

Unit 2 - Geometry

Content Area: **Mathematics**
Course(s): **Math 7**
Time Period: **September**
Length: **Throughout the year**
Status: **Published**

Unit Summary

In this unit, students will review and extend their learning of geometrical formulas. They will study geometrical figures and describe the relationships between them. Students will solve real-life and mathematical problems involving angle measure, area, surface area, and volume. Students will also use their expression skills to write numerical expressions that can be used to find surface area and volume of three-dimensional figures, including real-life applications of surface area and volume, with the addition of cones and cylinders. Students will use their knowledge of formulas and equations to solve for unknown value and will use and solve equations to represent relationships between angles and find missing angle measures in a transversal diagram. In order to understand the unit, students will develop and extend their vocabulary of geometrical terms. Students will use the appropriate mathematical tools (including rulers, protractors, and reference sheets) to construct geometric figures. Students will study circles (including radius, diameter, circumference), polygons and solids. Students will study angle relationships and the measurements of angles formed by transversals. Students will study complementary angles, supplementary angles, adjacent angles, and vertical angles. Investigating circles, students discover the proportional relationship between the circumference of a circle and its diameter.

Standards

MA.7.G.A	Draw, construct, and describe geometrical figures and describe the relationships between them.
MA.7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MA.7.G.A.2	Draw (with technology, with ruler and protractor, as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
MA.7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MA.7.G.B	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
MA.7.G.B.4	Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.
MA.7.G.B.5	Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.
MA.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.
MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.

MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
CAEP.9.2.8.B.3	Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.
TECH.8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.
TECH.8.1.8.A.CS1	Understand and use technology systems.
TECH.8.1.8.A.CS2	Select and use applications effectively and productively.
TECH.8.1.8.D.CS2	Demonstrate personal responsibility for lifelong learning.

Student Learning Objectives

- Students will learn to read, interpret, and graph points on a rectangular coordinate system.
- Students will learn to identify angles and classify angles as acute, right, obtuse, straight or reflex.
- Students will learn to measure and draw angles using a protractor.
- Students will learn to define and determine complement and supplement of an angle.
- Students will learn to identify adjacent angles.
- Students will learn to determine angle measurements of vertical angles.
- Students will learn to identify and define types of triangles (scalene, isosceles, equilateral, obtuse, acute, right).
- Students will learn to understand that the sum of any two lengths of a triangle must be greater than the length of the third side.
- Students will learn to understand that the sum of the angles in a triangle is 180° .
- Students will learn to determine the area and perimeter/ circumference of 2D figures (circles, parallelograms).
- Students will learn to determine the area and perimeter of irregular polygons.
- Students will learn to create a scale drawing using the appropriate tool such as a rule, protractor, etc.
- Students will learn to determine the area of the shaded portion of a figure.
- Students will learn to determine if a polygon is convex or concave.
- Students will learn to identify the criteria of different polygons on a quadrilateral hierarchy chart.
- Students will learn to determine perimeter of polygons.
- Students will learn to determine when to use area, perimeter, circumference, surface area, or volume, given real world situations.
- Students will learn to understand relationship and identify base vs. height.
- Students will learn to determine the volume and surface area of a 3D shape.
- Students will learn to determine the shape of a two-dimensional cross section when a plane intersects a three-dimensional shape.
- Students will learn to construct triangles given angles and side measurements.
- Students will learn to determine relationships of angles along a transversal.
- Students will learn to determine measurements of angles based on angle relationships.
- Students will learn to identify if given criteria creates a unique triangle, no triangle, or many triangles.

Essential Questions

- How can a complex geometric problem or design be broken down into simpler steps?
- How do you solve geometric problems based on the characteristics of the given geometric figures?

Enduring Understandings

- Students will understand that there are appropriate units of measurement for measuring length, volume, area, angles, temperature, etc.
- Students will understand that area, volume, and surface area relate and connect to everyday experiences (i.e. determine the largest amount of area for a garden, volume to fill a swimming pool).

Application

- Students will be able to independently use their learning to apply general formulas and basic geometric principles to any polygon.
- Students will be able to independently use their learning to demonstrate an understanding that the sum of the degrees in a triangle is 180 degrees.
- Students will be able to independently use their learning to find the measurement of a triangle's side using the information that the sum of the lengths of any two sides in a triangle is greater than the length of the third side (Triangle Inequality Theorem).
- Students will be able to independently use their learning to accurately use mathematical vocabulary such as congruent, angles, vertex, straight angle, acute angle, obtuse angle, reflex angle, adjacent angles, vertical angles, supplementary, complementary, alternate interior angles, alternate exterior angles, corresponding angles, pi, polyhedron, 3D figure, prism, convex, concave, net, pyramid, bisector, faces, edges, vertices.

Skills

Students will be skilled at:

- Identifying types of angles (acute, right, obtuse, straight, reflex).
- Utilizing a protractor to measure and draw an angle to within two degrees.
- Identifying types of triangles based on sides and based on angles.
- Identifying adjacent angles.
- Identifying relationships between angles along parallel lines/transversal.
- Determining measurements of angles based on angle relationships, including using simple equations to solve for measurements.
- Identifying polygons and polyhedra.
- Determining the area and perimeter of polygons, including irregular figures made of more than one polygon.
- Determining area and perimeter based on real world problems.
- Determining the area and circumference of circles.
- Determining dimensions with a ruler in order to find area and perimeter.
- Determining missing interior and exterior angle measurements of a triangle.
- Identifying solids and compute surface area and volume (cylinder, cube, prism, pyramid, cone, sphere); use in real world problems.
- Identifying top, front, and side views of solids.
- Describing 2D figures that result from slicing 3D figures.
- Determining measurements on a scale drawing; reproduce scale drawing.
- Determining how the triangle inequality theorem is proven true when constructing triangles (using ruler, protractor). The sum of any two lengths must be greater than the third side.
- Understanding the sum of the angles in a triangle is 180° .
- Defining and determining complementary, supplementary, and vertical angles.
- Determining area of shaded portion of figure; determine area of irregular portion of figure.
- Constructing a triangle given the angle and side measurements.
- Reading, interpreting, and graphing points on a rectangular coordinate system.

