# Lesson 20

Objective: Use place value strategies and the associative property $n \times (m \times 10) = (n \times m) \times 10$ (where n and m are less than 10) to multiply multiples of 10.

Related Topics: [More Lesson Plans for the Common Core Math](#)

Suggested Lesson Structure

■ Fluency Practice	(15 minutes)
■ Application Problem	(5 minutes)
■ Concept Development	(30 minutes)
■ Student Debrief	(10 minutes)
Total Time	**(60 minutes)**
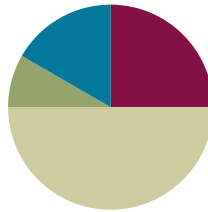
Fluency Practice (15 minutes)

- Group Counting **3.OA.1**   (3 minutes)
- Multiply by Different Units **3.NBT.3**   (6 minutes)
- Write In the Parentheses **3.OA.7**   (6 minutes)

Group Counting (3 minutes)

Note: Group counting reviews interpreting multiplication as repeated addition. The counts in these lessons review the multiplication taught earlier in the module. Direct students to count forward and backward, occasionally changing the direction of the count:

- Sixes to 60
- Sevens to 70
- Eights to 80
- Nines to 90

Multiply by Different Units (6 minutes)

Materials: (S) Personal white boards

Note: This fluency reviews Lesson 19.

T: (Write $2 \times 3 =$ _____.) Say the multiplication equation in unit form.
S: 2 ones × 3 = 6 ones.
T: Say it in standard form.

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S: 2 × 3 = 6.

T: (Write 2 tens × 3 = _____.) On your boards, write the multiplication equation.

S: (Write 2 tens × 3 = 6 tens.)

T: Below your equation, write a second multiplication equation in standard form.

S: (Write 20 × 3 = 60.)

Continue with the following possible sequence: 4 × 2, 4 tens × 2, 5 × 3, 5 × 3 tens, 6 × 4, 6 × 4 tens.

T: (Write 7 × 6 = _____.) Say the multiplication equation.

S: 7 × 6 = 42.

T: (Write 70 × 6 = _____.) Write the multiplication equation.

S: (Write 70 × 6 = 420.)

Continue with the following possible sequence: 8 × 8, 8 × 80; 9 × 8, 90 × 8; 6 × 6, 60 × 6; 8 × 7, 8 × 70; 4 × 9, 40 × 9; 9 × 6, 90 × 6.

Write In the Parentheses (6 minutes)

Materials: (S) Personal white boards

Note: This fluency reviews the use of parentheses and prepares students for today's lesson.

T: (Write 4 × 5 = 2 × 2 × 5.) What's 4 × 5?

S: 20.

T: On your boards, copy the equation. Then write in parentheses and solve.

S: (Write 4 × 5 = 2 × 2 × 5. Beneath it, write 20 = (2 × 2) × 5.)

4 × 5 = 2 × 2 × 5
20 = (2 × 2) × 5

Continue with the following possible sequence: 6 × 4 = 6 × 2 × 2, 6 × 6 = 6 × 2 × 3, 4 × 7 = 2 × 2 × 7, 7 × 8 = 7 × 4 × 2, 8 × 4 = 8 × 2 × 2, 8 × 6 = 8 × 3 × 2, 9 × 6 = 9 × 3 × 2, 9 × 8 = 9 × 4 × 2.

COMMON CORE   **Lesson 20:**   Use place value strategies and the associative property
$n × (m × 10) = (n × m) × 10$ (where *n* and *m* are less than 10)
to multiply multiples of 10.
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Application Problem (5 minutes)

Model 3 × 4 on a place value chart. Then explain how the array can help you solve 30 × 4.

MP.3
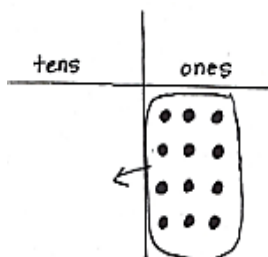
Note: This problem reviews multiplying by multiples of 10 from Lesson 19. In today's Concept Development, students will build on their understanding from Lesson 19 to multiply by multiples of 10 using the associative property.

Concept Development (30 minutes)

Materials: (S) Personal white boards

T: (Write 40 × 2.) Which tens fact gives us a product of 40?

S: 10 × 4.

T: Let's rewrite our equation. (Write (10 × 4) × 2.) Why do you think I put 10 × 4 in parentheses?

S: The parentheses show that when you group those numbers together and multiply, you get 40. → The parentheses remind us that we put 10 × 4 where 40 used to be.

T: Let's move the parentheses to change the way the numbers are grouped.

T: On your board, use the parentheses to group the numbers differently.

S: (Write 10 × (4 × 2).)

T: Is this problem friendlier than 40 × 2?

S: Oh, it's just 10 × 8! That's the same as 80! That was a little easier than multiplying by 40.

Repeat the process with 20 × 3, 30 × 3, and 50 × 2.

T: (Project or draw Image A shown below.) Use the chart to write a multiplication equation in unit form.
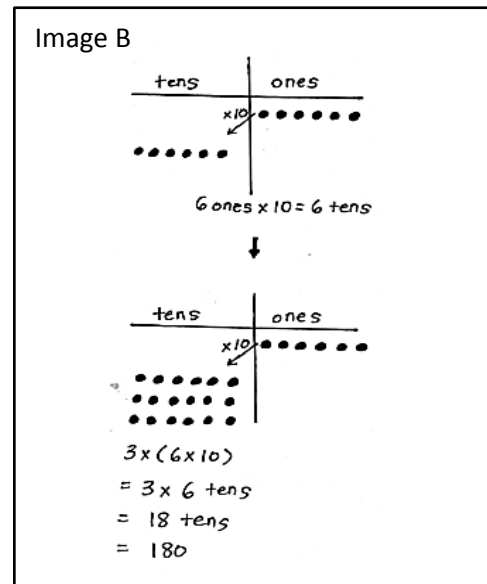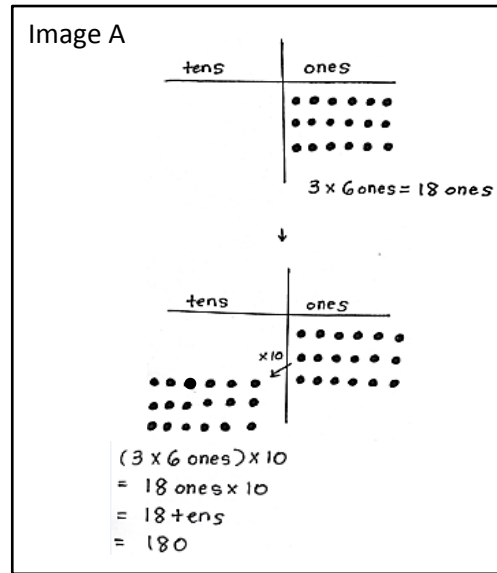
S: (Write 3 × 6 ones = 18 ones.)

T: Now I want to multiply my 18 ones by ten. Watch as I show this on the chart. I redraw my dots into the tens place and draw an arrow (draw arrow) to remind myself that they move to the next unit. Let's multiply our 3 groups of 6 ones by 10.

T: (Write (3 × 6 ones) × 10 = _____.) What is the answer to 18 ones × 10 in unit form?

S: 18 tens!

T: What is the value of 18 tens?

S: 180.

T: (Project or draw Image B shown at right.) This time I already moved my 6 ones to make them 6 tens. Use the chart to write a multiplication equation in unit form.

S: (Write 6 ones × 10 = 6 tens.)

T: Now I want to multiply my 6 tens by 3. How many rows do I need to add to show 3 rows of 6 tens?

S: 2 rows.

T: (Add 2 rows of 6 tens and write 3 × (6 × 10).) How does my array show this expression? Tell your partner.

S: There are 3 rows of 6 tens. → Six tens is the same as 6 × 10. It has the parentheses around it because we did that first on the chart. → Then we multiplied the 6 × 10 by 3.

T: What is the answer to 3 × 6 tens in unit form?

S: 18 tens! → 180.

T: Compare the equations (3 × 6 ones) × 10 and 3 × (6 × 10). What do you notice about the factors we used?

S: The factors are the same! 3, 6, and 10. The units are different, and so is the order of what you multiply first.

T: In both charts we saw how multiplying the ten, even at different times, made it easier to solve.

Repeat the process with (4 × 5) × 10 and 4 × (5 × 10).

Image A

3×6 ones $= 18$ ones

$(3 \times 6$ ones$) \times 10$
$= 18$ ones $\times 10$
$= 18$ tens
$= 180$

Image B

6 ones $\times 10 = 6$ tens

$3 \times (6 \times 10)$
$= 3 \times 6$ tens
$= 18$ tens
$= 180$

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.

COMMON CORE

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Student Debrief (10 minutes)

Lesson Objective: Use place value strategies and the associative property $n \times (m \times 10) = (n \times m) \times 10$ (where n and m are less than 10) to multiply by multiples of 10.

The Student Debrief is intended to invite reflection and active processing of the total lesson experience.

Invite students to review their solutions for the Problem Set. 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 and process the lesson.

You may choose to use any combination of the questions below to lead the discussion.

- In Problem 1, which grouping is easier for you to solve? Why?
- How do you see the parentheses move in the place value charts in Problem 1?
- Invite students to share how they knew where to draw parentheses for the equations in Problem 2.
- In Problem 3, how did Gabriella simplify the problem?
- Why didn't we have to have a hundreds column in our place value charts?
- How is this new strategy helpful in finding unknown, larger facts?

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.

Lesson 20: Use place value strategies and the associative property
$n \times (m \times 10) = (n \times m) \times 10$ (where n and m are less than 10)
to multiply multiples of 10.
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Name _____   Date _____

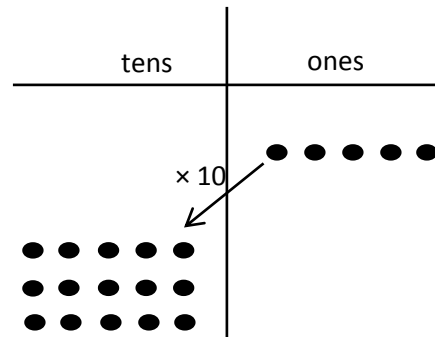1. Use the chart to complete the equations. Then solve. The first one has been done for you.
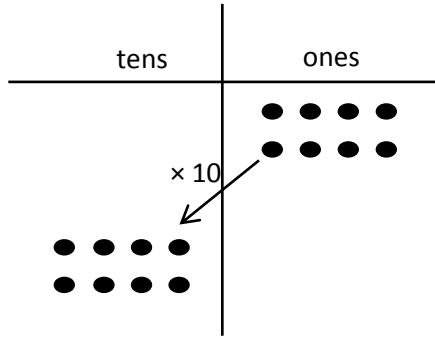
tens	ones

a. $(2 \times 4) \times 10$

= (8 ones) × 10

= __**80**__

tens	ones

b. $2 \times (4 \times 10)$

= 2 × (4 tens)

= _____

tens	ones

c. $(3 \times 5) \times 10$

= (_____ ones) × 10

= _____

tens	ones

d. $3 \times (5 \times 10)$

= 3 × (_____ tens)

= _____

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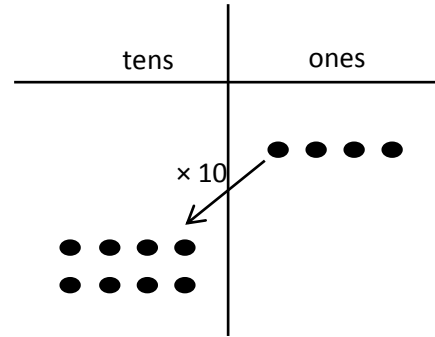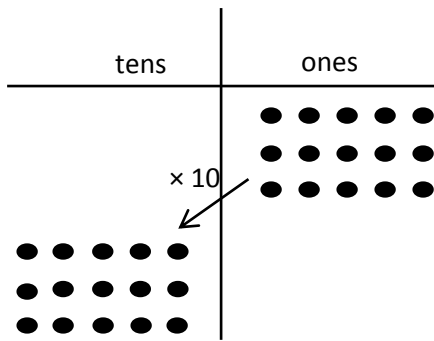
2. Place ( ) in the equations to find the related fact. Then solve. The first one has been done for you.

$2 \times 20 = 2 \times (2 \times 10)$

$= (2 \times 2) \times 10$

$= \underline{\quad 4 \quad} \times 10$

$= \underline{\quad 40 \quad}$

$2 \times 30 = 2 \times (3 \times 10)$

$= (2 \times 3) \times 10$

$= \underline{\qquad} \times 10$

$= \underline{\qquad}$

$3 \times 30 = 3 \times (3 \times 10)$

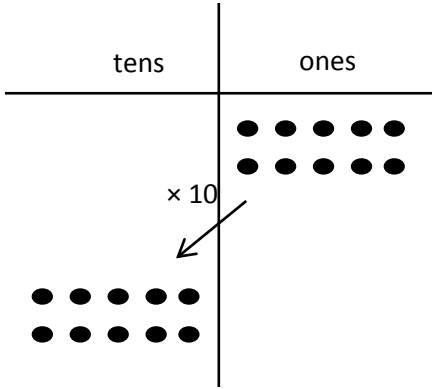$= 3 \times 3 \times 10$

$= \underline{\qquad} \times 10$

$= \underline{\qquad}$

$2 \times 50 = 2 \times 5 \times 10$

$= 2 \times 5 \times 10$

$= \underline{\qquad} \times 10$

$= \underline{\qquad}$

3. Gabriella solves 20 × 4 by thinking about 10 × 8. Explain her strategy.
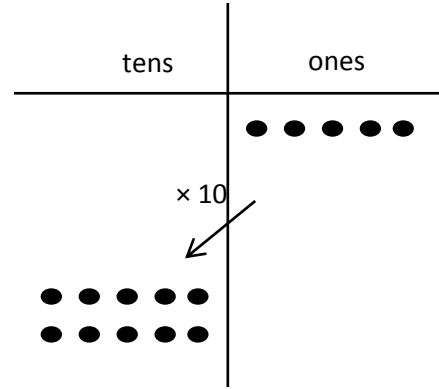
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Name _____   Date _____

1. Place ( ) in the equations to show how to use the associative property to find the related fact.
    Then solve.

    a. $4 \times 20 = 4 \times 2 \times 10$

        $= 4 \times 2 \times 10$

        $= \underline{\hspace{1cm}} \times 10$

        $= \underline{\hspace{1cm}}$

    b. $3 \times 30 = 3 \times 3 \times 10$

        $= 3 \times 3 \times 10$

        $= \underline{\hspace{1cm}} \times 10$

        $= \underline{\hspace{1cm}}$

2. Jamila solves 20×5 by thinking about 10 tens. Explain her strategy.

Name _____   Date _____

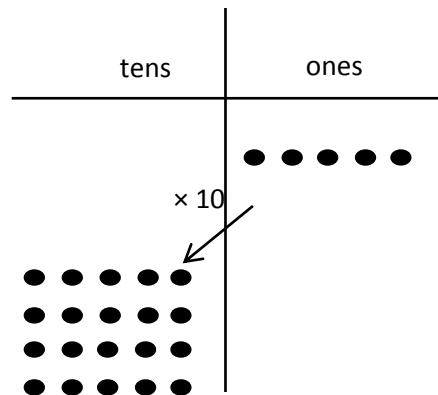1. Use the chart to complete the equations. Then solve.

tens	ones

a. $(2 \times 5) \times 10$

= (10 ones) × 10

= _____

tens	ones

b. $2 \times (5 \times 10)$

= 2 × (5 tens)

= _____

tens	ones

c. $(4 \times 5) \times 10$

= (_____ ones) × 10

= _____

tens	ones

d. $4 \times (5 \times 10)$

= 4 × (_____ tens)

= _____

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3.F.21
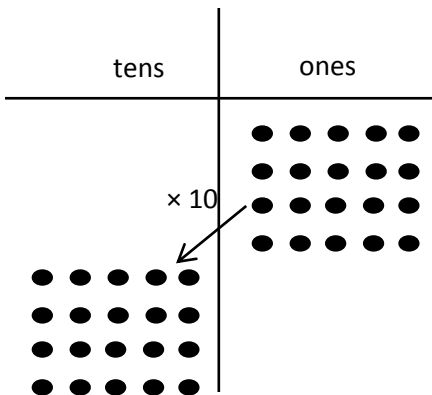
2. Solve. Place ( ) in (c) and (d) as needed to find the related fact.

a. 3 × 20 = 3 × (2 × 10)

= (3 × 2) × 10

= __6__ × 10

= _____

b. 3 × 30 = 3 × (3 × 10)

= (3 × 3) × 10

= _____ × 10

= _____

c. 3 × 40 = 3 × (4 × 10)

= 3 × 4 × 10

= _____ × 10

= _____

d. 3 × 50 = 3 × 5 × 10

= 3 × 5 × 10

= _____ × 10

= _____
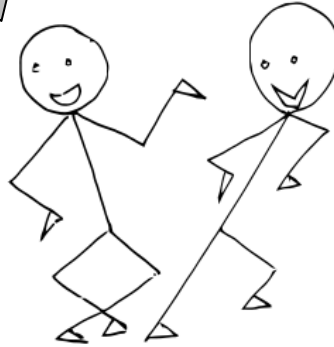
3. Danny solves 5 × 20 by thinking about 10 × 10. Explain his strategy.

3.F.22