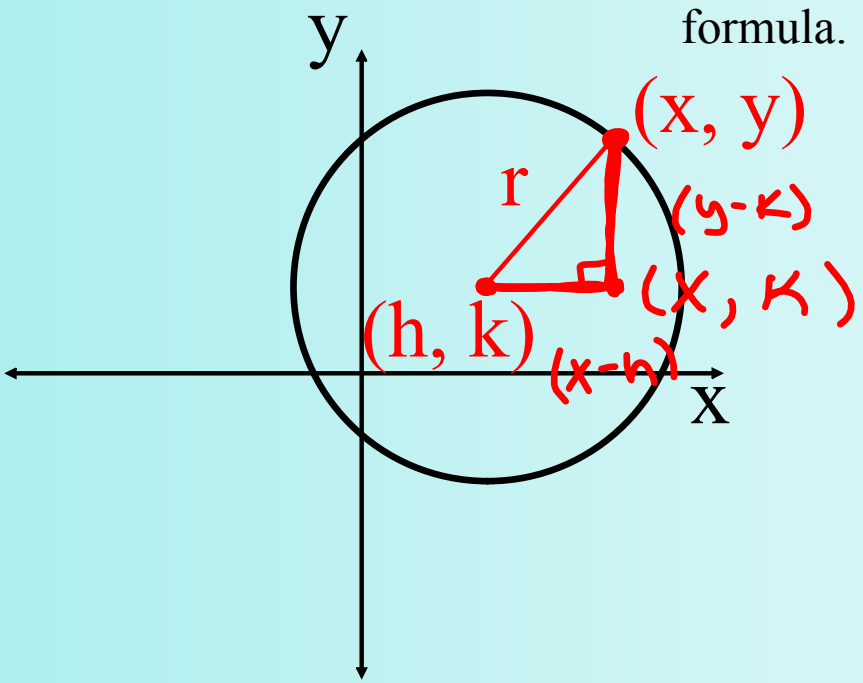
Geometry

12.5 Circles in the Coordinate Plane

You can use the Distance Formula to find an equation of a circle with center (h, k) and radius r. Let (x, y) be any point on the circle. Then the radius r is the distance from (h, k) to (x, y).

Derive the equation of a circle from the distance formula.



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

(center : (h, k)

r = radius

Standard Form of the equation of a circle:

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

Center: (h, k)
r = radius

Write in standard form the equation of a circle with center (-8, 0) and radius $\sqrt{5}$.

(h, k)

$C : (-8, 0)$

$r = \sqrt{5}$

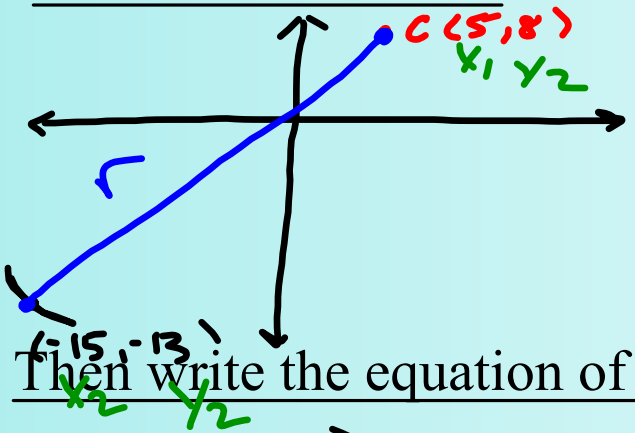
$(x-h)^2 + (y-k)^2 = (r)^2$

$(x-(-8))^2 + (y-0)^2 = (\sqrt{5})^2$

$\boxed{(x+8)^2 + y^2 = 5}$

Write in standard form the equation of a circle with center (5, 8) and passes through the point (-15, -13).

First find the radius.



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

$r = \sqrt{(-15-5)^2+(-13-8)^2}$

$r = \sqrt{(-20)^2+(-21)^2}$

$r = \sqrt{400+441} = \sqrt{841}$

$r = 29$

Then write the equation of the circle in standard form.

$C(5, 8)$

$h = 5$

$k = 8$

$r = 29$

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

$(x-5)^2+(y-8)^2 = (29)^2$

$(x-5)^2+(y-8)^2 = 841$

Find the center and radius of the circle with equation $(x+4)^2+(y-1)^2=25$. Then graph the circle.

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

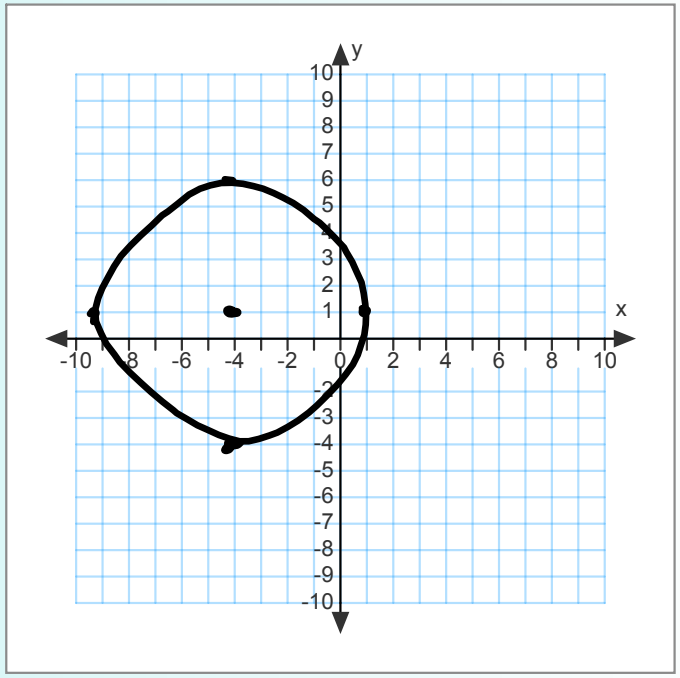
$(x+4)^2+(y-1)^2=25$

$(x-(-4))^2+(y-1)^2=25$

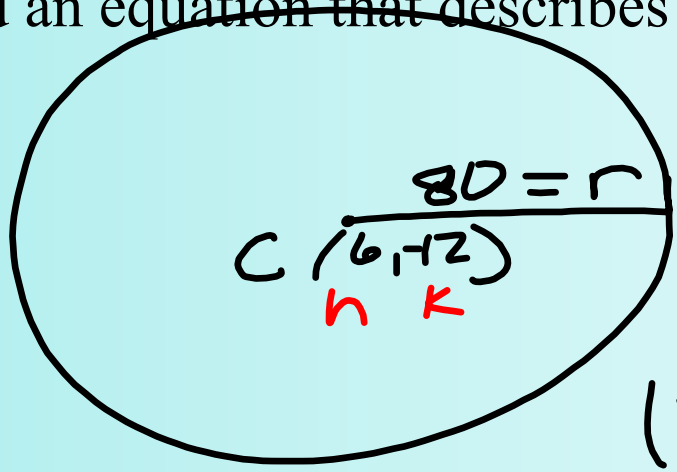
$\sqrt{r^2}=\sqrt{25}$

C(-4, 1)

r=5



A diagram locates a radio tower at (6, -12) on a coordinate grid where each unit represents 1 mi. The radio signal's range is 80 mi. Find an equation that describes the position and range of the tower.



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

$(x-6)^2 + (y-(-12))^2 = (80)^2$

$(x-6)^2 + (y+12)^2 = 6400$

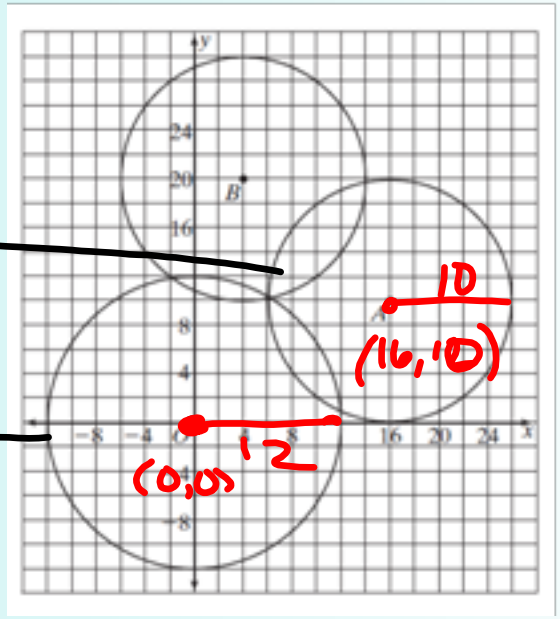
When you make a call on a cellular phone a tower recieves the call. In a diagram, the centers of circles O, A, and B are locations of cellular telephone towers. Write an equation in standard form that describes the position and range of each tower.

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

$(x-16)^2+(y-10)^2=100$

$(x-0)^2+(y-0)^2=12^2$

$x^2+y^2=144$



Write the standard equation of each circle.

center (3, 5)
radius 6

$(x-3)^2+(y-5)^2=6^2$

$(x-3)^2+(y-5)^2=36$

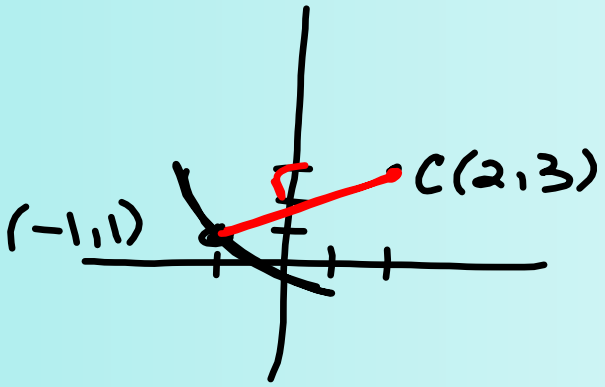
center (-2, -1)
radius $\sqrt{2}$

$(x-(-2))^2+(y-(-1))^2=(\sqrt{2})^2$

$(\sqrt{2})(\sqrt{2})=\sqrt{4}$

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

Write the standard equation of the circle with center (2, 3) that passes through the point (-1, 1).



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

$$= \sqrt{(2 - (-1))^2 + (3 - 1)^2}$$

$$\sqrt{(3)^2 + (2)^2}$$

$$\sqrt{9 + 4} = \sqrt{13}$$

$$(x - 2)^2 + (y - 3)^2 = (\sqrt{13})^2$$

$$(x - 2)^2 + (y - 3)^2 = 13$$

Find the center and radius of the circle with equation

$(x-2)^2+(y+3)^2=27.$

h K

$\sqrt{r^2}=\sqrt{27}$

$9\cdot 3$

$C:(2,-3)$ $r=3\sqrt{3}$