Vertical Progression:

7th Grade	**7.G.A Draw, construct, and describe geometrical figures and describe the relationships between them.** o **7.G.A.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.
8th Grade	**8.G.A Understand congruence and similarity using physical models, transparencies, or geometry software.** o **8.G.A.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.*
Geometry	**ELG.MA.HS.G.9 Understand and apply theorems about circles.** o **G-C.1** Prove that all circles are similar. o **G-C.2** Identify and describe relationships among inscribed angles, radii, and chords. *Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.* o **G-C.3** Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.
	ELG.MA.HS.G.9 Understand and apply theorems about circles. o **G-C.4 (+)** – Construct a tangent line from a point outside a given circle to the circle.

Students will demonstrate command of the ELG by:

- Using relationships among inscribed angles, radii, and chords to solve problems.
- Proving and using properties of angles for quadrilaterals inscribed in circles.
- Constructing the inscribed and circumscribed circles of a triangle.

Vocabulary:

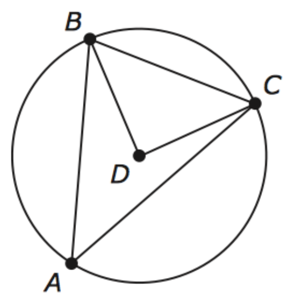
- central angle
- chord
- circle
- circumscribed angle
- circumscribed circles
- construct
- diameter
- inscribed angle
- inscribed circles
- intersect
- perpendicular
- quadrilateral
- radius, radii
- right angle
- similar
- tangent

Sample Instructional/Assessment Tasks:

1) **Standard(s): G-C.2**
Source: PARCC Geometry EOY Practice Test

Item Prompt:

The figure shows $\triangle ABC$ inscribed in circle D.



If $m\angle CBD = 44°$, find $m\angle BAC$, in degrees.

Solution:

The measure of angle *BAC* is 46°.

2) **Standard(s): G-C.A.1**

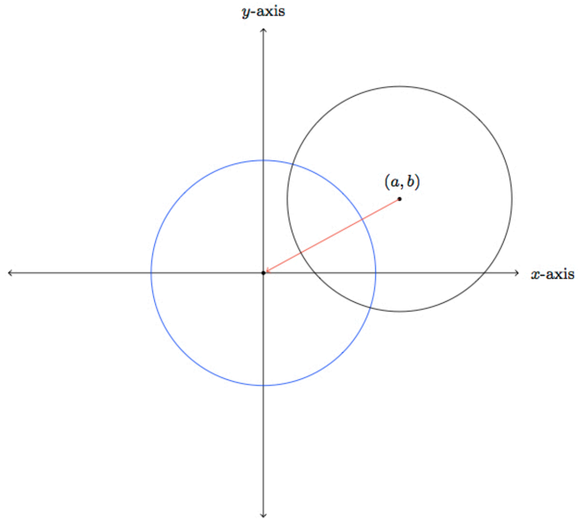
Source: https://www.illustrativemathematics.org/content-standards/HSG/C/A/1/tasks/1368

Item Prompt:

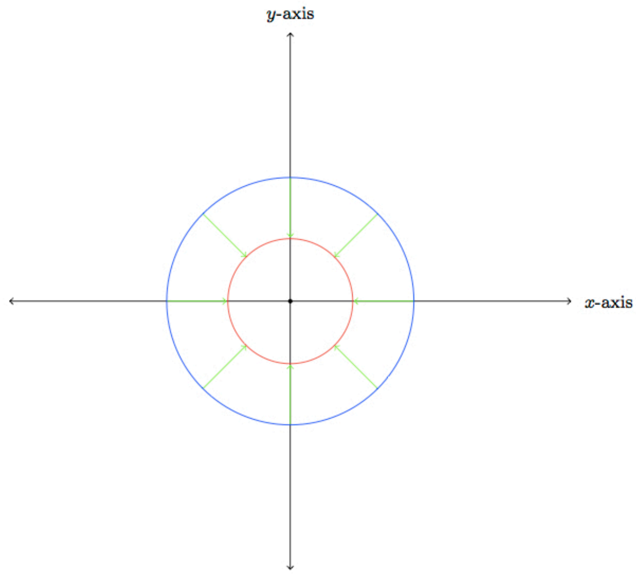
For this problem, (a,b) is a point in the x-y coordinate plane and r is a positive number.
a. Using a translation and a dilation, show how to transform the circle with radius r centered at (a,b) into the circle of radius 1 centered at (0,0) .
b. Explain how to use your work in part (a) to show that any two circles are similar.

Correct Answers:

a. To move the center of the circle to (0,0) we need to translate by -a in the x-direction and −b in the y-direction. This is pictured below:



In order to transform our circle of radius *r* centered at (0,0) into a circle of radius 1 centered at (0,0) we can apply a dilation, with center (0,0), with scale factor 1/*r*. This is pictured below (in this case r>1 so this is a contraction):



The green arrows show where selected points on the blue circle of radius *r* map to on the red circle of radius 1.

b. Part (a) applies to any circle in the plane. If C_1 and C_2 are two circles then by part (a) both C_1 and C_2 are similar to the circle of radius 1 with center (0,0). Therefore C_1 is similar to C_2.