1 Standards:

19 Derive and apply the relationships between the lengths, perimeters, areas, and volumes of similar figures in relation to their scale factor.

21 Represent transformations and compositions of transformations in the plane (coordinate and otherwise) using tools such as tracing paper and geometry software. a. Describe transformations and compositions of transformations as functions that take points in the plane as inputs and give other points as outputs, using informal and formal notation. b. Compare transformations which preserve distance and angle measure to those that do not.

22 Explore rotations, reflections, and translations using graph paper, tracing paper, and geometry software. a. Given a geometric figure and a rotation, reflection, or translation, draw the image of the transformed figure using graph paper, tracing paper, or geometry software. b. Specify a sequence of rotations, reflections, or translations that will carry a given figure onto another. c. Draw figures with different types of symmetries and describe their attributes.

29 Find patterns and relationships in figures including lines, triangles, quadrilaterals, and circles, using technology and other tools. a. Construct figures, using technology and other tools, in order to make and test conjectures about their properties. b. Identify different sets of properties necessary to define and construct figures.

30 Develop and use precise definitions of figures such as angle, circle, perpendicular lines, parallel lines, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.

35 Discover and apply relationships in similar right triangles. a. Derive and apply the constant ratios of the sides in special right triangles (45°-45° - 90° and 30° - 60° - 90°) b. Use similarity to explore and define basic trigonometric ratios, including sine ratio, cosine ratio, and tangent ratio. c. Explain and use the relationship between the sine and cosine of complementary angles. d. Demonstrate the converse of the Pythagorean Theorem. e. Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems, including finding areas of regular polygons.

1. We have determined that scaling a triangle creates a **similar** triangle where the angles do not change and the side lengths are a scalar multiple of the original. Using this information, scale each of the special triangles to fit inside a circle of radius 4. Use the hypotenuse of these triangles as the radii of the circle and the acute angles as the reference angles on the coordinate plane. You should include all of the following angles:

   - 30°
   - 45°
   - 60°
   - 120°
   - 135°
   - 150°
   - 210°
   - 225°
   - 240°
   - 300°
   - 315°
   - 330°

2. Using Desmos, repeat problem 1, but scale the triangles to fit inside a circle of radius 1 centered at the origin.