02_Multiplication and Geometry

Content Area: **Math**
Course(s):
Time Period: **Full Year**
Length: **5 Weeks**
Status: **Published**

General Overview, Course Description or Course Philosophy

In Grade 4, instructional time should focus on three critical areas:

1. Developing understanding and fluency with multi-digit multiplication, and developing an understanding of dividing to find quotients involving multi-digit dividends;
2. Developing an understanding of fraction equivalence, addition, and subtraction of fractions with like denominators, and multiplication of fractions by whole numbers;
3. Understanding that geometric figures can be analyzed and classified based on their properties, such as having parallel sides, perpendicular sides, particular angle measures, and symmetry.

OBJECTIVES, ESSENTIAL QUESTIONS, ENDURING UNDERSTANDINGS

Essential Questions:

- How does multiplication generate square number patterns, and what are the characteristics of these patterns?
- How is the area of a rectangle calculated, and what are its real-life applications?
- How are factors and multiples related, and how can they be identified for 2-digit numbers? How do factors contribute to classifying numbers as prime or composite?
- What methods are used to convert units of time (hours to minutes, minutes to seconds), and how are equations helpful in making multiplicative comparisons related to time?
- How can you determine whether a comparison between quantities is additive or multiplicative, and what are the implications of each type of comparison?
- How are right angles identified, and what are their characteristics? How are polygons classified based on their properties, especially triangles and quadrilaterals?
- How is symmetry identified in nature, objects, and shapes? How does recognizing symmetry aid in understanding patterns and relationships?
- How are patterns analyzed using "What's My Rule?" tables, and how do these tables help in understanding functions and relationships between variables?

Enduring Understandings:

Students will understand that:

- Applications for multiplication
- Shapes are classified by distinguishing properties known as attributes.
- Generalizing the computation for the area of a rectangle results in a formula.

STUDENT LEARNING TARGETS

Refer to the 'Declarative Knowledge' and 'Procedural Knowledge sections.

Declarative Knowledge

Students will understand that:

- A whole number is a multiple of each of its factors.
- Square numbers are numbers for which arrays have the same number of rows and columns.
- Factors are numbers that are multiplied together.
- Prime numbers, composite numbers, and square numbers are defined by their factors.
- A multiple of a number is the product of that number and some other whole number; every multiple of a number is evenly divisible by its factors.
- Multiplication equations are multiplicative comparisons and visa versa, i.e. one quantity is a number of times as large as the other.
- A triangle can only have one right angle; a triangle can only have one obtuse angle.
- If a figure is symmetric, there is at least one line of symmetry that can be drawn that divides the figure such that the two halves are mirror images of each other.

Procedural Knowledge

Students will be able to:

- Use multiplication to generate square number patterns.
- Find the area of a rectangle.
- Find at least two factors for 2-digit numbers.
- Identify multiples of numbers other than 10.
- Identify factors of a number in the 1-39 range; classify numbers as prime or composite.
- Use multiplicative reasoning to a make a correct prediction.
- Convert hours to minutes and minutes to seconds.
- Use equations to make multiplicative comparisons.
- Determine whether a comparison is additive or multiplicative.
- Identify right angles.
- Identify the properties of polygons and classify triangles, quadrilaterals.
- Identify symmetry in nature, objects, and shapes.

- Solve “What’s My Rule?” tables to analyze patterns.

CONTENT AREA STANDARDS

4.OA

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

B. Gain familiarity with factors and multiples

C. Generate and analyze patterns

4.NBT

A. Generalize place value understanding for multi-digit whole numbers

B. Use place value understanding and properties of operations to perform multi-digit arithmetic

4.NF

A. Extend understanding of fractions equivalence and ordering

B. Build fractions from unit fractions by applying and extending previous understandings of operations on whole numbers

C. Understand decimal notation for fractions and compare decimal fractions

4.M

A. Solve problems involving measurement and conversion of measurements from a larger unit to a smaller unit

MA.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.
MA.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.
MA.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.
MA.4.NBT.B.4	Fluently add and subtract multi-digit whole numbers using the standard algorithm.
MA.4.NBT.B.5	Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays,

	and/or area models.
MA.4.G.A.2	Classify two-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, and identify right triangles.
MA.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.

INTERDISCIPLINARY CONNECTIONS

Art:

- Students will make tessellations using geometric shapes and identify attributes such as the number of sides and angle size that contribute.

RELATED STANDARDS (Technology, 21st Century Life & Careers, ELA Companion Standards are Required)

LA.SL.4.1.A	Explicitly draw on previously read text or material and other information known about the topic to explore ideas under discussion.
LA.SL.4.1.B	Follow agreed-upon rules for discussions and carry out assigned roles.
LA.SL.4.1.C	Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.
LA.SL.4.1.D	Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.
CS.3-5.8.1.5.DA.1	Collect, organize, and display data in order to highlight relationships or support a claim.
WRK.K-12.P.4	Demonstrate creativity and innovation.
WRK.K-12.P.5	Utilize critical thinking to make sense of problems and persevere in solving them.
WRK.K-12.P.8	Use technology to enhance productivity increase collaboration and communicate effectively.
WRK.K-12.P.9	Work productively in teams while using cultural/global competence.
TECH.9.4.2.CI.1	Demonstrate openness to new ideas and perspectives (e.g., 1.1.2.CR1a, 2.1.2.EH.1, 6.1.2.CivicsCM.2).
TECH.9.4.2.CT.1	Gather information about an issue, such as climate change, and collaboratively brainstorm ways to solve the problem (e.g., K-2-ETS1-1, 6.3.2.GeoGI.2).
TECH.9.4.2.CT.3	Use a variety of types of thinking to solve problems (e.g., inductive, deductive).
TECH.9.4.2.IML.2	Represent data in a visual format to tell a story about the data (e.g., 2.MD.D.10).
TECH.9.4.5.CT.4	Apply critical thinking and problem-solving strategies to different types of problems such as personal, academic, community and global (e.g., 6.1.5.CivicsCM.3).

EVIDENCE OF LEARNING

Refer to the 'Formative, Summative, and Benchmark Assessments' sections.

Alternate Assessments

- Portfolios
- Verbal Assessment (instead of written)
- Multiple choice
- Modified Rubrics
- Performance Based Assessments

Formative Assessments

- Journal Pages
- Homelinks
- Math Boxes

Summative Assessments

- Unit 2 Checkpoints (1 & 2)

Benchmark Assessments

- IXL Screener / Diagnostic Snapshot BOY
- Trimester 1 Benchmark Assessment
- IXL Diagnostic Snapshot MOY
- Trimester 2 Benchmark Assessment
- IXL Diagnostic Snapshot EOY

- Trimester 3 Benchmark Assessment

RESOURCES (Instructional, Supplemental, Intervention Materials)

Core Instructional Materials:

- Everyday Math Unit 2 Resources (Math Masters, Student Journal Volume 1)
- ConnectED

Supplemental Materials:

- IXL
- Illustrative Math Tasks
- Games
    - Subtraction Target Practice (Lesson 2-1): Practicing place-value and subtraction skills
    - Rugs and Fences (Lessons 2-2, 2-10): Using formulas to find the perimeter and area of rectangles
    - Spin-and-Round (Lesson 2-2): Practicing rounding numbers through the hundred-thousands
    - Factor Captor (Lessons 2-3, 2-5, 2-8): Applying strategies for finding factors of larger numbers
    - Fishing for Digits (Lesson 2-3): Identifying and expressing the values of digits in whole numbers
    - Factor Bingo (Lessons 2-3, 2-5): Identifying factors and products of numbers
    - Buzz and Bizz-Buzz (Lessons 2-4, 2-9): Practicing naming multiples
    - Multiples Bingo (Lesson 2-4): Practicing identifying multiples
    - How Much More (Lesson 2-9, 2-12): Solving comparison number stories and writing valid comparison equations
    - Polygon Capture (Lesson 2-11): Identifying polygons by their properties
    - Number Top-It (Lesson 2-11): Comparing numbers through the hundred-thousands
    - Geometry Concentration, Part 3 (Lesson 2-11): Matching quadrilaterals with their names and definitions
- Manipulatives
    - Number card sets 0-9, 2-9, 2-10
    - Counters
    - Centimeter cubes
    - Centimeter ruler
    - 6-sided dice
    - Pattern blocks
    - Fraction circles
    - Geometry template

Intervention Materials:

- Number Worlds
- Touch Math Now

ACCOMMODATIONS & MODIFICATIONS FOR SUBGROUPS

See link to Accommodations & Modifications document in course folder.