Standards Based Skills Worksheet for Geometry (2009)

Student: ____________________ Date: ____________________

Completed by (name) ____________________ Position ____________________

School Division: ____________________

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<th>1. Review SOL strand for GEOMETRY STANDARD G.1-G.14</th>
<th>2. Review data on student performance and indicate all data sources analyzed to assess performance in this strand:</th>
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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 \(\rightarrow, \leftrightarrow, \sim, \vdash, \land, \lor\).

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.†

- Construct the inscribed and circumscribed circles of a triangle.†

- 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°-45°-90° triangles.
- Solve for missing lengths in geometric figures, using properties of 30°-60°-90° 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.†

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.

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