



## Topic A

# The Properties of Multiplication and Division

3.OA.4, 3.OA.5, 3.OA.7, 3.OA.9, 3.OA.1, 3.OA.2, 3.OA.3, 3.OA.6

|                               |        |   |
|-------------------------------|--------|---|
| <b>Focus Standards:</b>       | 3.OA.4 | Determine the unknown whole number in a multiplication or division equation relating three whole numbers. <i>For example, determine the unknown number that makes the equation true in each of the equations <math>8 \times ? = 48</math>, <math>5 = \_ \div 3</math>, <math>6 \times 6 = ?</math></i>  |
|                               | 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.7 | Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$ , one knows $40 \div 5 = 8$ ) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.  |
|                               | 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>  |
| <b>Instructional Days:</b>    | 3      |   |
| <b>Coherence -Links from:</b> | 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   |

In Lesson 1, students study the commutativity of familiar Module 1 facts that use units of 2, 3, 4, 5, and 10 to discover facts that they already know using units of 6, 7, 8, and 9. For example, students recognize that if they know  $3 \times 6 = 18$ , then they also know  $6 \times 3 = 18$ . They write out familiar facts and those known through commutativity, organizing them in rows and columns to form the beginning of a table through which arithmetic patterns become visible. Students finish this lesson encouraged about the work to come after seeing that they already know more than half of their facts.

In Lesson 2, students apply commutativity in conjunction with the  $n + 1$  strategy to solve unknown facts. For example, students relate  $5 \times 8$  and  $8 \times 5$  and then add one more group of 8 to solve  $6 \times 8$  and, by extension,  $8 \times 6$ . Adding one more group to a known fact in order to find an unknown fact continues to bridge student understanding in Module 1 and Module 3 as students are reminded of their prior work with the distributive property.

Lesson 3 introduces using a letter to represent the unknown in various positions within multiplication and division problems. In Module 1, students represented the unknown on tape diagrams, and occasionally in equations, using a question mark. This lesson uses familiar facts to introduce the new abstraction of using a letter as a placeholder.

### A Teaching Sequence Toward Mastery of The Properties of Multiplication and Division

**Objective 1:** Study commutativity to find known facts of 6, 7, 8, and 9.  
(Lesson 1)

**Objective 2:** Apply the distributive and commutative properties to relate multiplication facts  $5 \times n + n$  to  $6 \times n$  and  $n \times 6$  where  $n$  is the size of the unit.  
(Lesson 2)

**Objective 3:** Multiply and divide with familiar facts using a letter to represent the unknown.  
(Lesson 3)