Geometry

Domain Overview

GRADE 6

Students in Grade 6 build on their understanding of area and volume from Grade 5 to deepen understanding of volume and develop the concept of surface area. Students prepare for their work in Grade 8 with transformations by working with polygons in the coordinate plane in Grade 6. Reasoning about relationships in their work on surface area, composing and decomposing shapes, and finding distance on a coordinate plane using endpoint coordinates for horizontal and vertical lines prepare them for Grade 7 relationships.

GRADE 7

Seventh graders solve problems involving scale drawings and informal geometric constructions, and they work with two- and three-dimensional shapes to solve problems involving area, surface area, and volume. Students take their study of area from Grade 6 to circles. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross sections. They solve real-world and mathematical problems involving area, surface area, and volume of objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.

GRADE 8

The geometry focus in Grade 8 is on transformations. At this level, students describe their effects on figures in the coordinate plane to use the ideas they have developed about distance and angles. Students investigate angles created when a transversal crosses parallel lines and investigate the angle-angle criterion for similarity of triangles. Students understand the Pythagorean Theorem and its converse and use it to find distances on the coordinate plane. The study of volume culminates with problem solving for volume for cones, spheres, and cylinders.

SUGGESTED MATERIALS FOR THIS DOMAIN

6	7	8	
✓	✓	✓	Attribute shapes, Power Polygons™
✓			Empty cardboard boxes
		✓	Geometric software
	✓		Geometric solids
✓	✓	✓	Graph paper
✓	✓		Inch or centimeter cubes
✓			Nets for cubes, prisms, and pyramids
	✓		Protractors
	✓		Round objects to measure circumference such as CDs, can lids, etc.
✓	✓	✓	Rulers
	✓		Styrofoam three-dimensional figures such as cones and prisms
✓			Tangrams

KEY VOCABULARY

6	7	8	
	✓		**adjacent angles** two angles that share a common vertex and a common side
✓	✓	✓	**area** number of square units needed to cover a surface
	✓		**circumference** distance around the outside of a circle
	✓		**complementary angles** two angles whose sum is 90°
✓	✓	✓	**congruent figures** figures having the same size and shape
		✓	**dilation** a transformation where all distances are changed by a common factor
		✓	**exterior angle** an angle formed by one side of a polygon and the extension of an adjacent side
		✓	**hypotenuse** the side of a right triangle opposite the right angle
		✓	**legs** sides of a right triangle that form the right angle
		✓	**line of symmetry** line dividing a figure into two congruent halves

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KEY VOCABULARY

6	7	8	
✓			**net** two-dimensional representation of a three-dimensional figure that can be folded up into the three-dimensional figure
✓	✓	✓	**parallel lines** lines in a plane that will never intersect
✓			**polygon** a many-sided, closed, simple figure whose sides are line segments
✓	✓		**prism** a solid with parallel congruent polygons for bases and parallelograms for faces
	✓		**pyramid** a polyhedron with a polygon for the base and triangular faces that meet at the apex
		✓	**Pythagorean Theorem** for every right triangle, the sum of the squares of the length of the legs is equal to the square of the length of the hypotenuse
✓			**quadrilateral** a polygon with four sides
		✓	**reflection** a transformation that flips the plane over a fixed line
✓	✓		**right rectangular prism** a prism where all of the lateral faces are rectangles
		✓	**rotation** transformation where a figure turns around a fixed point
	✓	✓	**scale drawing** a drawing that shows the original drawing or object with its accurate dimensions enlarged or reduced by a scale factor
✓	✓	✓	**similar figures** figures having the same shape but not necessarily the same size
		✓	**sphere** the set of all points in three-dimensional space that is equidistant from a fixed point called the center
	✓		**supplementary angles** two angles whose sum is 180°
✓	✓	✓	**surface area** total area of the exterior faces of a three-dimensional figure
		✓	**transformation** a one-to-one correspondence of points in the plane such that each point P is associated with a unique point P', known as the image of P. Transformations can be dilations, translations, reflections, or rotations
		✓	**translation** a transformation where the original figure is moved to a new location without changing size or orientation. Also known as a slide
		✓	**transversal** a line that intersects two or more lines
	✓		**vertical angles** nonadjacent angles with equal measure located across a common vertex
✓	✓	✓	**volume** the amount of space contained in a solid; measured in cubic units