

**Standards Based Skills Worksheet for  
Geometry (2009)**

Student: \_\_\_\_\_ Date: \_\_\_\_\_

Completed by (name) \_\_\_\_\_ Position \_\_\_\_\_

School Division: \_\_\_\_\_

<b>1. Review SOL strand for</b>  <b>GEOMETRY</b> <b>STANDARD G.1-G.14</b>	<b>2. Review data on student performance</b> and indicate all data sources analyzed to assess performance in this strand: <input type="checkbox"/> Present Level of Performance (PLOP) <input type="checkbox"/> Prior SOL data <input type="checkbox"/> Standardized test data <input type="checkbox"/> Classroom assessments <input type="checkbox"/> Teacher observations
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**3. Check the areas that will require specially designed instruction critical to meeting the standard**

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Identify the converse, inverse, and contrapositive of a conditional statement.
- Translate verbal arguments into symbolic form, such as  $(p \rightarrow q)$  and  $(\sim p \rightarrow \sim q)$ .
- Determine the validity of a logical argument.
- Use valid forms of deductive reasoning, including the law of syllogism, the law of the contrapositive, the law of detachment, and counterexamples.
- Select and use various types of reasoning and methods of proof, as appropriate.
- Use Venn diagrams to represent set relationships, such as intersection and union.
- Interpret Venn diagrams.
- Recognize and use the symbols of formal logic, which include  $\rightarrow$ ,  $\leftrightarrow$ ,  $\sim$ ,  $\therefore$ ,  $\wedge$ , and  $\vee$ .

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Use algebraic and coordinate methods as well as deductive proofs to verify whether two lines are parallel.
- Solve problems by using the relationships between pairs of angles formed by the intersection of two parallel lines and a transversal including corresponding angles, alternate interior angles, alternate exterior angles, and same-side (consecutive) interior angles.
- Solve real-world problems involving intersecting and parallel lines in a plane.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Find the coordinates of the midpoint of a segment, using the midpoint formula.
- Use a formula to find the slope of a line.
- Compare the slopes to determine whether two lines are parallel, perpendicular, or neither.

- Determine whether a figure has point symmetry, line symmetry, both, or neither.
- Given an image and preimage, identify the transformation that has taken place as a reflection, rotation, dilation, or translation.
- Apply the distance formula to find the length of a line segment when given the coordinates of the endpoints.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Construct and justify the constructions of
  - a line segment congruent to a given line segment;
  - the perpendicular bisector of a line segment;
  - a perpendicular to a given line from a point not on the line;
  - a perpendicular to a given line at a point on the line;
  - the bisector of a given angle;
  - an angle congruent to a given angle; and
  - a line parallel to a given line through a point not on the given line.
- Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.<sup>†</sup>
- Construct the inscribed and circumscribed circles of a triangle.<sup>†</sup>
- Construct a tangent line from a point outside a given circle to the circle.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Order the sides of a triangle by their lengths when given the measures of the angles.
- Order the angles of a triangle by their measures when given the lengths of the sides.
- Given the lengths of three segments, determine whether a triangle could be formed.
- Given the lengths of two sides of a triangle, determine the range in which the length of the third side must lie.
- Solve real-world problems given information about the lengths of sides and/or measures of angles in triangles.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Use definitions, postulates, and theorems to prove triangles congruent.
- Use coordinate methods, such as the distance formula and the slope formula, to prove two triangles are congruent.
- Use algebraic methods to prove two triangles are congruent.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Use definitions, postulates, and theorems to prove triangles similar.
- Use algebraic methods to prove that triangles are similar.
- Use coordinate methods, such as the distance formula, to prove two triangles are similar.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Determine whether a triangle formed with three given lengths is a right triangle.
- Solve for missing lengths in geometric figures, using properties of  $45^\circ$ - $45^\circ$ - $90^\circ$  triangles.
- Solve for missing lengths in geometric figures, using properties of  $30^\circ$ - $60^\circ$ - $90^\circ$  triangles.
- Solve problems involving right triangles, using sine, cosine, and tangent ratios.
- Solve real-world problems, using right triangle trigonometry and properties of right triangles.
- Explain and use the relationship between the sine and cosine of complementary angles.<sup>†</sup>

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Solve problems, including real-world problems, using the properties specific to parallelograms, rectangles, rhombi, squares, isosceles trapezoids, and trapezoids.
- Prove that quadrilaterals have specific properties, using coordinate and algebraic methods, such as the distance formula, slope, and midpoint formula.
- Prove the characteristics of quadrilaterals, using deductive reasoning, algebraic, and coordinate methods.
- Prove properties of angles for a quadrilateral inscribed in a circle.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Solve real-world problems involving the measures of interior and exterior angles of polygons.
- Identify tessellations in art, construction, and nature.
- Find the sum of the measures of the interior and exterior angles of a convex polygon.
- Find the measure of each interior and exterior angle of a regular polygon.
- Find the number of sides of a regular polygon, given the measures of interior or exterior angles of the polygon.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Find lengths, angle measures, and arc measures associated with
  - two intersecting chords;
  - two intersecting secants;
  - an intersecting secant and tangent;
  - two intersecting tangents; and
  - central and inscribed angles.
- Calculate the area of a sector and the length of an arc of a circle, using proportions.
- Solve real-world problems associated with circles, using properties of angles, lines, and arcs.

- Verify properties of circles, using deductive reasoning, algebraic, and coordinate methods.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Identify the center, radius, and diameter of a circle from a given standard equation.
- Use the distance formula to find the radius of a circle.
- Given the coordinates of the center and radius of the circle, identify a point on the circle.
- Given the equation of a circle in standard form, identify the coordinates of the center and find the radius of the circle.
- Given the coordinates of the endpoints of a diameter, find the equation of the circle.
- Given the coordinates of the center and a point on the circle, find the equation of the circle.
- Recognize that the equation of a circle of given center and radius is derived using the Pythagorean Theorem.<sup>†</sup>

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Find the total surface area of cylinders, prisms, pyramids, cones, and spheres, using the appropriate formulas.
- Calculate the volume of cylinders, prisms, pyramids, cones, and spheres, using the appropriate formulas.
- Solve problems, including real-world problems, involving total surface area and volume of cylinders, prisms, pyramids, cones, and spheres as well as combinations of three-dimensional figures.
- Calculators may be used to find decimal approximations for results.

**The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to**

- Compare ratios between side lengths, perimeters, areas, and volumes, given two similar figures.
- Describe how changes in one or more dimensions affect other derived measures (perimeter, area, total surface area, and volume) of an object.
- Describe how changes in one or more measures (perimeter, area, total surface area, and volume) affect other measures of an object.
- Solve real-world problems involving measured attributes of similar objects.

**4. Is/Are standard-based goal(s) needed?**

- YES** Address areas of need in PLOP

**NO Check one or more justifications:**

- Accommodations Available (specify):
- Area of Strength in PLOP
- New Content
- Other (Specify):

**5. Notes Supporting Data Analysis**