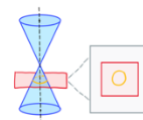


TOPIC: CIRCLES

Circles in Standard Form

↓	Circle	Ellipse	Parabola	Hyperbola
---	--------	---------	----------	-----------



- You'll need 2 things to graph a circle: _____ (C) & _____ (r)
 - The graph of a circle contains all points which are the _____ distance (r) from the center (C)

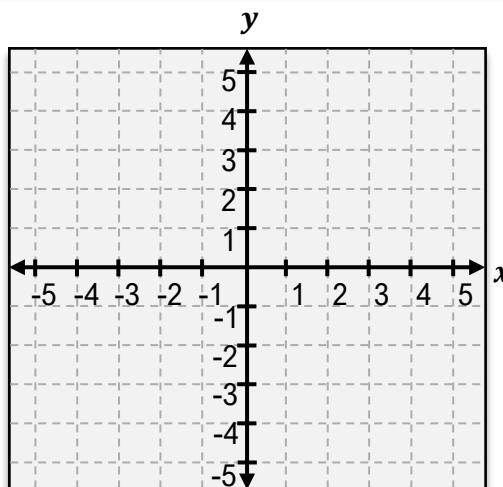
Circle at Origin	Circle NOT at Origin
<p>$x^2 + y^2 = r^2$</p>	<p>$(x - h)^2 + (y - k)^2 = r^2$</p>

EXAMPLE: Graph the circle.

$$(x - 1)^2 + (y - 2)^2 = 9$$

TO GRAPH

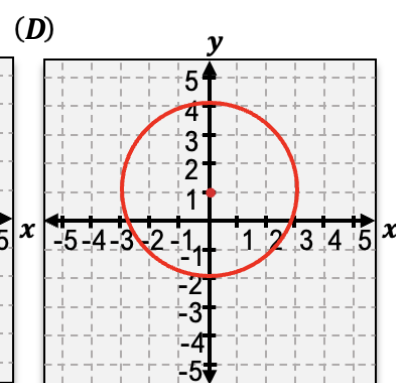
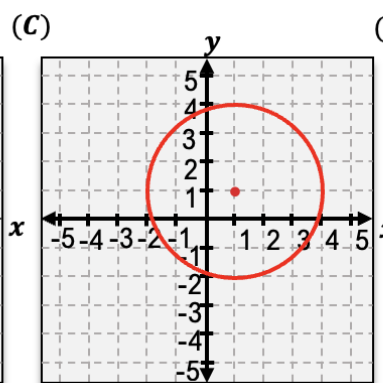
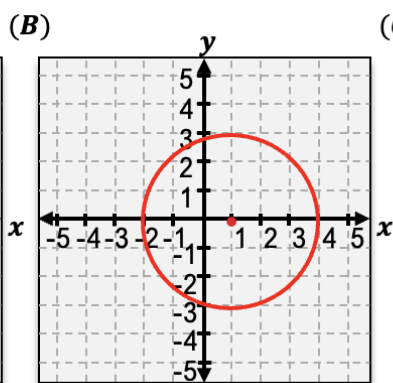
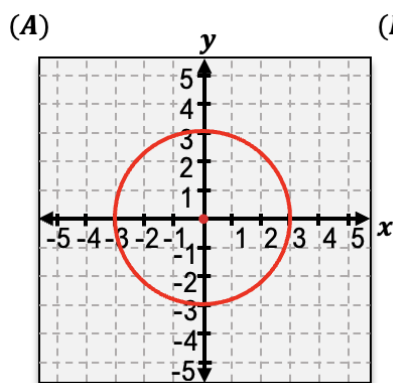
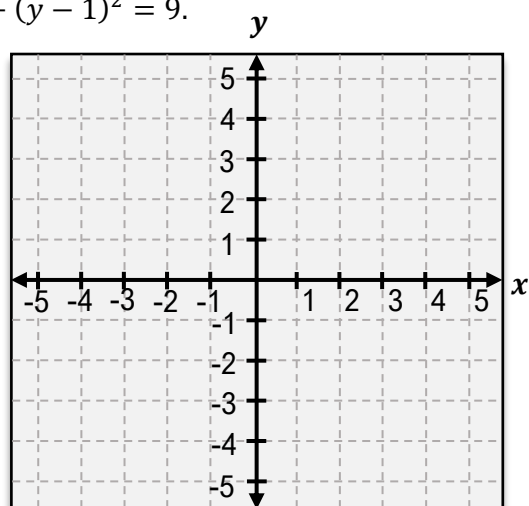
- Center (h, k) : (__ , __)
- Radius: $r =$ ____
- Plot 4 points a distance $r =$ ____ to the **left**, **right**, **above** and **below** the center point.
- Connect outside points with a smooth curve



Note: A circle [**IS** | **IS NOT**] a function because it [**PASSES** | **FAILS**] the VLT.

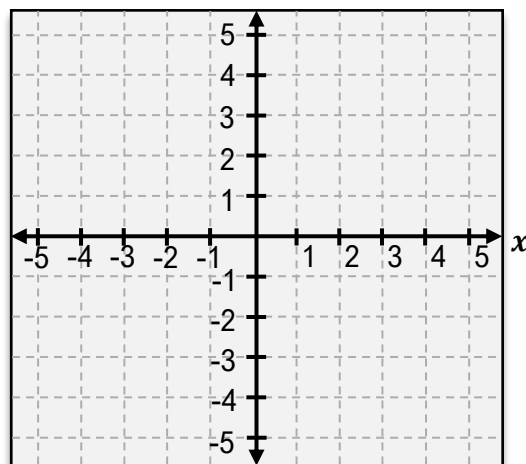
TOPIC: CIRCLES

PRACTICE: Sketch a graph of the circle based on the following equation: $x^2 + (y - 1)^2 = 9$.

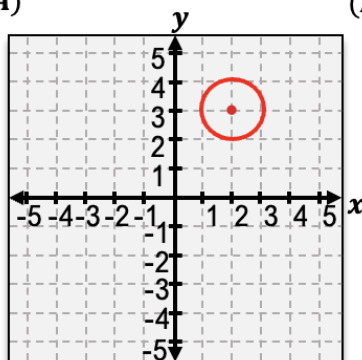


TOPIC: CIRCLES

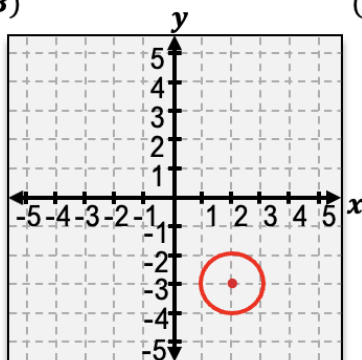
PRACTICE: Sketch a graph of the circle based on the following equation: $(x - 2)^2 + (y + 3)^2 = 1$.



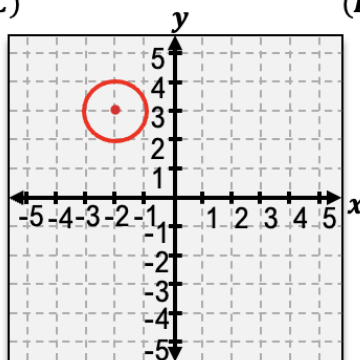
(A)



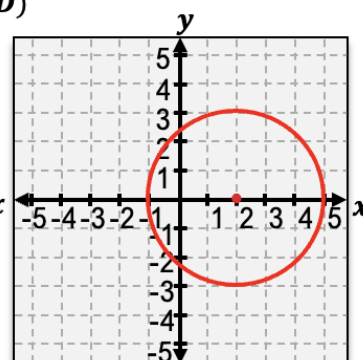
(B)



(C)

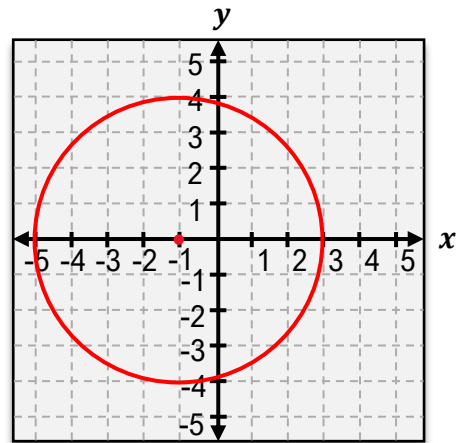


(D)



TOPIC: CIRCLES

PRACTICE: Find the equation for the following circle.



(A)

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

(B)

$$(x + 1)^2 + y^2 = 4$$

(C)

$$(x - 1)^2 + y^2 = 4$$

(D)

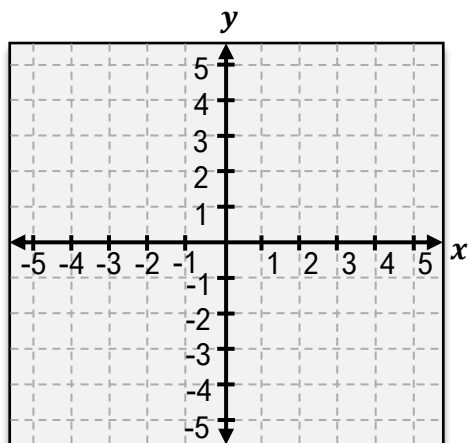
$$(x + 1)^2 + y^2 = 16$$

TOPIC: CIRCLES

EXAMPLE: Write the equation of a circle with the following characteristics and graph it.

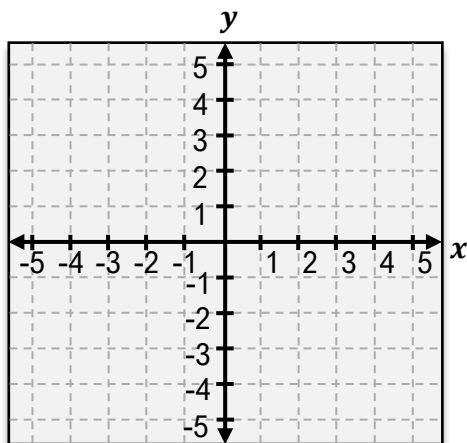
(A)

Center: $(0,1)$
Radius: 3



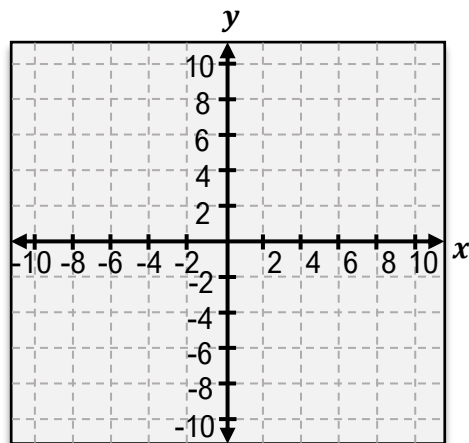
(B)

Center: $(1,-2)$
Radius: 1



(C)

Center: $(-6,3)$
Radius: $\sqrt{5}$



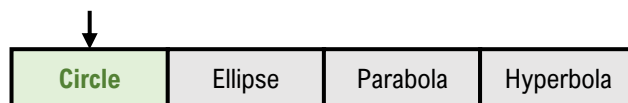
TOPIC: CIRCLES

General Form → Standard 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.



$$x^2 + y^2 + 2x + 6y + 8 = 0$$

General Form

Rewrite

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

Complete the Square

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

Standard Form

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

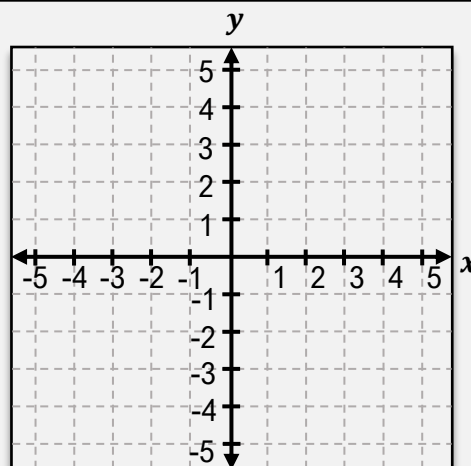
Standard Form

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 $\underline{\quad}$ to both sides for x terms
Add $\underline{\quad}$ to both sides for y terms
- 3) Factor to $(x + \underline{\quad})^2$ & simplify
- 4) Graph from $\underline{\quad}$ form



TOPIC: CIRCLES

PRACTICE: Determine if the equation $x^2 + y^2 - 2x + 4y - 4 = 0$ is a circle, and if it is, find its center and radius.

- (A) Is a circle, center = $c(0,0)$, radius $r = 2$.
- (B) Is a circle, center = $c(0,0)$, radius $r = 3$.
- (C) Is a circle, center = $c(1,-2)$, radius $r = 3$.
- (D) Is not a circle.

PRACTICE: Determine if the equation $x^2 + y^2 + 4x - 8y + 4 = 0$ is a circle, and if it is, find its center and radius.

- (A) Is a circle, center = $c(0,0)$, radius $r = 4$.
- (B) Is a circle, center = $c(2,-4)$, radius $r = 4$.
- (C) Is a circle, center = $c(-2,4)$, radius $r = 4$.
- (D) Is not a circle.