**Session Two: Multiplication of Whole Numbers**

**Common Core Standards Addressed**

#### Multiplication is advanced for Grade 1. Students at this level should refine their addition skills to prepare them for the multiplication operation.

#### Grade 2

#### Work with equal groups of objects to gain foundations for multiplication.

[CCSS.Math.Content.2.OA.C.3](http://www.corestandards.org/Math/Content/2/OA/C/3/)  
Determine whether a group of objects (up to 20) has an odd or even number of members, e.g., by pairing objects or counting them by 2s; write an equation to express an even number as a sum of two equal addends.

[CCSS.Math.Content.2.OA.C.4](http://www.corestandards.org/Math/Content/2/OA/C/4/)  
Use addition to find the total number of objects arranged in rectangular arrays with up to 5 rows and up to 5 columns; write an equation to express the total as a sum of equal addends.

#### Grade 3- Represent and solve problems involving multiplication and division.

[CCSS.Math.Content.3.OA.A.1](http://www.corestandards.org/Math/Content/3/OA/A/1/)  
Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7*.

[CCSS.Math.Content.3.OA.A.2](http://www.corestandards.org/Math/Content/3/OA/A/2/)  
Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8*.

[CCSS.Math.Content.3.OA.A.3](http://www.corestandards.org/Math/Content/3/OA/A/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.1

[CCSS.Math.Content.3.OA.A.4](http://www.corestandards.org/Math/Content/3/OA/A/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 = ?*

#### Understand properties of multiplication and the relationship between multiplication and division.

[CCSS.Math.Content.3.OA.B.5](http://www.corestandards.org/Math/Content/3/OA/B/5/)  
Apply properties of operations as strategies to multiply and divide.2 *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.)*

[CCSS.Math.Content.3.OA.B.6](http://www.corestandards.org/Math/Content/3/OA/B/6/)  
Understand division as an unknown-factor problem. *For example, find 32 ÷ 8 by finding the number that makes 32 when multiplied by 8*.

#### Multiply and divide within 100.

[CCSS.Math.Content.3.OA.C.7](http://www.corestandards.org/Math/Content/3/OA/C/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.

#### Grade 4

#### Use the four operations with whole numbers to solve problems.

[CCSS.Math.Content.4.OA.A.1](http://www.corestandards.org/Math/Content/4/OA/A/1/)  
Interpret a multiplication equation as a comparison, e.g., interpret 35 = 5 × 7 as a statement that 35 is 5 times as many as 7 and 7 times as many as 5. Represent verbal statements of multiplicative comparisons as multiplication equations.

[CCSS.Math.Content.4.OA.A.2](http://www.corestandards.org/Math/Content/4/OA/A/2/)  
Multiply or divide to solve word problems involving multiplicative comparison, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem, distinguishing multiplicative comparison from additive comparison.1

[CCSS.Math.Content.4.OA.A.3](http://www.corestandards.org/Math/Content/4/OA/A/3/)  
Solve multistep word problems posed with whole numbers and having whole-number answers using the four operations, including problems in which remainders must be interpreted. 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.

#### Gain familiarity with factors and multiples.

[CCSS.Math.Content.4.OA.B.4](http://www.corestandards.org/Math/Content/4/OA/B/4/)  
Find all factor pairs for a whole number in the range 1-100. Recognize that a whole number is a multiple of each of its factors. Determine whether a given whole number in the range 1-100 is a multiple of a given one-digit number. Determine whether a given whole number in the range 1-100 is prime or composite.

#### Grade 5

#### Write and interpret numerical expressions.

[CCSS.Math.Content.5.OA.A.1](http://www.corestandards.org/Math/Content/5/OA/A/1/)  
Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.

[CCSS.Math.Content.5.OA.A.2](http://www.corestandards.org/Math/Content/5/OA/A/2/)  
Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them. *For example, express the calculation "add 8 and 7, then multiply by 2" as 2 × (8 + 7). Recognize that 3 × (18932 + 921) is three times as large as 18932 + 921, without having to calculate the indicated sum or product*.

#### Students Grade 6 to Grade 8 should demonstrate mastery of the skills presented in this session.