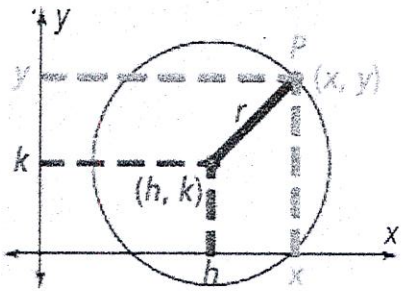
Equations of Circles

Formula for Circles

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



Center: (h, k)

Radius: r (make sure to sq. root)

Write an equation of a circle with the given center and radius.

***Plug in the coordinates for the circle into the h and k in the equation**
***Plug the value for the radius into the r in the equation. Remember to square it!**

Example 1)

a) Center (1, -3), Radius 10

h = 1 , k = −3 , r^2 = 100

$(x-1)^2 + (y+3)^2 = 100$

$(y--3) = (y+3)$

b) Center (2, 3), Diameter 9 ⇒ r = 4.5

h = 2 , k = 3 , r^2 = 20.25

$(x-2)^2 + (y-3)^2 = 20.25$

c) Center (0,0), Radius 10

h = 0 , k = 0 , r^2 = 100

$x^2 + y^2 = 100$

*do not write h, k if zero

Write an equation of the circle that passes through the given point and has the given center.

To find the radius, find the distance between the center and the given point.

Distance formula:

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

Example 2)

a) Center: (x_1, y_1) (0,0) Passes through: (x_2, y_2) (0, -3)

Radius = $\sqrt{(0-0)^2 + (-3-0)^2}$

$\sqrt{9} = 3$

h = 0 k = 0 r^2 = 9

$x^2 + y^2 = 9$

b) Center: (x_1, y_1) (1,7) Passes through: (x_2, y_2) (12, -5)

Radius = $\sqrt{(12-1)^2 + (-5-7)^2}$

$\sqrt{121 + 144} = \sqrt{265}$

h = 1, k = 7 r^2 = 265

$(x-1)^2 + (y-7)^2 = 265$

For each equation, find the center and the radius of the circle.

***x-value of the center is the opposite sign of the number in the parentheses with the x**

***y-value of the center is the opposite sign of the number in the parentheses with the y**

***radius is the square root of the number on the right side of the equation**

Example 3)

a) $x^2 + y^2 = 9/4$

h = 0 k = 0 r^2 = $\frac{9}{4}$

Center = (0, 0) Radius = $\frac{3}{2}$ or 1.5

b) $(x+3)^2 + (y-5)^2 = 81$

h = −3 k = 5 r^2 = 81

Center = (−3, 5) Radius = 9