

Divide Three-Digit Numbers

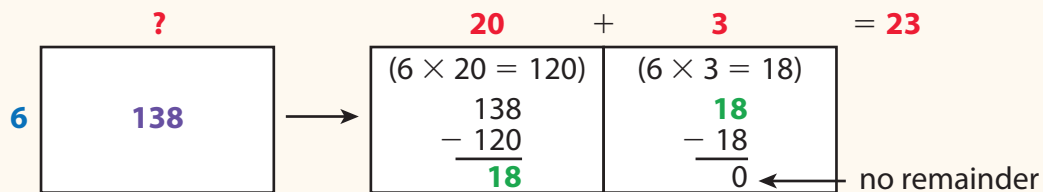


Dear Family,

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

Your child is learning about division. He or she is 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 $138 \div 6 = 23$.

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: $23 \times 6 = 138$, so the answer is correct.

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

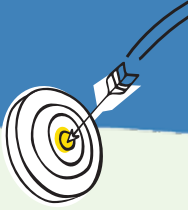
ACTIVITY DIVIDING THREE-DIGIT NUMBERS

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. ($157 \div 7 = 22 \text{ R } 3$, 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 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.

Explore Dividing Three-Digit Numbers



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
- counters
- bowls
- paper plates
- grid paper
- multiplication models

You have 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.

What is $78 \div 3$?

TRY IT



DISCUSS IT

Ask your partner: How did you get started?

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

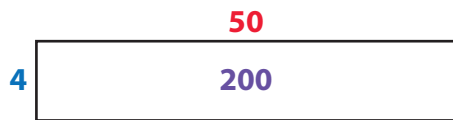
CONNECT IT

1 LOOK BACK

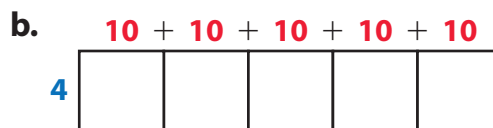
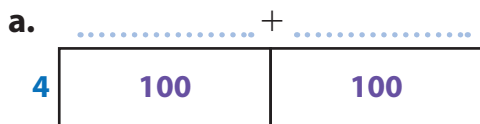
Explain how you found the quotient of $78 \div 3$.

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 $200 \div 4$.



An area model shows both multiplication ($4 \times 50 = 200$) and division ($200 \div 4 = 50$). 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 $200 \div 4$.



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

$$\begin{array}{r} 5 \text{ R} \square \\ 4 \overline{)21} \end{array}$$

- b. The **dividend** is $\dots\dots\dots$, the number you are dividing.
- c. The **divisor** is $\dots\dots\dots$, the number you are dividing by.
- d. The quotient is $\dots\dots\dots$, 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.

$$123 \div 5 = 24 R 3$$

- 3 Solve the problem. Show your work.

What is $68 \div 4$?

Solution

- 4 Check your answer. Show your work.

Develop Dividing with Arrays and Area Models



Read and try to solve the problem below.

What is $136 \div 4$?

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 ...

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

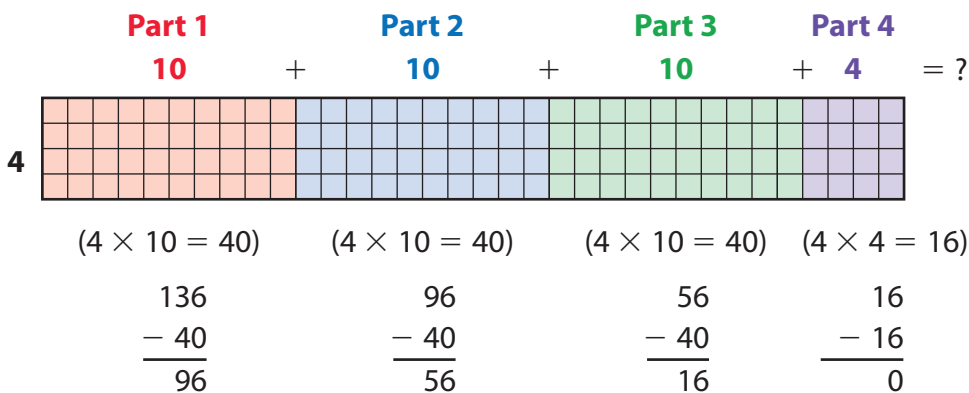
What is $136 \div 4$?

MODEL IT

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

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

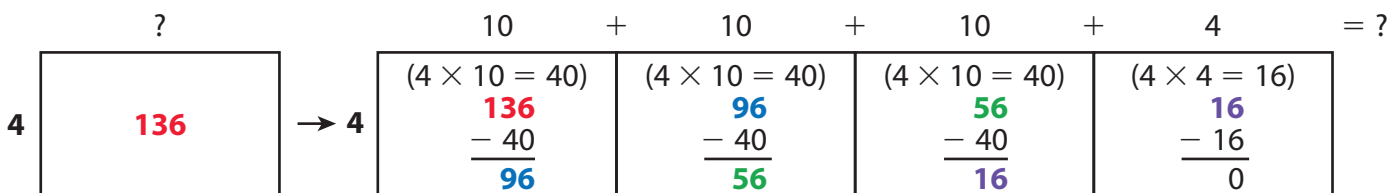
You can use what you know about multiplication and subtraction to break apart 136 and divide the lesser numbers by 4.



MODEL IT

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

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



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 $136 \div 4$? How do both **Model Its** show how to find the quotient of $136 \div 4$ 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 $132 \div 3$.

$20 + \square + \square = \square$

$ \begin{array}{r} 132 \\ - 60 \\ \hline \square \end{array} $	$ \begin{array}{r} 72 \\ - \square \\ \hline \square \end{array} $	$ \begin{array}{r} 12 \\ - \square \\ \hline \square \end{array} $
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Solution

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

	10																		
6																			

Solution

9 What is 224 divided by 7?

- (A) 30
- (B) 31
- (C) 32
- (D) 42

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.

$$\begin{array}{r}
 \color{red}{50} \quad + \quad \color{red}{10} \quad + \quad \color{red}{5} \quad = \color{red}{65} \\
 \color{blue}{4} \begin{array}{|l|l|l|}
 \hline
 (4 \times 50 = 200) & (4 \times 10 = 40) & (4 \times 5 = 20) \\
 \hline
 \begin{array}{r} 260 \\ - 200 \\ \hline 60 \end{array} & \begin{array}{r} 60 \\ - 40 \\ \hline 20 \end{array} & \begin{array}{r} 20 \\ - 20 \\ \hline 0 \end{array} \\
 \hline
 \end{array}
 \end{array}$$

Use multiplication to check:

$$\begin{aligned}
 4 \times 65 &= (4 \times 60) + (4 \times 5) \\
 &= 240 + 20 \\
 &= 260
 \end{aligned}$$

$$260 \div 4 = 65$$

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

$$\begin{array}{r}
 \square \quad + \quad \square \quad + \quad \square \quad = \quad \square \\
 \color{blue}{5} \begin{array}{|l|l|l|}
 \hline
 \begin{array}{r} 135 \\ - \square \\ \hline \square \end{array} & \begin{array}{r} 85 \\ - \square \\ \hline \square \end{array} & \begin{array}{r} 35 \\ - \square \\ \hline \square \end{array} \\
 \hline
 \end{array}
 \end{array}$$

Solution

2 Identify the dividend, divisor, and quotient.

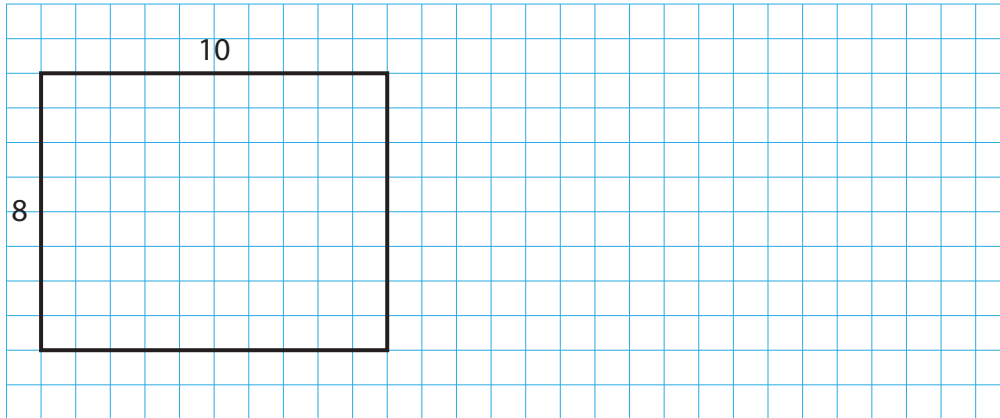
a. $900 \div 3 = 300$

dividend: divisor: quotient:

b. $120 = 600 \div 5$

dividend: divisor: quotient:

- 3 Complete the array to find $208 \div 8$. Show your work.



Solution

- 4 What is $476 \div 7$? 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.

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 ...

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.

$$232 \div 5 = ? \text{ and } 5 \times ? = 232$$

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

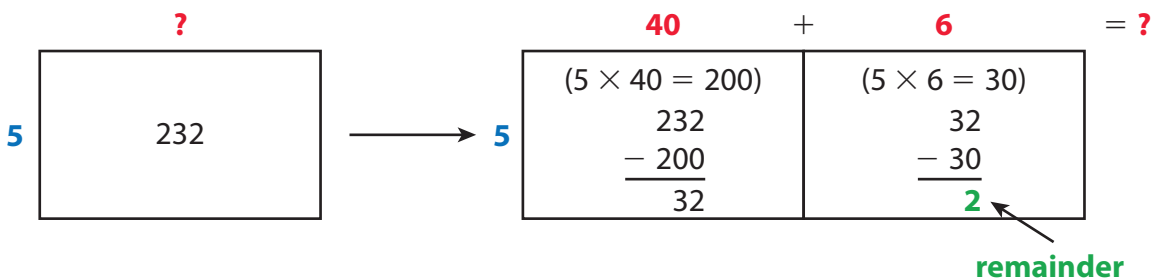
Number of Cars	10	20	30	40	50
Number of People	50	100	150	200	250

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:

$$\begin{aligned}
 5 \times 46 &= (5 \times 40) + (5 \times 6) \\
 &= 200 + 30 \\
 &= 230
 \end{aligned}
 \qquad
 \begin{aligned}
 230 + 2 &= 232
 \end{aligned}$$

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				

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Solution

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

Solution

- 9 Find $456 \div 6$. Show your work.

Solution

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

There are 650 flowers to arrange in vases. Each vase holds 6 flowers. How many vases can each be filled with 6 flowers? Are there any flowers left over?

Find $650 \div 6$.

Use an area model.

$$100 + 8 = 108$$

$ \begin{array}{r} (6 \times 100 = 600) \\ 650 \\ - 600 \\ \hline 50 \end{array} $	$ \begin{array}{r} (6 \times 8 = 48) \\ 50 \\ - 48 \\ \hline 2 \end{array} $
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$$650 \div 6 = 108 \text{ R } 2$$

108 vases can each be filled with 6 flowers. There are 2 flowers left over.

- 1 The table lists the products of 7 and multiples of 10. Use the table to help estimate the quotient of $253 \div 7$.

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 of $253 \div 7$. Complete the area model to solve the problem.

$$30 + 6 = \square$$

$ \begin{array}{r} (7 \times 30 = \square) \\ 253 \\ - \square \\ \hline \square \end{array} $	$ \begin{array}{r} (7 \times 6 = \square) \\ 43 \\ - \square \\ \hline \square \end{array} $
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Solution

- 3 Explain how to check whether the answer to the division problem below is correct.

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

- 4 Mike has 876 toy building pieces to share among himself and 2 friends. He wants each person to have an equal number of pieces. How many pieces does each person get? 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.

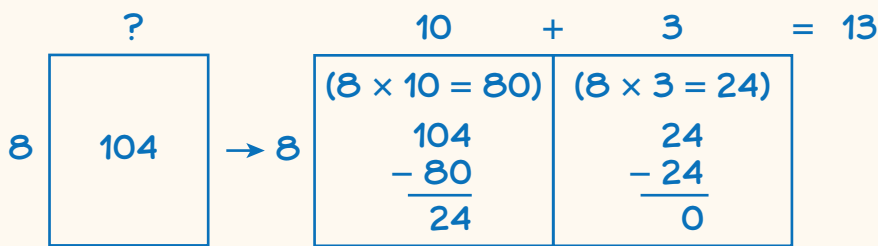
Refine Dividing Three-Digit Numbers

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

EXAMPLE

In art class, 8 students share 104 pieces of felt. Each student gets the same number of pieces. How many pieces of felt 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

- Find $641 \div 3$. Use multiplication to check your answer. Show your work.

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

PAIR/SHARE

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

Solution

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

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



Solution

3 The Prize Place has 252 toys to divide equally among 6 piñatas. How many toys go into each piñata?

- (A) 32
- (B) 41 R 4
- (C) 42
- (D) 420

Erin chose (D) as the correct answer. How did she get that answer?

PAIR/SHARE

How could you use multiplication to check your answer?

Will there be any toys left over?



PAIR/SHARE

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

- 4 Select all the true division equations.
- (A) $255 \div 8 = 31$
- (B) $493 \div 7 = 73$
- (C) $320 \div 4 = 8$
- (D) $675 \div 5 = 135$
- (E) $318 \div 6 = 53$
- 5 Select all the expressions that have a value of 25.
- (A) $225 \div 8$
- (B) $180 \div 7$
- (C) $150 \div 6$
- (D) $130 \div 5$
- (E) $100 \div 4$
- 6 Together, Aiden and his two sisters save 720 quarters. They divide the quarters equally. Aiden puts his quarters into 3 equal piles. How many quarters does Aiden put in each pile?

0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9



- 7 James, Micah, and Rebecca work at a restaurant. There is \$115 in the tip jar. They decide to divide the tips equally among them and leave any extra money in the jar. How much money do they leave in the jar?
- Ⓐ \$1
Ⓑ \$2
Ⓒ \$38
Ⓓ \$39
- 8 Mrs. Long 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 $228 \div 6$. 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.