Goals:

* I can write equations of circles.
* I can graph circles.

**Midpoint Formula:** $\left(h,k\right)=\left(\frac{x\_{1}+x\_{2}}{2},\frac{y\_{1}+y\_{2}}{2}\right)$

**Distance Formula:** $d^{2}=\left(x\_{1}-x\_{2}\right)^{2}+\left(y\_{1}-y\_{2}\right)^{2}$ **or** $d=\sqrt{\left(x\_{1}-x\_{2}\right)^{2}+\left(y\_{1}-y\_{2}\right)^{2}}$

**Example 1: Find the midpoint of the line segment with endpoints at the given coordinates.**

|  |  |
| --- | --- |
| 1. $\left(10, 6\right), \left(18, 12\right)$
 | 1. $\left(-12, -2\right), \left(-10, -6\right)$
 |

**Example 2: Find the distance between each pair of points with the given coordinates.**

|  |  |
| --- | --- |
| 1. $\left(3, -5\right), \left(13, -11\right)$
 | 1. $\left(-4.5, 10.75\right), \left(-6.25, -7\right)$
 |

**Example 3: Write each equation in standard form. Identify the vertex, axis of symmetry, and direction of opening of the parabola.**

|  |
| --- |
| 1. $y=-6x^{2}-36x-8$

Standard form: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Vertex:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_AOS: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Direction of opening of the parabola: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

**Example 4: Identify the Center and the Radius**

$$\left(x+2\right)^{2}+\left(y-3\right)^{2}=121$$

Center: Graph:

Radius:

**Example 6: Finding Center and Radius with Complex Equations**

$$x^{2}+y^{2}+24x+10y+160=0$$

|  |  |
| --- | --- |
| $$x^{2}+y^{2}+24x+10y+160=0$$$$\left(x^{2}+24x\right)+\left(y^{2}+10y\right)=-160$$$(x^{2}+24x+$\_\_\_$)+(y^{2}+10y+$\_\_\_$)=-160+$\_\_\_\_$+$\_\_\_\_ | * Original Equation
* Group *x*’s and *y*’s together and constants on the other side.
* Complete the square TWO TIMES
* Factor each set of parentheses
* Simplify the Right side

Center: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Radius: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |