

Unit C - Geometry

Overview

Students use ideas about distance and angles, how they behave under translations, rotations, reflections, and dilations. In later math courses, these transformations will be made on functions. Students continue their work with area from Grade 6 to solve problems involving the area and circumference of a circle and surface area of three-dimensional objects. They reason about relationships among two-dimensional figures and among angles formed by intersecting lines using informal geometric constructions. Students will use equations and inequalities, including those with a variable on both sides, to solve geometric problems. Students work with three-dimensional figures, relating them to two-dimensional figures by examining cross sections and nets. They solve real-world and mathematical problems involving area, surface area, and volume of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes and right prisms, cones, cylinders, and spheres.

21st Century Capacities: Synthesizing

Stage 1 - Desired Results

<p>ESTABLISHED GOALS/ STANDARDS</p> <p>MP 5 Use appropriate tools strategically. MP 7 Look for and make use of structure.</p> <p>CC. 8.G.1 Verify experimentally the properties of rotations, reflections, and translations CC. 8.G.1a Lines are taken to lines, and line segments to line segments of the same length. CC. 8.G.1 b Angles are taken to angles of the same measure. CC. 8.G.1c Parallel lines are taken to parallel lines. CC. 8.G.2 Understand 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</p>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th colspan="2" style="background-color: #D3D3D3; text-align: center; padding: 5px;">Transfer:</th> </tr> <tr> <td colspan="2" style="padding: 5px;"><i>Students will be able to independently use their learning in new situations to...</i></td> </tr> <tr> <td colspan="2" style="padding: 5px;"> <ol style="list-style-type: none"> 1. Combine skills and information learned to solve a novel problem (synthesizing) 2. Draw conclusions about shapes and objects 3. Apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem (synthesizing) </td> </tr> <tr> <th colspan="2" style="background-color: #D3D3D3; text-align: center; padding: 5px;">Meaning:</th> </tr> <tr> <td style="width: 50%; padding: 5px; vertical-align: top;"> <p>UNDERSTANDINGS: <i>Students will understand that:</i></p> <ol style="list-style-type: none"> 1. Complex shapes are made up of simple parts. 2. Transformations on a shape will lead to a congruent or similar shape. 3. Equations may not always have a single solution. </td> <td style="width: 50%; padding: 5px; vertical-align: top;"> <p>ESSENTIAL QUESTIONS: <i>Students will explore & address these recurring questions:</i></p> <ol style="list-style-type: none"> A. What do you see? B. How are 2D and 3D shapes similar? C. What have I seen in the past that can help me now? </td> </tr> </table>	Transfer:		<i>Students will be able to independently use their learning in new situations to...</i>		<ol style="list-style-type: none"> 1. Combine skills and information learned to solve a novel problem (synthesizing) 2. Draw conclusions about shapes and objects 3. Apply familiar mathematical concepts to a new problem or apply a new concept to rework a familiar problem (synthesizing) 		Meaning:		<p>UNDERSTANDINGS: <i>Students will understand that:</i></p> <ol style="list-style-type: none"> 1. Complex shapes are made up of simple parts. 2. Transformations on a shape will lead to a congruent or similar shape. 3. Equations may not always have a single solution. 	<p>ESSENTIAL QUESTIONS: <i>Students will explore & address these recurring questions:</i></p> <ol style="list-style-type: none"> A. What do you see? B. How are 2D and 3D shapes similar? C. What have I seen in the past that can help me now?
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<p>figures, describe a sequence that exhibits the congruence between them.</p> <p>CC. 8.G.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates</p> <p>CC. 8.G.4 Understand 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</p> <p>CC.7.G.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.</p> <p>CC.7.G.2 Draw (freehand, with ruler and protractor, and with technology) 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.</p> <p>CC.7.G.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.</p> <p>CC.7.G.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.</p> <p>CC. 8.G.9 Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.</p> <p>CC.7.G.6 Solve real-world and mathematical problems involving area, volume and surface area</p>	Acquisition:	
<p><i>Students will know...</i></p> <ol style="list-style-type: none"> 1. That transformations result in similar figures 2. The formulas for the volume of a cylinder, cone, prisms, pyramids and spheres 3. That pi is the ratio of any circle's circumference and diameter 4. That pi 5. ≈ 3.14 and is an irrational number 6. That $C=2\pi r$ or $C=d$ 7. $A=\pi r^2$ 8. That equations may have one, no or an infinite number of solutions 9. That vertical angles are congruent 10. That complementary angles add to 90 deg. 11. That supplementary angles add to 180 deg. 12. The relationship among the angles created when parallel lines have a transversal 13. That the angles of a triangle add to 180 degrees 14. The relationship between an exterior angle of a triangle and the two remote interior angles 15. The Pythagorean theorem 16. An informal proof of the theorem 17. Vocabulary: transformation, translation, rotation, reflection, dilation, similar, congruent cylinder, cone, sphere, prism, pyramid, surface area, circumference, diameter, radius, pi, rotation, dilation, translation, reflection, vertical angles, 	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> 1. Making transformations (rotation, dilation, translation, reflection) in the coordinate plane 2. Determining if two figures are similar 3. Finding the circumference of a circle 4. Finding the area of a circle 5. Finding the area and circumference of composite shapes that involve circles or parts of circles 6. Finding the volume of cylinders, cones, spheres, prisms and pyramids 7. Breaking a 3D shape into its parts to find the surface area 8. Solving equations and inequalities with a variable on both sides 9. Solving diagram problems involving angles (in both triangles and parallel lines) 10. Using the Pythagorean Theorem 11. Finding the distance between two points on the coordinate plane with the Pythagorean Theorem 	

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<p>of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.</p> <p>CC.8.EE.7a Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).</p> <p>CC.7.G.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.</p> <p>CC. 8.G.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.</p> <p>CC. 8.G.6 Explain a proof of the Pythagorean Theorem and its converse.</p> <p>CC. 8.G.7 Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.</p> <p>CC. 8.G.8 Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.</p>	<p>parallel, transversal, interior angle, exterior angle, complementary, supplementary</p>	
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