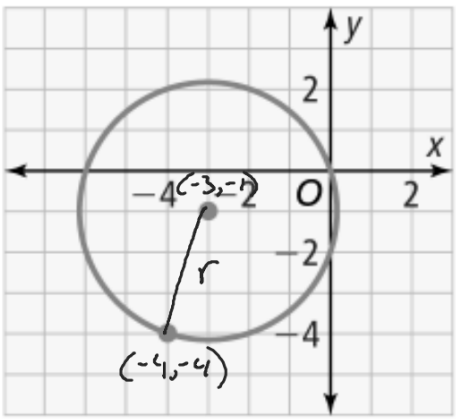
What is the equation for the circle?

$(-3,-1)$

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



$d=\sqrt{(x_2-x_1)^2+(y_2-y_1)^2}$

$d=\sqrt{(-4-(-3))^2+(-4-(-1))^2}$

$=\sqrt{(-4+3)^2+(-4+1)^2}$

$\sqrt{(-1)^2+(-3)^2}$

$\sqrt{10}$

$(x+3)^2+(y+1)^2=10$

Circle Q has radius 7 and is centered at the origin. Does the point $(-3\sqrt{2},\ 5)$ lie on $\odot Q$?

$x \quad y$

$x^2 + y^2 = 49$

$(-3\sqrt{2})^2 + (5)^2 \stackrel{?}{=} 49$

$18 + 25$

$43 \neq 49$

Not on Circle

For the following exercises, write the equation of an ellipse in standard form, and identify the end points of the major and minor axes as well as the foci.

$$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$$

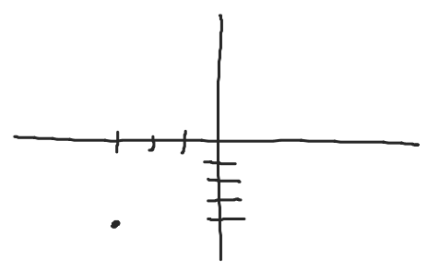
$$4x^2 + 24x + 25y^2 + 200y + 336 = 0$$

$$4x^2 + 24x \quad + 25y^2 + 200y \quad = -336$$

$$4(x^2 + 6x + 9) + 25(y^2 + 8y + 16) = -336 + 36 + 400$$

$$\frac{4(x+3)^2}{100} + \frac{25(y+4)^2}{100} = \frac{100}{100}$$

$$\frac{(x+3)^2}{25} + \frac{(y+4)^2}{4} = 1$$



major Axis
Vertices
$(2,-4)$ $(-8,-4)$

minor Axis
Co-Vertices
$(-3,-2)$ $(-3,-6)$

$$c^2 = a^2 - b^2$$

$$c^2 = 25 - 4$$

$$c = \sqrt{21}$$

Foci

$(-3+\sqrt{21}, -4)$

$(-3-\sqrt{21}, -4)$

$(-3 \pm \sqrt{21}, -4)$

For the following exercises, graph the given ellipses, noting center, vertices, and foci.

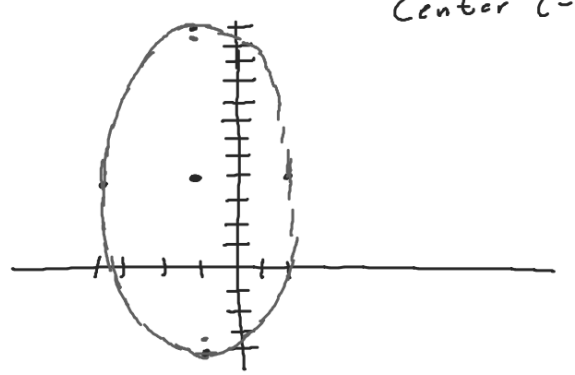
$$64x^2 + 128x + 9y^2 - 72y - 368 = 0$$

$$64(x^2+2x+1) + 9(y^2-8y+16) = 368 + 64 + 144$$

$$\frac{64(x+1)^2}{576} + \frac{9(y-4)^2}{576} = \frac{576}{576}$$

$$\frac{(x+1)^2}{9} + \frac{(y-4)^2}{64} = 1$$

Center $(-1,4)$



Vert

$(-1,12)$ $(-1,-4)$

Co-Vert

$(2,4)$

$(-4,4)$

Foci:

$(-1, 4 \pm \sqrt{55})$

$c^2 = a^2 - b^2$

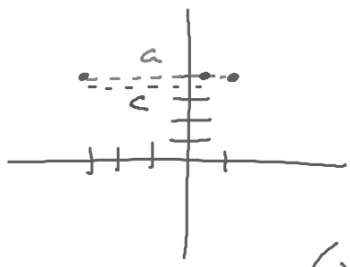
$c^2 = 64 - 9$

$c = \sqrt{55}$

For the following exercises, use the given information about the graph of each ellipse to determine its equation.

Center $(-3, 4)$; vertex $(1, 4)$; one focus: $(-3 + 2\sqrt{3}, 4)$

$(-3, 4)$
$h \quad k$



$a = 4$

$c = 2\sqrt{3}$

$b = ?$

$$\frac{(x+3)^2}{16} + \frac{(y-4)^2}{4} = 1$$

$c^2 = a^2 - b^2$

$(2\sqrt{3})^2 = 4^2 - b^2$

$12 = 16 - b^2$

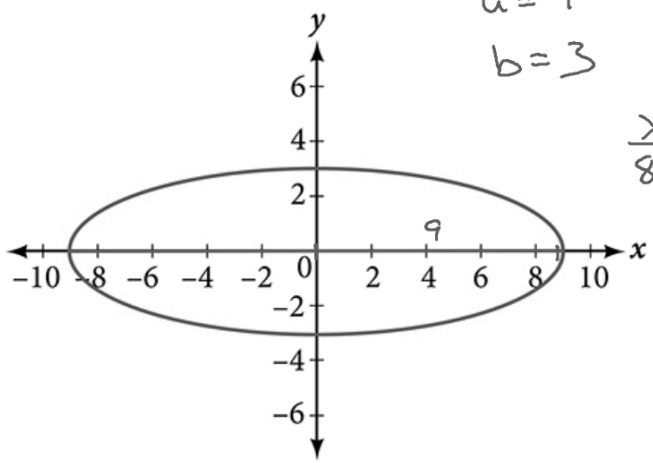
$-4 = -b^2$

$b^2 = 4$

For the following exercises, given the graph of the ellipse, determine its equation.

$a = 9$

$b = 3$

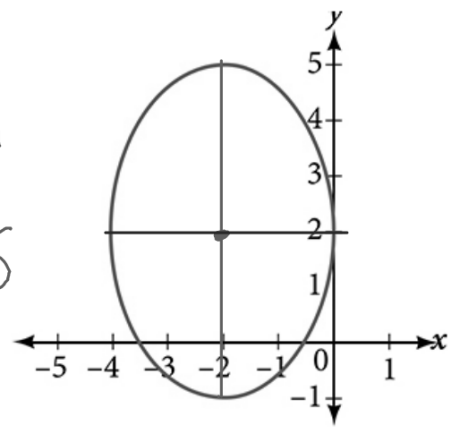


$$\frac{x^2}{81} + \frac{y^2}{9} = 1$$

Center $(-2, 2)$

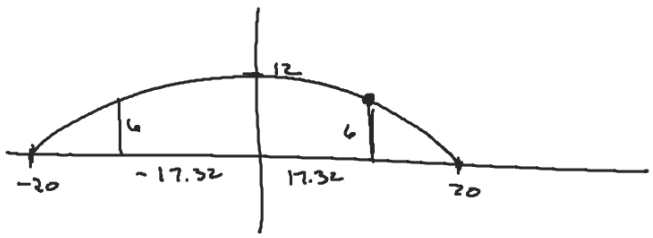
$a = 3$

$b = 2$



$$\frac{(x+2)^2}{4} + \frac{(y-2)^2}{9} = 1$$

65 . An arch has the shape of a semi-ellipse. The arch has a height of 12 feet and a span of 40 feet. Find an equation for the ellipse, and use that to find the distance from the center to a point at which the height is 6 feet. Round to the nearest hundredth.



$a = 20$

$b = 12$

$$\frac{x^2}{400} + \frac{y^2}{144} = 1$$

$$\frac{x^2}{400} + \frac{36}{144} = 1$$

$$\frac{x^2}{400} + \frac{1}{4} = 1$$

$$400\left(\frac{x^2}{400}\right) = \left(\frac{3}{4}\right)400$$

$$x^2 = 300$$

$$x = \pm\sqrt{300}$$

$$\pm 17.32$$

$$\frac{3}{4} \cdot \frac{400}{1}$$

Varsity Learning

J.2 10.1