



Grade 3 - Unit 5 - Extending Multiplication & Division Concepts

Unit Focus

Unit 5 returns to the study of multiplication, especially as it relates to division. Students focus on multiplication strategies and multiplying by multiples of 10. During this unit, students will practice strategies for multiplying single digit numbers by 0 -5 which should be learned "from memory" by the end of grade 3. They will also be introduced to strategies for multiplying by 6 - 9. Story problems play a major role in the unit helping students to connect their everyday experiences with division to more formal mathematical concepts. They will encounter different interpretations of division such as the area model and will have multiple opportunities to build understanding of different models and meanings. The connection between multiplication and division is also drawn through work that revolves around fact families. Toward the end of the unit, area is also introduced.

Stage 1: Desired Results - Key Understandings

Standard(s)	Transfer	
<p>Standards</p> <ul style="list-style-type: none"> • Common Core <ul style="list-style-type: none"> ○ <i>Mathematics: 3</i> <ul style="list-style-type: none"> ▪ Represent and solve problems involving multiplication and division. ▪ 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.1) ▪ Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ 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 $56 \div 8$. (CCSS.MATH.CONTENT.3.OA.A.2) ▪ 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. (CCSS.MATH.CONTENT.3.OA.A.3) ▪ 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 $8 \times ? = 48$, $5 = _ \div 3$, $6 \times 6 = ?$ (CCSS.MATH.CONTENT.3.OA.A.4) ▪ Understand properties of multiplication and the relationship between multiplication and division. ▪ Apply properties of operations as strategies to multiply and divide.2 Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.) (CCSS.MATH.CONTENT.3.OA.B.5) ▪ Understand division as an unknown-factor problem. For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8. (CCSS.MATH.CONTENT.3.OA.B.6) 	<p><i>Students will be able to independently use their learning to...</i></p> <p>T1 Demonstrate fluency with mathematical computations and definitions.</p> <p>T2 Initiate a plan using a variety of methods/strategies appropriately, execute it, and evaluate the reasonableness and accuracy of the solution.</p> <p>T3 Identify and generalize patterns and structure in numbers, expressions, data and objects.</p>	
	Meaning	
	Understanding(s)	Essential Question(s)
	<p><i>Students will understand that...</i></p> <p>U1 Mathematicians monitor progress while problem solving, change course if necessary and evaluate the reasonableness of their solution.</p> <p>U2 Mathematicians calculate efficiently and accurately while using appropriate symbols and labels.</p> <p>U3 Mathematicians see patterns to make generalizations about structures and relationships.</p>	<p><i>Students will keep considering...</i></p> <p>Q1 What do effective problem solvers do when they get stuck?</p> <p>Q2 How do I check my work for accuracy and completeness?</p> <p>Q3 What patterns are present?</p> <p>Q4 How can I decompose a number to make it easier to work with?</p>

Stage 1: Desired Results - Key Understandings

- Multiply and divide within 100.
- 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. *(CCSS.MATH.CONTENT.3.OA.C.7)*
- Solve problems involving the four operations, and identify and explain patterns in arithmetic.
- 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. *(CCSS.MATH.CONTENT.3.OA.D.8)*
- Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. 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. *(CCSS.MATH.CONTENT.3.OA.D.9)*
- Use place value understanding and properties of operations to perform multi-digit arithmetic.
- Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9×80 , 5×60) using strategies based on place value and properties of operations. *(CCSS.MATH.CONTENT.3.NBT.A.3)*
- Recognize area as an attribute of plane figures and understand concepts of area measurement. *(CCSS.MATH.CONTENT.3.MD.C.5)*
- A square with side length 1 unit, called a unit square, is said to have one square unit of area, and can be used to measure area. *(CCSS.MATH.CONTENT.3.MD.C.5A)*
- A plane figure which can be covered without gaps or overlaps by n unit squares is said to have an area of n square units. *(CCSS.MATH.CONTENT.3.MD.C.5B)*
- Geometric measurement: understand concepts of area and relate area to multiplication and to addition.
- Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units). *(CCSS.MATH.CONTENT.3.MD.C.6)*
- Relate area to the operations of multiplication and addition. *(CCSS.MATH.CONTENT.3.MD.C.7)*
- Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths. *(CCSS.MATH.CONTENT.3.MD.C.7A)*
- Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning. *(CCSS.MATH.CONTENT.3.MD.C.7B)*
- Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning. *(CCSS.MATH.CONTENT.3.MD.C.7C)*
- Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems. *(CCSS.MATH.CONTENT.3.MD.C.7D)*

Madison Public Schools Profile of a Graduate

Analyzing: Examining information/data/evidence from multiple sources to identify possible underlying assumptions, patterns, and relationships in order to make inferences. *(POG.1.2)*

Acquisition of Knowledge and Skill

Knowledge

Students will know...

- K1** models can help to solve multiplication and division equations.
- K2** multiplication can be used to solve division problems.
- K3** unit squares can be used to measure the area of plane figures.
- K4** fact families of multiplication and division problems can be written to match an array.
- K5** the appropriate operations to solve a given word problem.
- K6** the associative property of multiplication allows us to multiply three or more numbers in any order and still get the same product
- K7** Vocabulary: array, row, column, dimension, divide, equation, expression, quotient, product, area, rectilinear, model, unit square, divisor, dividend, factor

Skill(s)

Students will be skilled at...

- S1** interpreting products and quotients of whole numbers.
- S2** fluently multiplying and dividing within 100 using strategies.
- S3** identifying fact families to match an array.
- S4** solving for unknown factor, divisor or dividend.
- S5** solving one and two-step story problems using multiplication and division with products and dividends to 100.
- S6** finding the area of a rectangle or rectilinear shape.
- S7** drawing and labeling an array model and writing a corresponding equation.
- S8** solving problems using the associative property