Model Place Value Relationships

Common Core Standard CC.4.NBT.1
Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.

Lesson Objective Model the 10-to-1 relationship among place-value positions in the base-ten number system.

Essential Question How can you describe the value of a digit?

1 ENGAGE

GO Online *i*Tools

Materials *i*Tools: Base-Ten Blocks

Access Prior Knowledge Use *i*Tools to review representing numbers using base-ten blocks. Remind students that the words they will use are *small cube, long,* and *flat*. Show a group of blocks and ask students to name the number that is represented.

2 TEACH and TALK

GO Online HMH Mega Math

Unlock the Problem

MATHEMATICAL PRACTICES

How is the base-ten counting system different from the system used for telling time?

Ask students questions that will lead them answer the question.

- **How many seconds are in a minute?** 60
- **How many minutes are in an hour?** 60
- **What numbers do you see written above the long, flat, and cube?** 10, 100, 1,000
- **How are the two counting systems different?** Telling time uses a system based on 60, and the base-ten system uses multiples of 10.

Activity

Have students compare one small cube to one long.

- **How is the long related to the small cube?** Possible answers: 10 small cubes make up 1 long.

Have students compare the long to the flat.

- **How is the flat related to the long?** Possible answer: 10 longs make up 1 flat.

Have students compare the flat to the large cube.

- **How is the large cube related to the flat?** Possible answer: 10 flats make up 1 large cube.
- **How do you think the next base-ten block would relate to the large cube?** Possible answer: I will need 10 large cubes to make up 1 of those models. **What will be the value of this block?** 10,000
- **What words might you use to describe this pattern in the blocks?** Possible answer: each model is ten times the size of the model before it.

Point out to students that all of the answers they filled in along the bottom of the base-ten blocks show the answer *10*. Point out that the 10 remains the same in each instance, and the place value increases to represent the long, flat, and large cubes. The cubes represent 10 ones, 10 tens, 10 hundreds, and 10 thousands.

Use **Math Talk** to help students recognize the relationships between the model for 10,000 and 100,000.

Point out that 10,000 longs would be used to make a flat that shows 100,000. Be sure to point out that it would be unreasonable to show so many longs without linking them together into a flat or a cube.

- **Why are there so many cubes in a flat and a large cube?** Possible answer: It makes it easier to count cubes quickly.

Name _____

Model Place Value Relationships

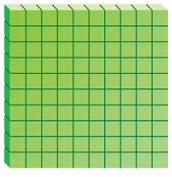
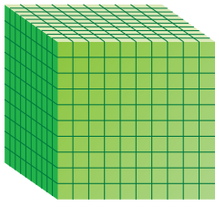
Essential Question How can you describe the value of a digit?

COMMON CORE STANDARD CC.4.NBT.1
Generalize place value understanding for multi-digit whole numbers.

UNLOCK the Problem

Activity Build numbers through 10,000.

Materials ■ base-ten blocks

1	10	100	1,000	10,000
				?
cube	long	flat	cube	long
1	10 ones	10 tens	10 hundreds	10 thousands

A small cube represents 1.

10 small cubes make a long. The long represents 10.

10 longs make a flat. The flat represents 100.

10 flats make a large cube. The large cube represents 1,000.

MATHEMATICAL PRACTICES

Math Talk **Explain** how you can use ten thousands longs to model 100,000.

Possible answer: use 10 ten thousands longs to make a flat that shows 100,000.

1. **Describe** the pattern in the shapes of the models. What will be the shape of the model for 10,000?

Possible answer: the pattern shows cube, long, flat, cube. So, the shape of the model for 10,000 will be long.

2. **Describe** the pattern you see in the sizes of the models. How will the size of the model for 100,000 compare to the size of the model for 10,000?

Possible answer: each model is 10 times the size of the previous model, so the model for 100,000 will be 10 times the size of the model for 10,000.

Value of a Digit

Discuss the concept that in a place-value chart, each place represents a value ten times the value of the place to its right.

- **How is a place-value chart similar to the models of small cubes, longs, flats, and large cubes?** Possible answer: a ten, or long, is 10 times the value of a one, or small cube. A hundred, or flat, is 10 times the value of a ten, or long. A thousand, or large cube, is 10 times the value of a hundred, or flat.
- **What is the name of the place value the digit 8 is in?** hundred thousands
- **How can you find the value of the digit 8?** Possible answer: since the 8 is in the hundred thousands place, the value is 8 hundred thousands.

Have students record the value of the digit 8 as a number: 800,000.

The next example involves identifying and comparing the values of digits in two numbers, using a place-value chart.

Use **Math Talk** to help students recognize that different methods can be used to compare the values of the digits. Help students to understand that the value of a digit is 10 times what it would be in the place-value position to the right.

- **How many times greater is the value of a number in the hundreds-place than a number in the tens-place?** 10
- **What place-value position is 10 times greater than a number in the thousands place?** the number in the ten-thousands place

Provide additional examples of numbers in which students can compare the value of underlined digits.

- **In the number 2,304, what is the name of the place value the digit 3 is in?** hundreds
- **What is the value of the digit 3 in 2,304?** 3 hundreds or 300
- **In the number 16,135, what is the name of the place value for the digit 3?** tens
- **What is the value of the digit 3 in 16,135?** 3 tens or 30
- **How do you know that 3 hundreds is 10 times as many as 3 tens?** Possible answer: a hundred is 10 times the value of a ten, so 3 hundreds is 10 times the value of 3 tens.

COMMON ERRORS

Error Students use the place-value name of the digit with the greater value when comparing the values of two digits.

Example 3 hundreds is one hundred times as a many as 3 tens.

Springboard to Learning In the ones period, have students place the appropriate base-ten block above each column of the place-value chart. Have students explain how many of the models for one place value are needed to create the model to its left. Students should recognize that each place value is 10 times the value of the place to its right, as long as the digits they are comparing are the same.

Value of a Digit The value of a digit depends on its place-value position in the number. A place-value chart can help you understand the value of each digit in a number. The value of each place is 10 times the value of the place to the right.

Write 894,613 in the chart. Find the value of the digit 9.

MILLIONS			THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones	Hundreds	Tens	Ones
			8	9	4,	6	1	3

			8 hundred thousands	9 ten thousands	4 thousands	6 hundreds	1 ten	3 ones
			800,000	90,000	4,000	600	10	3

The value of the digit 9 is 9 ten thousands, or 90,000.

Compare the values of the underlined digits.

2,304 16,135

MATHEMATICAL PRACTICES

Math Talk **Explain** how you can compare the values of the digits without drawing a model.

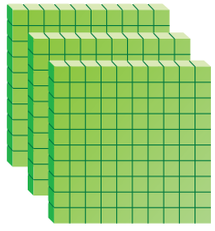
STEP 1 Find the value of 3 in 2,304.

Show 2,304 in a place-value chart.

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones
		2,	3	0	4

Think: The value of the digit 3 is 300.

Model the value of the digit 3.



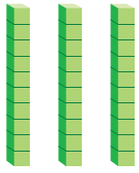
STEP 2 Find the value of 3 in 16,135.

Show 16,135 in a place-value chart.

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones
	1	6,	1	3	5

Think: The value of the digit 3 is 30.

Model the value of the digit 3.



Each hundred is 10 times as many as 10, so 3 hundreds is ten times as many as 3 tens.

So, the value of 3 in 2,304 is 10 times the value of 3 in 16,135.

Math Talk: Possible explanation: I can use a place-value chart. The value of a digit is 10 times what it would be in the place-value position to the right.

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 5 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 5 and 7

Differentiate Instruction with
- RtI Tier I Activity, p. 5B
- Reteach 1.1

On Your Own • Independent Practice

If students complete Exercises 5 and 7 correctly, they may continue with Independent Practice.

Encourage students to work independently, but offer guidance if needed. For Exercises 8–11, point out that the value of the underlined digit should include the digit in the answer. Point out that students should be giving the value of the number, not just the place value that is represented by the number. For example, in Exercise 8, students should indicate the answer as *30,000* instead of *ten thousands*.

- **For Exercises 12 and 13, compare the place values of the underlined digits. How does the value of an underlined digit compare to the value of the digit that is one place to its right?** The value of the digit is 10 times the value of the digit to the right.

If students have trouble comparing the underlined digits in Exercises 12 and 13, ask them to write the value of each underlined digit before they compare them.

Name _____

Share and Show

1. Complete the table below.

Number	1,000,000	100,000	10,000	1,000	100	10	1
Model	?	?	?				
Shape	cube	flat	long	cube	flat	long	cube
Group	10 hundred thousands	10 ten thousands	10 thousands	10 hundreds	10 tens	10 ones	1 one

Find the value of the underlined digit.

2. $\underline{7}03,890$

   700,000

3. $63,\underline{5}40$

   40

4. $1\underline{8}2,034$

   80,000

5. $34\underline{5},890$

   5,000

Compare the values of the underlined digits.

6. $\underline{2},000$ and $\underline{2}00$

   The value of 2 in 2,000 is 10 times the value of 2 in 200.

7. $\underline{4}0$ and $\underline{4}00$

   The value of 4 in 400 is 10 times the value of 4 in 40.

On Your Own

Find the value of the underlined digit.

8. $2\underline{3}0,001$

   30,000

9. $80\underline{3},040$

   3,000

10. $46,84\underline{2}$

    2

11. $\underline{9}80,650$

    900,000

Compare the values of the underlined digits.

12. $6\underline{7},908$ and $\underline{7}6,908$

    The value of 7 in 76,908 is 10 times the value of 7 in 67,908.

13. $546,\underline{3}00$ and $\underline{3},456$

    The value of 3 in 3,456 is 10 times the value of 3 in 546,300.

Problem Solving MATHEMATICAL PRACTICES

H.O.T. Problem

Exercise16 requires students to use higher order thinking skills as they use relationships between place values to represent a number using different place-value models. Step out the problem for students.

- **How many hundreds are in 3,000?** 30
- **How many hundreds are in 200?** 2
- **How can you add to find the number of hundreds in 3,200?** 30 hundreds + 2 hundreds equals 32 hundreds
- **What kind of base-ten blocks would be used to model 3,200?** three large cubes and three flats

Go Deeper

Ask students to choose two digits that are the same from two different numbers in the table and compare their values using the term *times*.

Test Prep Coach

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

For Exercise 18, if students selected:

A they confused tens and ten thousands.
B They confused thousands and ten thousands.
C They confused hundred thousands and ten thousands.

4 SUMMARIZE MATHEMATICAL PRACTICES

Essential Question

How can you describe the value of a digit? I can write the number in a place-value chart and then find the place value of the digit and tell its value.

Math Journal

How does a digit in the ten thousands place compare to a digit in the thousands place?

Problem Solving REAL WORLD

Use the table for 14–15.

14. What is the value of the digit 7 in the population of Memphis?

70,000

15. Which city's population has a 4 in the hundred thousands place?

Cleveland

16. H.O.T. How many models of 100 do you need to model 3,200? Explain.

32; possible explanation: 3 thousands are the same as 30 hundreds, 30 hundreds + 2 hundreds = 32 hundreds

17. Write Math Sid wrote 541,309 on his paper. Using numbers and words, **explain** how the number would change if he switched the digits in the hundred thousands and tens places.

Possible answer: the number would be 041,359, but since zeros are not recorded when they are in the leftmost place-value position, the number now is 41,359.

18. Test Prep There are 686,147 books at the Greenville Library. What is the value of the digit 8 in this number?

Ⓐ 80 ● 80,000

Ⓑ 8,000 Ⓓ 800,000

City Populations

City	Population*
Cleveland	431,369
Denver	610,345
Memphis	676,640

*2009 U. S. Census Bureau Estimation

SHOW YOUR WORK

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

FOR EXTRA PRACTICE:
Standards Practice Book, p. P19

Rename Numbers

Common Core Standard CC.4.NBT.1
Recognize that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right.
Also CC.4.NBT.2

Lesson Objective Rename whole numbers by regrouping.

Essential Question How can you rename a whole number?

1 ENGAGE

GO Online iTools

Materials *i*Tools: Base-Ten Blocks

Access Prior Knowledge Have students model the following numbers using *i*Tools: 29, 145, 608, 2,315, 1,034.

- **How do you model 608?** 6 flats and 8 small cubes to represent 6 hundreds and ones
- **Why did you not use any longs?** There are 0 tens.
- **How did you know which blocks to use?** Possible answer: the place value told me which type of block to use, and the digit in that place value told me how many of those blocks to use.

2 TEACH and TALK

Investigate

MATHEMATICAL PRACTICES

Students use base-ten blocks to model 1,200 in two ways, drawing quick pictures of their models.

- **What does 1 large cube represent?** 1,000
- **What does 1 flat represent?** 100

If students have difficulty recalling what each type of base-ten model represents, have them review Lesson 1.1. Alternatively, you may wish to label the manipulatives so that students can recall the value of each as they make their models.

- **In Step A, how do you know how many of each type of block to use?** Possible answer: a large cube represents 1,000, so I look at the digit in the thousands place. This tells me how many large cubes to use. A flat represents 100, so I look at the digit in the hundreds place. This tells me the number of flats to use.
- **In Step B, how do you know how many flats to use?** Possible answer: I know 1 thousand is 1 large cube, and 1 large cube is the same as 10 flats. So, 10 flats and 2 flats are 12 flats.

Provide additional practice by having students repeat the investigation by using manipulatives to model 2,400 or 1,800. Have them go through the same steps to regroup numbers and name them, and to draw quick pictures to represent the numbers.

Draw Conclusions

Help students see that they can use their understanding of the relationship between the values of the different base-ten blocks to represent a number in many different ways.

- **What is the relationship between a base-ten block and the next smaller base-ten block?** Possible answer: a base-ten block is 10 times as large as the next smaller base-ten block. For example, a large cube is 10 times as large as a flat, which is 10 times as large as a long, which is 10 times as large as a small cube.

Name _____

Rename Numbers

Essential Question How can you rename a whole number?

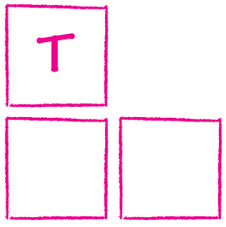
COMMON CORE STANDARD **CC.4.NBT.1**
Generalize place value understanding for multi-digit whole numbers.

Investigate

Materials ■ base-ten blocks

You can regroup numbers to rename them.

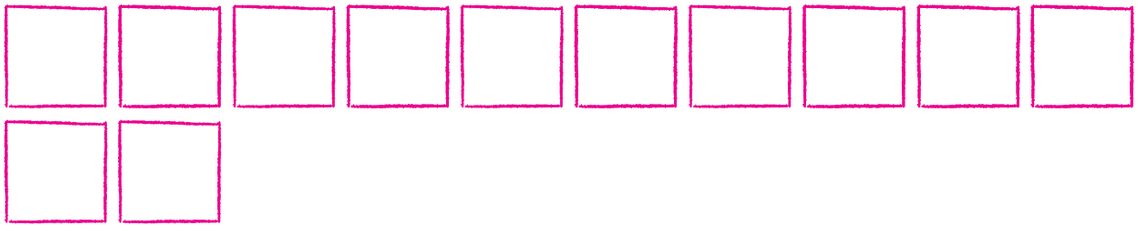
A. Use large cubes and flats to model 1,200. Draw a quick picture to record your model.



The model shows 1 large cube and 2 flats.

Another name for 1,200 is 1 thousand 2 hundreds.

B. Use only flats to model 1,200.
Draw a quick picture to record your model.



The model shows 12 flats.

Another name for 1,200 is 12 hundreds.

Draw Conclusions

1. How is the number of large cubes and flats in the first model related to the number of flats in the second model?

Possible answer: you need 10 flats to make a large cube, so 1 large cube and 2 flats is the same as 10 flats and 2 flats, or 12 flats.

H.O.T. Problem

Exercise 4 requires students to use higher order thinking skills to apply what they have learned to rename 5,200.

- **How can you model 5,200 using only longs? Explain.** 520 longs; possible explanation: I need 52 flats to model 5,200. Since there are 10 longs in each flat, I add 10 fifty-two times to get 520.
- **How can you rename 5,200 as tens? Explain.** 520 tens; possible explanation: each long is a ten, and I need 520 longs to model 5,200.

Explain to students why they would wish to rename models and represent them in different ways.

- **What other times do you regroup or rename numbers in different ways?** When I add numbers I must sometimes regroup the numbers and rename them so that I can subtract them.

Point out to students that renaming and recreating different models to represent numbers can help prepare them for subtracting over many columns of digits.

Make Connections

Students make the connection from using a model to using a place-value chart to rename numbers.

- **What is the relationship between the value of a digit in one place and what it represents in the place to its right?** Possible answer: a digit in one place is 10 times the value of the same digit in the place to its right.
- **How can you rename 3,200 as tens? Explain.** 320 tens; possible explanation: I can see on the place-value chart that 3,200 is 3 thousands and 3 hundreds, which is the same as 300 tens and 20 tens, or 320 tens.

Use **Math Talk** to focus on students' understanding of how to rename numbers. Encourage them to write each number on paper and then add them together.

- **How can you write the number "4 ten thousands"?** 40,000
- **How can you write the number "3 thousands"?** 3,000
- **What is the sum of these two numbers?** 40,000 + 3,000 = 43,000

Provide students with additional practice if needed. Ask them to rename 6 ten thousands and 2 thousands as thousands.

COMMON ERRORS

Error Students may rename numbers incorrectly.

Example 8 hundreds 4 tens = 84 hundreds

Springboard to Learning Remind students that they can make quick pictures or use a place-value chart to help them see how to rename the numbers.

2. Can you model 1,200 using only longs? **Explain**.

Yes. Possible explanation: you need 12 flats to model 1,200. Since there are 10 longs in each flat, you need 120 longs.

3. You renamed 1,200 as hundreds. How can you rename 1,200 as tens? **Explain**.

120 tens; possible explanation: each long is a ten, and you need 120 longs to model 1,200.

4. H.O.T. **Apply** What would the models in Step A and Step B look like for 5,200? How can you rename 5,200 as hundreds?

Possible answer: in Step A, the model would have 5 large cubes and 2 flats to model 5 thousands and 2 hundreds. In Step B, the model would have 52 flats. You can rename 5,200 as 52 hundreds.

Make Connections

You can also use a place-value chart to help rename numbers.

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones
5	0	0,	0	0	0

5 hundred thousands
50 ten thousands
500 thousands
5,000 hundreds
50,000 tens
500,000 ones

Write 32 hundreds on the place-value chart below. What is 32 hundreds written in standard form?

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones
		3,	**2**	**0**	**0**

32 hundreds

32 hundreds written in standard form is **3,200**.

Possible explanation: there are 40 thousands in 4 ten thousands. 40 + 3 = 43, so there are 43 thousands in 4 ten thousands 3 thousands.

MATHEMATICAL PRACTICES

Math Talk **Explain** how you can rename 4 ten thousands 3 thousands as thousands.

3 PRACTICE

Share and Show • Guided Practice

The first problems connect to the learning model. Have students use the MathBoard to explain their thinking.

Encourage students to express how drawing a quick picture or using a place-value chart can help them rename numbers.

- **In Exercise 1, how did you know you were drawing the right number of tens?** Possible answer: As I made each line or hash mark, I counted by tens. I counted 10, 20, 30, and so on until I got to 150. That's how I knew that my picture was accurate.
- **In Exercise 5, how did you know that there should not be a number in the hundreds thousands place?** Possible answer: The number 18 thousands does not use the hundreds thousands place. It only goes to the ten thousands place because the number 18 is made of digits in the ones and the tens place.

Use Exercises 2 and 6 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 6

Then **Differentiate Instruction** with
- RtI Tier 1 Activity, p. 23B
- Reteach 1.5

Name _____

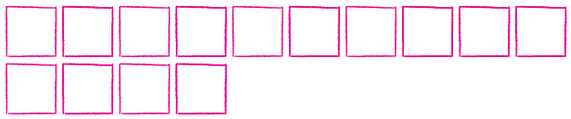
Share and Show

Rename the number. Draw a quick picture to help.

1. 150

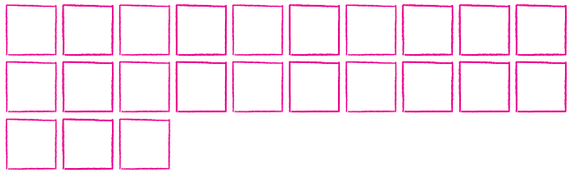
15 tens

2. 1,400



14 hundreds

3. 2 thousands 3 hundreds



23 hundreds

4. 13 hundreds

1 thousand 3 hundreds

Rename the number. Use the place-value chart to help.

5. 18 thousands = 18,000

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones
	1	8,	0	0	0

6. 570,000 = 57 ten thousands

THOUSANDS			ONES		
Hundreds	Tens	Ones	Hundreds	Tens	Ones
5	7	0,	0	0	0

Rename the number.

7. 580 = 58 tens

8. 740,000 = 74 ten thousands

9. 8 hundreds 4 tens = 84 tens

10. 29 thousands = 29,000

Unlock the Problem

MATHEMATICAL PRACTICES

Work through the scaffolded problem with students to help them focus on how to find the correct answer for a problem in multiple-choice format.

For students who need clarification, point out that the capital letters in the bubbles represent the answer choices to Exercise 11, and do not directly correspond to the lowercase letters on the short response questions. Tell students that the lowercase letters represent steps to solving the exercise.

- **In Step c, what place value would you choose to rename the numbers? Why?** The numbers should be renamed in sets of 10 because the store can order the cars in sets of 10. Renaming the number in the same way will make the numbers easier to compare.
- **In Step d, what other strategy could you use?** Possible answer: I could draw a quick picture of base-ten blocks to rename 3,000.

Test Prep Coach

Test Prep Coach helps teachers to identify common errors that students can make. For Exercise 13, if students selected:

B They think there are 15,000 hundreds in 150,000.

C They think there are 15,000 thousands in 150,000.

D They think there are 15,000 ten thousands in 150,000.

4 SUMMARIZE

MATHEMATICAL PRACTICES

Essential Question

How can you rename a whole number? Possible answer: I can draw quick pictures of base-ten blocks or use a place-value chart to help me rename numbers.

Math Journal

Explain how you can rename 5,400 as hundreds. Include a quick picture or a place-value chart in your explanation.

UNLOCK the Problem REAL WORLD

TEST PREP

11. A toy store is ordering 3,000 remote control cars. The store can order the cars in sets of 10. How many sets of 10 does the store need to order?

Ⓐ 30 Ⓒ 3,000

● 300 Ⓓ 30,000

a. What information do you need to use?

The store is ordering 3,000 remote control cars. The cars come in sets of 10.

b. What do you need to find?

I need to find how many sets of 10 the store needs to order.

c. How can renaming numbers help you solve this problem?

I can rename 3,000 as tens to find how many sets of 10 make 3,000.

d. Describe a strategy you can use to solve the problem.

Possible answer: I can use a place-value chart to see how many tens are in 3,000.

e. How many sets of 10 remote control cars does the store need to buy?

300

f. Fill in the bubble for the correct answer choice above.

12. Adam sold 53 boxes of oranges during a citrus sale. There were 10 oranges in each box. How many oranges did he sell in all?

Ⓐ 53 Ⓒ 5,300

● 530 Ⓓ 53,000

13. A store sold a total of 15,000 boxes of buttons last month. If the store sold 150,000 buttons, how many buttons were in each box?

● 10 Ⓒ 1,000

Ⓑ 100 Ⓓ 10,000

FOR MORE PRACTICE:
Standards Practice Book, pp. P11–P12

FOR EXTRA PRACTICE:
Standards Practice Book, p. P20

Problem Solving • Comparison Problems with Addition and Subtraction

Common Core Standard CC.4.NBT.4
Fluently add and subtract multi-digit whole numbers using the standard algorithm.

Lesson Objective Use the strategy *draw a diagram* to solve comparison problems with addition and subtraction.

Essential Question How can you use the strategy *draw a diagram* to solve comparison problems with addition and subtraction?

1 ENGAGE

There are hundreds of balloon festivals around the world each year. Some festivals allow spectators to walk amongst the balloons and learn more about the sport. Some festivals last two or three days, and some last longer than a week.

Access Prior Knowledge Discuss the different types of problems students have solved using addition and subtraction.

- **What are some examples of word problems that can be solved using addition?** Answers may vary. Answers should include problems that involve combining groups.
- **What are some examples of word problems that can be solved using subtraction?** Answers may vary. Answers should include problems that involve taking a group apart and comparing groups.

2 TEACH and TALK

Unlock the Problem

MATHEMATICAL PRACTICES

Point out to students that the information in the Read the Problem section helps them to organize what they need to know and they already know about the problem.

- **Is there another strategy you could use to solve the problem?** Possible response: I could subtract the numbers without using a model, but it would be more difficult to see the problem visually before I solve it, and to make sure I am using the right operation to solve the problem.

After students read the problem, discuss how they will use the information in the diagram to answer the question.

- **What do the two parts of the bar model represent?** The shorter box represents the number of people who attended the balloon festival the first day, and the longer box represents the number of people who attended the second day.
- **What does the bracket next to the shorter box represent?** The bracket represents how many more people attended the festival on the second day.
- **How will the bar model help you solve the problem?** Possible answer: the bar model helps me see how the information in the problem is related. I can see that I am comparing the two quantities, so I need to subtract to find how many more people attended the festival the second day.

Name _____

Problem Solving • Comparison Problems with Addition and Subtraction

Essential Question How can you use the strategy *draw a diagram* to solve comparison problems with addition and subtraction?

COMMON CORE STANDARD **CC.4.NBT.4**
Use place value understanding and properties of operations to perform multi-digit arithmetic.

UNLOCK the Problem REAL WORLD

Hot air balloon festivals draw large crowds of people. The attendance on the first day of one festival was 17,350. On the second day the attendance was 18,925. How many more people attended the hot air balloon festival on the second day?

Use the graphic organizer to help you solve the problem.

Read the Problem

What do I need to find?

Write what you need to find.

I need to find how many more people attended the festival on the second day.

What information do I need to use?

17,350 people attended on the first day,

18,925 people attended on the second day.

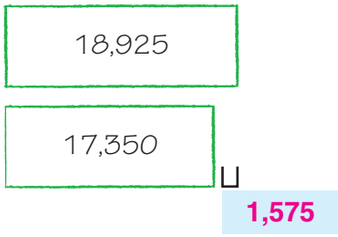
How will I use the information?

What strategy can you use?

Possible answer: I can draw a diagram or use a bar model.

Solve the Problem

I can draw a bar model and write an equation to represent the problem.



18,925 − 17,350 = 1,575

So, 1,575 more people attended the festival on the second day.

Try Another Problem

Have students answer the questions in the graphic organizer and draw a bar model to solve the problem. Invite students to share their bar models with the class by sketching them on the board.

Students should be able to communicate how they made their model and how they used it to find the number of feet the balloon traveled during the second trip.

- **Why did you add to find your answer?** Possible answer: my bar model shows that I am comparing two distances. I know the shorter distance, and I am trying to find the longer distance. I know the difference between the distances. If I add the shorter distance and the difference between the distances, I get the longer distance.

Use **Math Talk** to help students recognize that they can use the inverse operation to check their answer.

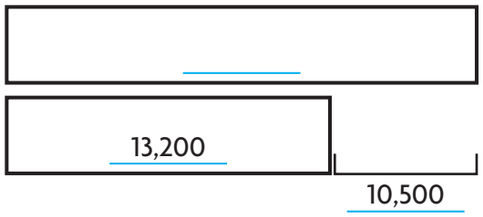
- **What is an inverse operation?** It is the opposite operation. Addition and subtraction are inverse operations, and multiplication and division are also inverse operations.
- **What operation did you use to solve the problem?** addition
- **What is the inverse operation?** subtraction
- **What should you do if you use the inverse operation to check your answer and you find that it is incorrect?** I should go back to the original problem and fix any addition errors I made. Then I should check the new answer using the inverse operation.

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

COMMON ERRORS

Error Students do not label the parts of a bar model correctly.

Example Ann has 10,500 red beads. She has 13,200 blue beads. How many more blue beads does she have?



Springboard to Learning Tell students that in a comparison model, the two boxes represent the quantities being compared. The bracket represents the difference between the two quantities. Before filling in the bar model, students need to identify what quantities are being compared and what the difference is.

Try Another Problem

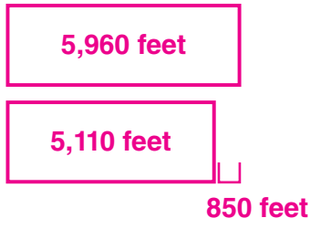
During an event, a hot air balloon traveled a distance of 5,110 feet during the first trip and 850 feet more during the second trip. How far did it travel during the second trip?

Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?
I need to find the number of feet the balloon traveled during the second trip.	I will use the facts that the balloon traveled 5,110 feet during the first trip and 850 feet more during the second trip.	I can draw a diagram or use a bar model to help me find how many feet the balloon traveled during the second trip.

Solve the Problem

Possible solution:



5,110 + 850 = 5,960

So, the balloon traveled a distance of 5,960 feet during the second trip.

- Is your answer reasonable? **Explain** how you know.

Possible answer: 5,960 feet is reasonable because 5,000 + 1,000 = 6,000, and 5,960 is close to 6,000.

Possible explanation: since addition and subtraction are inverse operations, you can subtract 850 from the sum to see if you get 5,110.

MATHEMATICAL PRACTICES

Math Talk **Explain** how inverse operations can be used to check your 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.

Discuss with students how they used the bar model to record the information in the problem.

- **How can you be sure that the first bar in the model refer to the record set in 2005?** The first bar is longer than the second bar, so it must represent the record that is newest, or the number that is greatest.
- **What operation should you use to solve the problem?** subtraction
- **How do you know?** I am looking for the number that belongs in the small bracket of the second model. That should be a smaller number that shows the difference between the two larger numbers.

Go Deeper

Remind students that they should be drawing bar models to go with Exercises 2–4. Have them use the side column of their paper to draw the bar models. If necessary, have them use another sheet of paper.

After students complete Exercise 2, ask:

- **Suppose the new world record was set at 71,000 feet. How would your answer be different?** Only the digit in the thousands place would be different. The answer would be 2,014 feet.

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. 35B
- Reteach 1.8

Name _____

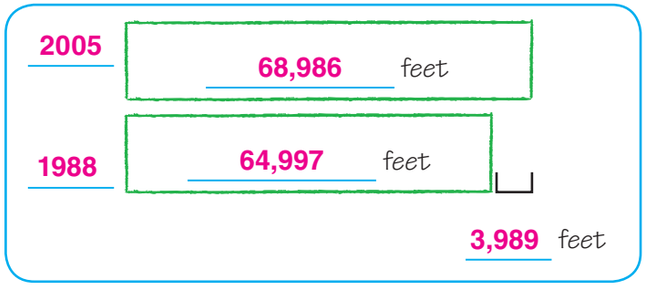
Share and Show

UNLOCK the Problem (Tips)

- Use the Problem Solving MathBoard
- Underline important facts.
- Choose a strategy you know.

1. Hot air balloons are able to fly at very high altitudes. A world record height of 64,997 feet was set in 1988. In 2005, a new record of 68,986 feet was set. How many feet higher was the 2005 record than the 1988 record?

First, draw a diagram to show the parts of the problem.



Next, write the problem you need to solve.

68,986 − 64,997 = _____

Last, solve the problem to find how many feet higher the 2005 record was than the 1988 record.

So, the 2005 record was 3,989 feet higher.

2. **What if** a new world altitude record of 70,000 feet was set? How many feet higher would the new record be than the 2005 record?

1,014 feet

3. Last year, the ticket sales for a commercial hot air balloon ride were $109,076. This year, the ticket sales were $125,805. How much more were the ticket sales this year?

$16,729

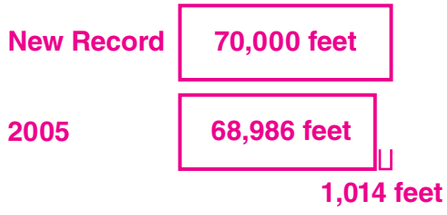
4. There were 665 hot air balloon pilots at a hot air balloon race. There were 1,550 more ground crew members than there were pilots. How many ground crew members were there in all?

2,215

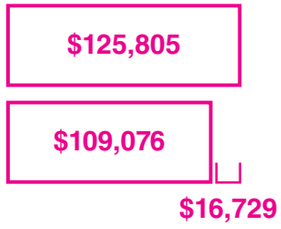
▲ Dr. Vijaypat Singhania flew the world's largest hot-air balloon when he made his record-breaking flight. The balloon he flew was over 20 stories tall.

Additional Answers

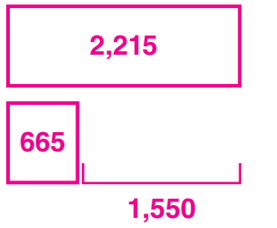
Exercise 2



Exercise 3



Exercise 4



Unlock the Problem

MATHEMATICAL PRACTICES

H.O.T. Problem

Exercise 6 requires students to use higher order thinking skills as they add distances and then compare the sum to the greatest distance.

- **What is the first step in finding the answer to the problem?** Find the combined distance for 1998 by adding 14,235 and 6,247.
- **What is the next step?** Compare the answer to the first part of the problem (20,038) to the distance for the 2002 flight (20,482).

Point out that an important part of the H.O.T.S problem is explaining the answer. Encourage students to discuss the problem in pairs before writing their explanation on the page.

Test Prep Coach

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

For Exercise 8, if students selected:

A They used subtraction instead of addition.
B They added incorrectly in the hundreds place.
D They added incorrectly in the ten thousands place.

4 SUMMARIZE

MATHEMATICAL PRACTICES

Essential Question

How can you use the strategy *draw a diagram* to solve comparison problems with addition and subtraction? Possible answer: When I have an addition or subtraction comparison problem to solve, I can draw a bar model to represent the situation.

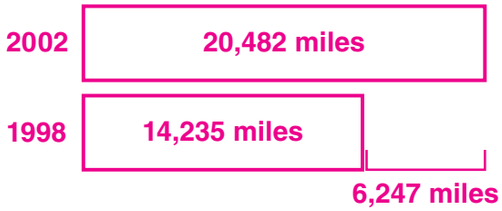
Math Journal

Write a comparison problem you can solve using addition or subtraction. Draw a bar model to represent the situation. Describe how the information in the bar model is related to the problem.

On Your Own

Use the information in the table for 5–7.

5. Steve Fossett attempted to fly around the world in a balloon several times before he succeeded in 2002. How many more miles did he fly during the 2002 flight than during the August 1998 flight?



20,482 − 14,235 = 6,247 miles

6. HOT Is the combined distance for the 1998 flights more or less than the distance for the 2002 flight? **Explain.**

less than; possible explanation: the combined distance is 20,038 miles, which is less than 20,482 miles.

7. Write Math Estimate the total number of miles Fossett flew during the six hot air balloon flights. **Explain** how you estimated.

55,000 miles; possible explanation: I rounded each distance to the greatest place-value position. Then I added 2,000 + 10,000 + 6,000 + 14,000 + 3,000 + 20,000.

8. Test Prep Rusty wants to buy a small hot air balloon that costs $23,950. The cost of training for a license is $2,750. How much will Rusty pay for the balloon and the training?

Ⓐ $21,200 ● $26,700

Ⓑ $26,600 Ⓓ $36,700

Choose a STRATEGY

- Act It Out
- Draw a Diagram
- Find a Pattern
- Make a Table or List
- Solve a Simpler Problem

Steve Fossett's Balloon Flights

Year	Distance in Miles
1996	2,200
1997	10,360
1998 (January)	5,803
1998 (August)	14,235
2001	3,187
2002	20,482

SHOW YOUR WORK

FOR MORE PRACTICE:
Standards Practice Book, pp. P17–P18

FOR EXTRA PRACTICE:
Standards Practice Book, p. P20