



## Topic F

# Multiplication of Single-Digit Factors and Multiples of 10

3.OA.5, 3.OA.8, 3.OA.9, 3.NBT.3, 3.OA.1

<b>Focus Standards:</b>	3.OA.5	Apply properties of operations as strategies to multiply and divide. (Students need not use formal terms for these properties.) <i>Examples: If <math>6 \times 4 = 24</math> is known, then <math>4 \times 6 = 24</math> is also known. (Commutative property of multiplication.) <math>3 \times 5 \times 2</math> can be found by <math>3 \times 5 = 15</math>, then <math>15 \times 2 = 30</math>, or by <math>5 \times 2 = 10</math>, then <math>3 \times 10 = 30</math>. (Associative property of multiplication.) Knowing that <math>8 \times 5 = 40</math> and <math>8 \times 2 = 16</math>, one can find <math>8 \times 7</math> as <math>8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56</math>. (Distributive property.)</i>	
	3.OA.8	Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order, i.e., Order of Operations.)	
	3.OA.9	Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. <i>For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.</i>	
	3.NBT.3	Multiply one-digit whole numbers by multiples of 10 in the range 10–90 (e.g., $9 \times 80$ , $5 \times 60$ ) using strategies based on place value and properties of operations.	
<b>Instructional Days:</b>	3		
<b>Coherence -Links from:</b>	G2–M3	Place Value, Counting, and Comparison of Numbers to 1,000	
	G2–M6	Foundations of Multiplication and Division	
	G3–M1	Properties of Multiplication and Division and Solving Problems with Units of 2–5 and 10	
	<b>-Links to:</b>	G3–M4	Multiplication and Area
		G4–M3	Multi-Digit Multiplication and Division
	G4–M7	Exploring Measurement with Multiplication	

In Lesson 19, students initially use the place value chart to multiply by multiples of 10. To solve  $2 \times 40$ , for example, they begin by modeling  $2 \times 4$  in the ones place. Students relate this to multiplying  $2 \times 4$  tens, locating the same basic fact in the tens column. They see that when multiplied by 10, the digits in the product shift one place value to the left. Complexities are addressed as regrouping becomes involved with problems like  $4 \times 6$ , where the product has mixed units of tens and ones. However, the same principle applies—the digits shift once to the left.

Lesson 20 carries students' understanding from Lesson 19 to more abstract situations using a wider range of multiples of 10. Students learn to model place value strategies using the associative property, for example,  $2 \times 30 = 2 \times (3 \times 10) = (2 \times 3) \times 10$ , and  $4 \times 60 = 4 \times (6 \times 10) = (4 \times 6) \times 10$ . In Lesson 21, students apply learning from Topic F to solving two-step word problems and multiplying single-digit factors and multiples of 10. They use the rounding skills learned in Module 2 to estimate and assess the reasonableness of their solutions.

### A Teaching Sequence Toward Mastery of Multiplication of Single-Digit Factors and Multiples of 10

**Objective 1: Multiply by multiples of 10 using the place value chart.**  
(Lesson 19)

**Objective 2: 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.**  
(Lesson 20)

**Objective 3: Solve two-step word problems involving multiplying single-digit factors and multiples of 10.**  
(Lesson 21)