10-8 Equations of Circles

The equation of the circle was derived from the distance formula.

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

$$r^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$

Standard Equation of a Circle:

* An equation for a circle with center (h, k) and a radius of r units is:

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

Given the center and a point on the circle, you can find the equation of the circle.

Given the equation of a circle you can state the center and radius.

When the center of the circle is the origin (0, 0) then the equation will be:

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

1. Write an equation for each circle.

a. Center at (3, -3), d = 12

h K

$r = 12 \div 2 = 6$

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

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

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

h K

b. Center at (-12, -1), r = 8

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

$(x+12)^2 + (y+1)^2 = 8^2$

2. Graph $(x - 3)^2 + y^2 = 16$

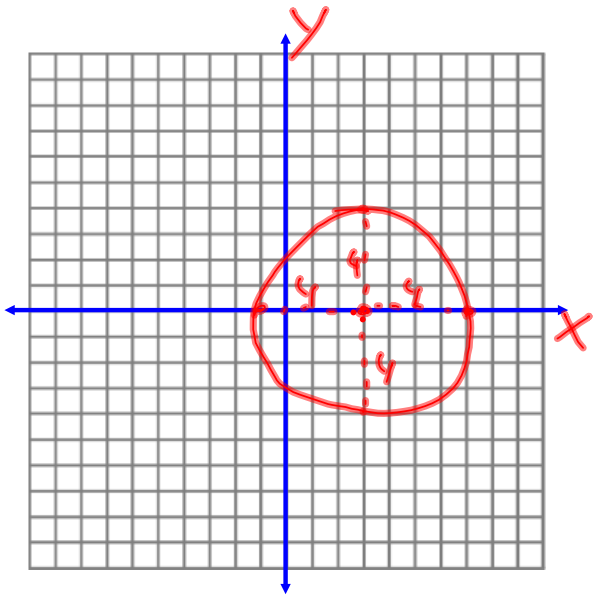
h K $= r^2$

Center: (3, 0)

r = 4

$r^2 = \sqrt{16}$

$r = 4$



3. Write an equation for a circle with a diameter that has endpoints (-7, -2) and (15, 6).

$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$

$\left(\frac{-7+15}{2}, \frac{-2+6}{2}\right)$

$\left(\frac{8}{2}, \frac{4}{2}\right)$

(4, 2) center

h k

(15, 6) (4, 2)

$r = \sqrt{(15-4)^2+(6-2)^2}$

$r = \sqrt{11^2+4^2}$

$r = \sqrt{121+16}$

$r = \sqrt{137}$

$r^2 = (\sqrt{137})^2$

$r^2 = 137$

$(x-4)^2+(y-2)^2=137$ (r^2)

4. Find the radius of a circle with equation $(x - 2)^2 + (y - 2)^2 = r^2$ that contains the point at (2, 5).