

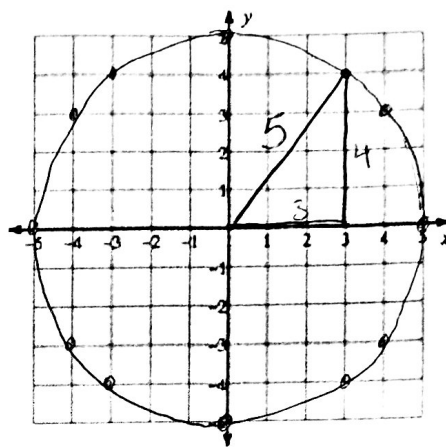
7.1 Circles

Find the distance of the point from the origin.

$$a^2 + b^2 = c^2 \quad \sqrt{25} = \sqrt{c^2}$$

$$3^2 + 4^2 = c^2 \quad \boxed{5} = c$$

$$9 + 16 = c^2$$



2) List as many coordinate points as possible that are the same distance from the origin. Name at least 12 points.

(3, 4)	(4, 3)	(0, 5)
(3, -4)	(4, -3)	(0, -5)
(-3, -4)	(-4, -3)	(5, 0)
(-3, 4)	(-4, 3)	(-5, 0)

3) Plot each of the points you found in #2 onto the graph. What shape does it make? Circle

Pythagorean Theorem...

$$a^2 + b^2 = c^2$$

...translated into circles

$$x^2 + y^2 = r^2 \leftarrow r \text{ is the radius}$$

$$\begin{matrix} a & b \\ (3, & 4) \\ x & y \end{matrix}$$

Find the distance between the two points on the graph on the below.

$$3^2 + 4^2 = c^2$$

$$\sqrt{25} = \sqrt{c^2}$$

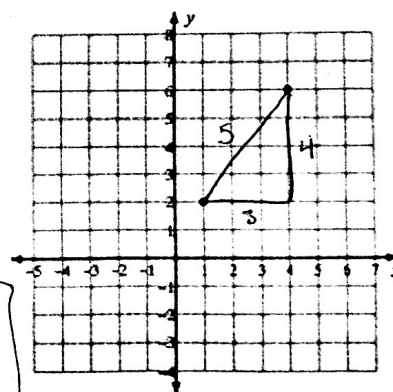
$$\boxed{5} = c$$

$$\begin{matrix} \text{center} \\ (1, 2) \quad (4, 6) \end{matrix}$$

Subtraction

$$x: 4 - 1 = 3 \leftarrow a$$

$$y: 6 - 2 = 4 \leftarrow b$$



$$x^2 + y^2 = r^2 \rightarrow \boxed{\begin{matrix} (x-h)^2 + (y-k)^2 = r^2 \\ (h, k) \text{ is the center} \end{matrix}}$$

What did we learn about circles in the activity above?

1) A circle is the set of all points that are the same distance from the center

2) The equation of a circle comes from the Pythagorean Theorem

3) The equation of a circle is $(x-h)^2 + (y-k)^2 = r^2$, where (h, k) is the center and r is the radius

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

5) Identify the center and radius of each equation:

a) $(x+10)^2 + (y+5)^2 = 25$ $\sqrt{r^2} = \sqrt{25}$

Center: $(-10, -5)$ $r = 5$

Take opposite

b) $(x+9)^2 + (y+1)^2 = 16$ $\sqrt{r^2} = \sqrt{16}$

C: $(-9, -1)$ $r = 4$

c) $(x-14)^2 + (y+8)^2 = 15$ $\sqrt{r^2} = \sqrt{15}$

C: $(14, -8)$ $r = \sqrt{15}$

d) $(x+12)^2 + (y-6)^2 = 13$

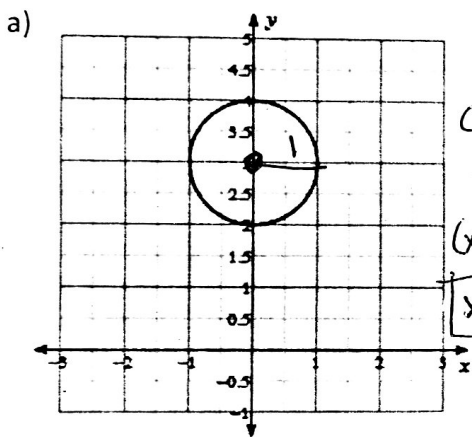
e) $(x-2)^2 + (y-3)^2 = 18$ $\sqrt{r^2} = \sqrt{18}$

C: $(2, 3)$ $r = 3\sqrt{2}$

f) $(x-4)^2 + (y+13)^2 = 5$

* If the radius is not a perfect square, leave it as a reduced radical

6) Find the center and radius for each circle pictured. Then write the equation of the circle in standard form.

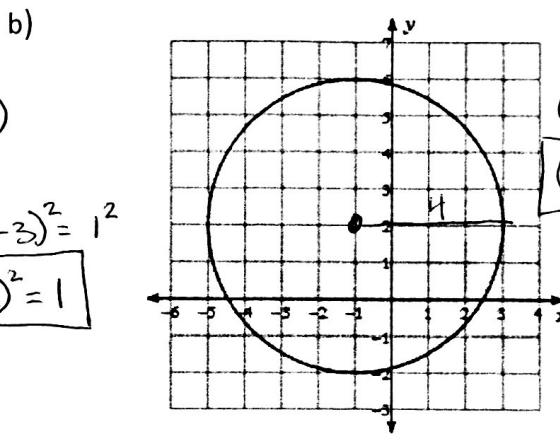


C: $(0, 3)$

$r = 1$

$(x-0)^2 + (y-3)^2 = 1^2$

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



C: $(-1, 2)$ $r = 4$

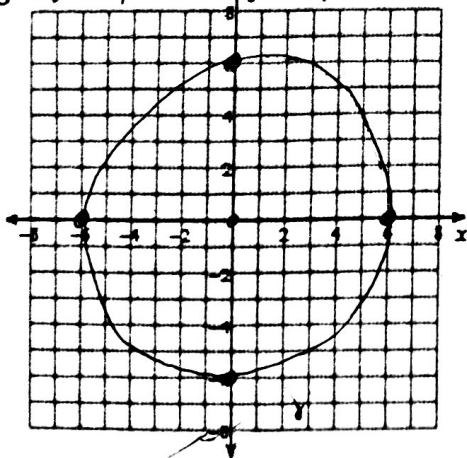
$(x+1)^2 + (y-2)^2 = 4^2$

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

7) Identify the center and radius of each circle. Then sketch the graph.

a) $x^2 + y^2 = 36$ C: $(0, 0)$

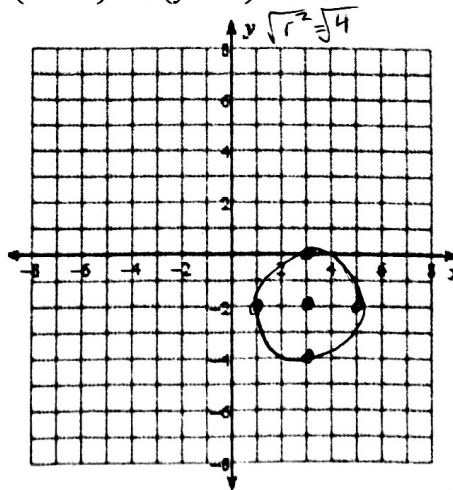
$(x-0)^2 + (y-0)^2 = r^2$ $r = 6$



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

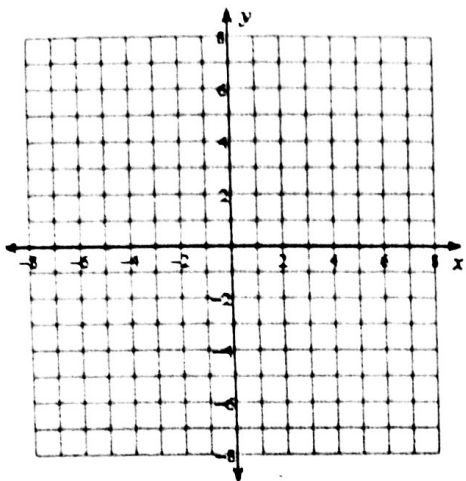
C: $(3, -2)$

$r = 2$

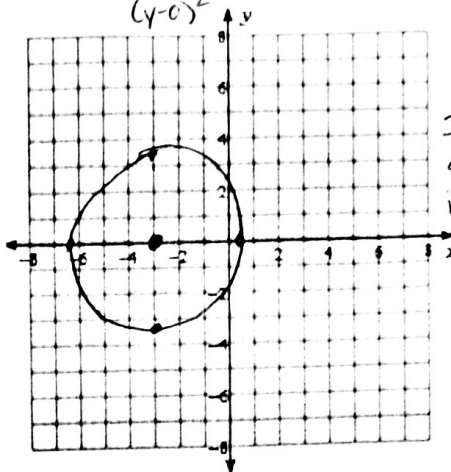


Find center, then go out radius in all directions

c) $(x + 4)^2 + (y - 4)^2 = 1$



d) $(x + 3)^2 + y^2 = 10$



C: $(-3, 0)$

$r = \sqrt{10} \approx 3.2$

If the radius is a radical, type it in your calculator to approximate the value. Then use that to graph.

8) Write the equation of the circle given the center and a point on the circle.

- a) Center: $(-2, -3)$; Point on the circle: $(15, 2)$

Use x & y to solve for r^2

$$\begin{aligned} (x + 2)^2 + (y + 3)^2 &= r^2 \\ (15 + 2)^2 + (2 + 3)^2 &= r^2 \\ 17^2 + 5^2 &= r^2 \\ 314 &= r^2 \end{aligned}$$

$$(x + 2)^2 + (y + 3)^2 = 314$$

- b) Center: $(1, 0)$; Point on the circle: $(10, 15)$

$$\begin{aligned} (x - 1)^2 + (y - 0)^2 &= r^2 \\ (10 - 1)^2 + (15 - 0)^2 &= r^2 \\ 9^2 + 15^2 &= r^2 \\ 306 &= r^2 \end{aligned}$$

$$(x - 1)^2 + y^2 = 306$$

- c) Center: $(-12, 11)$; Point on the circle: $(-17, 12)$

- d) Center: $(14, -10)$; Point on the circle: $(12, -13)$