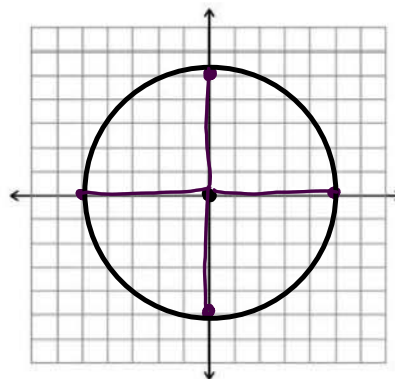


Geometry CC – Mr. Valentino
 Unit 12 (Our LAST Unit!) Day 1 – Equation of a Circle

Name: _____
 Date: _____ Per: _____

Aim: What is the equation of a circle (Day 1)?

Do Now:
 The center of a circle lies at the origin. Its radius is 5. Plot **at least** four points that will make up the circle.



How do you know they are 5 units away?

Because they are each a radius.

Equation of a Circle

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

$(h,k) \rightarrow$
 center of the circle
 $r \rightarrow$ radius

1. Write an equation of the circle whose center is (5, 4) and whose radius is 7.

$$(x-5)^2 + (y-4)^2 = 49$$

2. Write an equation of the circle whose center is (-5, -3) and whose radius is 9.

$$(x+5)^2 + (y+3)^2 = 81$$

3. Write an equation of the circle whose center is (3, -4) and whose radius is 5.

$$(x-3)^2 + (y+4)^2 = 25$$

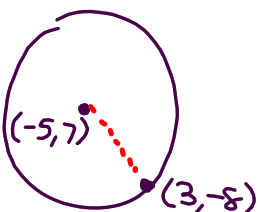
4. Write an equation of the circle whose center is (a, b) and whose radius is r.

$$(x-a)^2 + (y-b)^2 = r^2$$

★ ***You need to FLIP the coordinates of the center to write the equation.
 (the sign)

Think - Pair - Share #1

1. How can we write an equation of the circle whose center is $(-5, 7)$, and which contains the point $(3, -8)$?



$$\begin{aligned}
 d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\
 &= \sqrt{(3 - (-5))^2 + (-8 - 7)^2} \\
 &= \sqrt{8^2 + (-15)^2} \\
 &= \sqrt{64 + 225} = \sqrt{289} = 17 \text{ radius}
 \end{aligned}$$

$(x + 5)^2 + (y - 7)^2 = 289$

r^2
↓

2. Write an equation of the circle whose center is $(4, -9)$ and which passes through the point $(-7, 5)$.

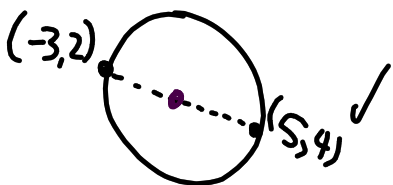
distance between $(4, -9)$ and $(-7, 5)$ } $\sqrt{317}$ radius

$$(x - 4)^2 + (y + 9)^2 = 317$$

$(\sqrt{317})^2$
317

Think - Pair - Share #2

3. How can we write an equation of the circle whose diameter has endpoints $(-3, 2)$ and $(5, 4)$?



midpoint formula

$$\begin{aligned}
 &\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right) \\
 &= \left(\frac{-3 + 5}{2}, \frac{2 + 4}{2} \right) \\
 &= (1, 3) \text{ center}
 \end{aligned}$$

$$\begin{aligned}
 d &= \sqrt{(5 - (-3))^2 + (4 - 2)^2} \\
 &= \sqrt{4^2 + 2^2} \\
 &= \sqrt{16 + 4}
 \end{aligned}$$

4. Write an equation of the circle whose diameter has endpoints $(-4, 11)$ and $(8, -1)$.

$$(x - 1)^2 + (y - 3)^2 = 17$$

$\sqrt{17}$ radius

Practice Problems

1. State the center and radius of each circle whose equation is given: (simplest radical form if needed).

a] $(x-3)^2 + (y-8)^2 = 100$ Center: Radius:

b] $(x+4)^2 + (y+9)^2 = 64$ Center: Radius:

c] $(x-2.3)^2 + (y+8.2)^2 = 81$ Center: Radius:

d] $(x+11)^2 + (y-3)^2 = 121$ Center: Radius:

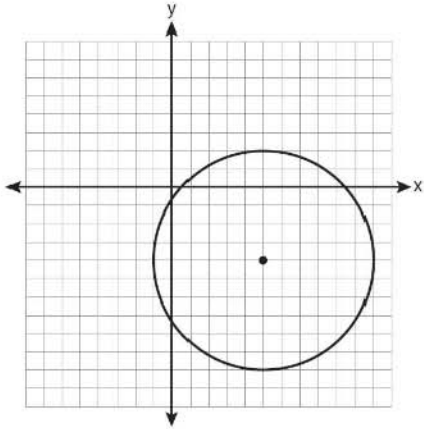
e] $(x-14)^2 + (y+2)^2 = 17$ Center: Radius:

f] $(x+4)^2 + y^2 = 15$ Center: Radius:

g] $x^2 + (y-5)^2 = 32$ Center: Radius:

h] $x^2 + y^2 = 16$ Center: Radius:

2) Write an equation for this circle:



3) Write an equation for each circle whose properties are given:

a) Center: (4, 5) Radius: 7

b) Center: (6, 2) Radius: 8

c) Center: (-3, -9) Radius: 11

d) Center: (-4, -6) Radius: 6

e) Center: (-3, 1) Radius: 9

f) Center: (-3, 0) Radius: 6.5

g) Center: (-9, 8) Radius: $\sqrt{13}$

h) Center: (5, -13) Radius: $\sqrt{17}$

4) Write an equation of the circle whose center is $(4, -1)$ and which passes through the point $(5, 2)$.

5) Write an equation of the circle whose center is $(5, -9)$, and passes through the point $(-2, 3)$.

6) Write the equation of a circle whose diameter has endpoints $(6, 2)$ and $(-4, -8)$

7) The equation of a circle is $(x - 2)^2 + (y + 4)^2 = 4$. Which diagram is the graph of the circle?

