

Theme 1 | Number Sense and Operations

Unit 1

Place Value

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Counting Ants

Unit Video Questions

Omar and Isha are familiar with place value through the Hundred Thousands place. But they may need to count even bigger numbers when counting ants.



Quick Code
egm4008

- ☐ How can they use what they already know about place value to learn about numbers to the Billions place?
- ☐ What strategies can Omar and Isha use to read and write really big numbers?
- ☐ How can they use place value to compare and order really big numbers?



Reinforcing Place Value

LESSON 1

Digit, Numeral, Number



Quick Code
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Learning Targets

- I can explain the difference between a **digit**, **numeral**, and **number**.
- I can discuss how the value of a digit can change.

ACCESS

Large Numbers with Small Animals Read Ant Facts for Kids to learn about amazing ants. Then, highlight or circle all of the numbers.

Ant Facts for Kids

- There are more than 12,000 species of ants all over the world.
- There are up to 2,000 ants in a colony of carpenter ants.
- House ants can have colonies of up to 10,000.
- Pavement ant colonies have 3,000-4,000 members and several queens.
- An ant can lift 20 times its own body weight. If you were as strong as an ant, you would be able to pick up a car!
- Egypt has 79 different species of ants!
- The total number of ants on the planet is estimated at 1,000,000,000,000,000 (one million billion)!



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BUILD

Numeral Building Write any large numeral you can think of here, or on a piece of paper.

Student responses will vary.

Vocabulary Building In your own words, write a brief definition of the terms digit, number, and numeral. It is okay if you do not yet know the difference among the three.

Digit Student responses will vary.

Numeral

Number

Record the definitions that were written by the class.

Digit Students should copy the class definitions.

Numeral

Number



Ants near an Anthill

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CONNECT

Writing About Math Consider the numbers 26, 260, and 62. Explain what strategies you would use to determine the greatest number. Try to use the words digit, numeral, or number to explain your thinking. Be prepared to share your thinking with the class.

Students should mention the use of place value to compare the value of the digits in the different numerals or numbers.

PRACTICE

1. Write each number in the appropriate column. Some may go in more than one column.

983	thirty-seven	six	0
9	seventy-five	2,300,540	one hundred

Digit	Number	Numeral
0	983	983
9	0	Thirty-seven
	9	Six
	2,300,540	0
		One hundred
		9
		Seventy-five
		2,300,540

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- Agree. Students may note that the three digits are 4, 5, and 8.

- Student responses will vary.
Sample answer: 86,420



Follow your teacher's instructions to complete this activity.



Carpenter Ants Building Nests in Wood

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Really Big Numbers!



Learning Targets

- I can identify all whole number place values through the One Billion place.
- I can explain how a digit's location in a number affects its value.

ACCESS

Exploring Place Value Talk with your Shoulder Partner. Record what you remember about the place value system from earlier grades. Be prepared share to your thinking with the class.

Students' notes will vary.

BUILD

Reading the Place Value Chart Use the place value chart to help you read the number aloud with your teacher. Write numbers in the place value chart with your teacher. The first one is done for you.

[illegible]

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Creating Really Big Numbers

Practice creating, reading, and comparing really big numbers.

1. Place all digit cards face down in the middle and mix them up.
2. One person in the group turns over a digit card. Each player independently decides which place value to put the digit in and records the digit in their own place value chart.
3. The next student turns over a card. Each player independently decides which place value to put the digit in and records the digit in their own place value chart.
4. Repeat until all spaces in the row have been filled. Then, players compare their numerals. The player with the greatest numeral wins a point.



	Milliards			Millions			Thousands			Ones		
Round	O			H	T	O	H	T	O	H	T	O
1												
2												
3												
4												
5												

Track your points.

CONNECT

Writing About Math Amir says that in the number 222, all of the digits have the same value. Do you agree or disagree? Use words and numbers to explain your thinking. Be prepared to share your ideas with the class.

Students should mention using place value to compare the numerals (or numbers) to determine the value of the digits.

PRACTICE

Follow your teacher's directions to solve the practice problems.

1. In the numeral 234,568 what digit is in the:
 - Tens place? 6
 - Hundred Thousands place? 2
 - One Thousands place? 4
2. Using the following number, complete the directions:
1,542,345678
 - Underline the digit in the Ten Millions place.
 - Draw a square around the digit in the One Millions place.
 - Circle the digit in the Hundreds place.

3. Is the digit 8 always worth 8 (▲▲▲▲▲▲▲)? Why or why not?
Use what you know about place value to support your answer.

Students should note that the digit 8 is not always worth 8 and that the value of the 8 depends on its place in a numeral (or number). For example, in the numeral 280, 8 has a value of 80. But in the number 68,427, 8 has a value of 8,000.



Check Your Understanding

Follow your teacher's instructions to complete this activity.

LESSON 3

Changing Values

Learning Targets

- I can explain how the value of a digit changes as it moves to the left.
- I can describe the patterns I see as a digit changes values in a whole number.



Quick Code
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ACCESS

Multiplying by Ten Use your Tens rods to explore patterns in multiplying by 10.

1. What quantity is represented by your Tens rods? Draw a picture, write an equation, or write a number to show the quantity.

Answers will vary but should use a picture, equation, or number to represent the quantity.

2. What quantity is represented by your group’s Tens rods? Draw a picture, write an equation, or write a number to show the quantity.

Answers will vary but should use a picture, equation, or number to represent the quantity.

BUILD

What’s My Value? Follow the steps to explore how a digit’s value changes when its location changes.

- Choose one digit and enter it in the Ones place.
- Record the value of the digit.
- Continue moving the digit card to the left on the place value chart, recording its new value each time.

Milliards		Millions			Thousands			Ones		
O		H	T	O	H	T	O	H	T	O

My digit is 4

Value of my digit in the Ones place 4

Value of my digit in the Tens place 40

Value of my digit in the Hundreds place 400

Value of my digit in the Thousands place 4,000

Value of my digit in the Ten Thousands place 40,000

Value of my digit in the Hundred Thousands place 400,000

Value of my digit in the Millions place 4,000,000

Value of my digit in the Ten Millions place 40,000,000

Value of my digit in the Hundred Millions place 400,000,000

Value of my digit in the One Milliards place 4,000,000,000

Exploring Place Value Relationships Work with your teacher to explore place value relationships. Then, circle the value that completes the sentence.

Milliards		Millions			Thousands			Ones		
O		H	T	O	H	T	O	H	T	O

As a digit moves one space to the left on the place value chart, its value increases **<10/100/1,000>** times.

CONNECT

Omar and Isha are amateur myrmecologists (scientists who specialize in studying ants). They found a colony with 10 anthill. Remarkably, each anthill had the same number of ants.

Multiplying Ants Look at each problem in the table. If Omar and Isha found the given number of ants in each anthill, how many ants were there all together? Show your work for each problem.

7 ants in 1 anthill. 70 ants in 10 anthills.	92 ants in 1 anthill. 920 ants in 10 anthills.
12 ants in 1 anthill. 120 ants in 10 anthills.	156 ants in 1 anthill. 1,560 ants in 10 anthills.
28 ants in 1 anthill. 280 ants in 10 anthills.	1,786 ants in 1 anthill. 17,860 ants in 10 anthills.

Student responses will vary. See sample responses in Teacher Materials.

PRACTICE

Follow your teacher’s directions to solve the practice problems.

1. What is the value of the following:
a. 2 in the Tens place? **20** c. 30 Tens? **300**
b. 7 in the Hundreds place? **700** d. 60 Thousands **60,000**

2. How does the value of a 7 change as it moves from the Tens place to the Hundreds place? Use what you know about place value to explain your thinking.

Students should recognize that the Hundreds place is 10 times greater than the Tens place, so the value of 7 changes from 70 to 700.

3. Choose a number between 1 and 9. (A different number than you used in BUILD.) Use this number to complete the charts.

Milliards		Millions			Thousands			Ones		
O		H	T	O	H	T	O	H	T	O

- My digit is _____
Value of my digit in the Ones place _____
Value of my digit in the Tens place _____
Value of my digit in the Hundreds place _____
Value of my digit in the Thousands place _____
Value of my digit in the Ten Thousands place _____

Student responses will vary. An example is given.

Value of my digit in the Hundred Thousands place _____

Value of my digit in the Millions place _____

Value of my digit in the Ten Millions place _____

Value of my digit in the Hundred Millions place _____

Value of my digit in the One Billiards place _____

4. What pattern (or patterns) do you observe in your answers to Item 3?

Students should recognize that each number is 10 times greater than the number before it.



Check Your Understanding

Follow your teacher's instructions to complete this activity.



Ant Colony Containing Millions of Ants

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LESSON 4

Comparing Values



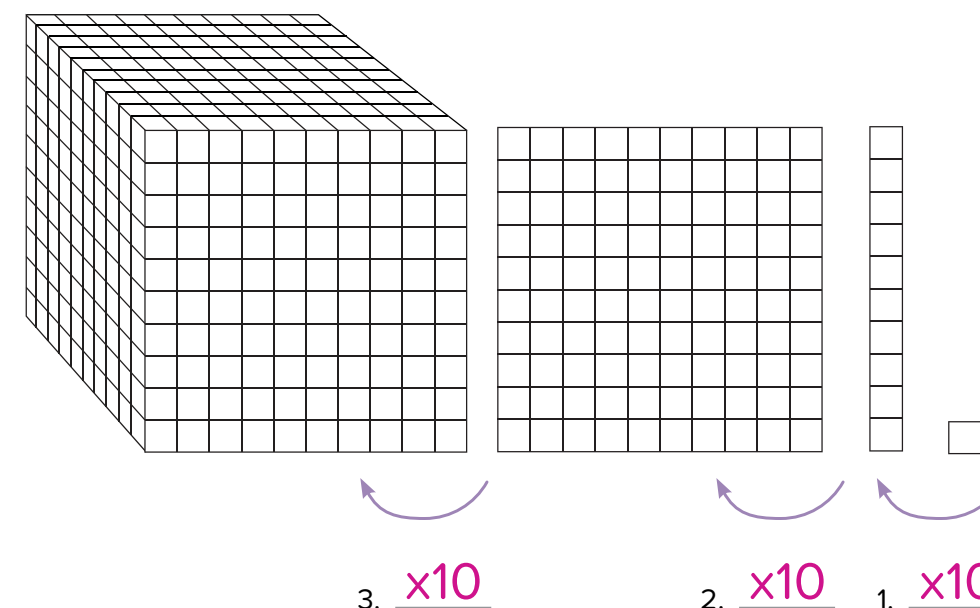
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Learning Targets

- I can explain relationships between place values.
- I can use multiplication to compare place values.

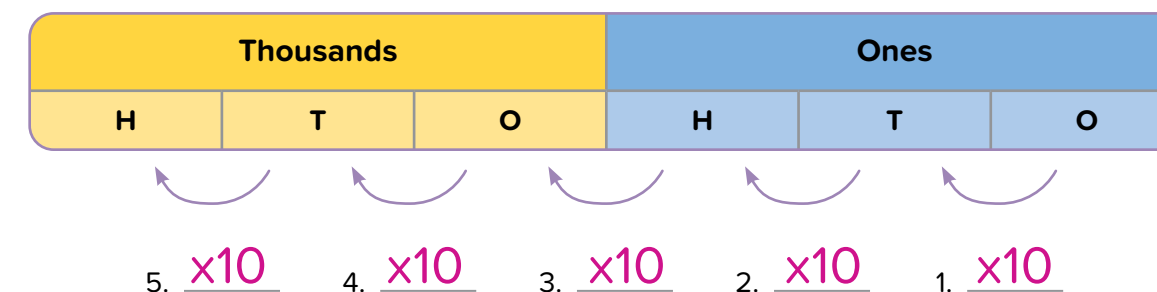
ACCESS

Relationships are Important! Think about the relationships among the Base Ten blocks. Use multiplication to describe the relationship between the value of a digit at the start of the arrow and the value of that same digit at the end of the arrow. Start at 1.



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Use multiplication to describe the relationship between the given place value and the place value one step to its left. Start at 1.



BUILD

Exploring Place Value Relationships Are you ready for challenging questions? How many Hundreds are in 1,000? Think quietly for a moment. Then, record your thinking and share your notes with a partner. Be prepared to share your ideas with the whole group.

How many Tens are in 1,000? Think quietly for a moment. Then, record your thinking and share your notes with a partner. Next, work with your small group. Use your Tens rods to help you determine or confirm how many Tens are in 1,000. Be prepared to share your ideas with the whole group.

Hundreds in 1,000 1,000 = 10 hundreds	Tens in 1,000 1,000 = 100 Tens
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Reflect on this learning activity. What do you now notice? What do you now wonder? Be prepared to share your ideas with the whole group.

Place Value and the Pharaoh Ant Work with a partner. Use what you know about place value relationships and the Pharaoh Ant to answer the questions. Be prepared to share your thinking with the class.

Pharaoh Ant queens lay around 400 eggs throughout their lifetime in batches of about 10. How many eggs will be laid in a year...

1. If there are 10 queens in a colony? 4,000
2. If there are 100 queens in a colony? 40,000
3. If there are 1,000 queens in a colony? 400,000

Work in pairs or small groups to solve problems about place value relationships.

4. New Pharaoh Ant colonies form through a process called budding. Queens in existing colonies and several workers leave their nest to start new colonies elsewhere. So, a colony that starts with 200 ants can quickly

grow 100 times greater, to a size of 20,000 ants.

5. A Pharaoh Ant colony can vary in size from a few dozen to several hundred thousand individuals. Imagine a Pharaoh Ant colony consisting of 333,333 ants!

- In which place is the 3 that has a value 10 times greater than the 3 in the Ten Thousands place? Hundred Thousands place
- In which place is the 3 that has a value 100 times greater than the 3 in the Ones place? Hundreds place

6. How many times greater is the value of a number in the One Thousands place than a number in the Tens place? Use an example to support your thinking.

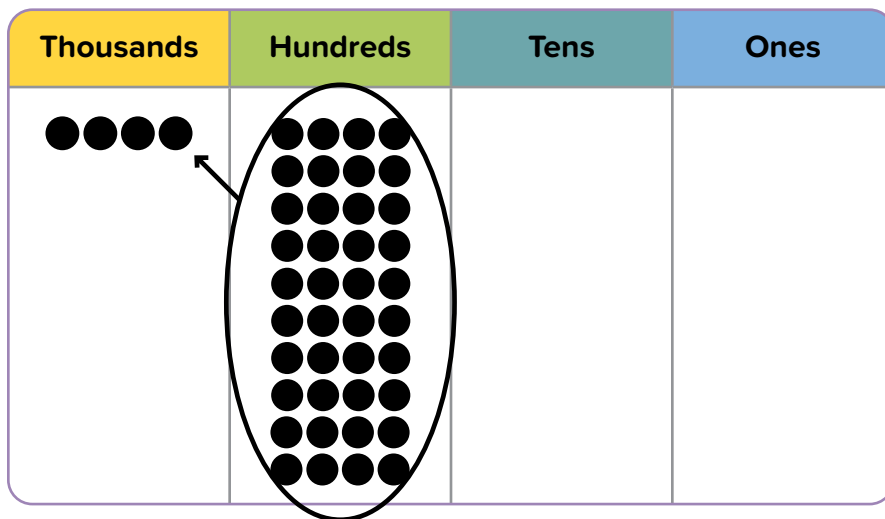
See sample responses in Teacher Materials.

7. If there are 12 million Pharaoh Ants on the Kalahari and South America has 100 times as many Pharaoh Ants as the Kalahari, how many ants are in South America? Use an example to support your thinking.

See sample responses in Teacher Materials.

CONNECT

Step to the Left Write a statement about the place value chart using the words “10 times greater.”



Students should recognize that the dots in the Thousands place have a place value 10 times greater than the dots in the Hundreds place.

PRACTICE

- (4 Tens and 3 Ones) $\times 10 =$ 430
- (2 Hundreds and 3 Tens) $\times 10 =$ 2300
- (7 Thousands and 8 Hundreds) $\times 100 =$ 780,000
- (6 Hundred and 4 Tens) $\times 1,000 =$ 650,000
- (4 Ten Thousands and 3 Tens) $\times 100 =$ 4,003,000
- Circle the number that is 100 times greater than 560.
5,600 56,000



Check Your Understanding

Follow your teacher’s instructions to complete this activity.

LESSON 5

Many Ways to Write



Quick Code
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Learning Target

- I can write numerals in standard, word, and expanded forms.

ACCESS

Same or Different? Omar and Isha are myrmecologists, scientists who study ants. They are conducting research to learn if ant populations are declining. As part of their research, they count the number of ants that live in one anthill. Every day they count ants.

At the end of the month, Omar recorded the number of ants he had counted as follows:

1,467,303,221



Scientist Collecting and Recording Data

Isha recorded her count in this way:

1,000,000,000 + 400,000,000 + 60,000,000 + 7,000,000
+ 300,000 + 3,000 + 200 + 20 + 1

BUILD

Numeral Form Exploration Compare the different forms of the same numeral. Use the information as a guide and reference.

Standard Form	9,231,043,204
Expanded Form	9,000,000,000 + 200,000,000 + 30,000,000 + 1,000,000 + 40,000 + 3,000 + 200 + 4
Word Form	nine billion, two-hundred thirty-one million, forty-three thousand, two hundred four

Be prepared to share your thinking about these questions:

- How would you describe these forms of numbers (standard, word, and expanded)?
- What do you remember about these forms of writing numerals?
- What was easy?
- What was challenging?

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Creating the Greatest

Play **Creating the Greatest** with a partner to practice creating numbers and writing them in multiple forms.

- Combine decks of digit cards with your partner. Place the cards face down in a pile and mix them up.
- Turn over 10 digit cards and record the numbers in the order in which you turned them over.
- Then, rearrange the cards to create the greatest numeral.
- Record the numeral in standard form, expanded form, and word form.

1. _____
Standard Form _____
Expanded Form _____
Word Form _____

2. _____
Standard Form _____
Expanded Form _____
Word Form _____

3. _____
Standard Form _____
Expanded Form _____
Word Form _____





Creating the Greatest

4. _____

Standard Form _____

Expanded Form _____

Word Form _____

5. _____

Standard Form _____

Expanded Form _____

Word Form _____



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CONNECT

Writing About Math Highlight or circle the greatest numeral you created. How do you know that the numeral you chose was the greatest? Explain the strategy you used to make your determination.

Students' numbers will vary, but students should mention using place value to determine which number was the greatest.

PRACTICE

- Write the word form of 48.
forty-eight
- Write the standard form of three hundred seventy.
370
- Write the standard form of $20,000 + 7,000 + 400 + 20 + 2$.
27,422
- Write the word form of $700,000 + 60,000 + 20 + 9$.
seven hundred sixty thousand, twenty-nine
- Write the expanded form of 50,391.
 $50,000 + 300 + 90 + 1$

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Check Your Understanding

Follow your teacher's instructions to complete this activity.

LESSON 6

Composing and Decomposing

Learning Targets

- I can build and break down numerals in multiple forms.



Quick Code
egm4008

ACCESS

We Have/Who Has? Your teacher will divide the class into small groups. Then, the class will play the game We Have/Who Has to practice reading large numbers in multiple forms.

We Have/Who Has? Directions

- One group starts by reading their card aloud together.
- The group who has the “Who Has?” number raises their hands and then reads their card aloud.
- Play until every group has used its card.

BUILD

Terminology Review Complete the activity to check your current understanding of the terms standard, word, and expanded form. For each term, write a definition and give an example.

Vocabulary	Definition	Example
Standard Form	Student answers will vary.	
Word Form		
Expanded Form		

Composing and Decomposing Do you remember the terms composing and decomposing from Primary 3? Look at the two images. What do you think the terms mean?

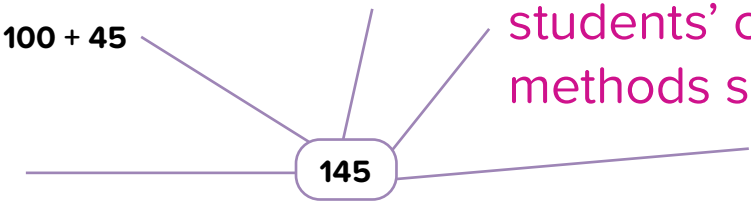


Ants **Composing** a New Anthill



Wind and Rain **Decomposing** This Anthill

Composing 145 What are some different ways we can compose 145? Use the web below to record your ideas. One idea is given to get you started.



Answers will vary, but students' composition methods should equal 145.

There are composed and decomposed numbers below. Fill in the missing numbers. Use the place value chart to help you. The first one has been done for you as an example.

Composed and Decomposed Numbers

Composed	345,532
Decomposed	$(3 \times 100,000) + (4 \times 10,000) + (5 \times 1,000) + (5 \times 100) + (3 \times 10) + (2 \times 1)$

Milliards		Millions			Thousands			Ones		
O		H	T	O	H	T	O	H	T	O
					3	4	5	5	3	2

1. **Composed** 6,124,030,420

Decomposed See Teacher Materials for sample student response.

Milliards	Millions			Thousands			Ones		
O	H	T	O	H	T	O	H	T	O
6	1	2	4	0	3	0	4	2	0

2. **Composed** 5,400,159,024

Decomposed See Teacher Materials for sample student response.

Milliards	Millions			Thousands			Ones		
O	H	T	O	H	T	O	H	T	O
5	4	0	0	1	5	9	0	2	4

3. **Composed** 7,050,043,509

Decomposed $(7 \times 1,000,000,000) + (5 \times 10,000,000) + (4 \times 10,000) + (3 \times 1,000) + (5 \times 100) + (9 \times 1)$

Milliards	Millions			Thousands			Ones		
O	H	T	O	H	T	O	H	T	O
7	0	5	0	0	4	3	5	0	9

For the next two problems, choose your own number and show it composed and decomposed.

4. **Composed**

Decomposed See Teacher Materials for sample student response.

Milliards	Millions			Thousands			Ones		
O	H	T	O	H	T	O	H	T	O

CONNECT

Writing About Math Reflect on today's Learning Target and your learning progress. Respond to the questions.

See Teacher Materials for sample student response.

Learning Target

- I can compose and decompose numbers in multiple forms.

What do I understand well?

What is still confusing to me?

What is my plan for getting help?

PRACTICE

1. Colony A has 268,820 Pharaoh Ants living in it. Decompose this numeral as you did in BUILD.

$$(2 \times 100,000) + (6 \times 10,000) + (8 \times 1,000) + (8 \times 100) + (2 \times 10)$$

2. Akira's class learned that the distance from Earth to the moon can be written as $200,000 + 30,000 + 8,000 + 900$ miles. Compose this numeral.

$$238,900$$

Decompose the following numerals using expanded form.

3. 105,208

$$100,000 + 5,000 + 200 + 8$$

4. 2 million, 277 thousand, 191

$$2,000,000 + 200,000 + 70,000 + 7,000 + 100 + 90 + 1$$

5. three milliard, one hundred thirty-seven million, six hundred nineteen thousand, eighty-eight

$$3,000,000,000 + 1,000,000 + 30,000,000 + 7,000,000 + 600,000 + 10,000 + 9,000 + 80 + 8$$



Check Your Understanding

Follow your teacher's instructions to complete this activity.