Name _____

Place Value and Patterns

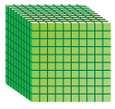
Essential Question How can you describe the relationship between two place-value positions?

COMMON CORE STANDARD **CC.5.NBT.1**
Understand the place value system.

Investigate

Materials ■ base-ten blocks

You can use base-ten blocks to understand the relationships among place-value positions. Use a large cube for 1,000, a flat for 100, a long for 10, and a small cube for 1.

Number	1,000	100	10	1
Model				
Description	large cube	flat	long	small cube

Complete the comparisons below to describe the relationship from one place-value position to the next place-value position.

A.

- Look at the long and compare it to the small cube.

  The long is 10 times as much as the small cube.

- Look at the flat and compare it to the long.

  The flat is 10 times as much as the long.

- Look at the large cube and compare it to the flat.

  The large cube is 10 times as much as the flat.

B.

- Look at the flat and compare it to the large cube.

  The flat is $\frac{1}{10}$ of the large cube.

- Look at the long and compare it to the flat.

  The long is $\frac{1}{10}$ of the flat.

- Look at the small cube and compare it to the long.

  The small cube is $\frac{1}{10}$ of the long.

100; 1,000; Possible explanation: There are 100 small cubes in the flat and 1,000 small cubes in the large cube.

MATHEMATICAL PRACTICES

Math Talk How many times as much is the flat compared to the small cube? the large cube to the small cube? **Explain**.

Draw Conclusions

For Exercise 1, students should make the generalization that when moving from right to left, each place-value position in 10 times greater than the place-value to its right.

If students have difficulty expressing their ideas in words, invite them to use a number example to demonstrate moving from a lesser place-value position to the next greater place-value position.

- **How can you describe the pattern of the place-value position of digits in the number 444 as you move from the ones place to the tens place?** The 4 in the tens place is in a position that is ten times greater than the 4 in the ones place.

For Exercise 2, demonstrate that as you move from left to right, each place-value position is $\frac{1}{10}$ of the place-value to its left.

Make Connections

Guide students to use the place-value chart to find numbers that are 10 times as much as or $\frac{1}{10}$ of the original numbers.

- **For the number 10, how many more zeros are there in the "10 times as much as" column?** There is one more zero.
- **How many fewer zeros are there in the "$\frac{1}{10}$ of" column?** There is one fewer zero.

Point out that the number of zeros increases by 1 in the "10 times as much as" column, and decreases by 1 in the "$\frac{1}{10}$ of" column. Help students recognize that each place-value represents a multiple of 10 by writing on the board 30,000 is ____ times as much as 300. Use the place-value chart to demonstrate that 30,000 is 2 place-value positions to the left of 300. So, 30,000 is 100 times as much as 300 because it is 10 × 10, or 100 times greater.

COMMON ERRORS

Error Students may confuse directions for finding place values.

Example To find a number that is 10 times as much as 20, a student may divide by 10 instead of multiply.

Springboard to Learning Use place-value charts to demonstrate that place-value positions to the left are greater, and positions to the right are lesser. Help students make the connection that when moving left in place-value position, they should multiply, and when moving right in place-value position, they should divide.

Draw Conclusions

1. **Describe** the pattern you see when you move from a lesser place-value position to the next greater place-value position.

   Possible description: As I move from a lesser place-value position to the next greater place-value position, the pattern is that the greater place-value position is 10 times as much as the next lesser place-value position.

2. **Describe** the pattern you see when you move from a greater place-value position to the next lesser place-value position.

   Possible description: As I move from a greater place-value position to the next lesser place-value position, the pattern is that the lesser place-value position is $\frac{1}{10}$ of the next greater place-value position.

Make Connections

You can use your understanding of place-value patterns and a place-value chart to write numbers that are 10 times as much as or $\frac{1}{10}$ of any given number.

Hundred Thousands	Ten Thousands	One Thousands	Hundreds	Tens	Ones
		?	300	?	

10 times as much as ↑ ↑ $\frac{1}{10}$ of

3,000 is 10 times as much as 300.

30 is $\frac{1}{10}$ of 300.

Use the steps below to complete the table.

STEP 1 Write the given number in a place-value chart.

STEP 2 Use the place-value chart to write a number that is 10 times as much as the given number.

STEP 3 Use the place-value chart to write a number that is $\frac{1}{10}$ of the given number.

Number	10 times as much as	$\frac{1}{10}$ of
10	**100**	**1**
70	**700**	**7**
9,000	**90,000**	**900**

3 PRACTICE

Share and Show • Guided Practice

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

Use Exercises 2 and 5 for Quick Check. Students should show their answers for the Quick Check on the MathBoard.

Quick Check RtI

If a student misses Exercises 2 and 5

Then **Differentiate Instruction** with

- RtI Tier 1 Activity, p. 5B
- Reteach 1.1

On Your Own • Independent Practice

If students complete Exercises 2 and 5 correctly, they may continue with Independent Practice.

Encourage students to work through the Share and Show problems independently, but offer help when needed. For Exercises 1–4, make sure students understand whether their answer should be greater than or less than the number they are comparing.

- **In Exercise 1, it says that 500 is "10 times as much as" another number. Is the number you are looking for greater than or less than 500?** less than
- **In Exercise 3, it says that 900 is "$\frac{1}{10}$" another number. Is the number you are looking for greater than or less than 900?** greater than

Point out to students that the place-value patterns in the table show numbers greater than and less than the number in the first column.

- **Are the numbers in column 2 greater than or less than the corresponding numbers in column 1?** greater than
- **Are the numbers in column 3 greater than or less than the corresponding numbers in column 1?** less than

H.O.T. Problem

Exercises 13–18 require students to use higher-order thinking skills to analyze values and determine quantitative relationships. Ask students how many more zeros there are in the first number in the sentence than the second number in the sentence. This should give students a hint about how much larger the first number is than the second number.

- **Look at Exercise 15. How any more zeros are in 700,000 than in 700?** 3
- **How many zeros are in 1,000?** 3

Students may also wish to solve the problems by using a place-value chart or using base-ten blocks.

Name _____

Share and Show

MATH BOARD

Complete the sentence.

1. 500 is 10 times as much as 50.

2. 20,000 is $\frac{1}{10}$ of 200,000.

3. 900 is $\frac{1}{10}$ of 9,000.

4. 600 is 10 times as much as 60.

Use place-value patterns to complete the table.

Number	10 times as much as	$\frac{1}{10}$ of
5. 10	100	1
6. 3,000	30,000	300
7. 800	8,000	80
8. 50	500	5

Number	10 times as much as	$\frac{1}{10}$ of
9. 400	4,000	40
10. 90	900	9
11. 6,000	60,000	600
12. 200	2,000	20

H.O.T. **Complete the sentence with 100 or 1,000.**

13. 200 is 100 times as much as 2.

14. 4,000 is 1,000 times as much as 4.

15. 700,000 is 1,000 times as much as 700.

16. 600 is 100 times as much as 6.

17. 50,000 is 100 times as much as 500.

18. 30,000 is 1,000 times as much as 30.

19. Write Math **Explain** how you can use place-value patterns to describe how 50 and 5,000 compare.

Possible explanation: Since 5,000 has 2 more zeros than 50, 5,000 is 100 times as much as 50.

Problem Solving MATHEMATICAL PRACTICES

H.O.T. Problem

Exercise 20 requires students to evaluate physical models to determine relationships between two numbers. Have students write under the model the number each model represents. Remind them to compare the numbers and the models to be sure that their answers make sense.

- **What number does Mark's model show? How does he show it?** Mark's model shows 300 on the left and 30 on the right by using 3 flats and 3 longs. The 3 flats represents 300, and the 3 longs represent 3 tens.
- **What number does Robyn's model show? How does she show it?** Robyn's model shows 300 on the left and 3 on the right by using 3 flats and 3 small cubes. The 3 flats represents 300, and the 3 small cubes represent 3 ones.
- **Whose model answers the question correctly?** Robyn's model answers the question because it asks for a comparison to a place-value in the ones place, not in the tens place.

Provide students with additional practice making comparisons between numbers of different place values. Have them use base-ten blocks to make comparisons between the numbers. Then have them partner with other students to decide whether their models are reasonable.

4 SUMMARIZE MATHEMATICAL PRACTICES

Essential Question

How can you describe the relationship between two place-value positions? Possible answer: Any place-value position is 10 times greater than the position to its right and $\frac{1}{10}$ of the position to its left.

Math Journal

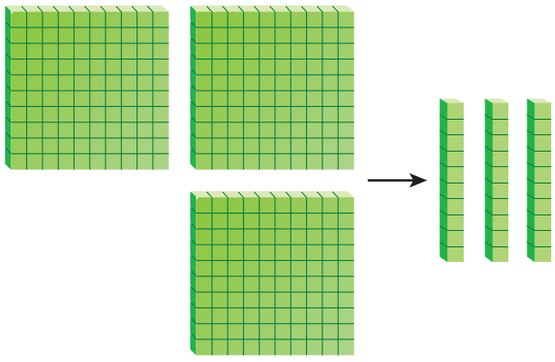
Write a number that has four digits with the same number in all places, such as 4,444. Circle the digit with the greatest value. Underline the digit with the smallest value. Explain.

Problem Solving

H.O.T. Sense or Nonsense?

20. Mark and Robyn used base-ten blocks to show that 300 is 100 times as much as 3. Whose model makes sense? Whose model is nonsense? **Explain** your reasoning.

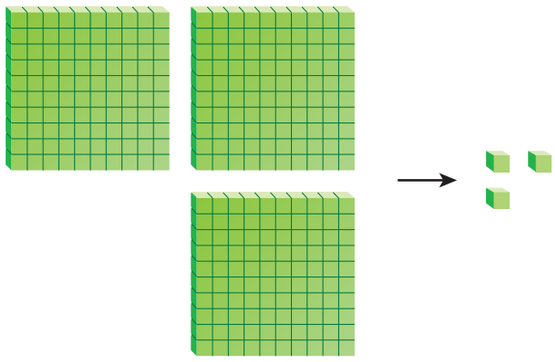
Mark's Work



300 30

Mark's model does not make sense. His model shows 30 instead of 3. Mark's model shows that 300 is 10 times as much as 30.

Robyn's Work



300 3

Robyn's model makes sense. Her model shows that 300 is 100 times as much as 3.

- **Explain** how you would help Mark understand why he should have used small cubes instead of longs.

Possible explanation: Flats are 10 times as much as longs and 100 times as much as small cubes. Since a small cube represents 1, and 300 is 100 times as much as 3, he should have used 3 small cubes in the model.

FOR MORE PRACTICE:
Standards Practice Book, pp. P3–P4

Place Value of Whole Numbers

Common Core Standard CC.5.NBT.1
Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.

Lesson Objective Read and write whole numbers through hundred millions.

Essential Question How do you read, write, and represent whole numbers through hundred millions?

Vocabulary period

1 ENGAGE

Math Board

Access Access Prior Knowledge Introduce the lesson by discussing the sun's size and its location in our solar system. Explain that distances between the sun and the planets are very large numbers. Students might find it interesting to research some ways scientists measure those distances.

2 TEACH and TALK

GO Online Animated Math Models

Unlock the Problem

MATHEMATICAL PRACTICES

Before reading and discussing the problem, focus students' attention on the use of the vocabulary word *period*.

- **How many periods are in the number 3,000? What are they?** 2; the ones and the thousands
- **How many periods are in the number 43,000,000? What are they?** 3; the ones, the thousands, and the millions

Provide students with additional support if needed and make it clear that a period is not simply a group of 3 zeros, but it is a group of 3 digits separated by commas. Even in the number 43,000,000, there are 3 periods because the millions period has zeros in the hundred millions place.

Read and discuss the problem. Direct students to focus on the place-value chart

- **Describe the pattern of place-value names in the chart.** Each period repeats the same three place-value names: hundreds, tens, ones.
- **What is the value of the digit 1 in 1,392,000? How does this relate to the expanded form of 1,392,000?** Possible answers: The value of the digit 1 is 1,000,000, or one million in word form. The expanded form of 1,392,000 must reflect the value of the 1 in the millions place; $1{,}392{,}000 = (1 \times 1{,}000{,}000) + (3 \times 100{,}000) + (9 \times 10{,}000) + (2 \times 1{,}000)$.
- **Point out the use of the comma to separate periods. Write 25,025 on the board. What is 25,025 written in word form?** twenty-five thousand, twenty-five

Point out that the word *and* is not used to separate periods. The correct word form is twenty-five thousand twenty-five, not twenty-five thousand and twenty five.

Name _____

Place Value of Whole Numbers

Essential Question How do you read, write, and represent whole numbers through hundred millions?

COMMON CORE STANDARD CC.5.NBT.1
Understand the place value system.

UNLOCK the Problem REAL WORLD

The diameter of the sun is 1,392,000 kilometers. To understand this distance, you need to understand the place value of each digit in 1,392,000.

A place-value chart contains periods. A **period** is a group of three digits separated by commas in a multidigit number. The millions period is left of the thousands period. One million is 1,000 thousands and is written as 1,000,000.

Periods

MILLIONS			THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		1,	3	9	2,	0	0	0
		1 × 1,000,000	3 × 100,000	9 × 10,000	2 × 1,000	0 × 100	0 × 10	0 × 1
		1,000,000	300,000	90,000	2,000	0	0	0

The place value of the digit 1 in 1,392,000 is millions. The value of 1 in 1,392,000 is $1 \times 1{,}000{,}000 = 1{,}000{,}000$.

Standard Form: 1,392,000
Word Form: one million, three hundred ninety-two thousand
Expanded Form:
$(1 \times 1{,}000{,}000) + (3 \times 100{,}000) + (9 \times 10{,}000) + (2 \times 1{,}000)$

Math Idea
When writing a number in expanded form, if no digits appear in a place value, it is not necessary to include them in the expression.

Try This! **Use place value to read and write numbers.**

Standard Form: 582,030

Word Form: five hundred eighty-two thousand, thirty

Expanded Form: $(5 \times 100{,}000) + (8 \times 10{,}000) + (2 \times 1{,}000) + (3 \times 10)$

- The average distance from Jupiter to the sun is four hundred eighty-three million, six hundred thousand miles. Write the number that shows this distance. 483,600,000

Example 1

- **Review the role of zero as a placeholder in our number system. How would you write nine hundred thousand in our number system?** Possible answer: In the place-value chart, hundred thousands are in the sixth place as you move from right to left. I would write 9 followed by five zeros to position the 9 in the hundred thousands place; 900,000.
- **Be sure students recognize that the value of each place is $\frac{1}{10}$ times the value of the place to its left. How do you know that 2,500 is less than 250,000?** Possible answers: There are two fewer digits in 2,500 than in 250,000, so I know that 2,500 is less than 250,000.

Explain to students that for each place value a number decreases, its value is $\frac{1}{10}$ of the next larger place value. So, two fewer place-value positions would mean that the number is $\frac{1}{10} \times \frac{1}{10}$, or $\frac{1}{100}$ of the number in the greater place value. For example, 2,500 has two fewer place values than 250,000. So, 2,500 is $\frac{1}{100}$ of 250,000.

Example 2

Ask students to complete the multiplication at the end of each row. Guide them to see that the result is always 40,000, even though the factors are different.

- **Why did the product remain the same?** Possible answer: As one factor increases by a place value, the other factor decreases by a place value. So the products are the same.

Go Deeper

MATHEMATICAL PRACTICES

- **Explain how to find the unknown factor in this number sentence: 52,300 = 523 × ____.** Possible explanation: I could use the location of the place value of the last digit, 3,as the unknown factor, which is 100. So, 52,300 = 523 × 100.

COMMON ERRORS

Error Students may omit or incorrectly use the period when writing a number in word form.

Example 4,357,078 is written as four million, three hundred fifty-seven, and seventy-eight.

Springboard to Learning Have students use a place-value chart to position each digit in its correct place-value position. Tell students to write the value of all the digits within each period followed by the period name. Remind students to use commas to separate period names, not the word *and*.

Place-Value Patterns

Canada's land area is about 4,000,000 square miles. Iceland has a land area of about 40,000 square miles. Compare the two areas.

Example 1 Use a place-value chart.

STEP 1 Write the numbers in a place-value chart.

MILLIONS			THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		4,	0	0	0,	0	0	0
				4	0,	0	0	0

STEP 2

Count the number of whole number place-value positions.

4,000,000 has 2 more whole number places than 40,000.

Think: 2 more places is 10 × 10, or 100.

4,000,000 is 100 times as much as 40,000.

So, Canada's estimated land area is 100 times as much as Iceland's estimated land area.

Remember

The value of each place is 10 times as much as the value of the next place to its right or $\frac{1}{10}$ of the value of the next place to its left.

You can use place-value patterns to rename a number.

Example 2 Use place-value patterns.

Rename 40,000 using other place values.

40,000	4 ten thousands	4 × 10,000
40,000	40 thousands	40 × 1,000
40,000	400 hundreds	400 × 100

3 PRACTICE

Share and Show • Guided Practice

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

Use Exercises 4 and 7 for Quick Check. Students should show their answers for the Quick Check on the MathBoard.

Quick Check RtI

If a student misses Exercises 4 and 7

Then Differentiate Instruction with

- RtI Tier I Activity, p. 9B
- Reteach 1.2
- Soar to Success Math 2.27

On Your Own • Independent Practice

If students complete Exercises 4 and 7 correctly, they may continue with Independent Practice. Assign Exercises 8–17.

If students have tried to work independently but still need additional help, guide them through the process of writing the underlined digit and replacing all of the digits to the right of the underlined digit with zeros.

To practice expressing the place values, ask students to give each answer in word form as well as in number form. For example, write 40,000,000 on the board.

- **What is this number in word form?** forty million
- **What is the number in expanded form?** $4 \times 10{,}000{,}000$

For Exercises 16 and 17, the other forms students should use to express the numbers are expanded form and word form. Guide students to write the expanded form of the numbers if necessary.

- **In Exercise 16, what place value does the 3 appear in?** hundred thousands
- **How can you write 300,000 in expanded form?** $3 \times 100{,}000$

Name _____

Share and Show

1. Complete the place-value chart to find the value of each digit.

MILLIONS			THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
		7,	3	3	3,	8	2	0
		7 × 1,000,000	3 × 100,000	3 × 10,000	3 × 1,000	8 × 100	2 × 10	0 × 1
		7,000,000	300,000	30,000	3,000	800	20	0

Write the value of the underlined digit.

2. 1,574,833 — 4,000

3. 598,102 — 100

4. 7,093,455 — 90,000

5. 301,256,878 — 300,000,000

Write the number in two other forms.

6. (8 × 100,000) + (4 × 1,000) + (6 × 1) — 804,006; eight hundred four thousand, six

7. seven million, twenty thousand, thirty-two — 7,020,032; (7 × 1,000,000) + (2 × 10,000) + (3 × 10) + (2 × 1)

On Your Own

Write the value of the underlined digit.

8. 849,567,043 — 40,000,000

9. 9,422,850 — 400,000

10. 96,283 — 90,000

11. 498,354,021 — 400,000,000

12. 791,350 — 300

13. 27,911,534 — 7,000,000

14. 105,980,774 — 80,000

15. 8,265,178 — 5,000

Write the number in two other forms.

16. 345,000 — (3 × 100,000) + (4 × 10,000) + (5 × 1,000); three hundred forty-five thousand

17. 119,000,003 — one hundred nineteen million, three; (1 × 100,000,000) + (1 × 10,000,000) + (9 × 1,000,000) + (3 × 1)

Problem Solving MATHEMATICAL PRACTICES

H.O.T. Problem

Exercise 20 involves Higher Order Thinking Skills because it requires students to find and correct errors in a given number. Explain that when we find errors and explain them, we must understand the concepts we are examining as well as be able to determine what someone else may not have understood about the concepts.

- **In the written form of the number, which place value has a zero in it?** ten thousands
- **In Matt's answer, which place value has the zero in it?** thousands
- **Did Matt write a number that was greater than or less than the written form?** greater than

Encourage students to write the corrected answer in expanded form or to make a place-value chart to show the number visually.

Test Prep Coach

Test Prep Coach helps teachers to identify common errors that students can make.
In Exercise 22, if students selected:

- **A or C** They compared the wrong place values.
- **D,** They compared the smaller place value to the place value to its left.

4 SUMMARIZE MATHEMATICAL PRACTICES

Essential Question

How do you read, write, and represent whole numbers through hundred millions? Possible answer: I identify the place value of each of the digits within a period, name the number and the period, and place a comma between the periods.

Math Journal

Write *Standard Form, Expanded Form*, and *Word Form* at the top of the page. Write five numbers that are at least 8 digits long under *Standard Form*. Write the expanded form and the word form for each number under the appropriate heading.

Problem Solving REAL WORLD

Use the table for 18–19.

Average Distance from the Sun (in thousands of km)			
Mercury	57,910	Jupiter	778,400
Venus	108,200	Saturn	1,427,000
Earth	149,600	Uranus	2,871,000
Mars	227,900	Neptune	4,498,000

18. Which planet is about 10 times as far as Earth is from the sun?

Saturn

19. Which planet is about $\frac{1}{10}$ of the distance Uranus is from the Sun?

Mars

20. **What's the Error?** Matt wrote the number four million, three hundred five thousand, seven hundred sixty-two as 4,350,762. **Describe** and correct his error.

Possible description: Matt switched 2 digits in the thousands period: 4,305,762

SHOW YOUR WORK

21. Write Math **Explain** how you know that the values of the digit 5 in the numbers 150,000 and 100,500 are not the same.

Possible explanation: In 150,000, the digit 5 is in the ten-thousands place, so its value is 50,000; in 100,500, the digit 5 is in the hundreds place, so its value is 500.

22. **Test Prep** In the number 869,653,214, which describes how the digit 6 in the ten-millions place compares to the digit 6 in the hundred-thousands place?

Ⓐ 10 times as much as

● 100 times as much as

Ⓒ 1,000 times as much as

Ⓓ $\frac{1}{10}$ of

FOR MORE PRACTICE:
Standards Practice Book, pp. P5–P6

FOR EXTRA PRACTICE:
Standards Practice Book, p. P27

Problem Solving • Multiplication and Division

Common Core Standard CC.5.NBT.6
Find whole-number quotients of whole numbers with up to four-digit dividends and two-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.

Lesson Objective Use the strategy *solve a simpler problem* to solve problems.

Essential Question How can you use the strategy *solve a simpler problem* to help you solve a division problem?

1 ENGAGE

Math Board

Access Prior Knowledge The first problem in this lesson is about pets. Invite volunteers to share a pet story with the class.

Have you ever been responsible for feeding your pet? What does your pet eat? How much food does your pet eat each day?

2 TEACH and TALK

Math Board

Unlock the Problem

MATHEMATICAL PRACTICES

Read and discuss the problem. Make sure to discuss the idea that before we can find the amount of food each dog gets, we must find the total number of ounces of dog food.

- **Why is the first step of the problem to multiply 8 and 18?** There are 8 cans of dog food and each can has 18 ounces. Multiplying the numbers will tell me the total ounces of dog food Mark uses to feed the dogs.
- **In the next step, what number should be divided into the total number of ounces of dog food?** the number of dogs, which is 9
- **Why does it help to break 144 into simpler numbers?** 144 is a large number, so breaking it down into smaller numbers helps make the calculations easier.

Discuss and complete the graphic organizer. When you discuss the division in the right column, make sure students understand that it is useful to rewrite 144 as the sum of 90 + 54 because both 90 and 54 are multiples of the divisor, which is 9.

Go Deeper

MATHEMATICAL PRACTICES

- **To divide 144 by 9, we broke apart 144 and wrote it as the sum of two numbers, 90 and 54. Is it possible to break 144 apart and write it as the sum of three or more numbers? Give a reason or example to support your answer.** Yes, Have students write their examples on the board. Possible example: $144 \div 9 = ?$; $(90 + 36 + 18) \div 9 = ?$; $(90 \div 9) + (36 \div 9) + (18 \div 9) = ?$; $10 + 4 + 2 = 16$

Name _____

Problem Solving • Multiplication and Division

Essential Question How can you use the strategy *solve a simpler problem* to help you solve a division problem?

COMMON CORE STANDARD **CC.5.NBT.6**
Perform operations with multi-digit whole numbers and with decimals to hundredths.

UNLOCK the Problem REAL WORLD

Mark works at an animal shelter. To feed 9 dogs, Mark empties eight 18-ounce cans of dog food into a large bowl. If he divides the food equally among the dogs, how many ounces of food will each dog get?

Use the graphic organizer below to help you solve the problem.

Read the Problem

What do I need to find?

I need to find the number of ounces of dog food that each dog gets.

What information do I need to use?

I need to use the number of cans of food, the number of ounces in each can, and the number of dogs that need to be fed.

How will I use the information?

I can multiply to find the total number of ounces. Then I can solve a simpler problem to divide that total by 9.

Solve the Problem

- First, multiply to find the total number of ounces of dog food.

$8 \times 18 =$ 144

- To find the number of ounces each dog gets, I'll need to divide.

$144 \div$ 9 $= \square$

- To find the quotient, I break 144 into two simpler numbers that are easier to divide.

$144 \div 9 = \square$

$(90 +$ 54 $) \div 9 = \square$

(90 $\div 9) + ($ 54 $\div 9) = \square$

10 $+$ 6 $=$ 16

So, each dog gets 16 ounces of food.

Try Another Problem

Read and discuss the problem.

- **To find the length of each shelf, we must divide. Why isn't division the first operation we will perform to solve this problem?** Michelle will cut 2 inches off each end of the plank before it is cut into seven equal pieces. So, 2 inches + 2 inches, or 4 inches altogether, must be subtracted from the length of the plank before we divide.

Discuss and complete the graphic organizer. Use **Math Talk** to focus on students' understanding of lesson concepts. Explain that it helps to divide simpler numbers not only when you do not know how to divide larger numbers, but because the calculations with smaller numbers will be easier. Stress the importance of using a tree diagram to solve the problem so that students can clearly and easily keep track of the simpler numbers with parentheses and arrows.

- **If you break 133 into 70 + 63, why should the numbers be in parentheses?** to keep them separate from the 7 in the number sentence
- **How can the 70 and 63 be broken into simpler numbers?** The 70 can be broken into 70 ÷ 7, which is 10, and the 63 can be broken into 63 ÷ 7, which is 9. 10 + 9 is an easier problem to solve than 133 ÷ 7.

You may suggest that students place completed Try Another Problem graphic organizers in their portfolios.

COMMON ERRORS

Error Students may not understand how to break apart a dividend.

Example 91 ÷ 7 = (80 ÷ 7) + (11 ÷ 7)

Springboard to Learning Have students name the divisor, and skip count by that number. Explain that numbers named while skip counting can be used for one of the numbers, and that subtraction can be used to find the other number. Multiples of 10 and the divisor are easy to find and can always be used.

Try Another Problem

Michelle is building shelves for her room. She has a plank 137 inches long that she wants to cut into 7 shelves of equal length. The plank has jagged ends, so she will start by cutting 2 inches off each end. How long will each shelf be?

137 inches

Read the Problem	Solve the Problem
What do I need to find? I need to find the length of each of 7 equal-sized shelves.	$137 - 2 - 2 = 133$ inches $133 \div 7 =$ $(70 + 63) \div 7 =$ $(70 \div 7) + (63 \div 7) =$ $10 + 9 = 19$
What information do I need to use? I need to know the amount of wood to cut off each end, the number of shelves, and the length of the plank before it is cut.	
How will I use the information? I will first subtract 2 inches from each end of the plank to see what length is being divided. Then I will divide the length of the remaining piece by 7. If that length is not easy to divide, I will break it into two numbers and divide each by 7. Then I will add the 2 partial quotients to get the final quotient.	

So, each shelf will be 19 inches long.

Math Talk MATHEMATICAL PRACTICES

Explain how the strategy you used helped you solve the problem.

Possible explanation: I did not know how to divide 133 by 7, but I did know how to divide simpler numbers by 7 that add to 133. I chose 70 and 63, both of which are easy to divide by 7. Then, I added the partial quotients to find the final answer.

3 PRACTICE

Share and Show • Guided Practice

The first problem connects to the learning model. Have students use the MathBoard to explain their thinking.

For all of the problems on this page, make sure students recognize that more than one operation is needed to solve the problems. Encourage them to use the Show Your Work area of the page and check it to make sure they did the work correctly. Work through Exercise 1 together:

- **Why are you adding the four numbers in the problem as the first step?** This will tell me the total number of pounds of cement, sand, and pebbles that Monica poured into the wheelbarrow.
- **What do you want to find out next?** how many pounds of materials will go into the 9 bags
- **What simpler numbers can 135 and 9 be broken into?** 135 can be broken into 90 + 45. I can then divide 9 by each of these numbers separately rather than the 135.
- **By breaking up 135, what problems are you solving instead of 135 ÷ 9?** I am solving 90 ÷ 9 and 45 ÷ 9.
- **Why is it easier to do two division problems instead of just one?** The numbers are easier to divide. I can do them in my head and then easily add them, but I cannot do 135 ÷ 9 in my head.

Use Exercises 3 and 4 for **Quick Check.** Students should show their answers for the Quick Check on the MathBoard.

Quick Check

If a student misses Exercises 3 and 4

Then **Differentiate Instruction** with

- RtI Tier I Activity, p. 39B
- Reteach 1.9
- Soar to Success Math 63.4

Go Deeper

Give students an opportunity to invent a strategy by inviting a volunteer to write his or her solution to one of the problems on the board. Then, as a class, discuss different ways to solve that same problem and then display those solutions on the board.

Name _____

Share and Show

MATH BOARD

Tips

UNLOCK the Problem

- Underline what you need to find.
- Circle the numbers you need to use.

1. To make concrete mix, Monica pours 34 pounds of cement, 68 pounds of sand, 14 pounds of small pebbles, and 19 pounds of large pebbles into a large wheelbarrow. If she pours the mixture into 9 equal-size bags, how much will each bag weigh?

SHOW YOUR WORK

First, find the total weight of the mixture.

$34 + 68 + 14 + 19 = 135$ pounds

Then, divide the total by the number of bags. Break the total into two simpler numbers to make the division easier, if necessary.

$135 \div 9 = (90 \div 9) + (45 \div 9)$
$= 10 + 5$
$= 15$

Finally, find the quotient and solve the problem.

So, each bag will weigh 15 pounds.

2. **What if** Monica pours the mixture into 5 equal-size bags? How much will each bag weigh?

27 pounds

3. Taylor is building doghouses to sell. Each doghouse requires 3 full sheets of plywood which Taylor cuts into new shapes. The plywood is shipped in bundles of 14 full sheets. How many doghouses can Taylor make from 12 bundles of plywood?

56 doghouses

4. Eileen is planting a garden. She has seeds for 60 tomato plants, 55 sweet corn plants, and 21 cucumber plants. She plants them in 8 rows, with the same number of plants in each row. How many seeds are planted in each row?

17 seeds

On Your Own • Independent Practice

If students complete Exercises 3 and 4 correctly, they may continue with Independent Practice. Assign Exercises 5–10.

Encourage students to solve the problems on their own, but offer help when necessary. For Exercise 1, students may be surprised to find that the answer is so high. Explain that making a table may be the easiest way to show the problem. Have them draw a table with ten boxes, then double the number that goes in each box.

H.O.T. Problem

Students will have to use higher order thinking skills to solve Exercises 6 and 8. If students need a hint for Exercise 6, tell them that they will need to draw eight different lines to show all of the ways their pencil can go through every square.

- **How many different ways can you solve the problem by first drawing a line up to the box above the starting point?** 4
- **How many different ways can you solve the problem by first drawing a line to the right of the box at the starting point?** 4

Draw students' attention to Exercise 8.

- **What strategy would you choose to solve this problem?** Answers will vary, but students may find the drawing a diagram is the easiest way to solve the problem.

If students do not know which strategy to choose for Exercise 8, suggest that they try drawing a diagram to represent the bulletin board and student pictures.

Test Prep Coach

Test Prep Coach helps teachers to identify common errors that students can make.

In Exercise 10, if students selected:

B They found the partial quotients incorrectly.

C They found the partial quotients incorrectly.

D They found the partial quotients incorrectly.

4 SUMMARIZE

MATHEMATICAL PRACTICES

Essential Question

How can you use the strategy *solve a simpler problem* to help you solve a division problem?

Possible answer: I can use this strategy to break apart a dividend into smaller numbers that are simpler to divide to solve a problem.

Math Journal

Rewrite Exercise 4 with different numbers. Solve the new problem and show your work.

On Your Own

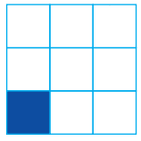
Choose a STRATEGY

- Act It Out
- Draw a Diagram
- Make a Table
- Solve a Simpler Problem
- Work Backward
- Guess, Check, and Revise

5. Starting on day 1 with 1 jumping jack, Keith doubles the number of jumping jacks he does every day. How many jumping jacks will Keith do on day 10?

512 jumping jacks

6. H.O.T. Starting in the blue square, in how many different ways can you draw a line that passes through every square without picking up your pencil or crossing a line you've already drawn? Show the ways.



8 ways

7. On April 11, Millie bought a lawn mower with a 50-day guarantee. If the guarantee begins on the date of purchase, what is the first day on which the mower will no longer be guaranteed?

May 31

8. H.O.T. A classroom bulletin board is 7 feet by 4 feet. If there is a picture of a student every 6 inches along the edge, including one in each corner, how many pictures are on the bulletin board?

40 pictures

9. Dave wants to make a stone walkway. The rectangular walkway is 4 feet wide and 12 feet long. Each 2 foot by 2 foot stone covers an area of 4 square feet. How many stones will Dave need to make his walkway?

12 stones

10. **Test Prep** Dee has 112 minutes of recording time. How many 4-minute songs can she record?

● 28 Ⓒ 18

Ⓑ 27 Ⓓ 17

FOR MORE PRACTICE:
Standards Practice Book, pp. P19–P20

FOR EXTRA PRACTICE:
Standards Practice Book, p. P28