TODAY'S AGENDA: May 21- June 5

- **Work on Khan Academy Mission:**
- **Whole Class Lessons**

- Today's Objective:

- **Equations of Circles**

- Standards:

- G.GPE. A.1:

- 1a. Derive the equation of a circle of given center and radius using the Pythagorean Theorem.

- Find the center and radius of a circle, given the equation of the circle.

- 1b. Graph circles given their equation.

Features of a Circle From its Standard Equation

- Standard Form of a Circle

$$(x - h)^2 + (y - k)^2 = r^2$$

Where (h, k) is the coordinate for the center of the circle, and r is the radius of the circle.

Example: $(x - 5)^2 + (y + 2)^2 = 36$

Center $(5, -2)$ Radius $= 6$

$$\left(x - \frac{2}{3}\right)^2 + y^2 = \sqrt{36}$$

$$\left(\frac{2}{3}, 0\right) \quad R = 6$$

The equation of a circle is given below.

$$(x - 13.4)^2 + (y + 2.6)^2 = \sqrt{100}$$

What is its center?

(13.4 , -2.6)

What is its radius?

If necessary, round your answer to two decimal places.

10 units

The equation of a circle is given below.

$$(x - 20)^2 + (y - 0.05)^2 = 81$$

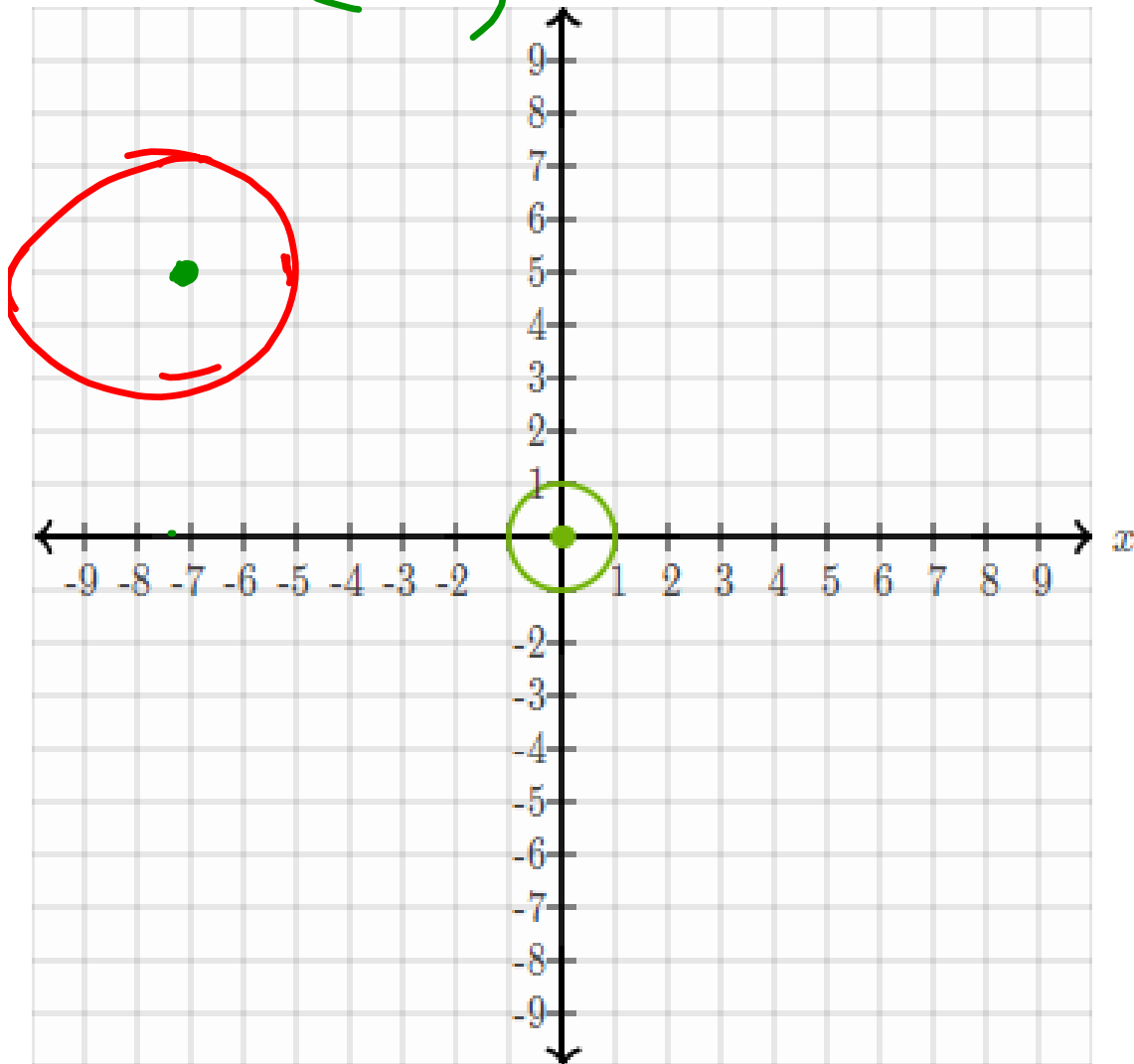What is its center?

(20 , 0.05)

What is its radius?

If necessary, round your answer to two decimal places.

9 units

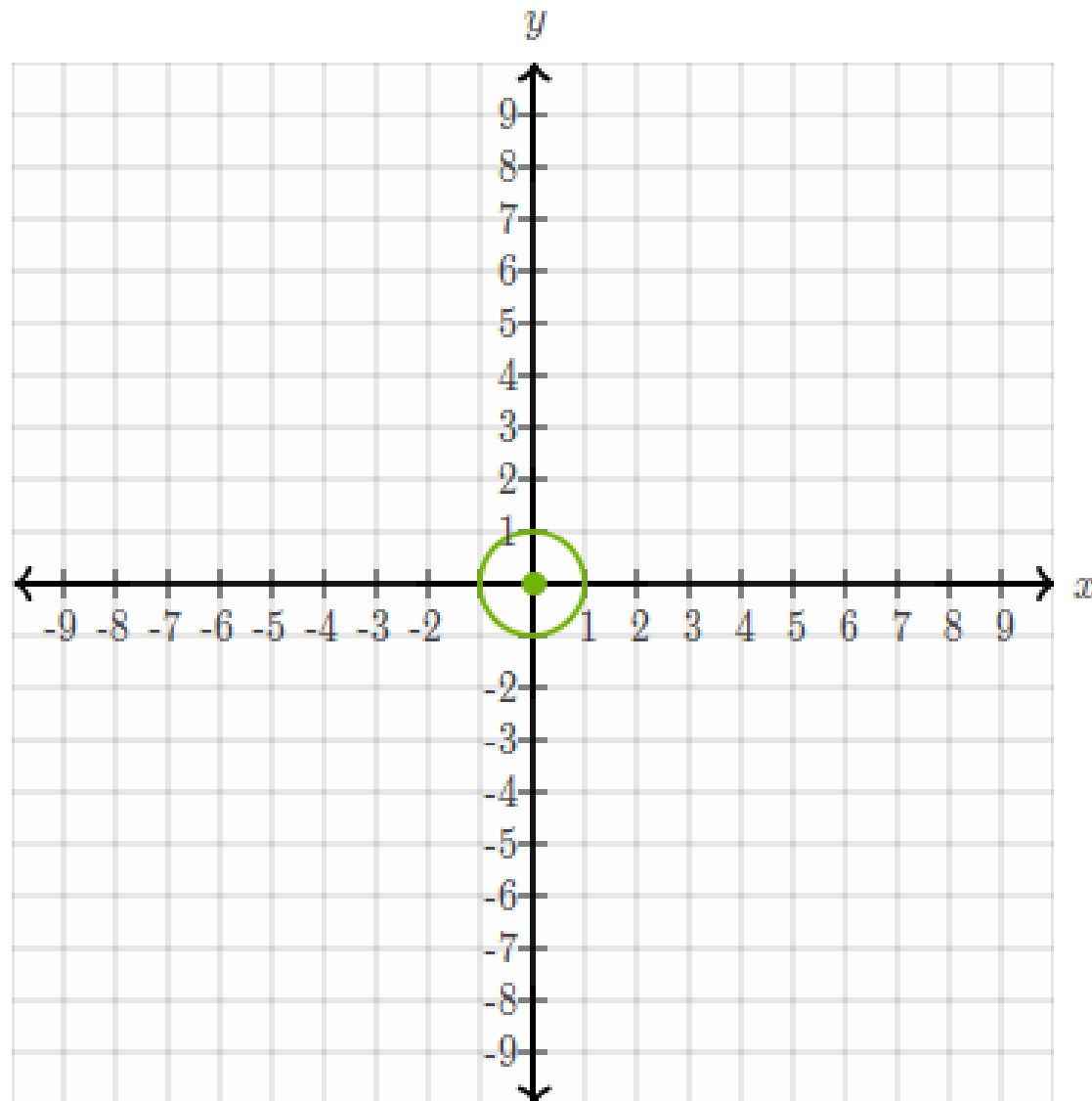Graph the circle $(x + 7)^2 + (y - 5)^2 = 4$.

$(-7, 5)$

$r = 2$

Graph the circle $(x - 1)^2 + (y - 8)^2 = 4$.

Writing Equations of a Circle in Standard Form

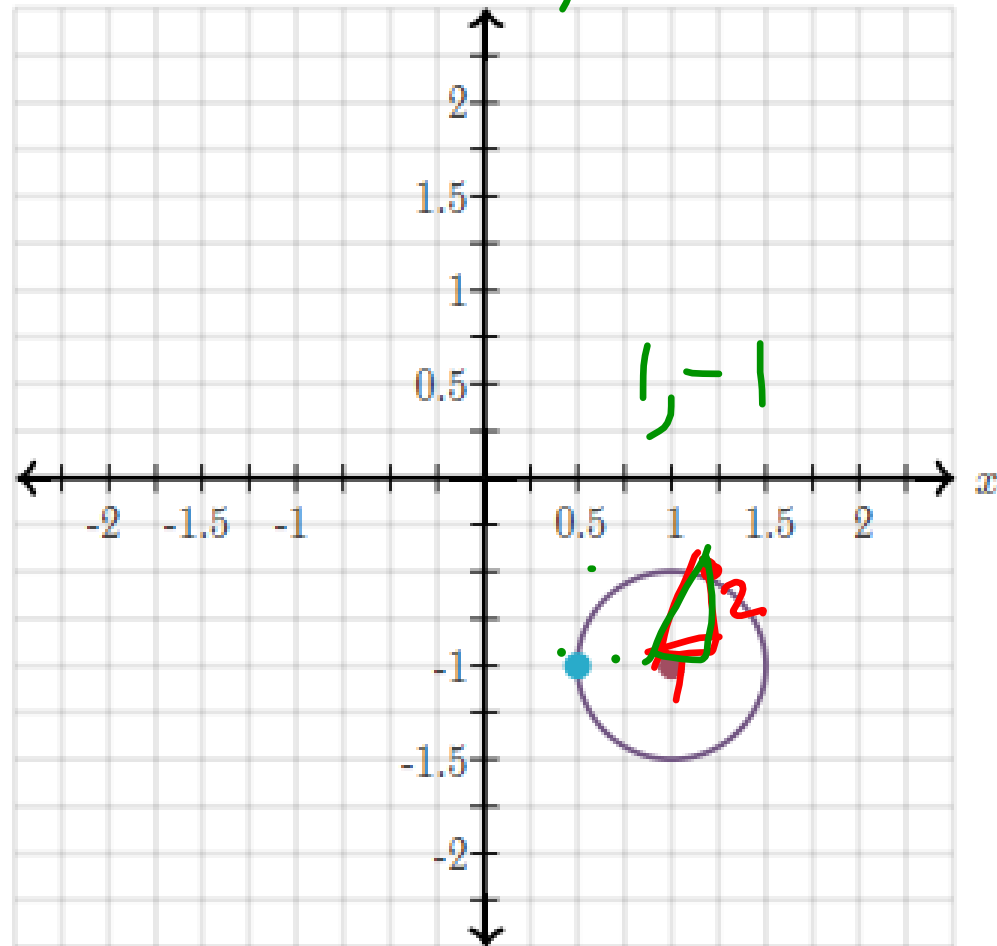A circle has a radius of $\sqrt{13}$ units and is centered at $(-9.3, 4.1)$.

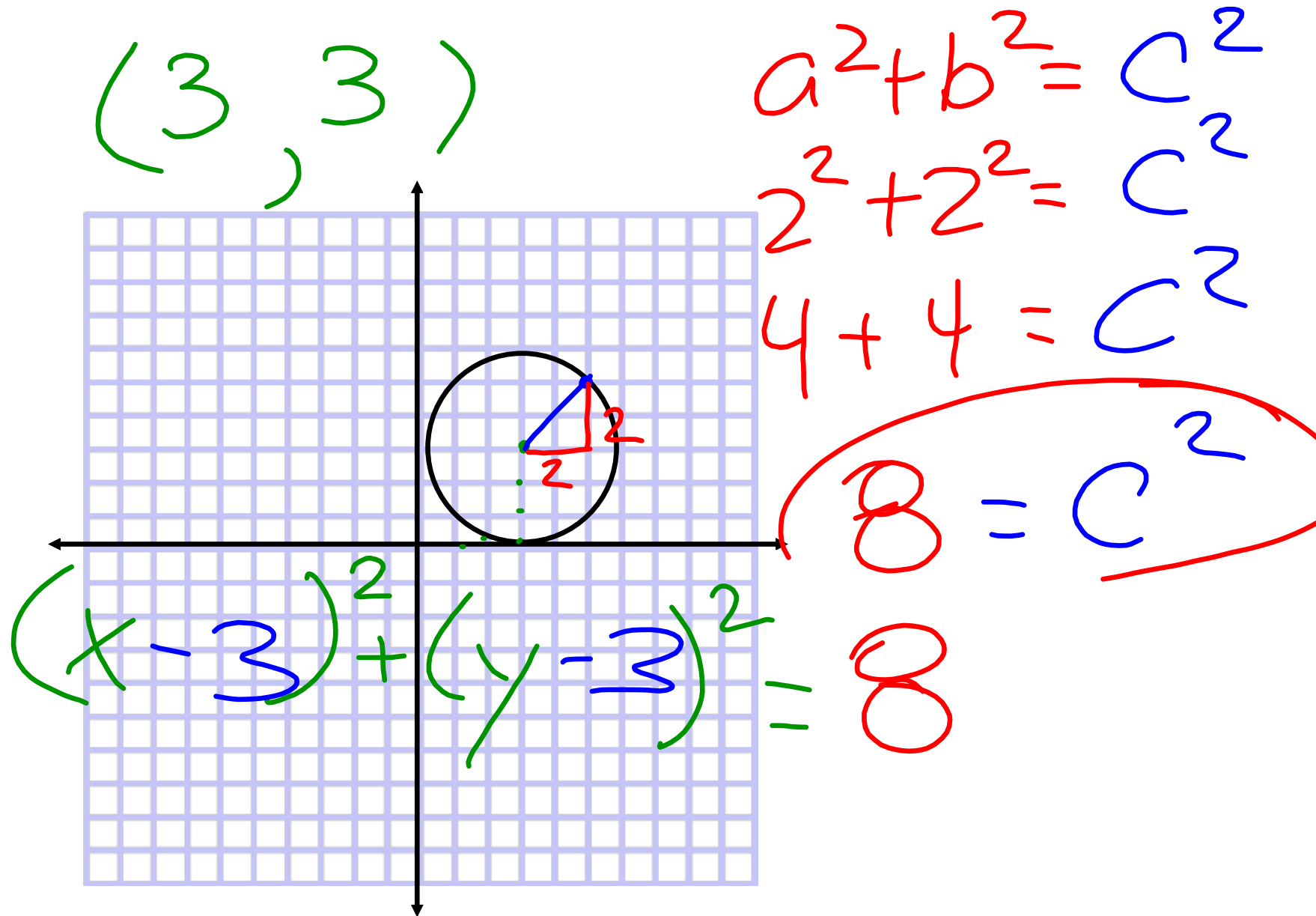Write the equation of this circle.

$$(x+9.3)^2 + (y-4.1)^2 = 13$$

Write the equation of the circle graphed below.

$(x-1)^2 + (y+1)^2 = 5$

$1^2 + 2^2$

$1 + 4 = \sqrt{5}$

$r = \sqrt{5}$

$r^2 = 5$

1, -1

$$(3, 3)$$

$$a^2 + b^2 = C^2$$

$$2^2 + 2^2 = C^2$$

$$4 + 4 = C^2$$

$$8 = C^2$$

$$(x-3)^2 + (y-3)^2 = 8$$

A circle has a radius of $\dfrac{5}{3}$ units and is centered at $(9.2, -7.4)$.

Write the equation of this circle. $\left(\dfrac{5}{3}\right)^2$

$$(x - 9.2)^2 + (y + 7.4)^2 = \dfrac{25}{9}$$

Completing A Square

4
16

HALF ②8

AND

SQUARE ④64

Equations of a Circle in Expanded Form
&
Completing the Square

What is the missing constant term in the perfect square that starts with $x^2 + 10x$?

$$x^2 + \boxed{10}x + 25$$

What is the missing constant term in the perfect square that starts with $x^2 - 16x$?

$$x^2 - 16x + 64$$

A certain circle can be represented by the following equation.

$$x^2 + y^2 + 10x + 12y + 25 = 0$$

What is the center of this circle?

([   ] , [   ])

What is the radius of this circle?

[   ] units

$$+25 = 0$$

$$\frac{-25}{+25}$$

$$x^2 + 10x + 25 \quad\quad y^2 + 12y + 36$$

$$(x + 5)^2 \quad\quad (y + 6)^2$$

$$(-5, -6) \quad r = 6$$

A certain circle can be represented by the following equation.

$$x^2 + y^2 + 12x + 4y + 15 = 0$$

$$x^2 + 12x + 36 \quad y^2 + 4y + 4$$

$$(x+6)^2 \quad (y+2)^2$$

What is the center of this circle?

$$(\ -6\ ,\ -2\ )$$

What is the radius of this circle?

$$-15$$
$$+36$$
$$+\ \ 4$$
$$\overline{\sqrt{25}}$$

5 units

A certain circle can be represented by the following equation.

$$x^2 + y^2 + 6y - 72 = 0$$

$$x^2 + 6y + 9 \quad y^2$$

$$(x+3)^2$$

What is the center of this circle?

$$(-3 , 0)$$

What is the radius of this circle?

$$9 \quad \text{units}$$

$$\begin{array}{c} 72 \\ \underline{9} \\ \sqrt{81} \end{array}$$

$$x^2 + y^2 - 10x - 16y \boxed{+53} = 0$$
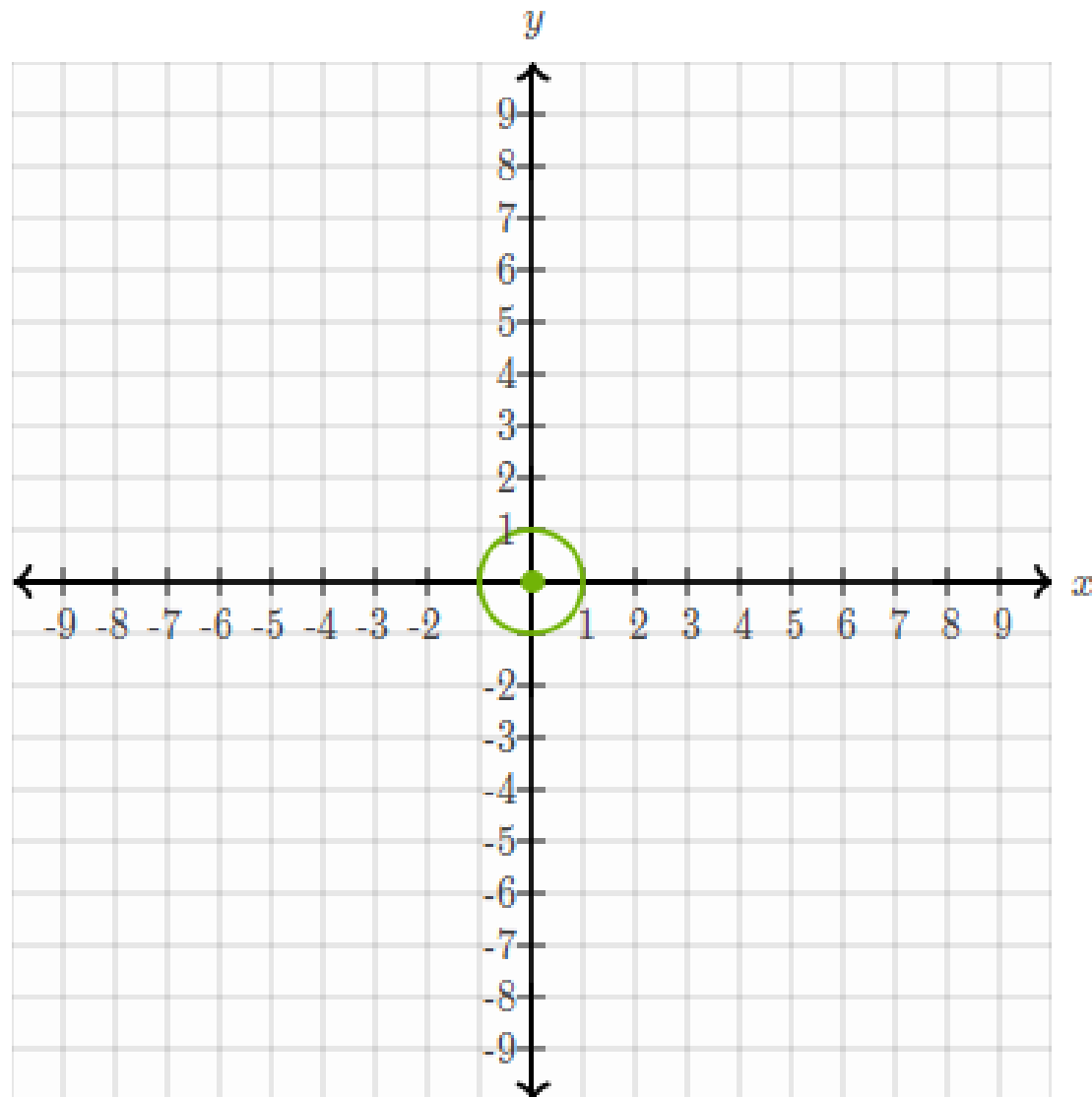
$$x^2 - 10x +25 \qquad y^2 - 16y + 64$$

$$(x-5)^2 \qquad (y-8)^2$$

$$(5,8) \qquad r = 6$$

$$\begin{array}{r} -53 \\ +25 \\ +64 \\ \hline \sqrt{36} \end{array}$$

Graph the circle $x^2 + y^2 + 2x + 4y - 44 = 0$.

Skills You Should Be Working on:

1. Features of a circle from its standard equation

2. Graph a circle from its standard equation

3. Write standard equation of a circle

4. Features of a circle from its expanded equation

5. Graph a circle from its expanded equation