

**Goals**:

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

**Vocabulary and Formulas**

**Circle**: the set of all points in a plane that are equidistant from a

given point in the plane

**Center (h, k):** the point that is equidistant from all points around a circle

**Radius:** any segment with endpoints at the center and a point on the

circle is a radius of the circle.

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

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



**Example 1: Write an Equation from a Graph**

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| --- | --- |
| Steps | Explanation |
| $$\left(x-h\right)^{2}+\left(y-k\right)^{2}=r^{2}$$ | Standard form of the circle. |
|  | Plug in what you know. |
|  | Simplify inside the parentheses |
|  | Use distance formula to find the radius |
|  | Simplify for $r^{2}$ |
|  | Write the final equation of the circle! |

**Example 2: Write an equation for a circle if the endpoints of a diameter are at** $(7, 6)$ **and** $(-1, -8)$**.**

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| Step 1: Find the center.$$\left(h, k\right)=\left(\frac{x\_{1}+x\_{2}}{2},\frac{y\_{1}+y\_{2}}{2}\right)$$ | Midpoint Formula using the two points given. |
| Step 2: Find the radius.$$r=\sqrt{\left(x\_{1}-x\_{2}\right)^{2}+\left(y\_{1}-y\_{2}\right)}$$ | Distance formula using one of the points given and the center.Since $r=\sqrt{260}$ then $r^{2}=260$. |
| Step 3: Put it all together!$$\left(x-h\right)^{2}+\left(y-k\right)^{2}=r^{2}$$ | Substitute *h, k,* and $r^{2}$ into the standard form of the equation of a circle. |

**Example 3: Write an equation for each circle given the center and radius.**

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| Center: $(4, 9)$, $r=6$Original Equation: $\left(x-h\right)^{2}+\left(y-k\right)^{2}=r^{2}$Substitute in what you have:  |

**Example 4: Graph an Equation in Standard Form**

**Find the center and radius of the circle with equation** $(x-1)^{2}+(y+2)^{2}=100$**. Then graph the circle.**

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| Questions to ask yourself? |
| What is the center of the circle? |
| What is the radius? |
| What are some other points on the circle?

|  |  |
| --- | --- |
| x | y |
| 0 |  |
| 6 |  |
| 8 |  |
| 10 |  |

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