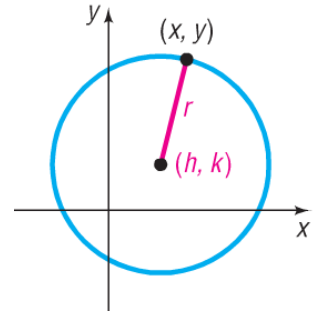


Circles

Circle: The set of all points in the xy -plane that are a fixed distance r , called the **radius**, from a fixed point (h, k) , called the **center** of the circle.



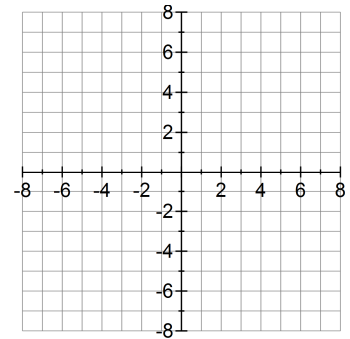
Standard Form of the Equation of a Circle with radius r and center (h, k) :

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

General Form of the Equation of a Circle:

$$x^2 + y^2 + ax + by + c = 0$$

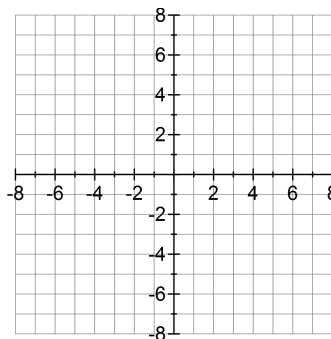
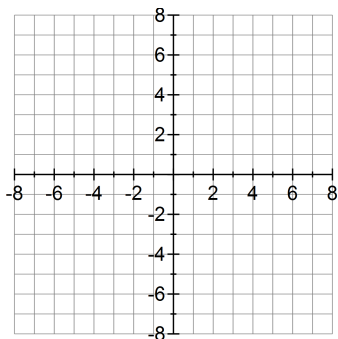
Example: Write the standard form of the equation and the general form of the equation of the circle with radius $r = 4$ and center $(h, k) = (4, -3)$. Then graph the circle.



Examples: Find the center (h, k) and radius r of each circle, graph the circle, and find the intercepts, if any.

a) $(x + 1)^2 + (y - 2)^2 = 25$

b) $3(x + 1)^2 + 3(y - 1)^2 = 6$



★ To find the standard form of the equation of a circle when you know the general form, complete the square for both x and y .

Examples: Find the standard form of the equation of each circle. State the center and radius of the circle.

a) $x^2 + y^2 - 6x + 2y + 9 = 0$

b) $2x^2 + 2y^2 + 8x - 8 = 0$

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

Midpoint Formula: $M = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$

Examples: Find the standard form of the equation of each circle.

a) Center at $(1, 0)$ and containing the point $(-3, 2)$.

b) Endpoints of a diameter at $(4, 3)$ and $(0, 1)$.

