$y - y_1 = m(x - x_1)$

2) through: $(-1, -2)$, parallel to $y = 3x - 2$

$m = 3$

$y + 2 = 3(x + 1)$

$y + 2 = 3x + 3$

$y = 3x + 1$

3) through: $(1, 3)$, perp. to $y = -\frac{1}{4}x + 2$

$m = -\frac{1}{4} \rightarrow m = 4$

$y - 3 = 4(x - 1)$

$y - 3 = 4x - 4$

$y = 4x - 1$

4) through: $(-1, 0)$, perp. to $y = x$

$m = \frac{1}{1} \rightarrow m = -\frac{1}{1}$

$y - 0 = -1(x + 1)$

$y = -x - 1$

Find the distance between each pair of points.

5) $(-2, 8), (-7, -8)$

$\sqrt{25 + 256}$

$\sqrt{281}$

16.76

6) $(1, -5), (-5, 3)$

$\sqrt{36 + 64}$

$\sqrt{100}$

10

Find the midpoint of the line segment with the given endpoints.

7) $(1, 1), (-5, 0)$

$\left(\frac{1 + -5}{2}, \frac{1 + 0}{2}\right)$

$\left(-2, \frac{1}{2}\right)$

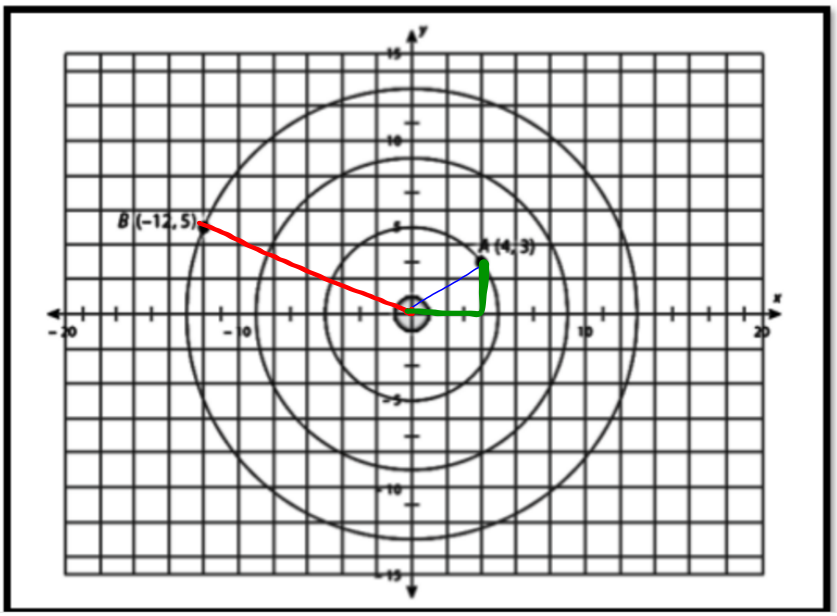
8) $(10, 0), (3, -7)$

$\left(\frac{10 + 3}{2}, \frac{0 + -7}{2}\right)$

$(6.5, -3.5)$

Equations of Circles and Their Graphs

A video game designer created the following diagram of a target.



What is the radius from the center to point A? (4, 3) (0, 0)

$\sqrt{(4-0)^2+(3-0)^2}$

$\sqrt{16+9}$

$r = \sqrt{25}$

$r = 5$

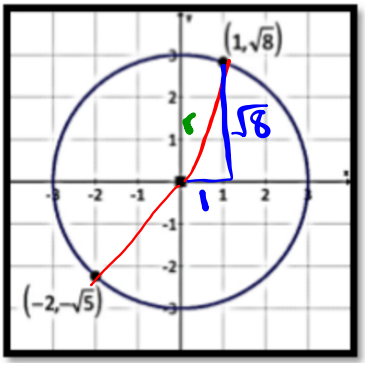
What is the radius from the center to point B? (-12, 5) (0, 0)

$\sqrt{(0+12)^2+(0-5)^2}$

$\sqrt{144+25}$

$r = \sqrt{169} = 13$

Deriving the Equation of a Circle



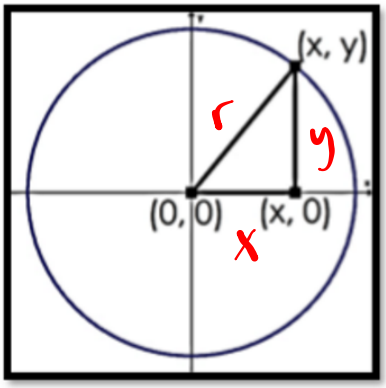
Using the Pythagorean Theorem, prove the radius of the circle is a length of 3 units using the given points.

$1^2 + (\sqrt{8})^2 = r^2$

$1 + 8 = r^2$

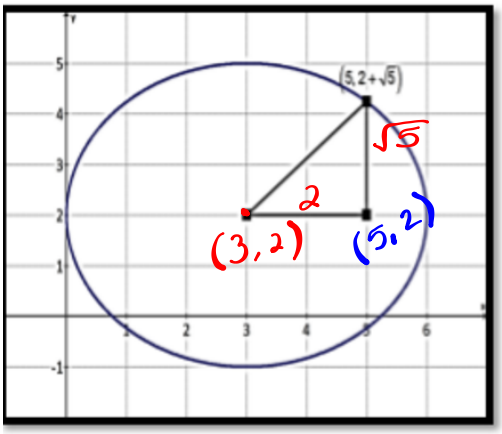
$9 = r^2$

$r = 3$



An arbitrary point has been placed on a general circle with radius r. Label the right triangle's legs and hypotenuse and write the Pythagorean Theorem equation that models your triangle.

$x^2 + y^2 = r^2$



Using the Pythagorean Theorem, prove the radius of the circle is a length of 3 units using the given point.

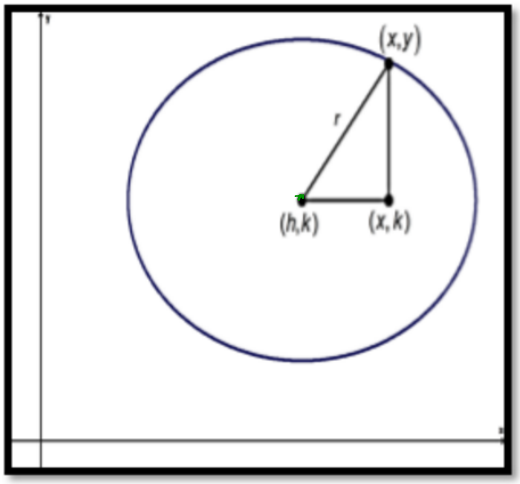
$(5-3)^2 + (2+\sqrt{5}-2)^2 = r^2$

$2^2 + (\sqrt{5})^2 = r^2$

$4 + 5 = r^2$

$9 = r^2$

$r = 3$



Arbitrary points have been placed on a general circle with radius r. Label the right triangle's legs and hypotenuse and write the Pythagorean Theorem equation that models your triangle.

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

C: (h,k)

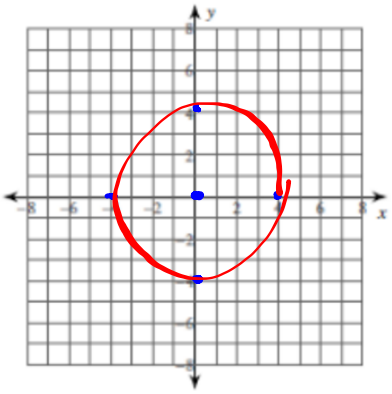
Equations of Circles

A circle is the set of all points (x, y) in a plane that are equidistant from a fixed point called the center of the circle. The distance between the center and any point (x, y) on the circle is called the radius.

The Standard Form of a Circle Centered at the Origin: (0,0)	The Standard Form of a Circle Centered Not at the Origin:
$x^2 + y^2 = r^2$	$(x - h)^2 + (y - k)^2 = r^2$
(0 ,0) is the center	(h, k) is the center
r is the radius	r is the radius

a. $x^2 + y^2 = 16$

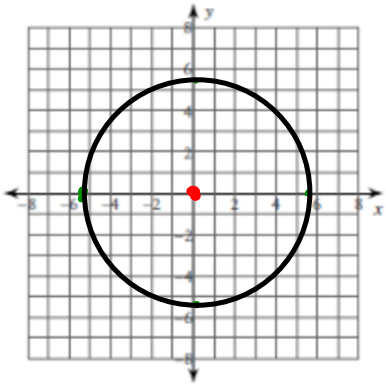
C: (0, 0) r: $\sqrt{16} = 4$



b. $x^2 = 30 - y^2$

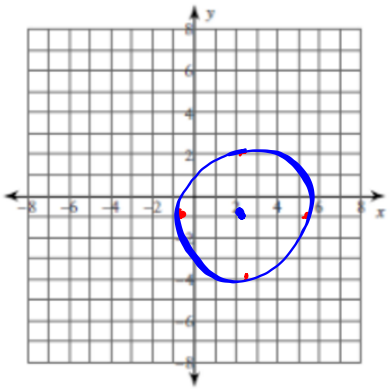
$x^2 + y^2 = 30$ (r^2)

C: (0, 0) r: $\sqrt{30} = 5.4$



c. $(x - 2)^2 + (y + 1)^2 = 9$

C: (2, −1) r: $\sqrt{9} = 3$



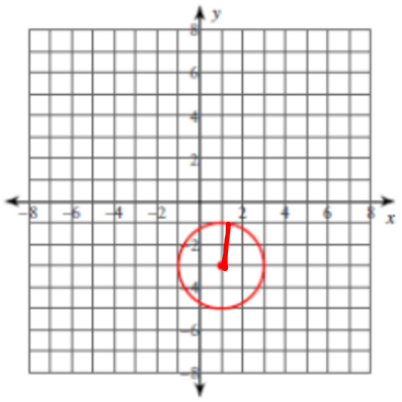
Writing Equations of Circles Given Graphs

Write the center, radius, and equation of the circle.

1. C = (1, −3)

r = 2

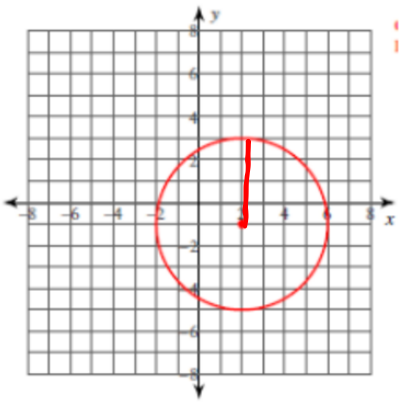
Eqtn: $(x-1)^2 + (y+3)^2 = 4$



2. C = (2, −1)

r = 4

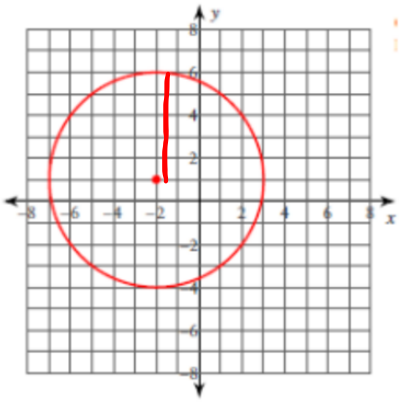
Eqtn: $(x-2)^2 + (y+1)^2 = 16$



3. C = (−2, 1)

r = 5

Eqtn: $(x+2)^2 + (y-1)^2 = 25$



Writing Equations of Circles

1. Write the equation of a circle with the given **radius** and whose **center is the origin.**

a. r = 11

$x^2 + y^2 = 121$

b. $r = \sqrt{17}$

$x^2 + y^2 = 17$

c. $2\sqrt{5}$

$(2\sqrt{5})^2$

$4 \cdot 5$

$x^2 + y^2 = 20$

2. Write the equation of a circle with the given **radius and center.**

a. Center at (-2, 3) and radius of 4

$(x+2)^2 + (y-3)^2 = 16$

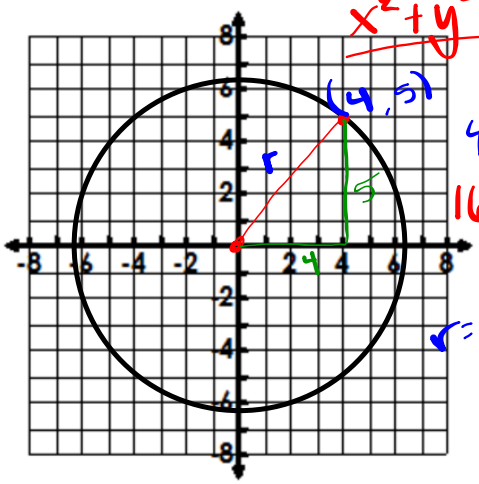
b. Center at (0, -5) and radius of $3\sqrt{10}$

$x^2 + (y+5)^2 = 90$

3. Write the equation given a **point on the circle and its center.**

r =

a. Point (4, 5) and Center (0, 0)



$x^2 + y^2 = 41$

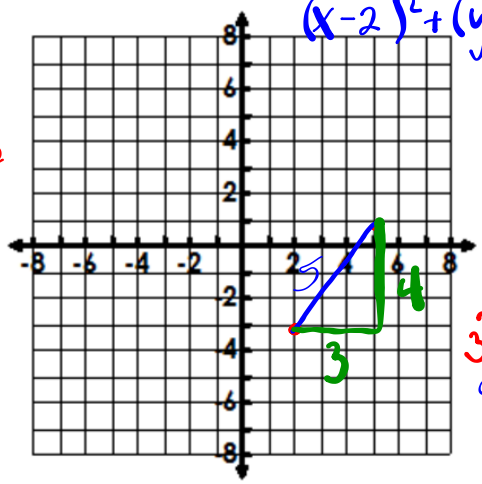
$4^2 + 5^2 = r^2$

$16 + 25 = r^2$

$41 = r^2$

$r = \sqrt{41}$

b. Point at (5, 1) and Center at (2, -3)



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

$3^2 + 4^2 = r^2$

$9 + 16 = r^2$

$25 = r^2$

$r = 5$

c. Point (0, 2) and Center at (-6, 3)

d. Point (2, 5) and Center (0, 0)