Mathematics | English Language Arts

4

common core

Performance Coach

Sample Lesson

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Understanding Place Value for Whole Numbers

Student Edition pages 70–77

LESSON OVERVIEW

Objectives

Students will:

- use a place-value chart to find the value of one digit in a multi-digit number.
- recognize that each place value is 10 times greater than the place value to its right.
- write a number name for a multi-digit number.
- write the expanded form of a multi-digit number.

Discussion Questions

MP4 How do the standard, word, and expanded forms of a number compare?

MP6 Why do we say the number 435 has the digit 4 in the hundreds place?

MP8 What types of patterns can be found in a place-value chart?

Standards

4.NBT.1, 4.NBT.2

Key Terms

expanded form
place value
standard form
word form

Materials

- Math Tool: Whole Number Place-Value Chart, p. C7 (Student Edition, p. 369)
- index cards

Differentiation

Lesson Support With each problem, ask students to make their own place-value charts based on the one provided. Instruct students to indicate above each chart where the thousands and ones periods can be found.

Lesson Extension On one side of an index card, have students make up a riddle similar to problem 10 in the Lesson Practice, using a 6-digit number. On the flip side of the card, have students write the 6-digit number. Let students solve each other's riddles.

1 GETTING THE IDEA

Lesson Opener

Say "one hundred twenty-five" out loud. Ask: *What are some ways this number can be written?* Students' answers will give you an opportunity to assess their understanding of the concepts needed for them to move successfully into writing numbers in standard, word, and expanded form. Point out the expanded form of 36,215 in the student book. Ask: *What pattern do you see when 36,215 is written in expanded form?* (From right to left, the number of zeroes is increasing.) Use this as an opportunity to discuss the place-value chart and how it can help with understanding the value of each digit, as presented in this lesson. Be sure to point out the thousands and ones periods, and that each is made up of hundreds, tens, and ones places.

▲ ***ELL Support*** *Have students add* place value, standard form, word form, *and* expanded form *to their student dictionaries.*

In the U.S., we separate periods, or groups of three, with commas. So, in 8,563,241, for example, a comma separates the millions period from the thousands period and the thousands period from the ones period. In other countries, you might find a point used to separate these periods, for example, 8.563.241, or a space used to separate these periods, for example, 8 563 241, or an apostrophe in combination with a comma to separate these periods, for example, 8'563,241, or a semicolon and a comma to separate these periods, for example, 8;563,241.

▸ Examples 1 and 2

Read, or have a volunteer read, the word problems in these examples. As a class, say the word form of 23,694 and 48,710 out loud. Ask: *How does saying the number out loud help you to place the number in the chart?* Extend Example 1 by having students find the value of other digits in 23,694. Extend Example 2 by having students write the word form for the number found in Example 1.

▲ ***Common Errors*** *Students, as well as adults, tend to insert the word "and" incorrectly when reading numbers, for example, forty-eight thousand, seven hundred* and *ten. Point out that "and" is reserved to indicate a decimal point. "And" is appropriate when reading decimals, not when reading whole numbers.*

▸ Example 3

As in the previous examples, read, or have a volunteer read, the word problem. Then, as a class, say the word form of 206,389 out loud. Ask: *How does saying the number out loud help you to place the number in the chart? How does writing the number in a place-value chart help you to write the number in expanded form?* Point out that the 0 in the ten thousands place does not need to be represented in the expanded form. However, it is good practice to place it in the place-value table as an aid because it assures that the correct number of zeroes are used for the other place values.

▲ ***Journal Prompt*** MP7 *Why is it not necessary to include 0 in the expanded form of 206,389?*

▸ Example 4

Prior to discussing Example 4 with students, have students return to the diagram, showing × 10 as you move from left to right, at the beginning of this lesson. Ask: *If you moved from right to left, would you still multiply by 10?* (No. You would divide by 10.) As a class, make up a similar table for 539,668, showing × 10 and ÷ 10 from one place value to another. Extend this example to find how many times greater the value of the 4 in the ten thousands place is than the value of the 4 in the tens place for the number 641,248.

2 COACHED EXAMPLE

Read, or have a volunteer read, the word problem out loud. As a class, say the word form of 642,075 out loud. Write 642,075 on the board. Have volunteers come to the board and underline each digit, going from right to left, stating its place value. Walk students through completing the sentence frames.

For answers, see page A6.

3 LESSON PRACTICE

Problems 2 and 6 would be good problems to use as a quick check for students' understanding of the concepts taught in this lesson. For problem 10, suggest students draw five short lines on their page. Then, as they discover each of the digits, they can write the digit on the appropriate line. You may wish to solve a problem similar to problem 12 before assigning it.

For answers, see page A7.

4.NBT.1, 4.NBT.2

Understanding Place Value for Whole Numbers

1 GETTING THE IDEA

Place value is the value of a digit based on its position in a number. A whole number can be written in different ways.

Standard form 36,215

Word form thirty-six thousand, two hundred fifteen

Expanded form 30,000 + 6,000 + 200 + 10 + 5

Expanded form shows a number as a sum of the values of its digits.

A digit's place determines its value. For each place a digit moves to the left, its value increases 10 times. A place-value chart can help you understand the value of each digit in a number.

Place	Hundred Thousands	Ten Thousands	Thousands	Hundreds	Tens	Ones
Value	100,000	10,000	1,000	100	10	1

×10 ×10 ×10 ×10 ×10

Example 1

23,694 hot dogs were sold at a major league baseball game. What is the value of the 3 in 23,694?

Strategy Use a place-value chart.

Step 1 Write the number 23,694 in a place-value chart.

Thousands Period				Ones Period		
Hundreds	**Tens**	**Ones**	**,**	**Hundreds**	**Tens**	**Ones**
	2	3	,	6	9	4
	↓	↓		↓	↓	↓
	20,000	**3,000**	**,**	**600**	**90**	**4**

Step 2 Find 3 and identify its place.

3 is in the one thousands place.

Step 3 Multiply 3 by 1,000.

$3 \times 1{,}000 = 3{,}000$

Solution The value of the 3 in 23,694 is 3,000.

Example 2

48,710 cars crossed Big River Bridge. Write the word form of the number.

Strategy Use a place-value chart.

Step 1 Write the number in the place-value chart.

Thousands Period				Ones Period		
Hundreds	**Tens**	**Ones**	**,**	**Hundreds**	**Tens**	**Ones**
	4	8	,	7	1	0

Step 2 Write the word form for the number in the thousands period.

Forty-eight

Step 3 Write the period name, *thousand*, and a comma.

Forty-eight **thousand,**

Step 4 Write the word form for the number in the ones period.

Forty-eight thousand, **seven hundred ten**

Solution The word form for the number of cars is forty-eight thousand, seven hundred ten.

Example 3

A machine puts caps on 206,389 bottles every hour. Write the number in expanded form.

Strategy Use a place-value chart.

Step 1 Write the number in a place-value chart. Write the value of each digit in the chart.

Thousands Period				Ones Period		
Hundreds	**Tens**	**Ones**	**,**	**Hundreds**	**Tens**	**Ones**
2	0	6	,	3	8	9
						9
					8	0
				3	0	0
		6	,	0	0	0
	0	0	,	0	0	0
2	0	0	,	0	0	0

Step 2 Write the number as a sum.

$206{,}389 = 200{,}000 + 6{,}000 + 300 + 80 + 9$

The digit in the ten thousands place is a 0. You do not need to include that digit in the sum.

Solution The expanded form of 206,389 is $200{,}000 + 6{,}000 + 300 + 80 + 9$.

Example 4

There are 539,668 people living in Forestville. How many times greater is the value of the 6 in the hundreds place than the value of the 6 in the tens place?

Step 1 Find the value of the 6 in the hundreds place.

600

Step 2 Find the value of the 6 in tens place.

60

Step 3 Divide.

$600 \div 60 = 10$

Solution The 6 in the hundreds place is 10 times greater than the 6 in the tens place.

2 COACHED EXAMPLE

642,075 copies of a magazine were sold in one month. Write the word form and the expanded form for the number.

First, write the word form for 642,075.

The word form for the number in the _____ period is _____.

Write the period name, _____, and a _____.

The word form for the number in the _____ period is _____.

So, the word form for 642,075 is _____.

Next, write the expanded form of 642,075. You can use a place-value chart or multiply each digit in 642,075 by its place value.

$6 \times 100{,}000 =$ _____

$4 \times 10{,}000 =$ _____

$2 \times$ _____ = _____

$0 \times$ _____ = _____

$7 \times$ _____ = _____

$5 \times$ _____ = _____

So, the expanded form for 642,075 is _____.

The word form for 642,075 is _____.

The expanded form for 642,075 is _____.

3 LESSON PRACTICE

1 An airplane full of passengers and luggage weighed three hundred eighty thousand, nine hundred fifty-five pounds. Circle the numbers that show the weight of the airplane.

389	995
380	55
308	595
80	955

2 Look at each choice. Is it another way to write 81,027? Select Yes or No.

A.	eighty-one thousand, twenty-seven	○ Yes	○ No
B.	800,000 + 10,000 + 200 + 70	○ Yes	○ No
C.	eight hundred ten thousand, two hundred seven	○ Yes	○ No
D.	80,000 + 1,000 + 20 + 7	○ Yes	○ No

3 **Part A**

Write a number in standard form that has 4 in the hundred thousands place, 7 in the hundreds place, and 5 in the tens place.

_____

Part B

Write the expanded form of the number.

_____

4 Select True or False for each statement.

A.	41,003 = 40,000 + 10,000 + 3	○ True	○ False
B.	fifty thousand, seven hundred nine = 50,000 + 700 + 9	○ True	○ False
C.	nine hundred seventeen thousand, twelve = 917,012	○ True	○ False
D.	100,000 + 40,000 + 400 + 80 + 1 = 104,481	○ True	○ False

5 Draw a line from each way of writing a number to a different way of writing the same number.

A.	83,610	•	• 800,000 + 6,000 + 300 + 10
B.	800,000 + 30,000 + 6,000 + 60 + 1	•	• eighty three thousand, six hundred ten
C.	806,310	•	• eighty-six thousand, three hundred sixty
D.	86,360	•	• eight hundred thirty-six thousand, sixty-one

6 Select an expression that shows the value of a digit in 83,562. Circle all that apply.

A. 5×10
B. 6×100
C. 8×10
D. 2×1
E. $3 \times 1{,}000$
F. 5×100
G. $8 \times 10{,}000$
H. 6×10

7 Brian says that the value of 7 in 157,683 and the value of the 7 in 945,721 are the same. Is he right or wrong? Explain how you know.

8 Federico has sailed his boat 68,316 nautical miles. He and his boat are 5 nautical miles from the dock. Write the word form for the total number of nautical miles Federico will have sailed when he reaches the dock.

9 Angela wrote the number 17,901. Then she switched the 1 and 7 digits to make 71,901.

Part A

How did changing the place of the 1 change its value?

Part B

How did changing the place of the 7 change its value?

10 Taylor's home street address number has five digits. Two digits have values of 60,000 and 300. The last digit is 9. The value of each of the other digits is ten times the value of the digit on its right. What is Taylor's home street address number?

_____

11 Jenny wrote the expanded form of 804,130 as 800,000 + 40,000 + 100 + 30.

Part A

What error did Jenny make?

_____

Part B

Correct Jenny's work by writing the number in expanded form.

_____

12 Juanita is using play money to count the amounts shown in the table. She wants to make each money amount with only one type of bill. Complete the table. How many of each type of bill would it take to make the amounts given?

Amount				
$16,000	16			
$345,000			34,500	
$602,000				602,000