

Circle Vertex Plans

Plan accurate regular polygons inside circles.

HIGH SCHOOL • MA.912.GR.5.4

MA.912.GR.5.4 "Construct a regular polygon inscribed in a circle. Regular polygons are limited to triangles, quadrilaterals and hexagons."

NAME _____

DATE _____

EQUAL SPACING

A regular polygon has equal sides and equal angles. When it is inscribed in a circle, every vertex lies on the circle and the vertices are equally spaced.

WORKED EXAMPLE

Construct a regular quadrilateral in a circle with radius 8 cm.

1. Draw a diameter through the center.
2. Draw a second diameter perpendicular to the first.
3. Connect the four points where the diameters meet the circle in order.

Answer: The connected points form an inscribed regular quadrilateral.

PRACTICE 5 problems

- 1** A circle has radius 6 cm. To mark an inscribed regular hexagon by stepping around the circle, what compass width should you use?

ANSWER _____

- 2** What central angle separates neighboring vertices of an inscribed regular triangle?

ANSWER _____

- 3** Six equally spaced points are marked on a circle. Which points should you connect to make a regular triangle?

ANSWER _____

- 4** A regular hexagon has central angles of 60 degrees. How many equal central angles make one full turn?

ANSWER _____

- 5** Points are marked at 0, 60, 120, 180, 240, and 300 degrees around a circle. Which three points make a regular triangle?

ANSWER _____

APPLY IT Show your work

- 1** Kai is designing a circular profile badge with an inscribed triangular logo. What central angle should be between neighboring logo vertices?

WORK SPACE

ANSWER _____

- 2** A music festival sticker has a circular border with radius 7 cm. The designer will inscribe a regular hexagon. What compass width should be used, and how many equally spaced vertex locations are needed?

WORK SPACE

ANSWER _____

CHALLENGE One step up

CHALLENGE

A regular hexagon is inscribed in a circle with radius 5 cm. Write exactly two sentences explaining why a compass opened to 5 cm can mark its vertices around the circle.

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A circle has radius 6 cm. To mark an inscribed regular hexagon by stepping around the circle, what compass width should you use?	6 cm
2	What central angle separates neighboring vertices of an inscribed regular triangle?	120 degrees
3	Six equally spaced points are marked on a circle. Which points should you connect to make a regular triangle?	Connect every other point.
4	A regular hexagon has central angles of 60 degrees. How many equal central angles make one full turn?	6
5	Points are marked at 0, 60, 120, 180, 240, and 300 degrees around a circle. Which three points make a regular triangle?	0, 120, and 240 degrees

PART 2 • APPLY IT

1. **120 degrees** A full circle is 360 degrees. Divide 360 degrees by 3 vertices.
2. **7 cm; 6 vertex locations** For an inscribed regular hexagon, each side equals the circle's radius. A hexagon has 6 vertices.

CHALLENGE

A compass opened to 5 cm makes each hexagon side equal to the radius. Each such chord makes an equilateral triangle with the center, so six equal triangles fit around the circle.

Accept equivalent construction language, such as “alternate marked points” for “every other point.” Accept degree symbols in place of the word “degrees.”