Chapter 10
Circles

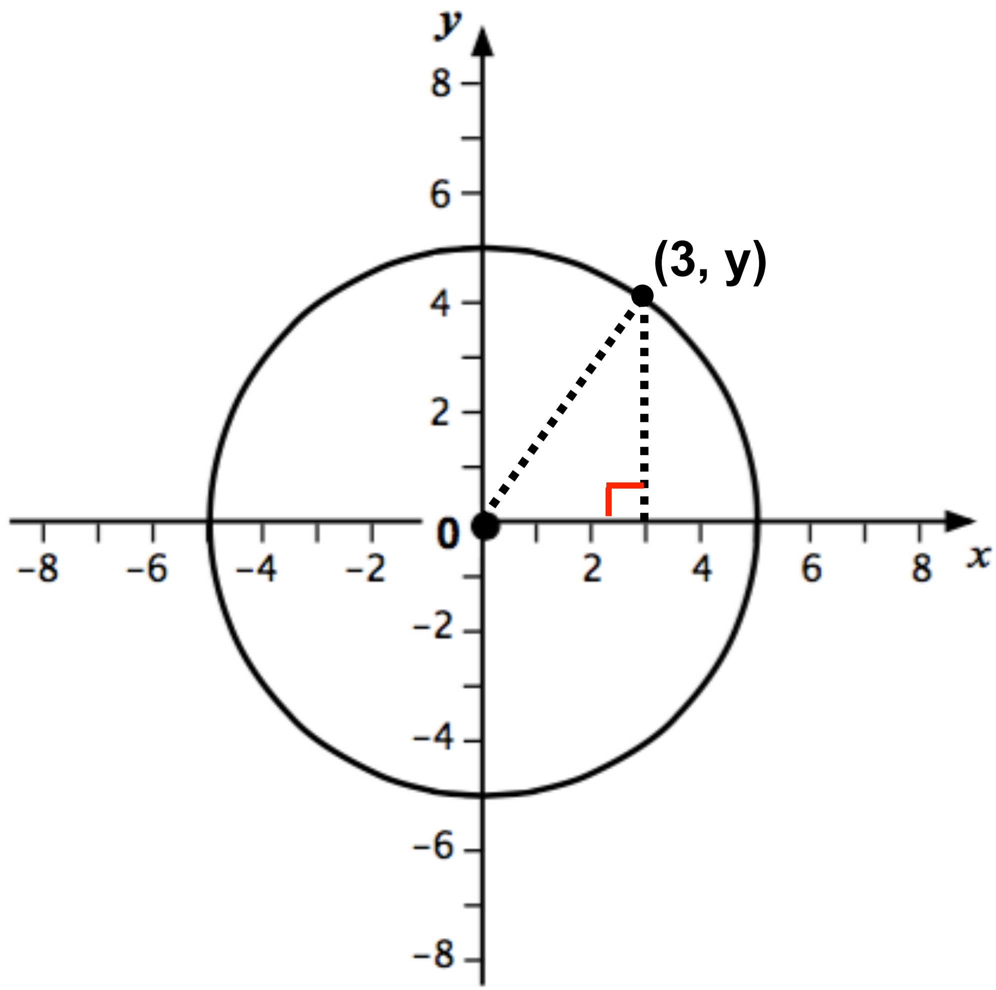
10.7 Circles in the Coordinate Plane

Circle Equation

Circle with center (0,0) and radius 5.

A point has coordinates (3,y) on the circle. Write a value for y.

(**Hint**: Use Pythagorean Theorem)



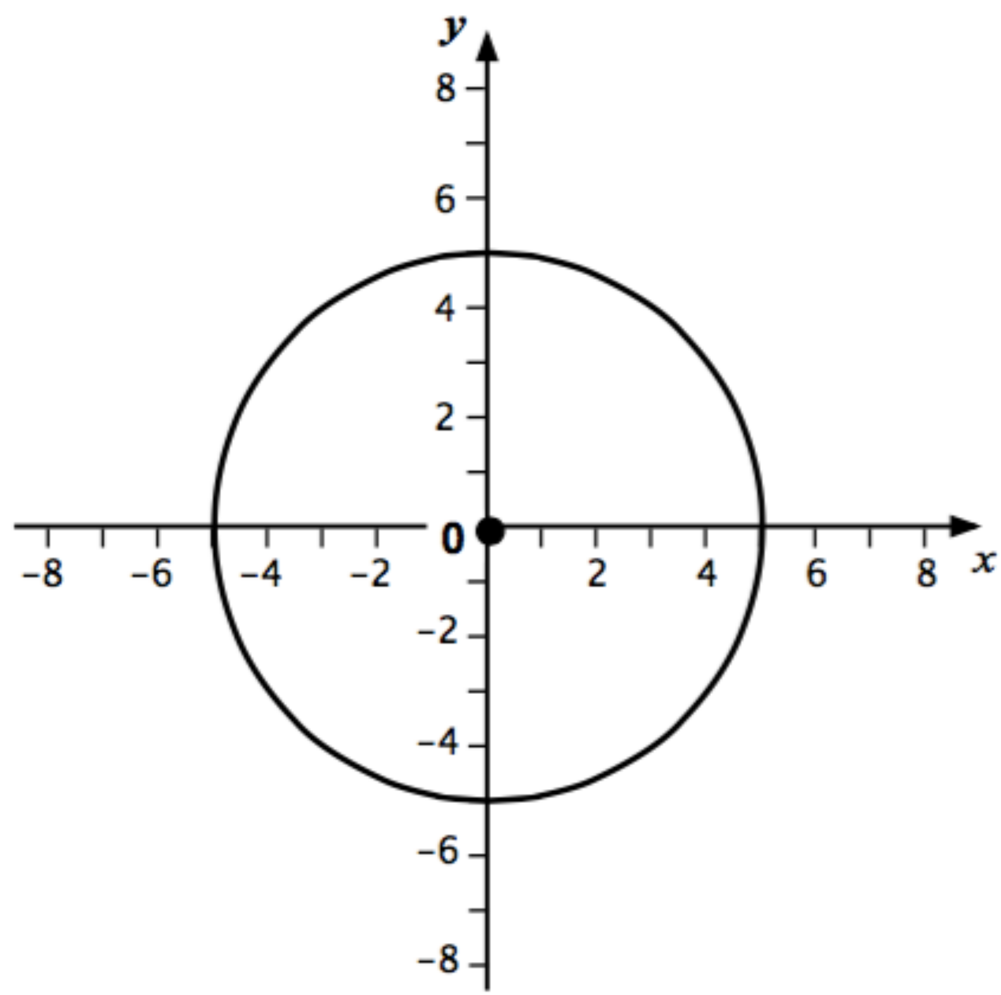
10.7 Circles in the Coordinate Plane

Circle Equation

Circle with center (0,0) and radius 5.

Find x and y for these points on the circle:

(1, y)
(x, 1)
(2, y)
(x, 2)



10.7 Circles in the Coordinate Plane

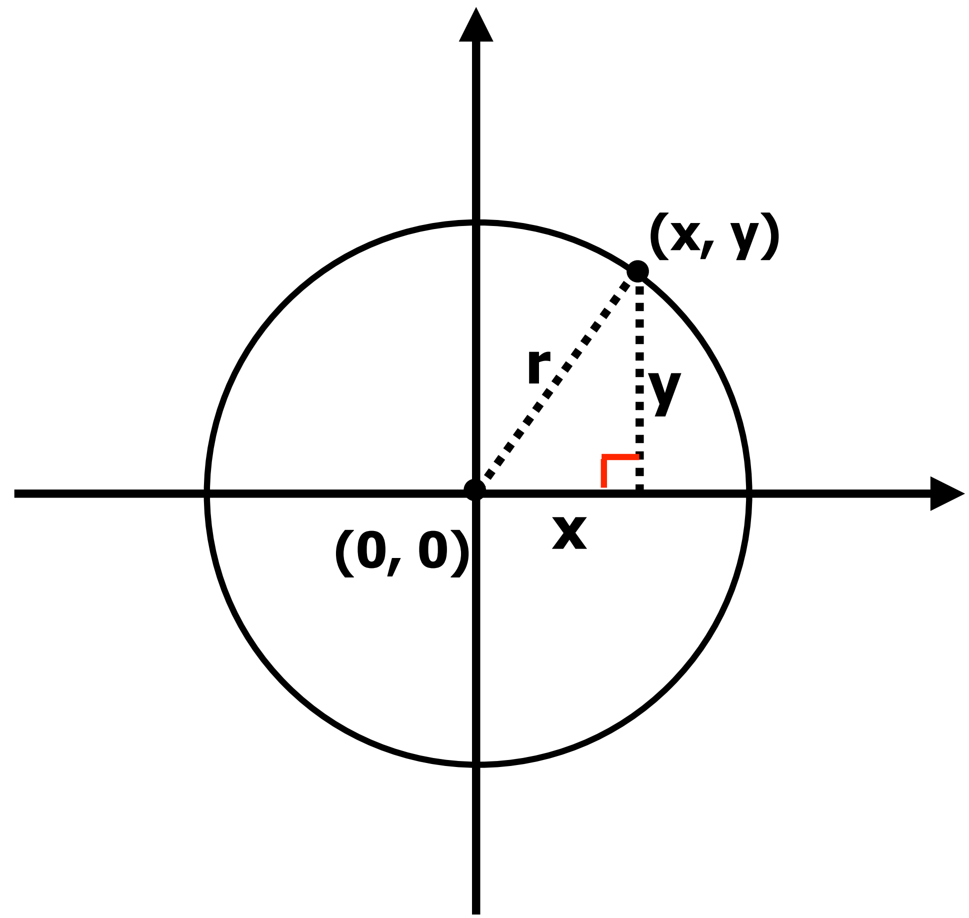
Circle Equation

From the Pythagorean Theorem

$$a^2 + b^2 = c^2$$

Circle with center (0,0) and radius r.

$$x^2 + y^2 = r^2$$

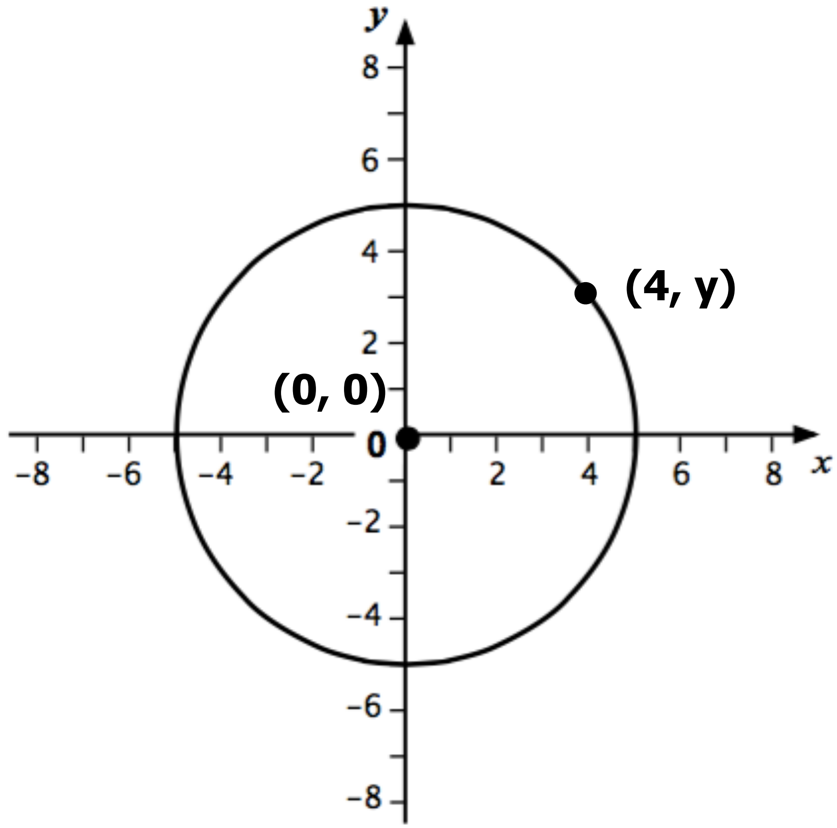


10.7 Circles in the Coordinate Plane

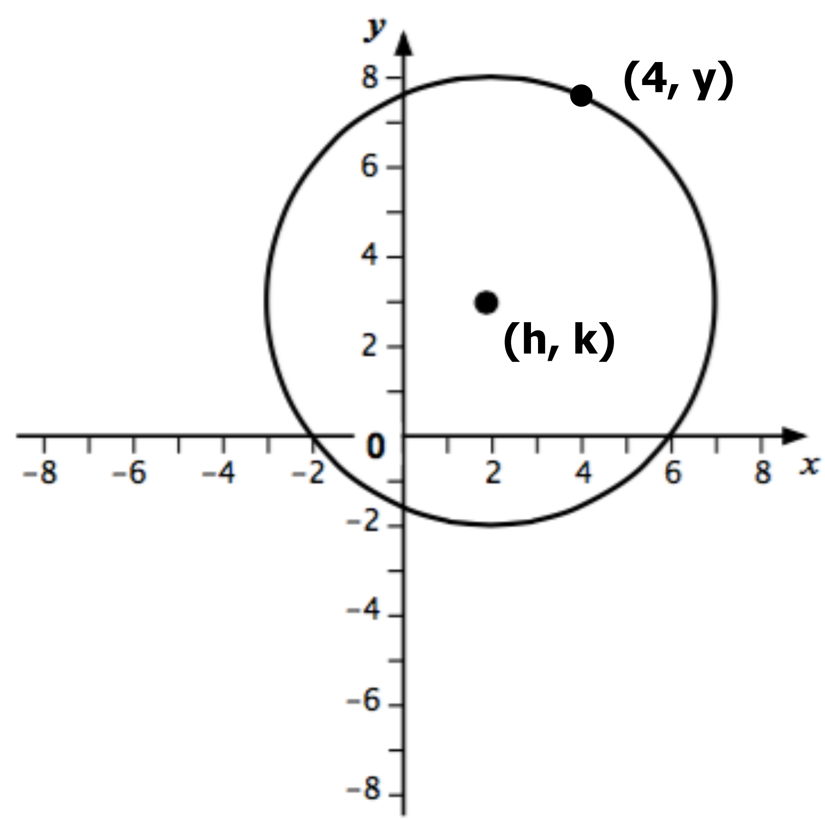
Standard Equation for a Circle

Two circles with same radius but different centers.
For point (4,y) on the circles, what is y?

C(0, 0), radius = 5

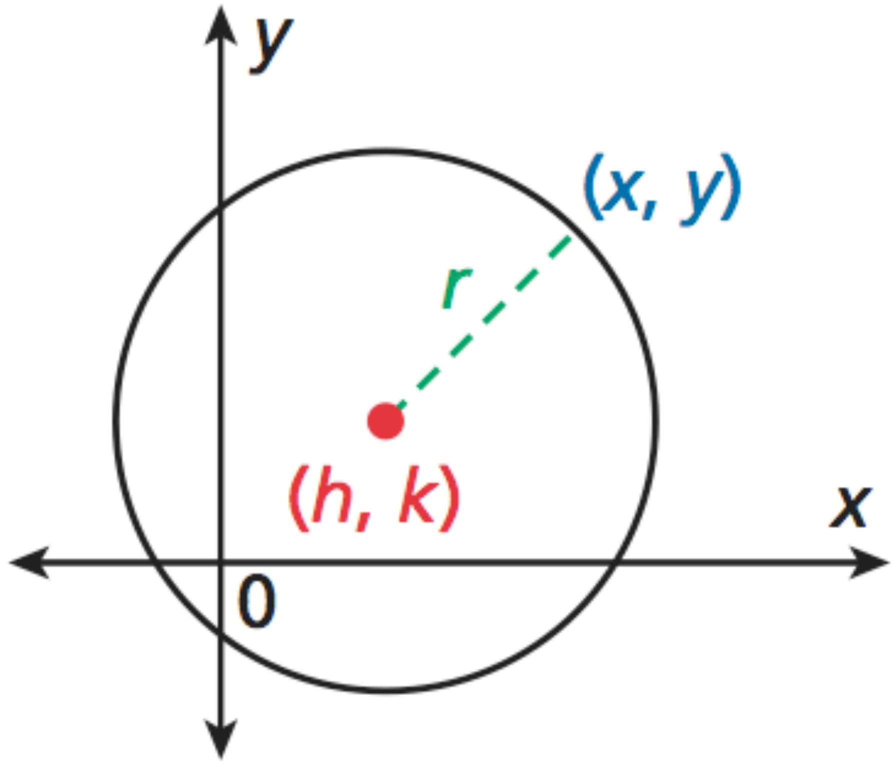


C(h, k), radius = 5



10.7 Circles in the Coordinate Plane

Standard Equation for a Circle



Distance Formula

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

↓

Substitution from diagram

$$r = \sqrt{(x - h)^2 + (y - k)^2}$$

↓

Square each side

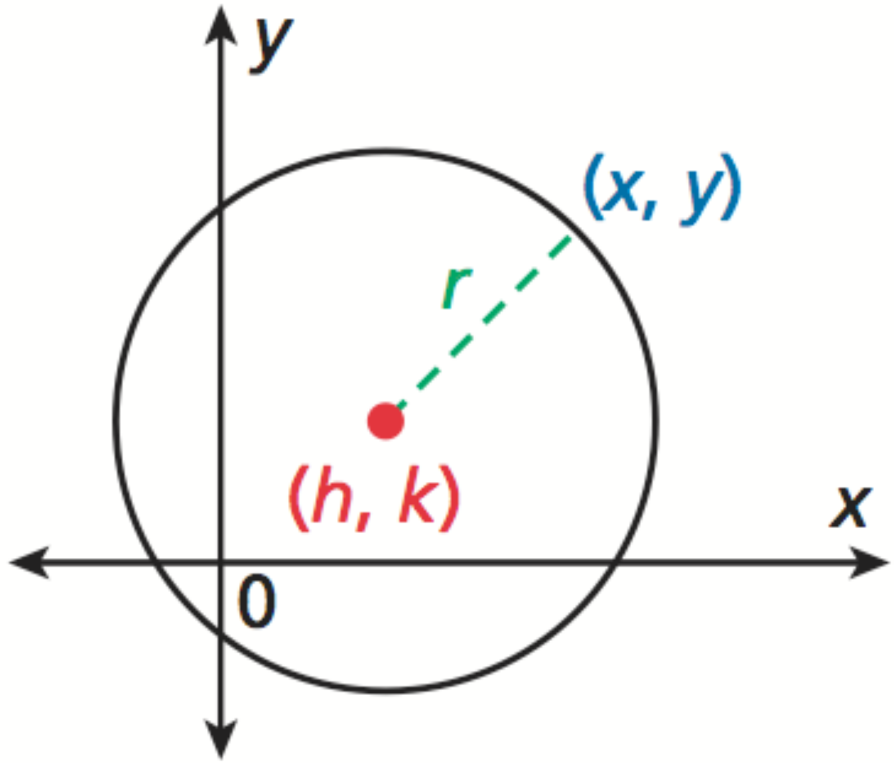
$$r^2 = (x - h)^2 + (y - k)^2$$

Standard Equation for a Circle

$$r^2 = (x - h)^2 + (y - k)^2$$

10.7 Circles in the Coordinate Plane

Standard Equation for a Circle



Write the standard equation for the following circles.

a) $r = 3; C(3, -4)$

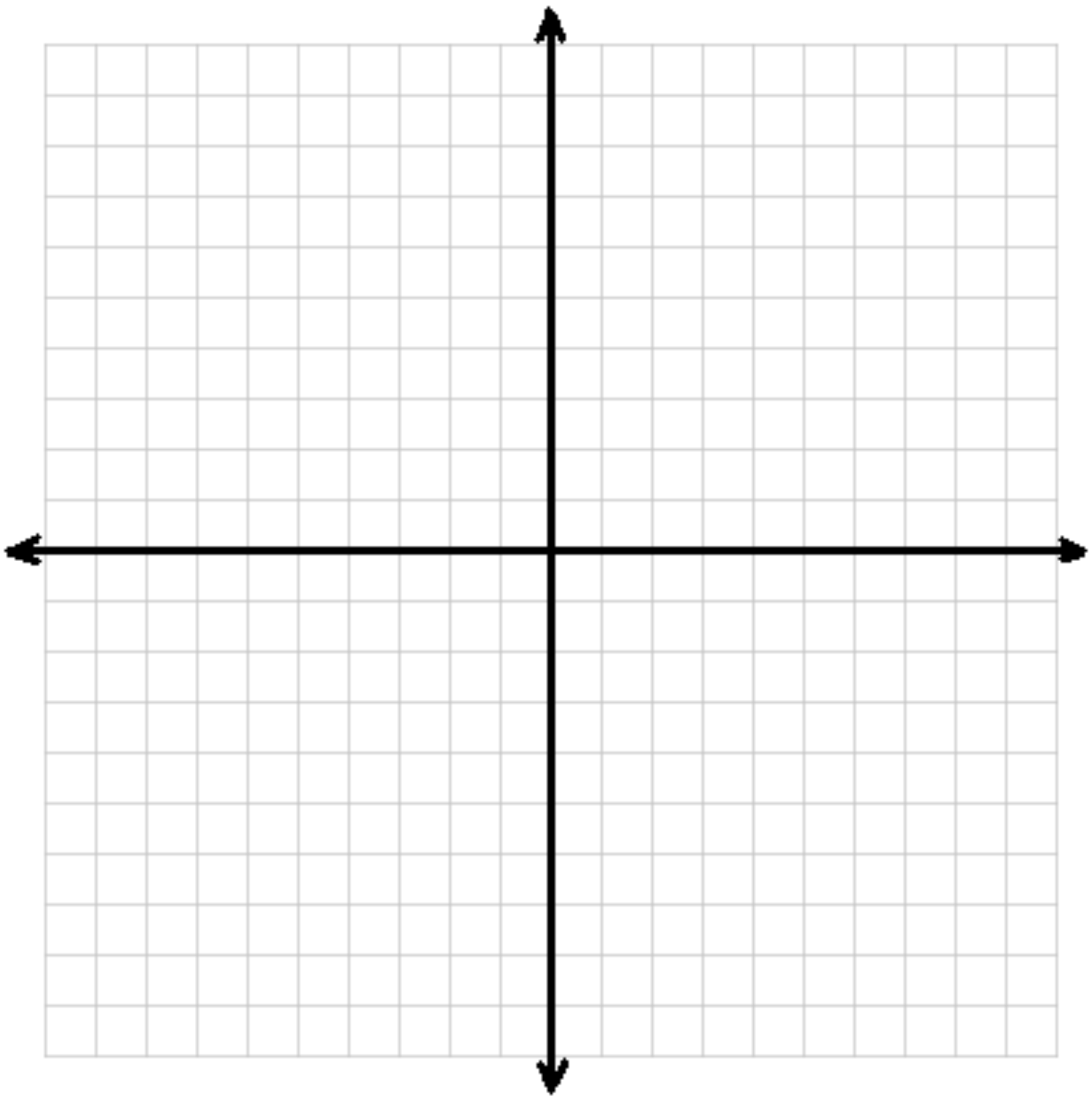
b) $r = 2\sqrt{3}; C(-2, 3)$

Standard Equation for a Circle

$$r^2 = (x-h)^2 + (y-k)^2$$

10.7 Circles in the Coordinate Plane

Sketch the Circle



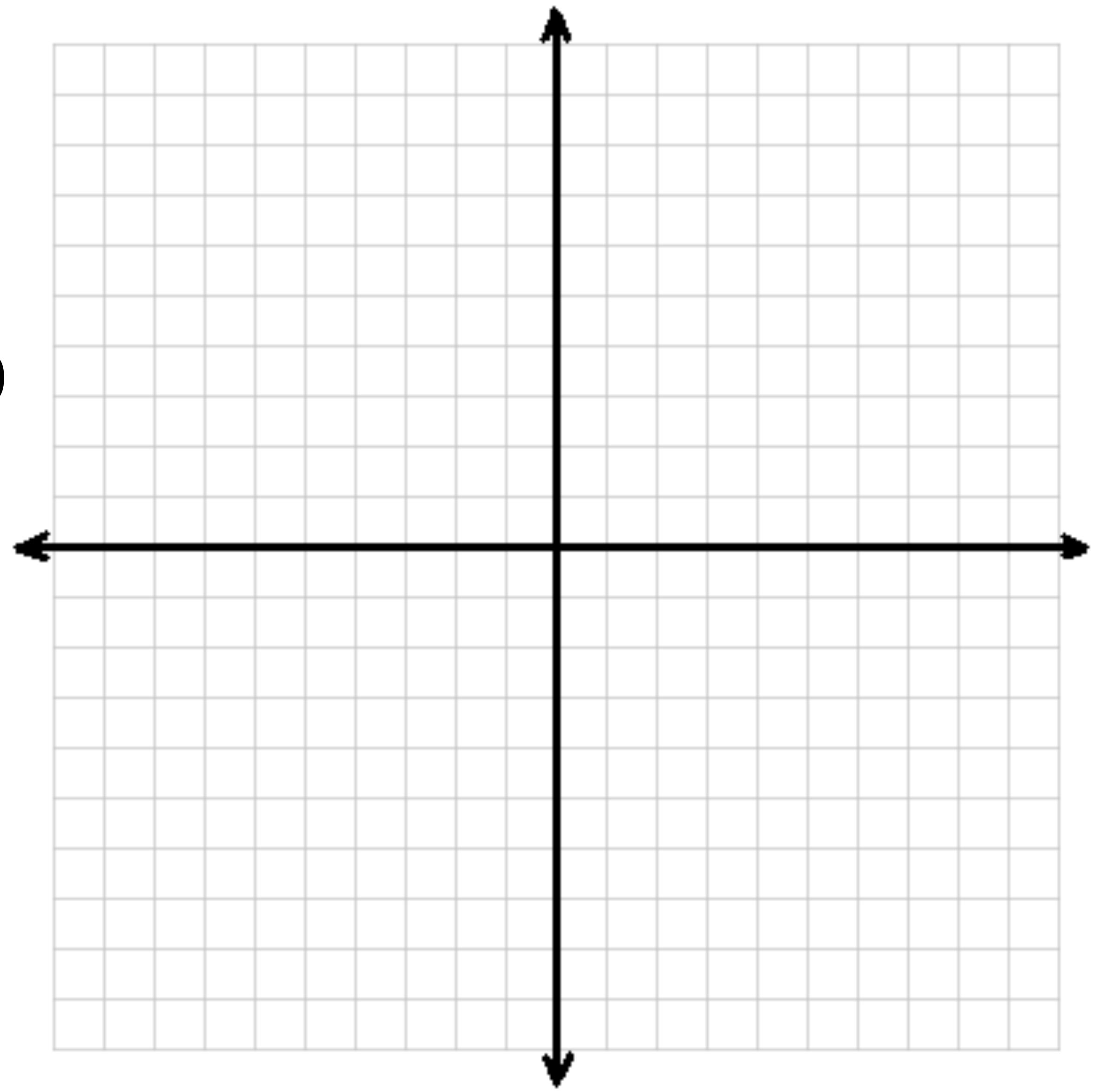
$$(x+3)^2+(y-2)^2=36$$

10.7 Circles in the Coordinate Plane

Standard Form

Rewrite the formula into standard form, then graph.

$$x^2 + y^2 - 8y + 4y - 16 = 0$$



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Coordinate Proof

Prove or disprove that the point $\left(\sqrt{2}, \sqrt{2}\right)$ lies on the circle centered at the origin and containing the point (2, 0).