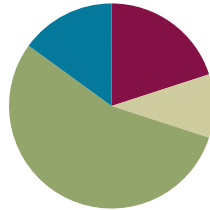


Lesson 2

Objective: Recognize a digit represents 10 times the value of what it represents in the place to its right.

Suggested Lesson Structure

■ Fluency Practice	(12 minutes)
■ Application Problem	(6 minutes)
■ Concept Development	(33 minutes)
■ Student Debrief	(9 minutes)
Total Time	(60 minutes)



Fluency Practice (12 minutes)

- Skip-Counting **3.OA.7** (4 minutes)
- Place Value **4.NBT.2** (4 minutes)
- Multiply by 10 **4.NB5.1** (4 minutes)

Skip Counting (4 minutes)

Note: Practicing skip-counting on the number line builds a foundation for accessing higher order concepts throughout the year.

Direct students to count by threes forward and backward to 36, focusing on the crossing-ten transitions.

Example: (3, 6, 9, 12, 9, 12, 9, 12, 15, 18, 21, 18, 21, 24, 27, 30, 27, 30, 33, 30, 33, 30, 33, 36...) The purpose of focusing on crossing the ten transitions is to help students to make the connection that, for example, when adding 3 to 9 that $9 + 1$ is 10 and then 2 more is 12.

We see a similar purpose in counting down by threes; $12 - 2$ is 10 and subtracting 1 more is 9. This work builds on the fluency work of previous grade levels. Students should understand that when crossing the tens that they, in essence, are regrouping.

Direct students to count by fours forward and backward to 48, focusing on the crossing ten transitions.

Place Value (4 minutes)

Materials: (S) Personal white boards with a place value chart to thousands

Note: Reviewing and practicing place value skills in isolation will prepare students for success in multiplying different place value units during the lesson.

T: (Project place value chart to the thousands place.) Show 5 tens in number disks and write the number below it.

Students draw 5 ten disks, write 5 below it and 0 in the ones column. (Draw to correct student misunderstanding.)

T: Say the number in unit form.

S: 5 tens.

T: Say the number in standard form.

S: 50.

Continue for the following possible sequence: 3 tens 2 ones, 4 hundreds 3 ones, 1 thousand 2 hundreds, 4 thousands 2 tens, 4 thousands 2 hundreds 3 tens and 5 ones.

Multiply by 10 (4 minutes)

Materials: (S) Personal white boards

Note: This fluency will review concepts learned in Lesson 1.

T: (Project $10 \text{ ones} \times 10 = 1 \text{ _____}$.) Fill in the blank.

Students write $10 \text{ ones} \times 10 = 1 \text{ hundred}$.

T: Say the multiplication sentence in standard form.

S: $10 \times 10 = 100$.

Repeat for the following possible sequence $10 \times \text{_____} = 2 \text{ hundreds}$; $10 \times \text{_____} = 3 \text{ hundreds}$; $10 \times \text{_____} = 7 \text{ hundreds}$;

$10 \times 1 \text{ hundred} = 1 \text{ _____}$; $10 \times \text{_____} = 2 \text{ thousands}$; $10 \times \text{_____} = 8 \text{ thousands}$;

$10 \times 10 \text{ thousands} = \text{_____}$.

Application Problem (6 minutes)

Amy is baking muffins. Each baking tray can hold 6 muffins.

- If Amy bakes 4 trays of muffins, how many muffins will she have all together?
- The corner bakery has made 10 times as many muffins as Amy baked. How many muffins did the bakery produce?

Bonus: If the corner bakery packages the muffins in boxes of 100, how many boxes of 100 could they make?

Note: This application problem builds on the concept from the previous lesson of *10 times as many*.

$$a) 6 \times 4 = 24 \text{ muffins}$$

$$b) 24 \times 10 = 240 \text{ muffins}$$

Bonus: 240 could make
two groups of 100.

Concept Development (33 minutes)

Materials: (S) Personal white boards

Problem 1

Multiply single units by 10 to build the place value chart to 1 million. Divide to reverse the process.

T: On your board, write the multiplication sentence that shows the relationship between 1 hundred and 1 thousand.

S: (Students write: $10 \times 1 \text{ hundred} = 10 \text{ hundreds} = 1 \text{ thousand}$.)

T: Draw number disks on your place value chart to find the value of 10 times 1 thousand.

T: (Circulate.) I saw that Tessa drew 10 disks in the thousands column. What does that represent?

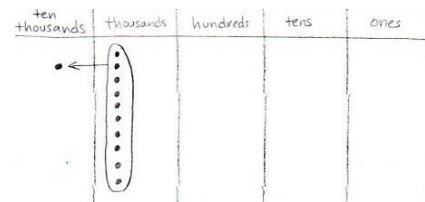
S: 10 times 1 thousand equals 10 thousand.
($10 \times 1 \text{ thousand} = 10 \text{ thousand}$.)

T: How else can 10 thousand be represented?

S: 10 thousand can be bundled because when you have 10 of one unit, you can bundle it and move it to the next column.

T: (Point to the place value chart.) Can anyone think what the name of our next column after the thousands might be? (Students might share. Label the **ten thousands** column.)

T: Now write a complete multiplication sentence to show 10 times the value of 1 thousand. Show how you regroup.



$10 \times 1 \text{ thousand} = 10 \text{ thousand} = 1 \text{ ten thousand}$

T: On your place value chart, show what 10 times the value of 1 ten thousand equals.

Circulate and assist students as necessary.

T: What is 10 times 1 ten thousand?

S: 10 ten thousands. \rightarrow **1 hundred thousand**.

T: That is our next larger unit.

$10 \times 1 \text{ ten thousand} = 10 \text{ ten thousands} = 1 \text{ hundred thousand}$

T: To move another column to the left, what would be my next 10 times statement?

S: 10 times 1 hundred thousand.

T: Solve to find 10 times 1 hundred thousand.

Circulate and assist students as necessary.



NOTES ON MULTIPLE MEANS OF REPRESENTATION:

Scaffold student understanding of the place value pattern by recording the following sentence frames:

- $10 \times 1 \text{ one} = 1 \text{ ten}$
- $10 \times 1 \text{ ten} = 1 \text{ hundred}$
- $10 \times 1 \text{ hundred} = 1 \text{ thousand}$
- $10 \times 1 \text{ thousand} = 1 \text{ ten thousand}$
- $10 \times 1 \text{ ten thousand} = 1 \text{ hundred thousand}$

Students may benefit from speaking this pattern chorally. Deepen understanding with prepared visuals (perhaps using a SMART board).

T: 10 hundred thousands can be bundled and represented as **1 million**. Title your column and write the multiplication sentence.

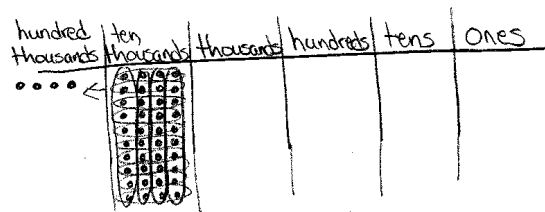
10×1 hundred thousand = 10 hundred thousands = 1 million

After having built the place value chart by multiplying by ten, quickly review the process simply moving from right to left on the place value chart, and then reversing and moving left to right. (e.g., 2 tens times 10 equals 2 hundreds times 10 equals 2 thousands divided by 10 equals 2 hundreds divided by 10 equals 2 tens.)

Problem 2

Multiply multiple copies of one unit by 10 (e.g., 10×4 ten thousands).

- T: Draw number disks and write a multiplication sentence to show the value of 10 times 4 ten thousands.
- T: 10 times 4 ten thousands is?
- S: 40 ten thousands. → 4 hundred thousands.
- T: Explain to your partner how you know this equation is true.



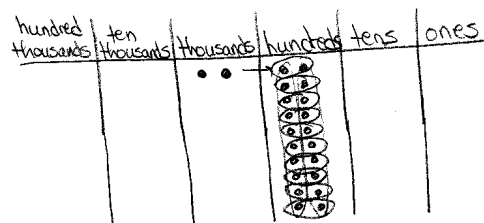
10×4 ten thousands = 40 ten thousands = 4 hundred thousands

Repeat with 10×3 hundred thousands.

Problem 3

Divide multiple copies of one unit by 10: 2 thousands $\div 10$. Solve in unit form: 2 thousands $\div 10$

- T: What is the process for solving this division equation?
- S: Use a place value chart. → Represent 2 thousands on a place value chart and then change for smaller units so we can divide.
- T: What would our place value chart look like if we changed each thousand for 10 smaller units?
- S: 20 hundreds. → 2 thousands can be changed to be 20 hundreds because 2 thousands and 20 hundreds are equal.
- T: Solve for the answer.
- S: 2 hundreds. → 2 thousands $\div 10$ is 2 hundreds because 2 thousands unbundled becomes 20 hundreds. → 20 hundreds divided by 10 is 2 hundreds.



2 thousands $\div 10 = 20$ hundreds $\div 10 = 2$ hundreds

Repeat with 3 hundred thousands $\div 10$.

MP.1

Problem 4

Multiply and divide multiple copies of two different units by 10.

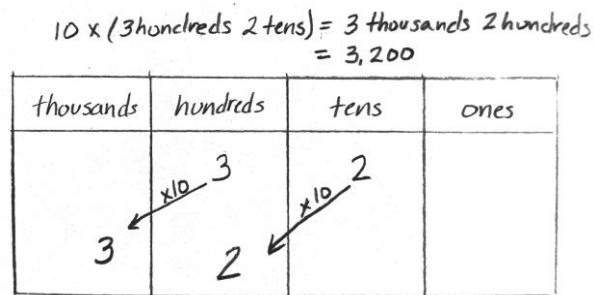
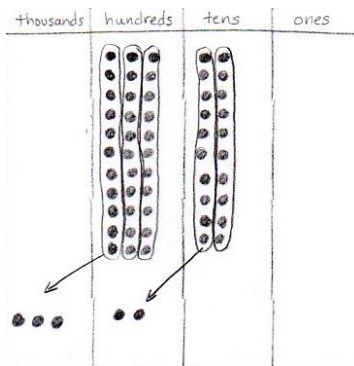
- T: Draw number disks to show 3 hundreds and 2 tens.
- T: Work in pairs to solve (write) $10 \times (3 \text{ hundreds } 2 \text{ tens})$.
- T: I wrote (3 hundreds 2 tens) in parentheses to show it is one number.

Circulate as students work. Clarify that both hundreds and tens must be multiplied by 10.

- T: What is your product?
- S: 3 thousands 2 hundreds.

$10 \times (3 \text{ hundreds } 2 \text{ tens}) = 3 \text{ thousands } 2 \text{ hundreds} = 3,200$

- T: How could we write this in standard form?
- S: 3,200

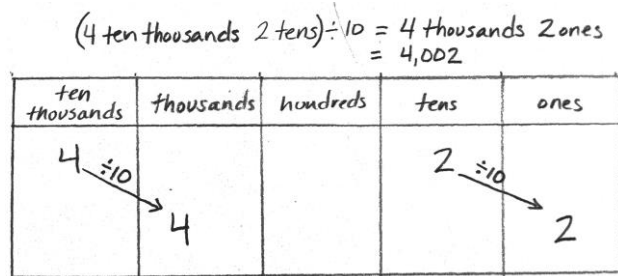
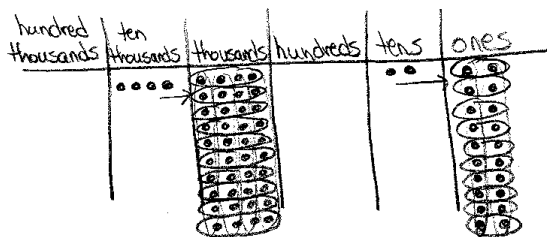


$(4 \text{ ten thousands } 2 \text{ tens}) \div 10$

- T: In this equation we have two units. Explain how you will find your answer.
- S: We can use the place value chart again and represent the unbundled units, then divide.

$(4 \text{ ten thousands } 2 \text{ tens}) \div 10 = 4 \text{ thousands } 2 \text{ ones} = 4,002$

- T: Watch as I represent numbers in the place value chart to multiply or divide by ten, instead of drawing disks.



Repeat with $10 \times (4 \text{ thousands } 5 \text{ hundreds})$ and $(7 \text{ hundreds } 9 \text{ tens}) \div 10$.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students solve these problems using the RDW approach used for Application Problems.

Student Debrief (9 minutes)

Lesson Objective: Recognize a digit represents 10 times the value of what it represents in the place to its right.

Invite students to review their solutions for the Problem Set and the totality of the lesson experience. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Debrief. Guide students in a conversation to debrief the Problem Set. You may choose to use any combination of the questions below to lead the discussion.

- How did we use patterns to predict the increasing units on the place value chart up to **1 million**? Can you predict the unit that is 10 times 1 million? 100 times 1 million?
- What happens when you multiply a number by 10? **1 ten thousand** is what times 10? **1 hundred thousand** is what times 10?
- Gail said that she noticed that when you multiply a number by 10, you shift the digits one place to the left and put a zero in the ones place. Is she correct?
- How can you use multiplication and division to describe the relationship between units on the place value chart? Use Problems 1(a) and 1(c) to help explain.
- Practice reading your answers in Problem 2 out loud. What similarities did you find in saying the numbers in unit form and standard form? Differences?

NYS COMMON CORE MATHEMATICS CURRICULUM

Name Jack Date _____

1. As you did during the lesson, label and represent the product or quotient drawing disks on the place value chart.

a. 10×2 thousands = 20 thousands = 2 ten thousands

b. 10×3 ten thousands = 30 ten thousands = 3 hundred thousands

c. 4 thousands $\div 10 =$ 40 hundreds $\div 10 =$ 4 hundreds

COMMON CORE Lesson 2: Recognize a digit represents 10 times the value of the digit to its immediate right. Date: 4/29/13 engage^{ny} 1.A.8

NYS COMMON CORE MATHEMATICS CURRICULUM

2. Fill in the blanks to complete each number sentence. Respond first in unit form, then in standard form.

Expression	Unit form	Standard Form
10×6 tens	60 tens	600
7 hundreds $\times 10$	70 hundreds	7,000
3 thousands $\div 10$	3 hundreds	300
6 ten thousands $\div 10$	6 thousands	6,000
10×4 thousands	40 thousands	40,000

3. Fill in the blanks to complete each number sentence. Respond first in unit form, then in standard form.

Expression	Unit form	Standard Form
$(4$ tens 3 ones) $\times 10$	4 hundreds 3 tens	430
$(2$ hundreds 3 tens) $\times 10$	2 thousands 3 hundred	2,300
$(7$ thousands 8 hundreds) $\times 10$	7 ten thousands 8 thousands	78,000
$(6$ thousands 4 tens) $\div 10$	6 hundreds 4 ones	604
$(4$ ten thousands 3 tens) $\div 10$	4 thousands 3 ones	4,003

4. Explain how you solved the last problem of set 2. Use a place value chart to support your explanation.

10×4 thousands = 40 thousands

I know that multiplying by ten shifts the value to the left. Ten times 4 thousands will give us 4 ten thousands. 4 ten thousands = 40,000

COMMON CORE Lesson 2: Recognize a digit represents 10 times the value of the digit to its immediate right. Date: 4/29/13 engage^{ny} 1.A.9

- In Problem 7, did you write your equation as a multiplication or division sentence? Which way is correct?
- Which problem in Problem 3 was hardest to solve?
- When we multiply 6 tens times 10, as in Problem 2, are we multiplying the 6, the tens, or both? Does the digit or the unit change?
- Is 10 times 6 tens the same as 6 times 10 tens? (Use a place value chart to model.)
- Is 10 times 10 times 6 the same as 10 tens times 6? (Use a place value chart to model 10 times 10 is the same as 1 ten times 1 ten.)
- When we multiply or divide by 10 do we change the digits or the unit? Make a few examples.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

NYS COMMON CORE MATHEMATICS CURRICULUM

5. Explain how you solved the last problem of set 3. Use a place value chart to support your explanation.

When dividing by ten, each place value shifts to the right one column.
 4 ten thousands ÷ 10 = 4 thousands
 3 tens ÷ 10 = 3 ones

6. Jacob saved 2 thousand dollar bills, 4 hundred dollar bills, and 6 ten dollar bills to buy a car. The car costs 10 times as much as he has saved. How much does the car cost?

$2,000 + 400 + 60 = \$2,460$
 $\$2,460 \times 10 = \$24,600$
 The car costs \$24,600

7. Last year the apple orchard experienced a drought and didn't produce many apples. But this year the apple orchard produced 45 thousand granny smith apples and 9 hundred red delicious apples, which is 10 times as many apples as last year. How many apples did the orchard produce last year?

$45,000 + 900 = 45,900$
 $45,900 \div 10 = 4,590$
 Last year the orchard produced 4,590 apples.

8. Planet Ruba has a population of 1 million aliens. Planet Zamba has 1 hundred thousand aliens.

a. How many more aliens does Planet Ruba have than Planet Zamba?
 1 million = 10 hundred thousands
 10 hundred thousands
 - 1 hundred thousand
 = 9 hundred thousands
 Planet Ruba has 900,000 more aliens than Planet Zamba.

b. Write a sentence to compare the populations for each planet using the words "10 times as many."
 The population of Planet Ruba is 10 times as many as Planet Zamba.

COMMON CORE Lesson 2: Recognize a digit represents 10 times the value of what it represents in the place to its right. engage^{ny} 1.A.10
 Date: 6/28/13

Name _____

Date _____

1. As you did during the lesson, label and represent the product or quotient drawing disks on the place value chart.

a. 10×2 thousands = _____ thousands = _____

b. 10×3 ten thousands = _____ ten thousands = _____

c. 4 thousands $\div 10 =$ _____ hundreds $\div 10 =$ _____

2. Fill in the blanks to complete each number sentence. Respond first in unit form, then in standard form.

Expression	Unit form	Standard Form
10×6 tens		
7 hundreds $\times 10$		
3 thousands $\div 10$		
6 ten thousands $\div 10$		
10×4 thousands		

3. Fill in the blanks to complete each number sentence. Respond first in unit form, then in standard form.

Expression	Unit form	Standard Form
$(4 \text{ tens } 3 \text{ ones}) \times 10$		
$(2 \text{ hundreds } 3 \text{ tens}) \times 10$		
$(7 \text{ thousands } 8 \text{ hundreds}) \times 10$		
$(6 \text{ thousands } 4 \text{ tens}) \div 10$		
$(4 \text{ ten thousands } 3 \text{ tens}) \div 10$		

4. Explain how you solved the last problem of Set 2. Use a place value chart to support your explanation.

5. Explain how you solved the last problem of Set 3. Use a place value chart to support your explanation.
6. Jacob saved 2 thousand dollar bills, 4 hundred dollar bills, and 6 ten dollar bills to buy a car. The car costs 10 times as much as he has saved. How much does the car cost?
7. Last year the apple orchard experienced a drought and didn't produce many apples. But this year, the apple orchard produced 45 thousand granny smith apples and 9 hundred red delicious apples, which is 10 times as many apples as last year. How many apples did the orchard produce last year?
8. Planet Ruba has a population of 1 million aliens. Planet Zamba has 1 hundred thousand aliens.
- How many more aliens does Planet Ruba have than Planet Zamba?
 - Write a sentence to compare the populations for each planet using the words "10 times as many."

Name _____

Date _____

1. Fill in the blank to complete the number sentence. Respond with a numeral.

a. (4 ten thousands 6 hundreds) $\times 10 =$ _____

b. (8 thousands 2 tens) $\div 10 =$ _____

2. The Carson family saved up \$39,580 for a new home. The cost of their dream home is 10 times as much as they have saved. How much does their dream home cost?

Name _____

Date _____

1. As you did during the lesson, label and represent the product or quotient drawing disks on the place value chart.

a. 10×4 thousands = _____ thousands = _____

b. 4 thousands $\div 10$ = _____ hundreds $\div 10$ = _____

2. Fill in the blanks to complete each number sentence. Respond first in unit form, then in standard form.

Expression	Unit Form	Standard Form
10×3 tens		
5 hundreds $\times 10$		
9 ten thousands $\div 10$		
10×7 thousands		

3. Fill in the blanks to complete each number sentence. Respond first in unit form, then in standard form.

Expression	Unit Form	Standard Form
$(2 \text{ tens } 1 \text{ one}) \times 10$		
$(5 \text{ hundreds } 5 \text{ tens}) \times 10$		
$(2 \text{ thousands } 7 \text{ tens}) \div 10$		
$(4 \text{ ten thousands } 8 \text{ hundreds}) \div 10$		

4. Emily collected \$950 selling Girl Scout cookies all day Saturday. Emily's troop collected 10 times as much as she did. How much money did Emily's troop raise?
5. On Saturday, Emily made 10 times as much as on Monday. How much money did Emily collect on Monday?