

TOPIC: GRAPHING CIRCLES

Circles in Standard Form (Center-Radius Form)

- ◆ The graph of a circle is the set of all points that are the _____ distance ***r*** (radius) from the center ***(h, k)***.
 - ▶ To sketch, use ____ to plot points above, below, right, & left of _____ then connect with a smooth curve.

New

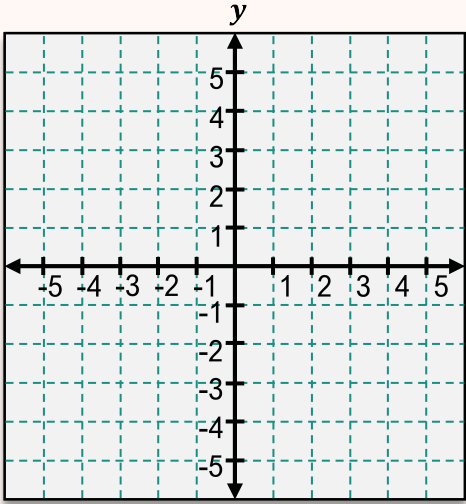
Graphing a Circle: Standard Form

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

$$(x - 2)^2 + (y + 1)^2 = 16$$

Center: $(\frac{\quad}{h}, \frac{\quad}{k})$

Radius:



- ◆ A circle centered at the origin (__, __) has the equation: $x^2 + y^2 = r^2$

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PRACTICE

Give the center and radius of each circle and graph.

(A)

$$x^2 + y^2 = 36$$

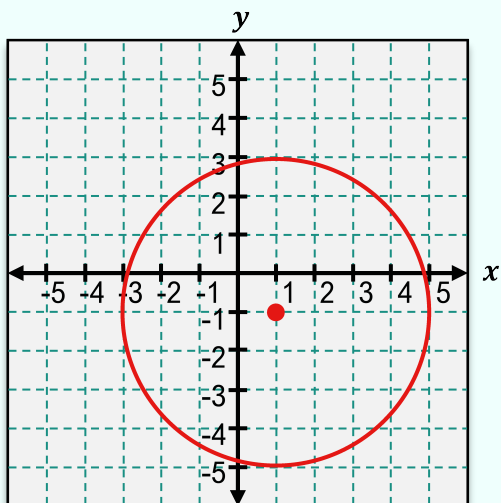
(B)

$$(x + 2)^2 + (y - 3)^2 = 4$$

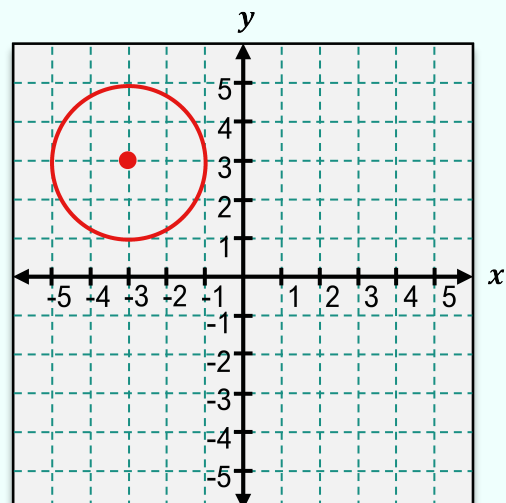
EXAMPLE

Write an equation in standard form that represents the graph of the circle.

(A)



(B)



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PRACTICE

Write the standard form equation of the circle described.

(A)

Centered at $(-3, 5)$; radius: 7

(B)

Centered at the origin; diameter: 10

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Circles in General Form

◆ You will sometimes be given the equation of a circle in **general form**.

$$x^2 + y^2 + Ax + By + C = 0$$

► Convert to **standard form** by *completing the square* for x & y , then graph.

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

Standard Form

$$x^2 + y^2 + 2x + 6y + 8 = 0 \quad \text{General Form}$$

Rewrite

$$(x^2 + 2x + \underline{\quad}) + (y^2 + 6y + \underline{\quad}) = -8 + \underline{\quad} + \underline{\quad}$$

Complete the Square

$$(x + 1)^2 + (y + 3)^2 = 2$$

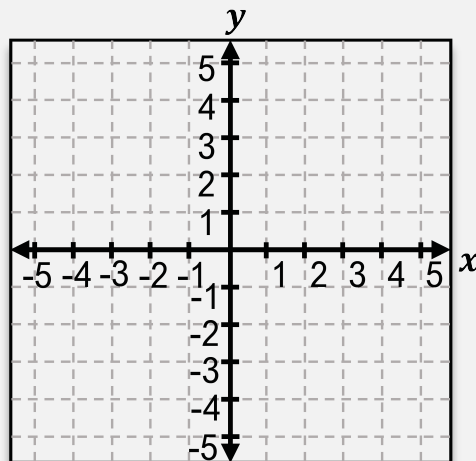
Standard Form

EXAMPLE: Convert the following equation to standard form and sketch a graph of the circle.

$$x^2 + y^2 + 2x - 4y + 1 = 0$$

GENERAL FORM → STANDARD FORM CIRCLES

- 1) Group x terms & y terms on left; constant on right
- 2) Add _____ to both sides for x terms
Add _____ to both sides for y terms
- 3) Factor to $(x + \underline{\quad})^2$ & simplify
- 4) Graph from _____ form



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PRACTICE

Write the standard form equation of the circle described. Give the center and radius.

(A)

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

(B)

$$x^2 + y^2 - 8x - 12y + 3 = 0$$