**Unit Abstract:**

Students will draw, construct and describe geometric figures as well as the relationships between them. Students solve real life and mathematical problems involving angle measure, area, surface area and volume.

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| **Overarching Question:**  How do we use the relationship of geometric shapes and figures in the real world? | | | | | | |
|  | | **This Unit:** Geometric figures, angles, area, surface area, volume | | | |  |
| **Questions to Focus Assessment and Instruction:**   * How are the areas of geometric figures related? * How are circumference and diameter related? * How do math relationships lead to formulas? * For what reasons might designers need to know the volume and surface area of an object? * What 2-dimensional figures can be formed by slicing a 3-dimensional figure? * What are the characteristics of angles and sides that will create different geometric shapes? | | | | **Standards for Mathematical Practice**  1**.Make sense of problems and persevere in solving them.**  2.Reason abstractly and quantitatively.  3.Construct viable arguments and critique the reasoning of others.  4**.Model with mathematics.**  **5.Use appropriate tools strategically.**  **6.Attend to precision.**  **7.Look for and make use of structure.**  8.Look for and express regularity in repeated reasoning. | | |
| **Academic Vocabulary**  *(5-8 most important content specific vocabulary words)* | Circumference  Radius  Diameter  Surface Area  Supplementary angle  Complimentary angle  Vertical angle | |  | |  | |

| **Standards** | **Learning Targets** *(including relevant practice standards)* | **Explanations and Examples\*** | **Assured Experiences**  *(common assessments and learning activities)* |
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| **7.G.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.** | Students will solve problems involving area of rectangles, triangles, parallelograms and polygons. | * Find the area of a triangle with a base length of three units and a height of four units. * Find the area of the trapezoid shown below using the formulas for rectangles and triangles. | * common assessment   [Unit assessment basic](https://www.dropbox.com/home/Grade%207/Math/Unit%203%20-%202-Dimensional%20%26%203-Dimensional%20Geometry?preview=geometry+test+basic.docx)  [Unit assessment Mid](https://www.dropbox.com/home/Grade%207/Math/Unit%203%20-%202-Dimensional%20%26%203-Dimensional%20Geometry?preview=geometry+test.docx)  [Unit assessment pre algebra](https://www.dropbox.com/home/Grade%207/Math/Unit%203%20-%202-Dimensional%20%26%203-Dimensional%20Geometry?preview=geometry+test+pre-algebra.docx)   * learning activity   *Disaster at Sea:*  [*https://grade6commoncoremath.wikispaces.hcpss.org/Unit+4+Geometry*](https://grade6commoncoremath.wikispaces.hcpss.org/Unit+4+Geometry) |

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| **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.** | Students will investigate the relationship between circumference and diameter.  Students will derive formula for area of circles from relationships. | • The seventh grade class is building a mini golf game for the school carnival. The end of the putting green will be a circle. If the circle is 10 feet in diameter, how many square feet of grass carpet will they need to buy to cover the circle? How might you communicate this information to the salesperson to make sure you receive a piece of carpet that is the correct size?  • Students measure the circumference and diameter of several circular objects in the room (clock, trash can, door knob, wheel, etc.). Students organize their information and discover the relationship between circumference and diameter by noticing the pattern in the ratio of the measures. Students write an expression that could be used to find the circumference of a circle with any diameter and check their expression on other circles.  • Students will use a circle as a model to make several equal parts as you would in a pie model. The greater number the cuts, the better. The pie pieces are laid out to form a shape similar to a parallelogram. Students will then write an expression for the area of the parallelogram related to the radius (note: the length of the base of the parallelogram is half the circumference, or *πr*, and the height is *r*, resulting in an area of *πr*2. Extension: If students are given the circumference of a circle, could they write a formula to determine the circle’s area or given the area of a circle, could they write the formula for the circumference? | * common assessment * learning activity |

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| **7.G.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.**  **MP 1 Make sense of problems and persevere at solving them.**  MP 3 Construct viable arguments and critique the reasoning of others.  MP 4 Model with mathematics | Students will solve problems involving area of rectangles, triangles, parallelograms and polygons.  Students will solve problems involving surface area and volume of three-dimensional objects.  Students will design analogous problems, and try special cases and simpler forms of the original problem in order to gain insight into its solution. | Students understanding of volume can be supported by focusing on the area of base times the height to calculate volume. Students understanding of surface area can be supported by focusing on the sum of the area of the faces. Nets can be used to evaluate surface area calculations.  Examples:  • Choose one of the figures shown below and write a step by step procedure for determining the area. Find another person that chose the same figure as you did. How are your procedures the same and different? Do they yield the same result?    • A cereal box is a rectangular prism. What is the volume of the cereal box? What is the surface area of the cereal box? (Hint: Create a net of the cereal box and use the net to calculate the surface area.) Make a poster explaining your work to share with the class. | * common assessment   [Unit assessment basic](https://www.dropbox.com/home/Grade%207/Math/Unit%203%20-%202-Dimensional%20%26%203-Dimensional%20Geometry?preview=geometry+test+basic.docx)  [Unit assessment Mid](https://www.dropbox.com/home/Grade%207/Math/Unit%203%20-%202-Dimensional%20%26%203-Dimensional%20Geometry?preview=geometry+test.docx)  [Unit assessment pre algebra](https://www.dropbox.com/home/Grade%207/Math/Unit%203%20-%202-Dimensional%20%26%203-Dimensional%20Geometry?preview=geometry+test+pre-algebra.docx)  \*Assessment work is incomplete.   * Learning activity:   [volume of 3d shapes performance task](http://map.mathshell.org/materials/download.php?fileid=806)  [Library performance task](https://www.dropbox.com/home/Grade%207/Math/Unit%203%20-%202-Dimensional%20%26%203-Dimensional%20Geometry?preview=library+performance+task.PDF)  *Fie’s file*  *Site the example of the complex to simpler here* |

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| 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. | Students will compare and contrast types of angles.  Students will integrate facts about angle to write simple equations. | Angle relationships that can be explored include but are not limited to:  • Same-side (consecutive) interior and same-side (consecutive) exterior angles are supplementary.  Examples:  • Write and solve an equation to find the measure of angle *x*    • Write and solve an equation to find the measure of angle *x.* | * common assessment: * learning activity:   + [Map angles performance task](https://www.dropbox.com/home/Grade%207/Math/Unit%203%20-%202-Dimensional%20%26%203-Dimensional%20Geometry?preview=maps+and+angles+performance+task.PDF) |

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| 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 prisms. | Students will describe the two dimensional figure that results from slicing a three dimensional figure. | Example:  • Using a clay model of a rectangular prism, describe the shapes that are created when planar cuts are made diagonally, perpendicularly, and parallel to the base. | * common assessment: * learning activity: |

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| 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. | \*\*optional | Conditions may involve points, line segments, angles, parallelism, congruence, angles, and perpendicularity.  Examples:  Is it possible to draw a triangle with a 90˚ angle and one leg that is 4 inches long and one leg that is 3 inches long? If so, draw one. Is there more than one such triangle?  • Draw a triangle with angles that are 60 degrees. Is this a unique triangle? Why or why not?  • Draw an isosceles triangle with only one 80 degree angle. Is this the only possibility or can you draw another triangle that will also meet these conditions?    • Can you draw a triangle with sides that are 13 cm, 5 cm and 6cm?  • Draw a quadrilateral with one set of parallel sides and no right angles. | * common assessment: * learning activity: |

**Suggested sequence:**

* Area of rectangles, triangles,
* Circumference of Circle
* Area of circle
* Surface area and Volume Right Rectangular prism
* Triangular prism
* Slicing a Right Rectangular Pyramid
* Angles

**Instructional resources**: (including manipulatives, literature connections, professional resources)

Standard #1

Standard #2

Standard #3

Standard #4

Standard #5