

1/6/16  
Analytic Geometry

## Constructing Equilateral Triangles & Squares Inscribed in Circles


**EQ:** How can a polygon be constructed given a circle?

MCC9-12.G.CO.13 Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle

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Let's see how you are doing

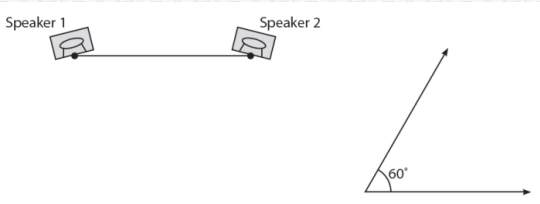
## Ticket



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### Warm-up

The town of Evans is planning an outdoor concert in the park. During the planning process, committee members determined there will be two large speakers, but they can't decide where the audience should sit. The best arrangement for two speakers and the center of the audience is a triangle where each angle is  $60^\circ$ . The diagram below depicts the line segment formed by the two speakers; a  $60^\circ$  angle is also shown. Use the  $60^\circ$  angle and the given segment to construct the triangle created by the two speakers and the center of the audience.



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**Key Concepts:**

A polygon is \_\_\_\_\_ when all side lengths are the same.


A polygon is \_\_\_\_\_ when all angle measures are the same.

A regular polygon is a polygon that is \_\_\_\_\_ and \_\_\_\_\_.



An \_\_\_\_\_ triangle has all three sides which are \_\_\_\_\_.



A \_\_\_\_\_ is a four-sided regular polygon.




To \_\_\_\_\_ means to draw a figure within a figure so that every \_\_\_\_\_ of the enclosed figure touches the outside figure.

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**Example 1:**  
Construct a square inscribed in a circle

- Begin with a point that will be the center of the circle.
- Place your compass on the point and draw a circle around this center point.
- Draw a diameter through the circle.
- Find the perpendicular bisector of the diameter.
- Reminder:** -Open your compass more than half the size of AB.
- Put your compass on the endpoint A and draw an arc above the line and an arc below the line.
- Put your compass on the endpoint B and draw an arc above the line and an arc below the line that intersect with the last arcs you draw.
- Draw your perpendicular bisector through the two intersections.
- Connect the endpoints of the diameters to form a square.

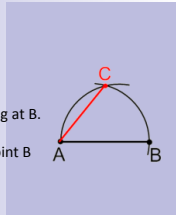


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**Example 2:**

**60° ANGLE**

- Begin with a line segment with endpoints A & B.
- Set the compass to the distance between A and B.
- Place the compass on point A and draw a large arc starting at B.
- Keep the compass the same and place the compass on point B and draw a large arc starting at A.
- Mark the intersection between the arcs as point C.
- Use a straight edge to connect A to C. This is a  $60^\circ$  angle.



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**Example 3:**  
 Construct a hexagon inscribed in a circle.

- Begin by placing a point on your paper. Set the compass to the size of the radius you want and construct a circle.
- Do not change your compass setting. Mark a point anywhere on the circle. This will be the first vertex of the hexagon.
- Make an arc across the circle. This will be the next vertex of the hexagon.
- Move the compass on to the next vertex and draw another arc. This is the third vertex of the hexagon.
- Continue in this way until you have all six vertices.
- Draw a line between each successive pairs of vertices, for a total of six lines.

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**Example 4:**  
 Equilateral Triangle Inscribed in a Circle

- Begin by placing a point on your paper. Set the compass to the size of the radius you want and construct a circle.
- Do not change your compass setting. Mark a point anywhere on the circle. This will be the first vertex of the triangle. Make an arc across the circle.
- Move the compass on to the next vertex and draw another arc.
- Continue in this way until you have six marked arcs on the circle. Draw a line between every other mark so that you have the three vertices of the equilateral triangle.

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**Homework:**

Add to the construction notebook:

- Square Inscribed in a Circle
- 60 degree Angle
- Hexagon Inscribed in a Circle
- Equilateral Triangle Inscribed in a Circle

On-line and textbook help references, p. 3-10

- <http://www.mathopenref.com/tocs/constructiontoc.html>
- <http://www.mathopenref.com/constructions.html>
- <https://www.khanacademy.org/math/geometry/geometric-constructions>

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