Unit 2: Multiplication and Geometry (4 Weeks)

Content Standards:

- 4.OA.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.
- 4.OA.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.
- 4.OA.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.
- 4.OA.5 Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.
- 4.MD.3 Apply the area and perimeter formulas for rectangles in real world and mathematical problems.
- 4.MD.1 Know relative sizes of measurement units within one system of units including km, m, cm; kg, g; lb, oz.; l, ml; hr, min, sec. Within a single system of measurement, express measurements in a larger unit in terms of a smaller unit. Record measurement equivalents in a two-column table.
- 4.G.2 Classify 2-dimensional figures based on the presence or absence of parallel or perpendicular lines, or the presence or absence of angles of a specified size. Recognize right triangles as a category, & identify right triangles.
- 4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. Identify line-symmetric figures and draw lines of symmetry.

Practice Standards :

Students will have opportunities to:

- Explain your mathematical thinking clearly and precisely **(MP. 6)**
- Use an appropriate level of precision for our problem **(MP. 6)**
- Use clear labels units and mathematical language **(MP. 6)**
- Think about accuracy and efficiency when you count, measure and calculate **(MP. 6)**
- Look for mathematical structures such as categories, patterns and properties **(MP. 7)**
- Use structures to solve problems and answer questions **(MP. 7)**

Concepts from Previous Units Supporting Unit 2:	Big Ideas, Concepts, & Strategies for Unit 2:	Connections to Upcoming Concepts after Unit 2:
Previously from 3rd Grade: - Multiplication is related to addition and involves counting groups of like size and determining how many there are in all. - In multiplication, one factor counts how many sets, groups, or parts of equal size are involved. The other factor tells the size of each set or part. - Area is the 2-dimensional space inside a region. It's measured by tiling. - When finding the area of a rectangle, the dimensions represent the factors in a multiplication problem. - The perimeter can be calculated by adding the lengths of its sides. - Quadrilaterals can be classified according to the lengths of their sides. Previously from 4th Grade Unit 1: - Formulas such as, $P = 2l + 2w$ or $P = 2(l + w)$ or $P = l + l + w + w$ can be used to find the sum of the side lengths of a rectangle. - Geometric figures can be analyzed and classified based on their properties (point, line, line segment, ray and angles). - Two lines are parallel if they never intersect and are always equidistant. - Two lines are perpendicular if they intersect in right angles (90°).	- In multiplicative comparison problems there are two different sets. The comparison is based on one group being a particular multiple of the other (multiple copies). - One type of multiplicative comparison problem is when the product is unknown. - Prime numbers have only a factor of 1 and itself. - Composite numbers have more than two factors. - A whole number is a multiple of each of its factors. - The larger units can be subdivided into equivalent units. (time) - Two dimensional figures can be classified by angle measurement. An obtuse angle measures more than 90^o. An acute angle measures less than 90^o. A right angle measures exactly 90^o. - Right triangles can be a category for classification. It has one right angle. - Two dimensional figures can be classified by parallel or perpendicular lines. - Some two dimensional figures are symmetric and have lines of symmetry. - - A line of symmetry divides a figure into two congruent halves that are mirror images of each other.	- There are different types of multiplicative comparison problems. The group size could be unknown or the number of groups could be unknown. - Acute, right and obtuse angles can be used as benchmark to estimate angle measurement. - Angles can be measured by non-standard and standard units. - Angle measures can be added or subtracted. - Lines of symmetry for a 2-dimensional figure occur when a line can be drawn across the figure such that the figure can be folded along the line into matching parts. - Mirror images of symmetric figures are the same size and have the same shape. They face in opposite directions.

Vocab.	**Acute triangle, additive comparison, adjacent, attribute, column, comparison statement, composite number, composite unit, conjecture, divisibility, equilateral triangle, factor, factor pair, formula, function machine, input, isosceles triangle, line of symmetry, multiple, multiplicative comparison statement, multiplicative relationship, obtuse triangle, output, prime number, product, properties, quantity, rectangular array, right triangle, row, rule, scalene triangle ,square array, square number, symmetrical,** turn-around facts, times as much, multiplication, repeated addition, sets, two-dimensional, halves, equivalent, column, distance, sum, rectangle, pattern **Bold- listed in teacher's edition** Normal- not listed in teacher's edition as a vocabulary word but will be helpful for students in explanations

Unit 2: Multiplication and Geometry (4 Weeks)								
Lessons:	**Learning Objective(s):**	**Student Objective(s):**	**Math Vocabulary & Tools:**	**Implement Math Task(s) from TE:**	**Supplemental Math Task Options:**	**Guiding Questions & Strategies to Support Struggling Learners:**	**Select Practice Opportunities:**	**Implement Mental Number Sense Routine: (Write in Plans)**
2-1	1. Recognize that a whole number is a multiple of each of its factors. 2. Determine whether a given whole number in the range 1-100 is a multiple of a given one digit number. *Review of third grade concept -square numbers	1. I can find the pattern in factor pairs of products.	**Vocabulary in the Launch:** - rectangular arrays -row -column **Tools:** -36 counters -Square Tiles -EDM Esuite Array Tools -MM TA10 **Vocabulary in the Summarize:** -square array -square number	- 2-1 Warm Up and Math Task (Adapted from TE1 p.124) - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-N/A - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *What is the problem asking? What are you stuck on? How can you use _____ to show the problem? How can you prove that to me? What patterns to you observe in the arrays? What patterns do you observe in the expressions? Can square arrays be drawn for the following numbers _____? Explain your reasoning.*	-MJ pg. 35 -MM pg. 53 #1-5 -MBoxes pg.36	
2-2	1. Apply the perimeter formula for rectangles in real world and mathematical problems. 2. Apply the area formula for rectangles in real world and mathematical problems. *review of third grade concept of area and perimeter	1. I can find the perimeter of rectangles. 2. I can use strategies to find the amount of space a rectangle covers in real world problems.	**Vocabulary in the Launch:** -perimeter -rectangle **Tools:** -toothpicks -straw or pipe cleaner segments -square tiles -small cubes -grid paper **Vocabulary in the Summarize:** -composite unit -area	- 2-2 Math Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *How did you find the perimeter? What is the difference between area and perimeter? Other than counting the squares, what is another way to find area and perimeter of rectangles? What equation could we write for the total number of squares? How could we find the total more efficiently?*	-MM pg. 55 -MM pg. 54 -MM pg. TA11, pg.56 -Activity card 18 -MJ pg. 37 -MM pg. 57 -MM- pg. G11-G14 -SRB 272 -MBoxes pg. 38	
2-3	1. Find all factor pairs for whole number in the range 1-100.	1. I can find all the factor pairs of a given product.	**Vocabulary in the Launch:** -factor -product -factor pair **Tools:** -Counters or square tiles -Grid paper **Vocabulary in the Summarize:** -divisibility	-2-3 Math Task (Adapted from MJ pg. 39) - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *How do you know when you have found all the factor pairs for a number? How can you organize the factor pairs? How can we use division to find the factors of ____?*	-MJ pg.39 -SRB pg.258/MM pg.G15-G16 -MM pg. 59 #1 -MM pg. 58 -SRB pg. 257/MM G19 -Factor Rainbow	

2-4	1. Recognize that a whole number is a multiple of each of its factors. 2. Determine whether a given whole number in the range 1-100 is a multiple of a given one digit number.	1. I can find patterns in products of whole numbers.	**Vocabulary in the Launch:** -multiples **Tools:** (-Dot Tiles can be used to help students generate multiples for numbers 2-10) -Multiplication table -Crayons **Vocabulary in the Summarize:** -multiple	-Math Message TE pg. 140 - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *Is ____ a multiple of _____? How you do know?* *What patterns do you see for the multiples of ___?* *How are factors and multiples related?*	-MJ pg. 41 -SRB pg.252 -MM pg. 61 #1-6 -MM pg. 58 -MM pg. 60 -Activity Card 19	
2-5	1. Determine whether a given whole number in the range 1-100 is prime or composite.	1. I can find all the factor pairs of a given product. 2. I can find the pattern in factor pairs of products.	**Vocabulary in the Launch:** -factor pairs **Tools:** -Counters or square tiles -Grid paper **Vocabulary in the Summarize:** -prime number -composite number	-Math Message TE pg. 146 - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *Which numbers have only a factor of 1 and itself?* *What patterns do you notice in prime numbers?* *What patterns do you notice for composite numbers?* *(Which numbers have the least number of arrays and, therefore, the least number of factors?)*	-Activity Card 20 - MM 62/63 - Activity Card 21 - MJ pg. 44 -MJ pg. 45 -SRB pg.257 -MM pg. 64	
2-6 **(2 day)**	1. Multiply to solve word problems involving multiplicative comparison. 2. Use drawings and equations with symbol for unknown to represent the problem.	1. I can solve word problems involving comparison. 2. I can represent comparison problems using drawings.	**Vocabulary in the Launch:** -conjecture **Tools:** -Sentence strips can be used by students to fold into equal parts. **Vocabulary in the Summarize:** -argument	-Day 1: MM pg. 65-66 -Day 2: Reengagement - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-N/A	- Ask guiding questions such as: *What is your prediction? How can you improve your argument/response? What would a good argument include? How can you revise your prediction/argument/response?*	-MJ pg. 47 -MM pg. 68	
2-7	1. Know relative sizes of measurement units within units of time including hr, min, sec. 2.Record measurement equivalents in a two-column table	1. I know relative sizes of measurement units within the units of time. 2. I can record measurement equivalents in a two-column table.	**Vocabulary in the Launch:** -minutes -seconds -hours -convert **Tools:** -SRB pg. 198 -Measurement Scales -Clocks/Timers **Vocabulary in the Summarize:**	-2-7 Math Task (Adapted from pg. 163, 164) - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *What patterns do you notice when changing from seconds to minutes to hours? Give an example of an activity that would be measures in seconds? Minutes? Hours? How did you convert from __ to ___?*	-MM pg. 69 -Activity Card 22 -MM TA9 -MM pg. 70	

2-8	1. Interpret multiplication equation as a comparison. 2. Represent verbal statements of multiplicative comparisons as multiplication equations.	1. I can understand multiplication equation as a comparison. 2. I can represent multiplicative comparison statements.	**Vocabulary in the Launch:** -comparison statement -quantity **Tools:** -Sentence strips can be used by students to represent each amount. They can fold the strips. It resembles a bar diagram. **Vocabulary in the Summarize:** -multiplicative comparison statement -multiplicative	- 2-8 Math Task (Adapted from pg. 168) - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *What model can you draw to prove your statement? What equation can you write to describe the relationship between two items? Does the equation represent the situation in the number story? How do you know? What comparison number story can you create to match this equation?*	-MM pg. 71 -MM pg. 72 -MM pg. 73 -MJ pg. 53 -MM pg. 74 #1-4 -Multiplication as Comparison Problems	
2-9	1. Multiply to solve word problems involving multiplicative comparison. 2. Use drawings and equations with symbol for unknown to represent the problem. 3. Distinguish multiplicative comparison from an additive comparison.	1. I can solve word problems involving comparison. 2. I can represent multiplication word problems using an equation with a variable 3. I can recognize differences between comparison problems.	**Vocabulary in the Launch:** -additive comparison -multiplicative comparison **Tools:** -Sentence strips can be used by students to represent the problem. -Unifix or linking cubes -Post-its **Vocabulary in the Summarize:**	- Math Message TE pg.174 - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *How are the two situations the same and different? Estimate the number of bookmarks Paul sold? How can you use a model to represent the situations? Help students understand 8 times as many by asking what does twice as much mean? (double) What does 4 times as many mean? (double of a double). What do you think 8 times as many means?*	-MJ pg.55 -MM 75 (Additive comparisons) -MM pg. TA17 -MM pg. 76 -SRB pg. 266/ MM G20/G21 -MM pg. 77 #1-3 -Multiplicative Comparison Number Stories	
2-10	1. Classify two-dimensional figures based on the presence or absence of angles of a specified size. 2. Recognize right triangles as a category for classification.	1. I can classify 2-dimensional figures based on attributes. 2. I can classify triangles by its attributes.	**Vocabulary in the Launch:** -acute angle -obtuse angle -right angle -properties -vertex (vertices) **Tools:** **Vocabulary in the Summarize:** -acute triangle -obtuse triangle -right triangle -equilateral triangle -isosceles triangle -scalene triangle	- 2-10 Math Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-N/A	- Ask guiding questions such as: *How did you choose to sort the triangles? What patterns did you observe? What other shapes can you draw to fit your categories? Can you sort it a different way?*	-MM pg. 78 -Activity Card 23 -MJ pg. 57	

2-11	1. Classify two-dimensional figures based on the presence or absence of parallel or perpendicular lines. 2. Classify two-dimensional figures based on the presence or absence of angles of a specified size.	1. I can classify 2-dimensional figures based on attributes.	**Vocabulary in the Launch:** -attributes **Tools:** -geoboards -SRB -Geometry Template **Vocabulary in the Summarize:** -adjacent	- Quadrilateral Sort pg. TE 186, MM pg. TA18, MJ pg. 59 - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-N/A	- Ask guiding questions such as: *How did you sort the quadrilaterals? What attributes or properties do the quadrilaterals in each group share? What type of angles are in group _____? How did you decide which categories to use when sorting your quadrilaterals?*	-MM pg. 80 -MM pg. 81 -Activity card 24 -SRB pg. 270 -MM pg. 82 -MM pg. 79 #1-8 -Quadrilateral Criteria	
2-12	1. Recognize line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded along the line into matching parts. 2. Identify line-symmetric figures from two-dimensional figures. 3. Draw lines of symmetry for a two-dimensional figure.	1. I can recognize the line of symmetry for a 2-dimensional figure. 2. I can identify line-symmetric figures. 3. I can draw lines of symmetry for a 2-dimensional figure.	**Vocabulary in the Launch:** **Tools:** -ruler -mirror can be used to show mirror image **Vocabulary in the Summarize:** -line symmetry -line of symmetry -symmetrical	- 2-12 Math Task (Adapted Math Message pg. 192) - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *What everyday items around your home or classroom are symmetrical? How can you tell how many lines of symmetry an item has? How can you prove a shape has a line of symmetry? Which types of triangles or quadrilaterals have the most lines of symmetry? What patterns can you observe?*	-MM pg. 87 -Activity Card 25 -Readiness activity TE 191 -MJ pg. 61 -MM pg. 88 -Symmetrical Designs -Quilt Making	
2-13	1. Generate a number or shape pattern that follows a given rule. 2. Identify the other features of the pattern that are not stated in the rule. 3. Explain the other features of the pattern that are not stated in the rule.	1. I can create a pattern that follows a given rule. 2. I can identify the other features of the pattern that are not stated in the rule. 3. I can explain the other features of the pattern that are not stated in the rule.	**Vocabulary in the Launch:** -What's My Rule **Tools:** **Vocabulary in the Summarize:** -function machine -input -output -rule	-Earth Day Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	-Supplemental Task - Observe student thinking during Explore and Summarize portions of the task for **Formative Assessment**	- Ask guiding questions such as: *What patterns do you observe? How do you know your rule is correct? Explain your thinking? What does the in column represent? What does the* out column represent?	-MM pg. 89 -Activity Card 26 -Activity Card 27 -MM TA 20 -MJ pg. 63 -MJ pg. 64 -MM pg. 90 #1-3	
Administer the Unit 2 Assessment								

Key: MJ = Math Journal; MM = Math Master; MP = Math Practice; EDM = Everyday Math; TE = Teacher's Edition; SRB = Student Reference Book

Language Supports for Mathematics:		
Domains	**Language Objective(s):**	**Sentence Stem(s):**
Speaking	1. I can orally describe the steps I took to solve the problem. 2. I can orally describe my reasoning. 3. I can defend my strategy. 4. I can restate someone else's thinking in my own words. 5. I can compare strategies.	● I need more time to think please. ● I would like to add _____. ● I think what you said is _____. ● This is my strategy _____. ● I agree/disagree with _____ because _____. ● I would _____ instead. ● This makes me think _____. ● The evidence I have is _____. ● What if_____? ● How can that be _____? ● Could you have _____? ● How did you _____? ● Why did you _____?
Reading	1. I can find important information in a word problem. 2. I can summarize the purpose of the word problem.	● The problem is asking me to find _____. ● The purpose of the problem is _____.
Writing	1. I can write to explain my reasoning. 2. I can explain why my strategy works. 3. I can record drawings and equations to show my work.	● The problem is asking me to find _____. First I, _____Next, _____. Finally I found out that _____. My strategy works because _____. ● The problem is asking me to find _____. In the beginning _____. But then, _____. At the end, _____. My strategy works because _____. ● These are the steps I took to find _____. First, _____. Second, _____. Third, _____. I got _____ as my solution. I solved the problem this way because _____. ● The problem is asking me to determine _____. I used the _____ strategy. To solve this problem first I _____. Then, I _____. Next, _____. After that, I _____. Finally I found out that _____. I noticed _____. My strategy works because _____.