Divide Four-Digit Numbers

LESSON 15

Dear Family,

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

Your child is learning to divide a four-digit number by a one-digit number.

One way your child can solve a division problem is to find **partial quotients**. With this strategy, your child divides by breaking the dividend into parts.

Below shows one way to divide 2,113 by 4 by finding partial quotients.

```
   3
  25
 500
4)2,113  ← How many groups of 4 in 2,000? 500
− 2,000  ← Subtract 500 groups of 4.
-------
   113   ← How many groups of 4 in 100? 25
 − 100   ← Subtract 25 groups of 4.
-------
    13   ← How many groups of 4 in 13? 3
  − 12   ← Subtract 3 groups of 4.
-------
     1
```

The partial quotients are **500**, **25**, and **3**. The remainder is **1**.

Altogether, there are **500** + **25** + **3**, or **528**, groups of 4 in 2,113, with 1 left over.

2,113 ÷ 4 = **528 R 1**

Invite your child to share what he or she knows about dividing four-digit numbers by doing the following activity together.

ACTIVITY DIVIDING FOUR-DIGIT NUMBERS

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

Materials 1 number cube (or dot cube)

- Have your child roll a number cube five times to make a division problem with a four-digit number and a one-digit number.
- The first four rolls form the four-digit number in the order of the rolls. The first roll is the thousands digit. The last roll is the divisor.

  Example: Your child rolls a 4, 2, 6, 1, and 3.
  The division problem is 4,261 ÷ 3.
- Have your child find the quotient. There may or may not be a remainder.

  Example: 4,261 ÷ 3 = 1,420 R 1
- Then you multiply to check your child's answer.

  Example: 3 × 1,420 = 4,260
  4,260 + 1 = 4,261
  Your child's answer is correct!
- Switch roles and repeat the activity with you doing the division and your child using multiplication to check the answer.
- The player with the greater quotient wins the round.
- Play three rounds.

Explore Dividing Four-Digit Numbers

Previously, you learned about dividing three-digit numbers by one-digit numbers. Use what you know to try to solve the problem below.

What is 1,400 ÷ 4?

TRY IT

Learning Target

- Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

SMP 1, 2, 3, 4, 5, 6, 7, 8

Math Toolkit

- base-ten blocks
- grid paper
- multiplication models

DISCUSS IT

Ask your partner: Can you explain that again?

Tell your partner: I started by . . .

CONNECT IT

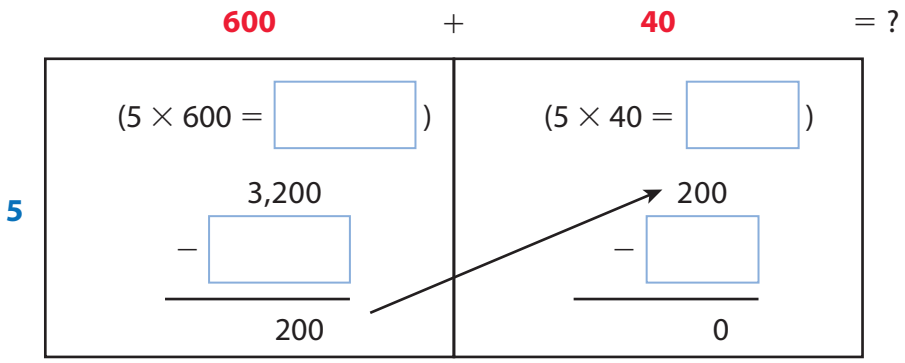
1 LOOK BACK

Explain how you found the quotient of 1,400 ÷ 4.

2 LOOK AHEAD

You can divide four-digit numbers in many ways.

a. Complete the area model to show 3,200 ÷ 5.



The quotient of 3,200 ÷ 5 is ..... .

b. Another way to find 3,200 ÷ 5 is by using **partial quotients**. Complete the division that shows using partial quotients.

```
      40
     600
5)3,200   ← How many groups of 5 in 3,000? .....
−[   ]    ← Subtract 600 groups of 5.
 ------
  − 200   ← How many groups of 5 in 200? .....
   [   ]  ← Subtract 40 groups of 5.
 ------
       0   ← The remainder is .....
```

Add the partial quotients shown above the problem to find the quotient:

..... + ... = ...

3 REFLECT

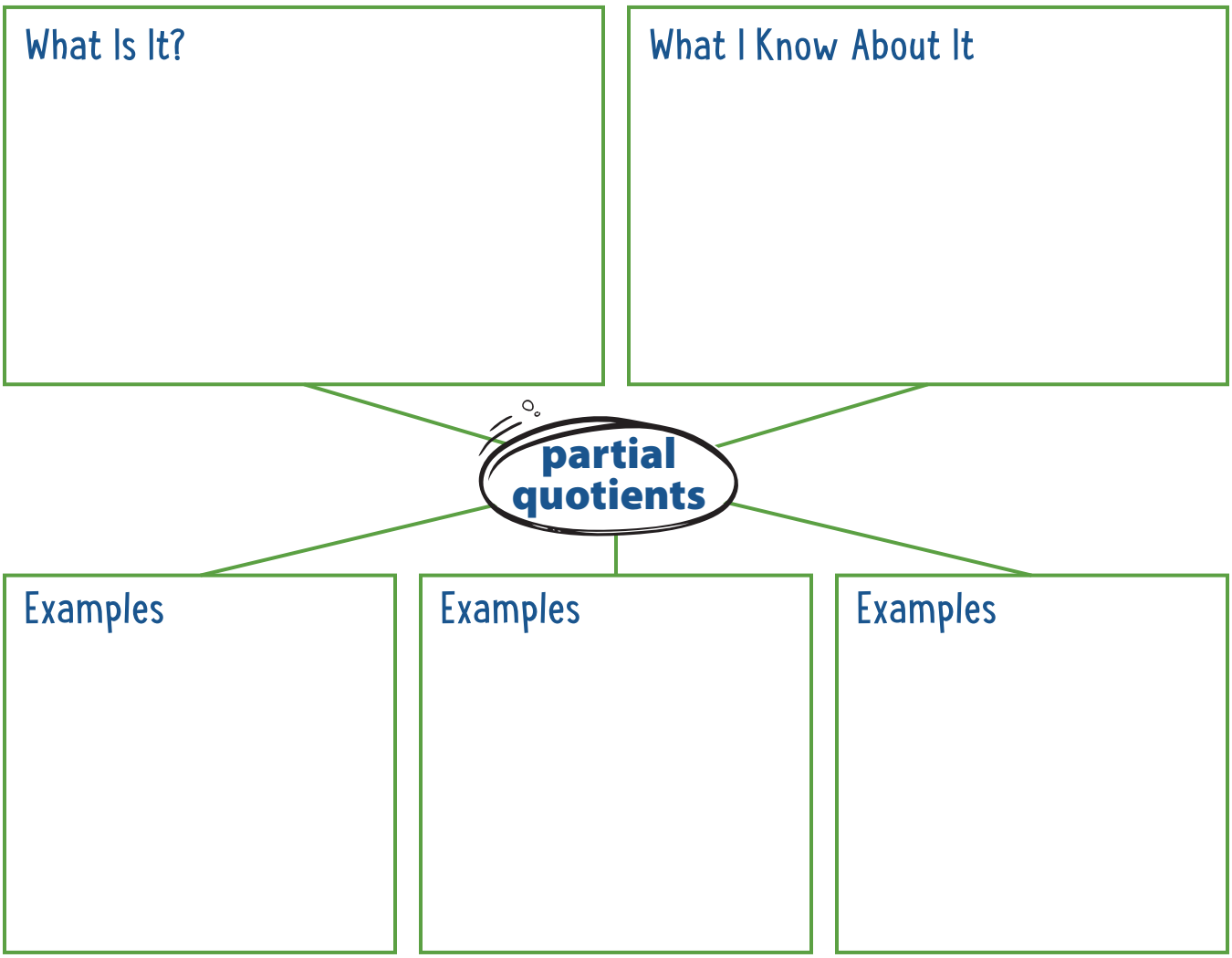
How are the strategies of using an area model and partial quotients alike?

.....

.....

Prepare for Dividing Four-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.



2 Complete the area model to show 2,200 ÷ 8. Add the partial quotients to solve the division problem.

200 + 70 + 5 = ?

8			
	(8 × 200 = ☐)	(8 × 70 = ☐)	(8 × 5 = ☐)
	2,200	600	40
	− ☐	− ☐	− ☐
	600	40	0

3 Solve the problem. Show your work.

What is 1,500 ÷ 6?

Solution

4 Check your answer. Show your work.

Develop Dividing Four-Digit Numbers

Read and try to solve the problem below.

A factory has 2,125 tablets to ship to stores.
It can ship 4 tablets in each box.
How many full boxes can the factory ship?

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 agree with you about . . . because . . .

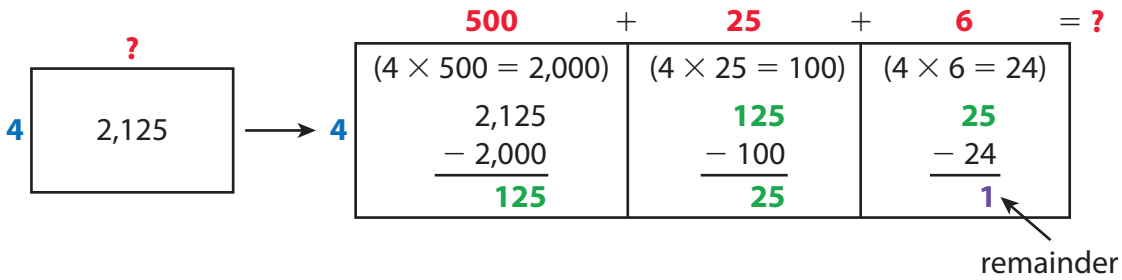
Explore different ways to understand dividing a four-digit number by a one-digit number.

A factory has 2,125 tablets to ship to stores. It can ship 4 tablets in each box. How many full boxes can the factory ship?

MODEL IT

You can use an area model to break apart the problem into smaller parts.

The area model shows how to use multiplication and repeated subtraction to divide 2,125 by 4.



MODEL IT

You can also find partial quotients to divide.

Divide each place value of 2,125 by 4.

```
   6
  25
 500
4)2,125   ← How many groups of 4 in 2,000? 500
− 2,000     Subtract 500 groups of 4.
   125    ← How many groups of 4 in 100? 25
 − 100       Subtract 25 groups of 4.
    25    ← How many groups of 4 in 25? 6
  − 24       Subtract 6 groups of 4.
     1
```

The partial quotients are **500**, **25**, and **6**.

The quotient includes both the sum of the partial quotients and the remainder, the amount left over.

CONNECT IT

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

1. Look at the first **Model It**. How can you find the number of full boxes the factory can ship?

2. What does the remainder mean in this problem?

3. Look at the second **Model It**. How does using the partial quotients strategy help you find the quotient of 2,125 ÷ 4?

4. Explain how using an area model and partial quotients can help you divide a four-digit number by a one-digit number.

5. How can you 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 four-digit number by a one-digit number? Explain.

APPLY IT

Use what you just learned to solve these problems.

7 Find 1,010 ÷ 9. Show your work.

Solution

8 Find 1,458 ÷ 3. Use multiplication to check your answer. Show your work.

Solution

9 What is 5,783 divided by 6?

Ⓐ 963

Ⓑ 963 R 5

Ⓒ 964 R 5

Ⓓ 968

Practice Dividing Four-Digit Numbers

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

EXAMPLE

A group of hikers plan to take 3 hours to hike a trail 5,380 meters long. They want to hike the same distance each hour. How many meters do they plan to hike each hour?

5,380 ÷ 3 = **1,793 R 1**

The hikers plan to hike 1,793 meters each hour. Then they will need to hike 1 more meter to reach the end of the trail.

```
   3
  90
 700
1,000
3)5,380   ← There are 1,000 groups of 3 in 5,000.
- 3,000     Subtract 1,000 groups of 3.
  2,380   ← There are 700 groups of 3 in 2,380.
- 2,100     Subtract 700 groups of 3.
    280   ← There are 90 groups of 3 in 280.
-   270     Subtract 90 groups of 3.
     10   ← There are 3 groups of 3 in 10.
-     9     Subtract 3 groups of 3.
      1
```

1 Complete the division problem using partial quotients.

8,235 ÷ 5 = ...

5)8, 2 3 5

2 Complete the division problem using partial quotients.

4,507 ÷ 4 = ...

4)4, 5 0 7

3 One week has 7 days. How many weeks do 1,230 days make? What does the remainder mean? Show your work.

Solution

4 Mugs can be packed with up to 6 mugs in each box. How many boxes are needed to pack 1,528 mugs? Show your work.

Solution

5 Use estimation to select all the true division equations.

Ⓐ 4,960 ÷ 2 = 9,920

Ⓑ 7,095 ÷ 5 = 1,419

Ⓒ 9,621 ÷ 3 = 230 R 7

Ⓓ 3,875 ÷ 6 = 645 R 5

Ⓔ 5,004 ÷ 4 = 251

Vocabulary

remainder the amount left over when one number does not divide another number a whole number of times.

5,380 ÷ 8 = 672 R 4

remainder

Refine Dividing Four-Digit Numbers

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

EXAMPLE

What is 7,824 divided by 3?

Look at how you could show your work using partial quotients.

```
      8   }
    600   } partial quotients
  2,000   }
3)7,824   ← 7,824 is between 3 × 2,000 and 3 × 3,000,
- 6,000     so subtract 3 × 2,000.
  1,824   ← 1,824 is between 3 × 600 and 3 × 700,
- 1,800     so subtract 3 × 600.
     24   ← 24 is equal to 3 × 8,
-    24     so subtract 3 × 8.
      0   ← There is no remainder.
```

7,824 ÷ 3 = 2,000 + 600 + 8

Solution .....

The student added the partial quotients to find 7,824 ÷ 3.

PAIR/SHARE

How else could you solve this problem?

APPLY IT

1 Find 1,359 ÷ 4. Use multiplication to check your answer. Show your work.

How many digits will the quotient have?

Solution .....

.....

PAIR/SHARE

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

2 Rogelio has 2,490 stamps in his collection. He divides his stamps equally among his 6 children. How many stamps does each child get? Show your work.

How could you use partial quotients to solve this problem?

PAIR/SHARE

How could you use multiplication to check your answer?

Solution

3 There are 1,275 people waiting to try out for a show. The people wait in 5 rooms. Each room has the same number of people. How many people are in each room?

Ⓐ 111

Ⓑ 251

Ⓒ 255

Ⓓ 1,270

Can you use multiplication to help solve the problem?

Awan chose Ⓓ as the correct answer. How did he get that answer?

PAIR/SHARE

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

4 Mariah finds 4,048 ÷ 8 using partial quotients as shown at the right. What partial quotient goes in the box?

$$\begin{array}{r} \square \\ 500 \\ 8\overline{)4{,}048} \\ -\ 4{,}000 \\ \hline 48 \\ -\ 48 \\ \hline 0 \end{array}$$

Ⓐ 6

Ⓑ 7

Ⓒ 60

Ⓓ 70

5 A tailor has 1,495 yards of fabric to make costumes. He needs 7 yards of fabric for each costume. How many costumes can the tailor make? Is there any fabric left over? Show your work.

Solution

6 Jack uses partial quotients to solve 6,035 ÷ 5 as shown by the area model.

	1,000	+ 200	+ 35
5	5,000	1,000	35

Jack says the quotient is 1,235 because 1,000 + 200 + 35 = 1,235. What did Jack do wrong?

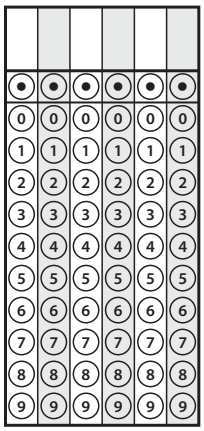
Ⓐ Jack broke apart 6,035 incorrectly.

Ⓑ Jack wrote the incorrect partial quotient above 1,000.

Ⓒ Jack should have subtracted 35 from 1,000 + 200.

Ⓓ Jack wrote the incorrect partial quotient above 35.

7 Find 2,259 ÷ 3.



8 Trina has a box of 1,132 beads to make necklaces. She wants to use as many of the beads as possible to make 9 necklaces. She uses the same number of beads for each necklace. How many beads are on each necklace? How many beads are left over? Show your work.

There are _____ beads on each necklace.

There are _____ beads left over.

9 MATH JOURNAL

Explain how to divide 3,625 by 4 using partial quotients.

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