Notes Distance and Midpoint Formulas

The **Midpoint** of a line segment, m, from point $A(x_1, y_1)$ to $B(x_2, y_2)$ can be found by the formula:

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

The **Distance**, d, between two points $A(x_1, y_1)$ to $B(x_2, y_2)$ can be found by the formula:

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

Determine the length and midpoint of the line segment with the given endpoints.
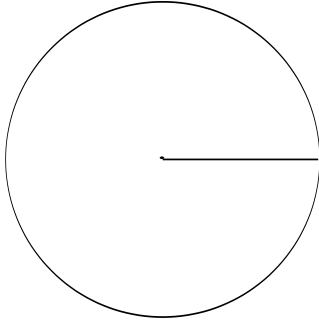
Ex1: $(4,6)$ and $(-5,-6)$	Ex2: $(5,0)$ and $(1,3)$

Ex3: $(-3,-2)$ and $(1,2)$

Notes Circles

A **Circle** is a set of points in a plane that are located a fixed distance, called the **radius**, from a given point, called the **center**.

The equation of a circle is standard form is $(x-h)^2 + (y-k)^2 = r^2$
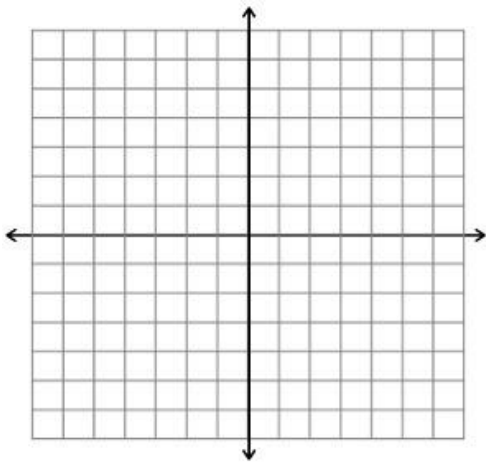
Where (h,k) is the center of the circle and r is the radius of the circle

To graph a circle:
- Determine the Center of the circle and draw the point on your graph
- Determine the radius of the circle and move up, down, left and right **r** units from the center
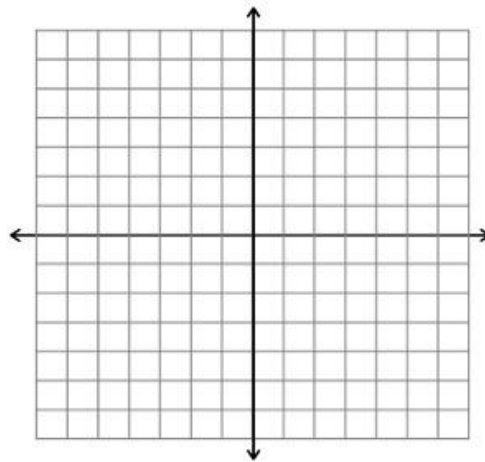- Connect the points giving it a circular shape

Find the equations of the following circles & graph the equations. Write your answer in standard form.
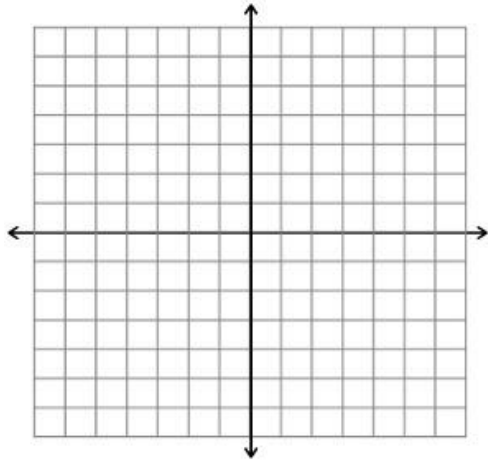
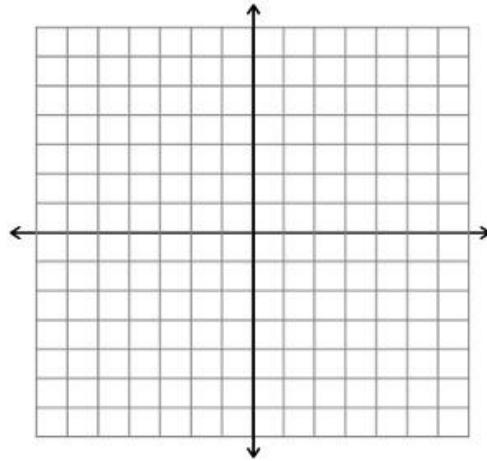| Ex4: Center $c = (0,0)$ and radius=2	Ex5: Center $c = (-2,1)$ and radius=3
STANDARD FORM:_____	STANDARD FORM:_____

Ex6: Center $c = (-1,1)$ and passing through $(2,5)$

STANDARD FORM:_____

Ex7: $(-8,1)$ & $(2,7)$ are endpoints of diameter

STANDARD FORM:_____

When you have an equation in this form $(x-h)^2 + (y-k)^2 = r^2$

- If $r^2 > 0$ then you have a circle of radius r
- If $r^2 = 0$ then you have a point at (h,k)
- If $r^2 < 0$ then you have NO GRAPH

Determine if the given equation represents a circle, point or no graph. If the graph of the equation is a circle give the center and radius. If the equation represents a point, name the point.

Ex8: $(x+7)^2 + (y-2)^2 = 1$

Ex9: $x^2 + y^2 - 8x + 5 = 0$

Ex10: $x^2 + y^2 + 2x + 8y + 6 = 0$

Ex11: $x^2 + y^2 + 10x + 25 = 0$

Ex12: $x^2 + y^2 - 4x + 6y + 20 = 0$