Topic B

Multiplication and Division Using Units of 6 and 7

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

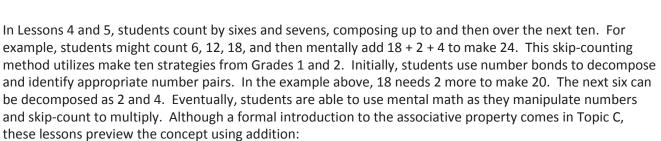|		
Focus Standard:	3.OA.3	Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem.
	3.OA.4	Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations 8 × ? = 48, 5 = _ ÷ 3, 6 × 6 = ?*
	3.OA.5	Apply properties of operations as strategies to multiply and divide. (Students need not use formal terms for these properties.) *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) 3 × 5 × 2 can be found by 3 × 5 = 15, then 15 × 2 = 30, or by 5 × 2 = 10, then 3 × 10 = 30. (Associative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*
	3.OA.7	Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that 8 × 5 = 40, one knows 40 ÷ 5 = 8) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.
Instructional Days:	4	
Coherence -Links from:	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
-Links to:	G3–M4	Multiplication and Area
	G4–M3	Multi-Digit Multiplication and Division
	G4–M5	Fraction Equivalence, Ordering, and Operations
	G4–M7	Exploring Measurement with Multiplication

In Lessons 4 and 5, students count by sixes and sevens, composing up to and then over the next ten. For example, students might count 6, 12, 18, and then mentally add 18 + 2 + 4 to make 24. This skip-counting method utilizes make ten strategies from Grades 1 and 2. Initially, students use number bonds to decompose and identify appropriate number pairs. In the example above, 18 needs 2 more to make 20. The next six can be decomposed as 2 and 4. Eventually, students are able to use mental math as they manipulate numbers and skip-count to multiply. Although a formal introduction to the associative property comes in Topic C, these lessons preview the concept using addition:

- 6 + 6 = 6 + 4 + 2
- 18 + 6 = 18 + 2 + 4
- 36 + 6 = 36 + 4 + 2
- 48 + 6 = 48 + 2 + 4

Lesson 6 builds on Lesson 2 with a formal re-introduction of the distributive property using the 5 + n pattern to multiply and divide. Students understand that multiples of 6 can be thought of as $(5 + 1) \times n$ to make 5 and 1 more groups, or 6 groups of n. Similarly, multiples of 7 can be thought of as $(5 + 2) \times n$ to make 5 and 2 more groups, or 7 groups of n. In division, students decompose the dividend using a multiple of 5 and then add the quotients of the smaller division facts to find the quotient of the larger unknown division fact. For example:

$$54 \div 6 = (30 \div 6) \div (24 \div 6)$$
$$= 5 + 4$$
$$= 9$$

Use of the 5 + n pattern as a strategy builds on concepts in Lessons 2, 4, and 5. It also facilitates mental math, particularly using units of 6.

In Lesson 7, students use tape diagrams to analyze multiplication and division word problems and to determine the unknown. This is the first time they solve problems using new units, with a letter to represent the unknown.

A Teaching Sequence Towards Mastery of Multiplication and Division Using Units of 6 and 7
Objective 1: Count by units of 6 to multiply and divide using number bonds to decompose. **(Lesson 4)**
Objective 2: Count by units of 7 to multiply and divide using number bonds to decompose. **(Lesson 5)**
Objective 3: Use the distributive property as a strategy to multiply and divide using units of 6 and 7. **(Lesson 6)**
Objective 4: Interpret the unknown in multiplication and division to model and solve problems using units of 6 and 7. **(Lesson 7)**