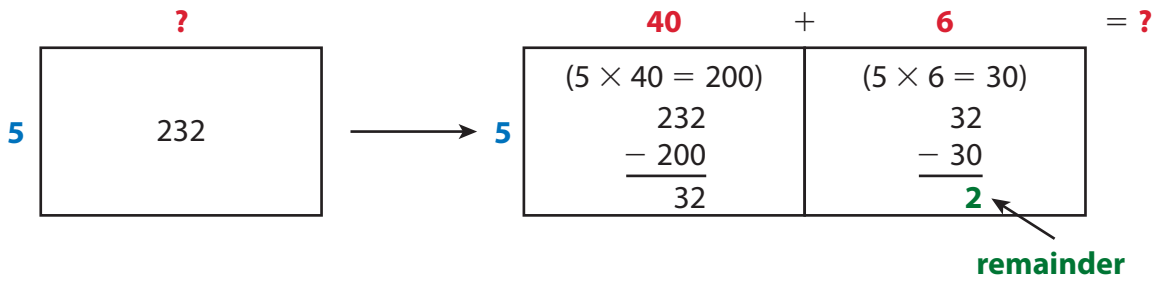
Number of Cars	10	20	30	**40**	**50**
Number of People	50	100	150	**200**	**250**

The dividend 232 is between **200** and **250**, so the quotient is between **40** and **50**.

MODEL IT

You can use an area model to solve a division problem with a one-digit divisor.

The estimate shows the quotient is between 40 and 50.
Begin the area model by multiplying 40 by 5.



Use multiplication to check:

$5 \times 46 = (5 \times 40) + (5 \times 6)$
$= 200 + 30$
$= 230$ $\qquad 230 + 2 = 232$

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CONNECT IT

Now you will use the problem from the previous page to help you understand how to estimate a quotient and use the estimate to divide with an area model.

1. In the first **Model It**, why do you multiply 5 by multiples of 10?

2. Look at the second **Model It**. How can you find the number of cars that are each filled with 5 people?

3. What does the remainder mean in this problem?

4. How many cars are needed to hold all the people waiting in line? Explain.

5. How can you break apart a division problem with an area model in order to solve the problem?

6 REFLECT

Look back at your **Try It**, strategies by classmates, and **Model Its**. Which models or strategies do you like best for estimating a quotient and for dividing a three-digit number by a one-digit number? Explain.

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APPLY IT

Use what you just learned to solve these problems.

7 A store orders 315 hats. The hats are shipped in boxes of 8. How many boxes are needed to ship all the hats? First, find which two multiples of 10 the quotient is between. Then find the quotient using an area model. Show your work.

Number of Boxes				
Number of Hats				

Solution

8 What is 174 divided by 3? Use multiplication to check your answer. Show your work.

Solution

9 Find 456 ÷ 6. Show your work.

Solution

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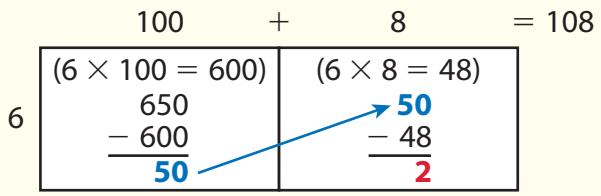
Practice Dividing with Estimation and Area Models

Study the Example showing one way to divide a three-digit number by a one-digit number. Then solve problems 1–6.

EXAMPLE

An art teacher has 650 markers to give to their art students. They give 6 markers to each student. How many students get 6 markers? Are there any markers left over?

Find 650 ÷ 6. Use an area model.



650 ÷ 6 = 108 R **2**

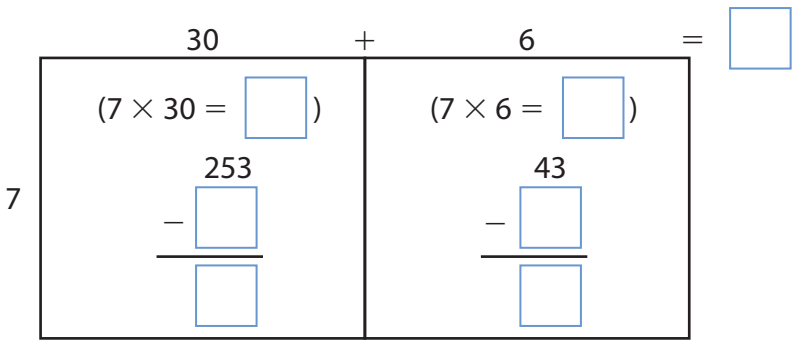
108 students each get 6 markers. There are 2 markers left over.

1 The table lists the products of 7 and multiples of 10. Use the table to help estimate the quotient 253 ÷ 7.

10	20	30	40	50
70	140	210	280	350

The quotient is between ..... and ..... .

2 Use the estimate in problem 1 to find the quotient 253 ÷ 7. Complete the area model to solve the problem.



Solution .....

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3 Explain the process for checking whether the answer to the division problem below is correct.

$134 \div 5 = 26 \text{ R } 4$

4 Mr. Lonetree is a beekeeper. He needs to deliver 876 beehives to a blueberry farm so the bees can pollinate the blueberry plants. Mr. Lonetree has 3 trucks available. He wants to put the same number of beehives on each truck. How many beehives should go on each truck? Show your work.





Solution

5 Look at how you solved problem 4. Explain how you could use estimation before you divide in order to know whether your answer is reasonable.

6 Explain how to use multiplication to check your answer in problem 4.

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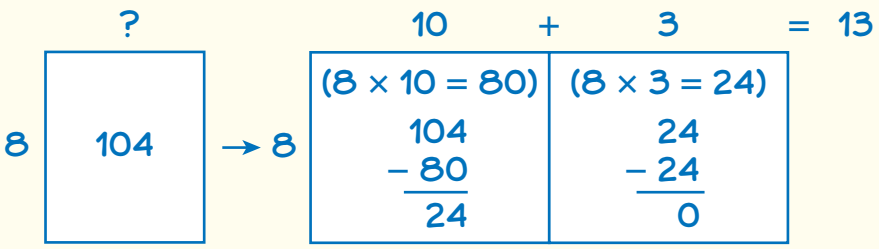
Refine Dividing Three-Digit Numbers

Complete the Example below. Then solve problems 1–9.

EXAMPLE

In math class, 8 students share 104 counters. Each student gets the same number of counters. How many counters does each student get?

Look at how you could show your work using an area model.



Solution .....

The student first multiplied 8 × 10. After subtracting 80 from 104, there were still 24 left.



PAIR/SHARE
How else could you solve this problem?

APPLY IT

1 Find 641 ÷ 3. Use multiplication to check your answer. Show your work.

How can you estimate to find how many digits the quotient will have?

Solution .....

PAIR/SHARE
How do you know if there is a remainder in this problem?

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2 What is 738 divided by 9? Show your work.

How could you use an area model to help solve this problem?



PAIR/SHARE

How could you use multiplication to check your answer?

Solution

3 Margarita is helping her dad make 6 piñatas for a party at her school. They have 252 toys to divide equally among the piñatas. How many toys go into each piñata?

Ⓐ 32

Ⓑ 41 R 4

Ⓒ 42

Ⓓ 420

Bridget chose Ⓓ as the correct answer. How did she get that answer?

Will there be any toys left over?



PAIR/SHARE

How can you tell that Bridget's answer does not make sense?

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4 Which division equations are true? Select all that apply.

Ⓐ $255 \div 8 = 31$

Ⓑ $493 \div 7 = 73$

Ⓒ $320 \div 4 = 8$

Ⓓ $675 \div 5 = 135$

Ⓔ $318 \div 6 = 53$

5 Which expressions have a value of 25? Select all that apply.

Ⓐ $225 \div 8$

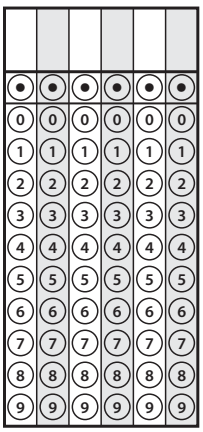
Ⓑ $180 \div 7$

Ⓒ $150 \div 6$

Ⓓ $130 \div 5$

Ⓔ $100 \div 4$

6 A dance studio offers 2 months of African dance lessons for $176. Each month includes 4 weeks of lessons. Each week of lessons costs the same amount. What is the cost, in dollars, of 1 week of lessons?



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7 Gilberto and his two sisters collect erasers. Together, they have 115 erasers. They decide to divide the erasers equally among themselves and give any extra erasers to their mom. How many erasers do they give to their mom?

Ⓐ 1

Ⓑ 2

Ⓒ 38

Ⓓ 39





8 Mrs. Washington makes 7 snack bags. She uses 175 almonds and shares them evenly among the bags. How many almonds are in each bag? How many almonds are left over? Show your work.





There are ..... almonds in each bag.

There are ..... almonds left over.



9 MATH JOURNAL

Look at the expression 228 ÷ 6. What two multiples of 10 is the quotient between? Explain how you know.

SELF CHECK Go back to the Unit 3 Opener and see what you can check off.

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