

Writing and Graphing Circle Equations

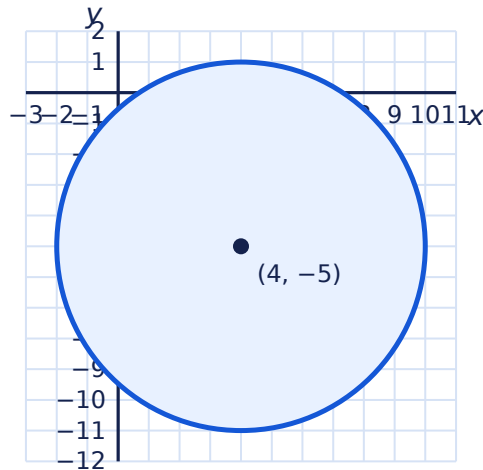
Grade 10 – Geometry math · Worksheet · Standards: G-GPE.A.1

Name: _____ Date: _____ Class: _____

These problems build the equation of a circle from the Pythagorean Theorem, read centers and radii, complete the square, and classify points (G-GPE.A.1). Early problems use standard form; later problems start from general form. Cell towers, Ferris wheels and plazas supply the contexts.

Standards: G-GPE.A.1 · **Level:** Grade 10 Geometry

Problem 1 Write the Equation (easy)



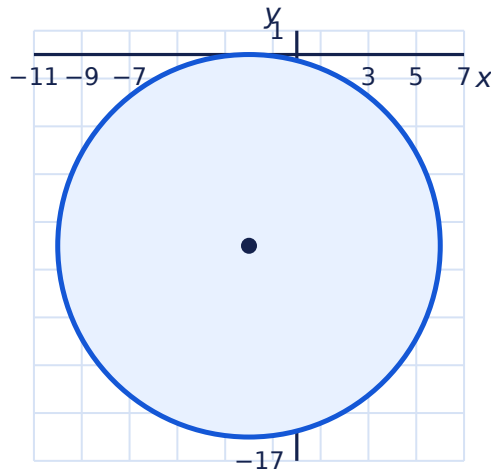
Fountain on the park map; 1 unit = 1 yard.

A circular fountain is centered at $(4, -5)$ on a park map and has a radius of 6 yards. Write the equation of its edge.

Problem 2 Centered at the Origin (easy)

A radar screen is centered at the origin. One range ring has radius 11 units. Write its equation.

Problem 3 Read Center and Radius (easy)



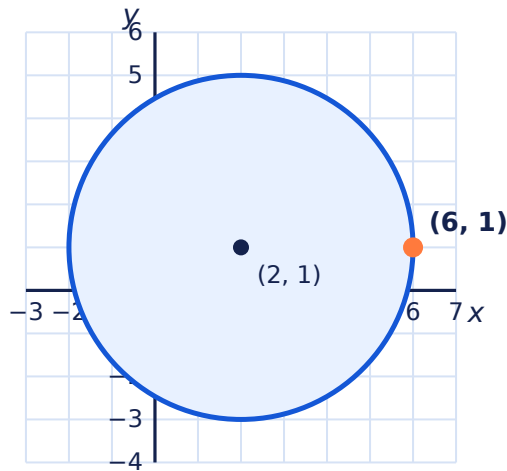
Graph of $(x + 2)^2 + (y + 8)^2 = 64$.

State the center and the radius of the circle $(x + 2)^2 + (y + 8)^2 = 64$.

Problem 4 Center on the x-Axis (easy)

A circle has center $(-5, 0)$ and radius $\sqrt{10}$. Write its equation.

Problem 5 Equation from a Graph (medium)



Circle on the coordinate plane.

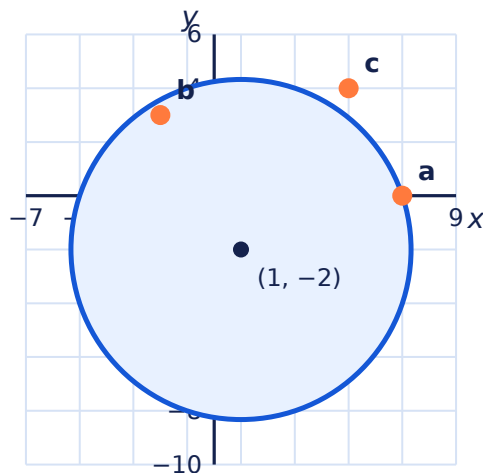
Write the equation of the circle shown.

Problem 6 Radius from a Point (medium)

A circular skating rink is centered at $(-3, 2)$ on a grid, and a light pole at $(1, 7)$ stands exactly on its edge. Write the equation of the rink.

Problem 7 Equation from a Diameter (medium)

The endpoints of a diameter are $(-4, 3)$ and $(6, -1)$. Write the equation of the circle.

Problem 8 Inside, On or Outside (medium)

Points a , b and c relative to the circle.

Circle C : $(x - 1)^2 + (y + 2)^2 = 40$. Decide whether each point is inside, on or outside: (a) $(7, 0)$ (b) $(-2, 3)$ (c) $(5, 4)$.

Problem 9 Another Point on the Circle (medium)

A circle has center $(-2, -4)$ and passes through $(6, -1)$. Use the Pythagorean Theorem or the circle equation to show that $(1, 4)$ is also on the circle.

Problem 10 Complete the Square: Basic (medium)

Rewrite $x^2 + y^2 - 6x + 10y + 18 = 0$ in standard form. Give the center and radius.

Problem 11 Complete the Square: Irrational Radius (hard)

Rewrite $x^2 + y^2 + 8x - 2y - 4 = 0$ in standard form. Give the center and the radius.

Problem 12 Completing the Square with Large Terms (hard)

Rewrite $x^2 + y^2 - 12x - 4y + 20 = 0$ in standard form. Give the center and the radius in simplest radical form.

Problem 13 Divide First (hard)

Rewrite $2x^2 + 2y^2 + 4x - 16y - 10 = 0$ in standard form. Find the center and radius.

Problem 14 Circle, Point or Nothing? (hard)

Complete the square for each equation and say whether it is a circle, a single point or has no graph. (a) $x^2 + y^2 - 4x + 6y + 13 = 0$ (b) $x^2 + y^2 - 4x + 6y + 20 = 0$

Problem 15 Cell Tower Coverage (medium)

On a county map with 1 unit = 1 mile, a cell tower at $(-3, 5)$ reaches 12 miles in every direction. (a) Write the equation of the edge of its coverage. (b) A town sits at $(6, -3)$. Is it covered?

Problem 16 Flower Bed in a Corner (medium)

A circular flower bed with radius 4 feet fits in the corner formed by two perpendicular fences along the positive x-axis and y-axis, touching both fences. Write the equation of its edge.

Problem 17 Circle Through Three Points (hard)

A circular plaza passes through the points $(0, 0)$, $(10, 0)$ and $(0, 4)$ on a city grid. Find the equation of the circle. (Hint: the angle at the origin is a right angle.)

Problem 18 Ferris Wheel Heights (hard)

A Ferris wheel has radius 10 feet and its center is 12 feet above the ground, directly above the origin of a coordinate system. (a) Write the equation of the wheel. (b) A rider is 5 feet to the right of the center line. How high above the ground can the rider be? Round to the nearest tenth.

Problem 19 Bike Path Through a Plaza (hard)

A circular plaza has equation $(x - 1)^2 + (y - 2)^2 = 8$ and a straight bike path follows $y = x + 1$. Find the two points where the path meets the edge of the plaza.

Problem 20 Tangent Line to a Circle (hard)

The point $(3, 4)$ lies on the circle $(x + 1)^2 + (y - 2)^2 = 20$. (a) Verify this. (b) Find the equation of

the tangent line to the circle at $(3, 4)$.