

14.2 ~ Circles

Past due on _____ Period _____

Use the information provided to write the standard form equation of each circle.

- 1) Center:
- $(-3, -6)$

Point on Circle: $(3, -9)$

$$(x+3)^2 + (y+6)^2 = 45$$

$$\begin{aligned} r &= \sqrt{(3-(-3))^2 + (-9-(-6))^2} \\ &= \sqrt{6^2 + (-3)^2} \\ &= \sqrt{36+9} \\ &= \sqrt{45} \end{aligned}$$

- 2) Ends of a diameter:
- $(-11, 2)$
- and
- $(-13, 14)$

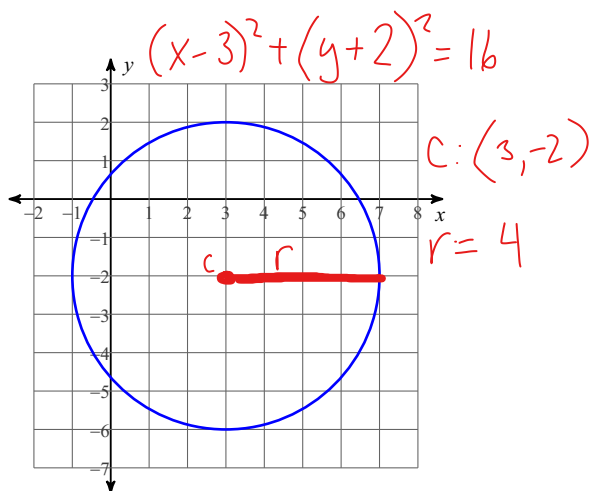
$$\left(\frac{x_2+x_1}{2}, \frac{y_2+y_1}{2} \right) \rightarrow \left(\frac{-11+(-13)}{2}, \frac{2+14}{2} \right) \rightarrow \left(\frac{-24}{2}, \frac{16}{2} \right)$$

center: $(-12, 8)$

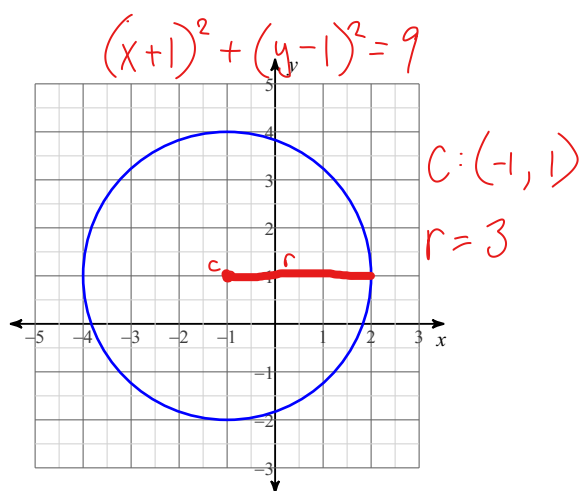
$$\begin{aligned} r &= \sqrt{(-12-(-11))^2 + (8-2)^2} \\ &= \sqrt{1^2 + 6^2} \\ &= \sqrt{1+36} \\ &= \sqrt{37} \end{aligned}$$

$$(x+12)^2 + (y-8)^2 = 37$$

- 3)



- 4)



- 5) Ends of a diameter:
- $(-10, 17)$
- and
- $(-4, 11)$

$$\left(\frac{-10+(-4)}{2}, \frac{17+11}{2} \right) \rightarrow \left(\frac{-14}{2}, \frac{28}{2} \right)$$

 $C: (-7, 14)$

$$\begin{aligned} r &= \sqrt{(-7-(-4))^2 + (14-11)^2} \\ &= \sqrt{(-3)^2 + 3^2} \\ &= \sqrt{9+9} \\ &= \sqrt{18} \end{aligned}$$

$$(x+7)^2 + (y-14)^2 = 18$$

- 6) Center:
- $(7, -5)$

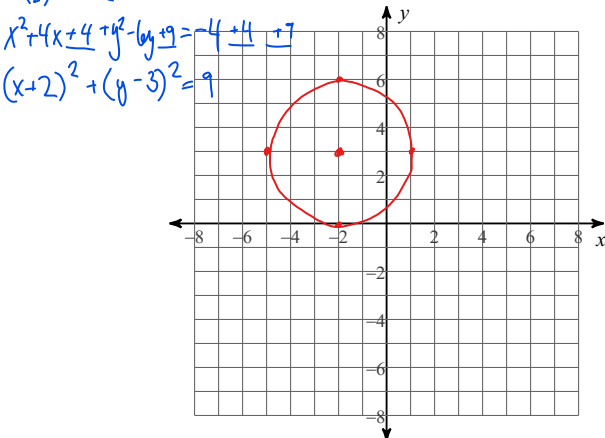
Point on Circle: $(-5, -5)$

$$\begin{aligned} r &= \sqrt{(-5-7)^2 + (-5-(-5))^2} \\ &= \sqrt{(-12)^2 + 0} \\ &= \sqrt{144} \\ &= 12 \end{aligned}$$

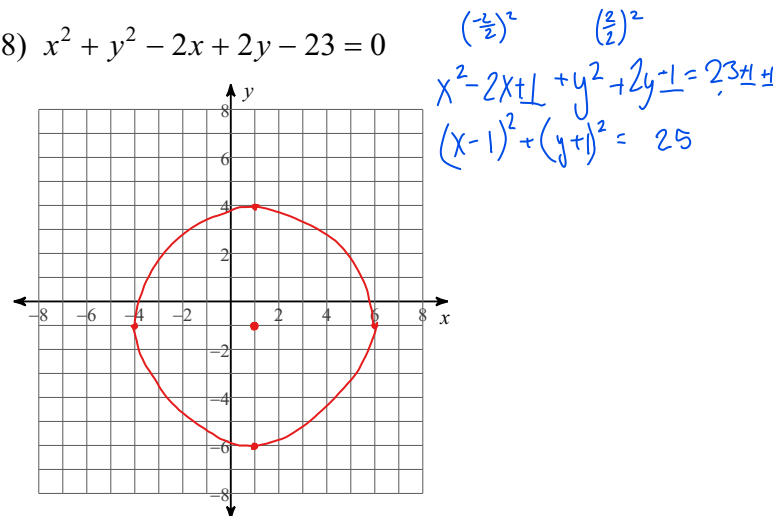
$$(x-7)^2 + (y+5)^2 = 144$$

Consider the circle whose equation is given in general form. Complete the square to write the equation in standard form. Then identify the coordinates of the center and the radius and sketch its graph.

$$\left(\frac{4}{2}\right)^2 \quad \left(\frac{-3}{2}\right)^2 \quad 7) \quad x^2 + y^2 + 4x - 6y + 4 = 0$$



$$8) \quad x^2 + y^2 - 2x + 2y - 23 = 0$$



Consider the circle whose equation is given in general form. Complete the square to write the equation in standard form. Then identify the coordinates of the center and the radius.

$$9) \quad x^2 + y^2 - 10x - 2y - 170 = 0$$

$\left(\frac{-10}{2}\right)^2 \quad \left(\frac{-2}{2}\right)^2$
 $x^2 - 10x + 25 + y^2 - 2y + 1 = 170 + 25 + 1$
 $(x-5)^2 + (y-1)^2 = 196$
 $C: (5, 1)$
 $r = \sqrt{196} = 14$

$$10) \quad x^2 + y^2 + 22x - 6y + 94 = 0$$

$\left(\frac{22}{2}\right)^2 \quad \left(\frac{-6}{2}\right)^2$
 $x^2 + 22x + 121 + y^2 - 6y + 9 = -94 + 121 + 9$
 $(x+11)^2 + (y-3)^2 = 36$
 $C: (-11, 3) \quad r = 6$

$$11) \quad 2x^2 + 2y^2 - 14x + 2y + 7 = 0$$

$\left(\frac{-7}{2}\right)^2 \quad \left(\frac{1}{2}\right)^2$
 $2x^2 - 14x + \frac{49}{2} + 2y^2 + 2y + \frac{1}{2} = -7 + \frac{49}{2} + \frac{1}{2}$
 $\frac{2(x-\frac{7}{2})^2 + 2(y+\frac{1}{2})^2}{2} = \frac{18}{2}$
 $(x-\frac{7}{2})^2 + (y+\frac{1}{2})^2 = 9$
 $C: (\frac{7}{2}, -\frac{1}{2}) \quad r = 3$

$$12) \quad 4x^2 + 4y^2 - 12x - 32y + 57 = 0$$

$\left(\frac{-3}{2}\right)^2 \quad \left(\frac{-8}{2}\right)^2$
 $4x^2 - 12x + 9 + 4y^2 - 32y + 64 = -57 + 9 + 64$
 $4[(x-\frac{3}{2})^2 + (y-4)^2] = 16$
 $(x-\frac{3}{2})^2 + (y-4)^2 = 4$
 $C: (\frac{3}{2}, 4) \quad r = 2$