Unit 4 Relationships in Geometry
MS Advanced 1

Last Update: August 1, 2026

Archdiocesan Curriculum > MS Advanced 1> Math > Length of unit 20 to 25 days

Stage 1: Desired Results

General Information

In this unit, students will explore ratios, rates, and proportional relationships to develop a strong foundation for reasoning with percents and real-world applications. They will begin by writing and interpreting ratios, using tables and graphs to compare rates and find unit rates to solve problems. Students will apply ratio reasoning to create and interpret circle graphs and perform unit conversions within and between measurement systems using equivalent ratios. Building on these skills, students will analyze proportional relationships, determine the constant of proportionality, and represent these relationships with equations and graphs. They will solve multi-step problems and apply their understanding to percents, calculating percent increase or decrease, markups, markdowns, taxes, tips, discounts, commissions, fees, and simple interest. Throughout the unit, students will model real-world financial and measurement scenarios using equations of the form y = kx and assess the reasonableness of their solutions using proportional reasoning.

Mathematical Practices

- MP2 – Reason abstractly and quantitatively
- MP4 – Model with mathematics
- MP5 – Use appropriate tools strategically
- MP7 – Look for and make use of structure

Essential Question(s)

- How can we use the coordinate plane to locate points, graph polygons, and solve geometric problems?
- What strategies help us find the perimeter and area of various polygons, including composite figures, using formulas?
- How do the attributes of shapes like parallelograms, trapezoids, and triangles affect how we calculate their areas?
- How can nets help us understand and calculate the surface area of three-dimensional shapes like pyramids?
- In what ways can we use formulas and equations to find the volume of rectangular prisms and solve real-world problems?

Enduring Understanding/Knowledge

Students will:

- Locate rational ordered pairs on the coordinate plane.
- Solve problems by graphing and identifying polygons in the coordinate plane.
- Find the perimeter and area of polygons on the coordinate plane.

Review/Assess

- Find the areas of parallelograms and trapezoids.
- Find the area of triangles.
- Find the area of composite figures.

Review/Assess

- Use nets to find surface area.
- Find the volume of a rectangular prism.
- Write equations to solve problems involving volume of rectangular prisms.
- Identify and use volume formulas involving cylinders, cones, and spheres.

Review/Assess

Vocabulary

New	Review
• coordinate plane • ordered pair • origin • quadrants • reflection • x-axis • y-axis • polygon • vertex • base of a trapezoid • height of a trapezoid • trapezoid • base of a triangle • height of a triangle • composite figure • net • pyramid • surface area	• coordinates • transformation • x-coordinate • y-coordinate • hexagon • pentagon • right angle • right triangle • area • base • formula • height • parallelogram • solid figure • volume •

Connections to Catholic Identity / Other Subjects

Religion/Catholic Identity:

- Calculate the size of Noah's Ark using the dimensions provided in Genesis 6:15-16. (Note a *cubit* is approximately 18 ins or 44 cm.)
- Research units of measure used in the Bible.

Other Subject Here:

- Shapes both 2D and 3D can be easily integrated into art projects.
- Social Studies classes can research different units of measure used throughout history. See the link below in resources.

Differentiation

Enrichment

- **Explore Coordinates in All Quadrants** – Challenge students to plot and analyze points and polygons in all four quadrants, including reflections across axes and identifying symmetry.
- **Create Composite Figures** – Have students design their own composite polygons on the coordinate plane, calculate area and perimeter, and explain their methods.
- **Derive and Prove Area Formulas** – Guide students to derive the area formulas for trapezoids and parallelograms by decomposing shapes or using coordinate geometry reasoning.
- **Investigate Surface Area and Nets** – Encourage students to create nets for various 3D solids beyond rectangular prisms and pyramids, and calculate surface areas.
- **Apply Volume in Real-World Contexts** – Assign multi-step volume problems involving rectangular prisms with missing dimensions, requiring algebraic equation setup and solving.

Support

- **Use Grid Paper and Manipulatives for Coordinates** – Provide graph paper and physical models to help students visualize and plot points and polygons, reinforcing vocabulary like *origin*, *vertex*, and *quadrants*.
- **Step-by-Step Area Calculations** – Scaffold area problems with guided templates breaking down base and height identification, especially for trapezoids and triangles.
- **Visual Nets and Surface Area Models** – Use cut-out nets and physical models of solids to build surface area understanding before applying formulas.
- **Formula Reference Charts** – Provide students with formula charts and graphic organizers that clearly distinguish base, height, area, and volume components.
- **Guided Problem Solving with Real Objects** – Use rectangular boxes or containers for hands-on volume measurement practice, linking equations to physical contexts.

Standards & Benchmarks

Polygons on the Coordinate Plane:

6.NS.2
Explain how opposite signs of numbers indicate locations on opposite sides of 0 on the number line; identify the opposite of the opposite of a number.

6.AF.5
Solve real-world and other mathematical problems by graphing points with rational number coordinates on a coordinate plane. Include the use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate. (E)

6.NS.C.6.a
Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself. For example, –(–3) = 3, and that 0 is its own opposite.

6.G.A.3
Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.

6.NS.C.6.c
Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.
6.NS.C.6.b
Describe locations in the coordinate plane using signed numbers in ordered pairs; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes**.**
6.NS.C.8
Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
6.G.3
Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
6.NS.6c
Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane**.**
6.NS.8
Solve real-world and mathematical problems by graphing points in all four quadrants of the coordinate plane. Include use of coordinates and absolute value to find distances between points with the same first coordinate or the same second coordinate.
6.NS.6a
Recognize opposite signs of numbers as indicating locations on opposite sides of 0 on the number line; recognize that the opposite of the opposite of a number is the number itself, e.g., -(-3) = 3, and that 0 is its own opposite.
6.NS.6b
Understand signs of numbers in ordered pairs as indicating locations in quadrants of the coordinate plane; recognize that when two ordered pairs differ only by signs, the locations of the points are related by reflections across one or both axes.
6.A.1.1
Plot integer- and rational-valued (limited to halves and fourths) ordered-pairs as coordinates in all four quadrants and recognize the reflective relationships among coordinates that differ only by their signs.

Area of Triangles and Special Quadrilaterals:

6.GM.3
Find the area of complex shapes composed of polygons by composing or decomposing into simple shapes; apply this technique to solve real-world and other mathematical problems.
6.G.A.1
Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
6.G.1
Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.

Surface Area and Volume:

6.GM.4
Find the volume of a right rectangular prism with fractional edge lengths using unit cubes of the appropriate unit fraction edge lengths (e.g., using technology or concrete materials) and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ to find volumes of right rectangular prisms with fractional edge lengths to solve real-world and other mathematical problems. (E)
6.G.A.4
Represent three-dimensional figures using nets made up of rectangles and triangles and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
6.G.A.2
Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = lwh$ and $V = Bh$ (where B stands for the area of the base) to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
6.G.4
Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.

6.G.2
Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas V = lwh and V = bh to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.

7.G.B.6
Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

8.G.C.9
Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Teaching Ideas/Resources

Websites/Resources:

- **Surface Area and Nets Notes** – This note sheet allows students to see nets of 3D shapes that allow students to have all the info in the same spot. You may consider writing the volume formula for rectangular prisms on this note sheet also.
- **3-D Art and Geometry Project** - Students create 3-D shapes with patterns to explore the shapes in the real world.
- **Ancient Units of Measure** - This website details units of measure used in ancient history.
- **Patterns in Nature** - This website and video details how patterns show up and repeat in nature.
- **Graphing Pictures** – This site contains sets of coordinate pairs to graph different pictures from cartoon characters to sports logos.

Volume of Cylinder, Cone, and Sphere Resources

- **Formula Sheet for Volume of Cylinder, Cone, and Sphere**
- **Video with Discussion Questions and Vocabulary**
- **TPT Free Note Sheets**
- **TPT Free Practice and Cheat Sheet**
- **Activity on Amplify**
- Mashup Math Worksheets(Cylinder, Cone, Sphere). Different Worksheets for Each Figure