

1. Write an equation of a circle with a center at $(2, -4)$ and an area of 81π units squared.

I know the area of a circle is found by $A = \pi r^2$ so I substituted 81π in for the area to solve for r , the radius.	$A = \pi r^2$ $81\pi = \pi r^2$
I divided both sides by π then took the square root of both sides.	$\frac{81\pi}{\pi} = \frac{\pi r^2}{\pi}$ $81 = r^2$ $\sqrt{81} = \sqrt{r^2}$
This led me to $r=9$. Now that I have a radius along with a center, I am ready to write an equation.	$9 = r$
Using the standard form of an equation for a circle, I substituted $(2, -4)$ for the center: (h, k) and 9 for the radius, r .	$(x - h)^2 + (y - k)^2 = r^2$ $(x - 2)^2 + (y - 4)^2 = 9^2$
Then I simplified where possible.	$(x - 2)^2 + (y + 4)^2 = 81$

Practice

1. Write an equation of a circle with a center at $(-3, 1)$ and an area of 64π units squared.
- Write the equation for area of a circle.
 - Substitute into this equation to find the missing radius.
 - Write the standard form of a circle with (h, k) as the center and r as the radius.
 - Now substitute the center and radius into the standard form equation of a circle. Simplify where needed.

2. Write an equation of a circle with ends of a diameter: (5, 17) and (-3, -5).

<p>The first thing I had to figure out was what I could do with the endpoints of the diameter. I know that the radius is half of the diameter, so I decided that I would find the length of the diameter to help me get the radius. I used the distance formula to find the length.</p>	$\begin{aligned}(x_1, y_1) &= (5, 10) \\ (x_2, y_2) &= (-3, -5) \\ d &= \sqrt{(y_2 - y_1)^2 + (x_2 - x_1)^2} \\ d &= \sqrt{(-5 - 10)^2 + (-3 - 5)^2} \\ d &= \sqrt{(-15)^2 + (-8)^2} \\ d &= \sqrt{225 + 64} \\ d &= \sqrt{289} \\ d &= 17\end{aligned}$
<p>Once I had the diameter was 17 units, all I did to find the radius was divide it by 2. The radius of the circle is 8.5 units.</p>	$\begin{aligned}d &= 2r \\ 17 &= 2r \\ \frac{17}{2} &= \frac{2r}{2} \\ 8.5 &= r\end{aligned}$
<p>Next I realized I didn't have the center of the circle. I had to think about where the center is in relation to the diameter. I realized that the center is the midpoint of the diameter. Once I got the idea, all I had to do was use the midpoint formula to find the middle of the diameter, a.k.a my center.</p>	$\begin{aligned}(x_1, y_1) &= (5, 10) \\ (x_2, y_2) &= (-3, -5) \\ \text{midpoint: } &\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) \\ \text{midpoint: } &\left(\frac{5 + -3}{2}, \frac{10 + -5}{2}\right) \\ &\left(\frac{2}{2}, \frac{5}{2}\right) \\ \text{midpoint: } &(1, 2.5)\end{aligned}$
<p>The last thing I needed to do was to substitute the midpoint for the center and use the radius I found.</p>	$\begin{aligned}(x - h)^2 + (y - k)^2 &= r^2 \\ (x - 1)^2 + (y - 2.5)^2 &= (8.5)^2 \\ (x - 1)^2 + (y - 2.5)^2 &= 72.25\end{aligned}$

Practice

2. Write an equation of a circle with ends of a diameter: (-8, 17) and (-3, 5).

a) Write the distance formula.

b) Find the length of the diameter using the distance formula.

c) Identify the radius of the circle now that you have the diameter.

d) Write the midpoint formula.

e) Find the center of the circle using the midpoint formula.

f) Write the standard form of a circle with (h,k) as the center and r as the radius.

g) Use the radius you found in part c) and the center from part e) to write an equation of a circle in standard form. Simplify where needed.