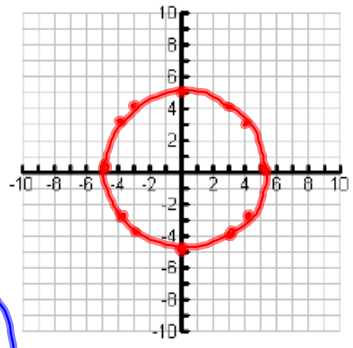
Notes Equation of a Circle 10.7

Consider the equation $x^2 + y^2 = 25$

Calculate the missing values in the table below. Then graph the ordered pair solutions to the equation on the coordinate plane.

| x | $x^2 + y^2 = 25$ | y |
|---|---|---|
| 0 | $y^2=25$ | $\pm5$ |
| 3 | $y^2=16$ | $\pm4$ |
| -3 | $y^2=16$ | $\pm4$ |
| 4 | $y^2=9$ | $\pm3$ |
| -4 | $y^2=9$ | $\pm3$ |
| 5 | $y^2=0$ | 0 |
| -5 | $y^2=0$ | 0 |



$r=5$

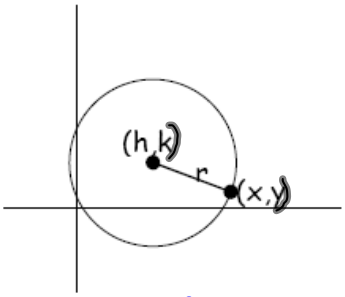
center $(0,0)$

We can use the distance formula to find an equation of a circle with the center (h,k) and radius r. Let (x,y) be any point on the circle. The radius is the distance from the center (h,k) to the point (x,y):

$r^2 = \left(\sqrt{(x-h)^2+(y-k)^2}\right)^2$ (distance formula)

$x^2+y^2=1$

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




Standard Equation of a Circle

$y=mx+b$

The standard equation of a circle with center (h,k) and radius r is :

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

h K r

Write the standard equation of a circle with center (0,-5) and radius 3.7.

$(x-0)^2+(y+5)^2=3.7^2$

$x^2+(y+5)^2=13.69$

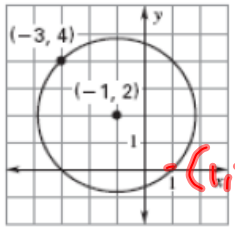
Write the standard equation of a circle.

$(h,k)=(-1,2)$

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

$d=\sqrt{(-1-1)^2+(2-0)^2}$

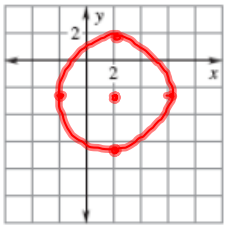
$d=(\sqrt{8})^2$




The equation of a circle is $(x-2)^2 + (y+3)^2 = 16$. Graph the circle.

$(2,-3)$

$r=4$




Write the standard equation for a circle with diameter endpoints at (-1,-1) and (5,7).

$(h,k)=(2,3)$

$(x-2)^2+(y-3)^2=25$

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

$d=\sqrt{36+64}$

$r=5$

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

$d=\sqrt{9+16}=5$

Time Capsule: You bury a time capsule and use a grid to write directions for finding it. Use the following measurements to find the location of the capsule.

The capsule is about 11 feet from the oak tree at A(0,0)

The capsule is 8 feet from the flagpole at B(0,8)

The capsule is 4 feet from the mailbox at C(-12,8)

$(-8,8)$