Geometry: Circles

1. Using a translation and a dilation, explain how to transform the circle with radius of 5 units centered at (2, 3) into the circle with radius of 2 units centered at (–1, 4).
2. Circle *A* has a center at (6, 7) and includes the point (2, 4). Circle B has an area that is
4 times the area of Circle *A*. Circle *A* and Circle *B* are tangent to each other at (2, 4).

What is the ordered pair that corresponds to the center of Circle *B*?
3. The equation of a circle in the coordinate plane with center (0, 0) and radius 5 units is shown:

does **not** define *y* as a function of *x*.

| ***x*** | ***y*** |
| --- | --- |
|  |  |
|  |  |

1. In the figure, is a diameter of a circle and *C* is a point on the circle different from *A* and *B*.



**Part A**Show that triangles *COB* and *COA* are both isosceles triangles.

**Part B**Use Part A and the fact that the sum of the angles in triangle *ABC* is 180° to show that
angle *C* is a right angle.
2. **Proposition:** All circles are similar. Circle 1 and Circle 2, as shown, can be used to prove this proposition.



A partial argument that proves this proposition is shown:

Step 1: Given Circle 1 with center *P*1 and radius *r*1 and Circle 2 with center *P*2 and radius *r*2 such

 that *r*1 ≤ *r*2.
Step 2: Translate Circle 1 from *P*1 to *P*2 so that the two circle have the same center.
Step 3:
Step 4: The circles now coincide, showing they are similar.

Select **all** the statements that could be used in Step 3 to complete the argument.

A. Dilate Circle 1 by a factor of *r*2, centered on *P*1.
B. Dilate Circle 1 by a factor of , centered on *P*2.
C. Dilate Circle 1 by a factor of , centered on *P*1.
D. Dilate Circle 2 by a factor of *r*1, centered on *P*2.
E. Dilate Circle 2 by a factor of , centered on *P*1.

F. Dilate Circle 2 by a factor of , centered on *P*2.

1. Triangle *FGH* is inscribed in Circle *O* with being a diameter of Circle *O*.
The length of radius is 6, and .



What is the area of the sector formed by angle *GOH*?

A.
B.
C.
D.
2. In the diagram shown below:
* is tangent to Circle *O* at point *A*
* is tangent to Circle *P* at point *C*
* intersects at point *B*
* *OA* = 4 units, *AB* = 5 units, and *PC* = 10 units



What is the length of ?

A. 6.4 units
B. 8 units
C. 12.5 units
D. 16 units

**Teacher Material**

G-C.A

Understand and apply theorems about circles

G-C.B

Find arc lengths and areas of sectors of circles

| **Question** | **Claim** | **Key/Suggested Rubric** |
| --- | --- | --- |
| 1[[1]](#footnote-1) | 1 and 3 | **1 point:** Answers will vary. **Example 1:** Translate the center of the original circle left 3 and up 1 then dilate the translated circle, centered at (–1, 4), by a scale factor of . **Example 2:** Dilate the circle, centered at (2, 3), by a scale factor of , then translate the circle using the rule (*x*, *y*)🡪(*x* – 3, *y* + 1). |
| 2[[2]](#footnote-2) | 2 | **1 point:** (–6, –2). |
| 31 | 3 | **1 point:** Answers will vary. **Example:**

| ***x*** | ***y*** |
| --- | --- |
| 3 | 4 |
| 3 | –4 |

NOTE: A correct response must show that, for the same *x* value, there are two different *y* values that satisfy the equation. |
| 4[[3]](#footnote-3) | 3 | **2 points:** Shows triangles *COB* and *COA* are both isosceles (for example, based on *OA*, *OB*, and *OC* all being radii of the circles, so are congruent) AND Shows angle *C* is a right angle (for example, based on base angles of isosceles triangles being congruent, the sum of the measures of angles *COB* and *COA* is 180°, and the sum of the measures of the interior angles of a triangle is 180°).**1 point:** Shows triangles *COB* and *COA* are both isosceles (for example, based on *OA*, *OB*, and *OC* all being radii of the circles, so are congruent) OR Shows angle *C* is a right angle (for example, based on base angles of isosceles triangles being congruent, the sum of the measures of angles *COB* and *COA* is 180°, and the sum of the measures of the interior angles of a triangle is 180°). |
| 5[[4]](#footnote-4) | 3 | **1 point:** Selects B, F |

| **Question** | **Claim** | **Key/Suggested Rubric** |
| --- | --- | --- |
| 6[[5]](#footnote-5) | 2 | **1 point:** Selects D. |
| 7[[6]](#footnote-6) | 1 | **1 point:** Selects C. |

1. Adapted from Smarterbalanced.org. Grades 11, Claim 3 Item Specifications. Internet. Available from <http://www.smarterbalanced.org/smarter-balanced-assessments/>; accessed 11/2015. [↑](#footnote-ref-1)
2. Adapted from Smarterbalanced.org. Grades 11, Claim 2 Item Specifications. Internet. Available from <http://www.smarterbalanced.org/smarter-balanced-assessments/>; accessed 11/2015. [↑](#footnote-ref-2)
3. <https://www.illustrativemathematics.org/content-standards/HSG/C/A/2/tasks/1091> [accessed on November 1](https://www.illustrativemathematics.org/content-standards/HSG/GMD/A/3/tasks/514%20accessed%20on%20November%201), 2015, is licensed by [Illustrative Mathematics](https://www.illustrativemathematics.org/) under [CC BY-NC-SA 4.0](http://creativecommons.org/licenses/by-nc-sa/4.0/). [↑](#footnote-ref-3)
4. Adapted from the Mathematics K–12 Learning Standards. Internet. Available from <http://www.k12.wa.us/Mathematics/Standards.aspx>; accessed 11/2015. [↑](#footnote-ref-4)
5. From EngageNY.org of the New York State Education Department. Regents High School Examination Geometry (Common Core). Internet. Available from <http://www.nysedregents.org/geometrycc/815/geomcc82015-exam.pdf>; accessed 1 November 2015. [↑](#footnote-ref-5)
6. Adapted from the Mathematics K–12 Learning Standards. Internet. Available from <http://www.k12.wa.us/Mathematics/Standards.aspx>; accessed 11/2015. [↑](#footnote-ref-6)