

10.8 Equations of Circles Guided Notes

Objective: *To be able to write the equation circles and graph circles.*

Standard Equation of a Circle: $(x - h)^2 + (y - k)^2 = r^2$

Things to Notice

1. *Center at point (h , k)*
2. *Radius r*
3. *The terms being squared are not expanded.*
4. *The Signs!!!*

Write the equation for each circle.

1) Center at $(-2, 3)$, $r = 5$

$$\begin{aligned}(x - h)^2 + (y - k)^2 &= r^2 \\(x + 2)^2 + (y - 3)^2 &= 5^2 \\(x + 2)^2 + (y - 3)^2 &= 25\end{aligned}$$

2) Center at $(-2, -6)$, $d = 8$

$$\begin{aligned}r &= 4 \\(x - h)^2 + (y - k)^2 &= r^2 \\(x + 2)^2 + (y + 6)^2 &= 4^2 \\(x + 2)^2 + (y + 6)^2 &= 16\end{aligned}$$

3) Center at $(-\frac{1}{2}, \frac{1}{4})$, $r = \sqrt{3}$

$$\begin{aligned}(x - h)^2 + (y - k)^2 &= r^2 \\(x + \frac{1}{2})^2 + (y - \frac{1}{4})^2 &= (\sqrt{3})^2 \\(x + \frac{1}{2})^2 + (y - \frac{1}{4})^2 &= 3\end{aligned}$$

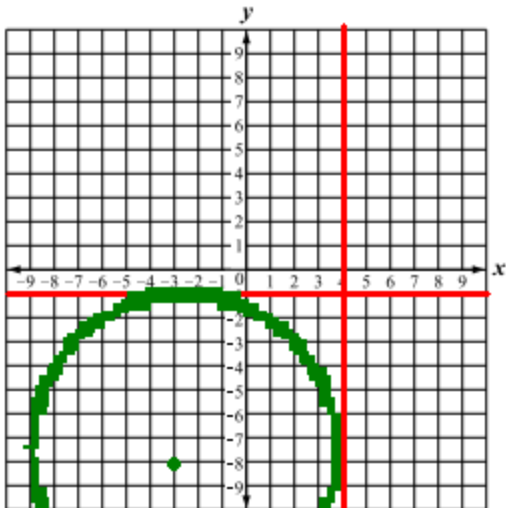
4) A diameter has endpoint at $(-7, -2)$ and $(-15, 6)$

**Find Midpoint, then find distance from One of the endpoints to the center.*

$$\begin{aligned}\text{midpoint} &= \left(\frac{(-7 + 15)}{2}, \frac{(-2 + 6)}{2} \right) \\&= \left(\frac{-22}{2}, \frac{4}{2} \right) \\&= (-11, 2)\end{aligned}$$

$$\begin{aligned}\text{Distance} &= \sqrt{(-11 + 7)^2 + (2 + 2)^2} \\&= \sqrt{(-4)^2 + (4)^2} \quad (x - h)^2 + (y - k)^2 = r^2 \\&= \sqrt{16 + 16} \quad (x + 11)^2 + (y - 2)^2 = (\sqrt{32})^2 \\&= \sqrt{32} \quad (x + 11)^2 + (y - 2)^2 = 32\end{aligned}$$

5) Center is in the third quadrant, $d = 14$, and has tangent lines $x = 4, y = -1$.

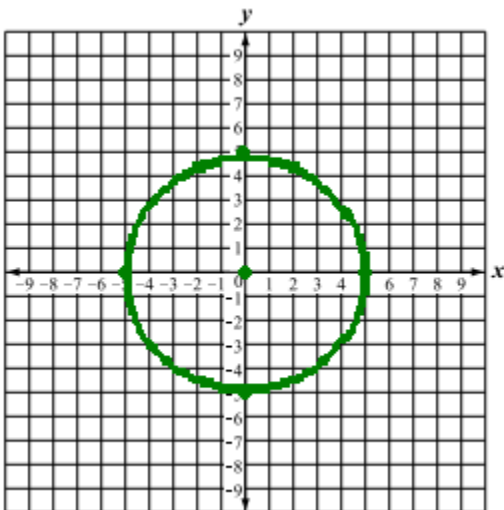


$$r = 7$$

*Draw tangent lines, count left 7, down 7 so it's in the 3rd quadrant

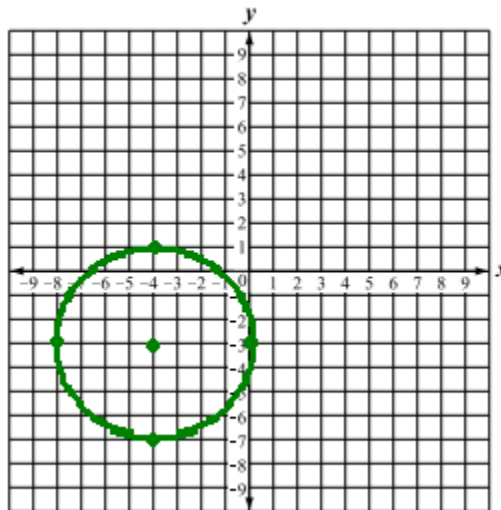
Graph each equation

6) $x^2 + y^2 = 25$



$$r = 5, (0, 0)$$

7) $(x + 4)^2 + (y + 3)^2 = 16$



$$r = 4, (-4, -3)$$

8) $(x - 2)^2 + (y - 2)^2 = r^2$ and contains (2, 5).

$$(2, 2)$$

$$\begin{aligned} r &= \sqrt{(2 - 2)^2 + (2 - 5)^2} \\ &= \sqrt{(0)^2 + (-3)^2} \\ &= \sqrt{0 + 9} \\ &= \sqrt{9} \\ &= 3 \end{aligned}$$

