Unit 4
Geometry

Grade 8 Math

Unit Description:

This unit will introduce new geometry concepts of transformations, congruence, similarity, parallel lines, angle relationships created from parallel lines cut by a transversal, and the Pythagorean Theorem. Students will add to their understanding of 3-D objects to include volume of cylinders, cones, and spheres.

Standards for Mathematical Practice

MP.1 Make sense of problems and persevere in solving them.
MP.2 Reason abstractly and quantitatively.
MP.3 Construct viable arguments and critique the reasoning of others.
MP.4 Model with mathematics.
MP.5 Use appropriate tools strategically.
MP.6 Attend to precision.
MP.7 Look for and make use of structure.
MP.8 Look for and express regularity in repeated reasoning.

Louisiana Student Standards for Mathematics (LSSM)

G – Geometry	
A. Understand congruence and similarity using physical models, transparencies, or geometry software.	
8.G.A.1	Verify experimentally the properties of rotations, reflections, and translations: (Rotations are only about the origin and reflections are only over the y-axis and x-axis in Grade 8) **a.** Lines are taken to lines, and line segments to line segments of the same length. **b.** Angles are taken to angles of the same measure. **c.** Parallel lines are taken to parallel lines.
8.G.A.2	Explain that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. (Rotations are only about the origin and reflections are only over the y-axis and x-axis in Grade 8)

8.G.A.3	Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. (Rotations are only about the origin and reflections are only over the y-axis and x-axis in Grade 8)
8.G.A.4	Explain that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. (Dilations only use the origin as the center of dilation, rotations are only about the origin and reflections are only over the y-axis and x-axis in Grade 8)
8.G.A.5	Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.
B. Understand and apply the Pythagorean Theorem.	
8.G.B.6	Explain a proof of the Pythagorean Theorem and its converse using the area of squares.
8.G.B.7	Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (Some parts of tasks require students to use the converse of the Pythagorean Theorem.)
8.G.B.8	Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
C. Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.	
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

Enduring Understandings:	**Essential Questions:**
*Congruent figures have the same size and shape. *When parallel lines are cut by a transversal, corresponding angles, alternate interior angles, alternate exterior angles, and vertical angles are congruent. *The Pythagorean Theorem can be used both algebraically and geometrically to solve problems involving right triangles	*What are transformations and what effect do they have on a two-dimensional figure? *How can you use coordinates to describe the result of a translation, reflection, or rotation? *What properties of a two-dimensional figure are preserved under a translation, reflection, or rotation? *Why does the Pythagorean Theorem apply only to right triangles?

*There is a relationship between the Pythagorean Theorem and the distance formula and both can be used to find missing side lengths in a coordinate plane and real-world situation. *Two shapes are similar if the lengths of all the corresponding sides are proportional and all the corresponding angles are congruent. *Two similar figures are related by a scale factor, which is the ratio of the lengths of corresponding sides.	*Where is the origin on a coordinate grid? *What does the scale factor of a dilation convey? *Can two figures be both congruent and similar?