

Graph the ellipse and identify the center, vertices, and foci.

1. $\frac{x^2}{16} + \frac{y^2}{4} = 1$ *major axis is horiz.*

$a^2 \rightarrow 16$ $b^2 \rightarrow 4$

Center (0,0)
 $a^2 = 16 \Rightarrow a = 4$
 $b^2 = 4 \Rightarrow b = 2$

To find c: $c^2 = a^2 - b^2$
 $c^2 = 4^2 - 2^2$
 $c^2 = 16 - 4$
 $c^2 = 12$
 $c = 3.5$

Foci: (3.5, 0) and (-3.5, 0)

2. $\frac{x^2}{9} + \frac{y^2}{36} = 1$ *major axis is vertical*

$b^2 \rightarrow 9$ $a^2 \rightarrow 36$

Center (0,0)
 $a^2 = 36 \Rightarrow a = 6$
 $b^2 = 9 \Rightarrow b = 3$

Foci: (0, 5.2) and (0, -5.2)

Vertices: (0, 6) and (0, -6)

To find foci: $c^2 = a^2 - b^2$
 $c^2 = 6^2 - 3^2$
 $c^2 = 36 - 9$
 $c^2 = 27$
 $c = \sqrt{27}$
 $c \approx 5.2$

3. $\frac{25x^2}{100} + \frac{4y^2}{100} = \frac{100}{100}$ *get in standard form by dividing everything by 100*

$\frac{x^2}{4} + \frac{y^2}{25} = 1$ *major axis is vert.*

$b^2 \rightarrow 4$ $a^2 \rightarrow 25$

$a^2 = 25 \Rightarrow a = 5$
 $b^2 = 4 \Rightarrow b = 2$

Center (0,0)
 Vertices (0, 5) and (0, -5)

4. $\frac{7x^2}{35} + \frac{5y^2}{35} = \frac{35}{35}$ *get in standard form by dividing everything by 35*

$\frac{x^2}{5} + \frac{y^2}{7} = 1$ *major axis is vertical*

$a^2 = 7 \Rightarrow a = \sqrt{7} \approx 2.6$
 $b^2 = 5 \Rightarrow b = \sqrt{5} \approx 2.2$

Center (0,0)
 Vertices: (0, 2.6) and (0, -2.6)

5. $\frac{(x-2)^2}{9} + \frac{(y+2)^2}{25} = 1$ *major axis is vertical*

$b^2 \rightarrow 9$ $a^2 \rightarrow 25$

Center (2, -2)
 $a^2 = 25 \Rightarrow a = 5$
 $b^2 = 9 \Rightarrow b = 3$

Vertices: (-2, 3) and (-2, -7)

To find c: $c^2 = a^2 - b^2$
 $c^2 = 5^2 - 3^2$
 $c^2 = 25 - 9$
 $c^2 = 16$
 $c = 4$

Foci: (-2, 2) and (-2, -6)

WORK for #3:
 $c^2 = a^2 - b^2$
 $c^2 = 25 - 4$
 $c^2 = 21$
 $c = \sqrt{21} \approx 4.6$

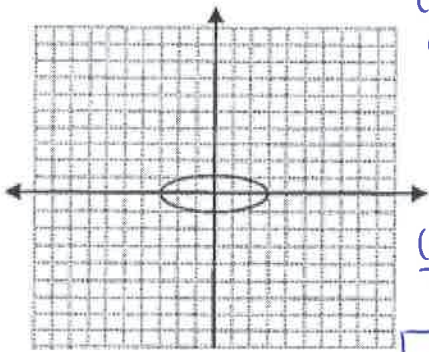
Foci: (0, 4.6) and (0, -4.6)

WORK for #4:
 $c^2 = a^2 - b^2$
 $c^2 = 7 - 5$
 $c^2 = 2$
 $c = \sqrt{2} \approx 1.4$

Foci: (0, 1.4) and (0, -1.4)

Find the standard form of the equation of each ellipse.

6.



center (0,0)
 $a=3 \Rightarrow c^2 = a^2 - b^2$
 $b=1 \Rightarrow c^2 = 9 - 1$
 $c^2 = 8$
 $c = \sqrt{8}$

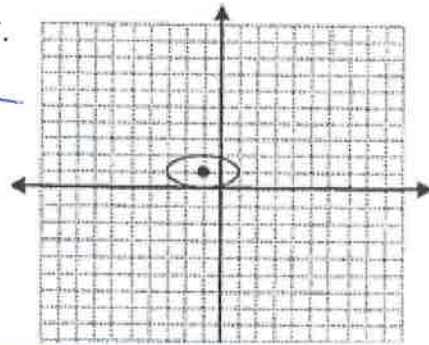
$$\frac{(x-0)^2}{9} + \frac{(y-0)^2}{1} = 1$$

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

* major axis is horizontal so a-value goes below $(x-h)^2$

* major axis is horizontal so a-value goes below $(x-h)^2$

7.

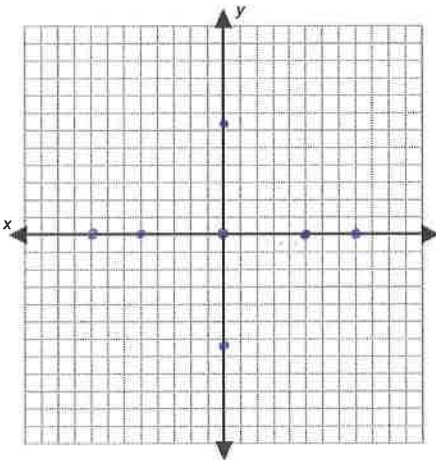


center (-1,1); a=2; b=1

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

Write the standard form of the equation of ellipse satisfying the given conditions.

8. Foci: $(\pm 5, 0)$; Vertices $(\pm 8, 0)$



center: (0,0)

$c=5$

$a=8$

To find b: $c^2 = a^2 - b^2$

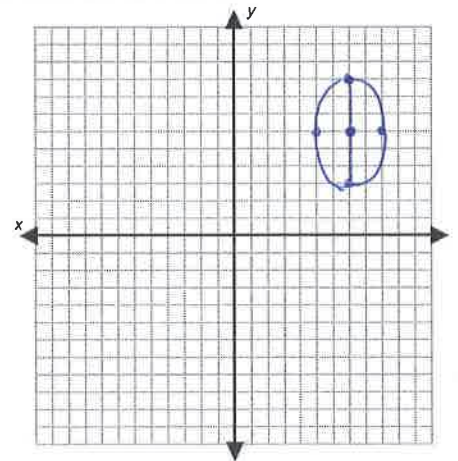
$$25 = 64 - b^2$$

$$39 = b^2$$

$$b = \sqrt{39} \approx 6.2$$

$$\frac{(x-0)^2}{64} + \frac{(y-0)^2}{39} = 1 \Rightarrow \boxed{\frac{x^2}{64} + \frac{y^2}{39} = 1}$$

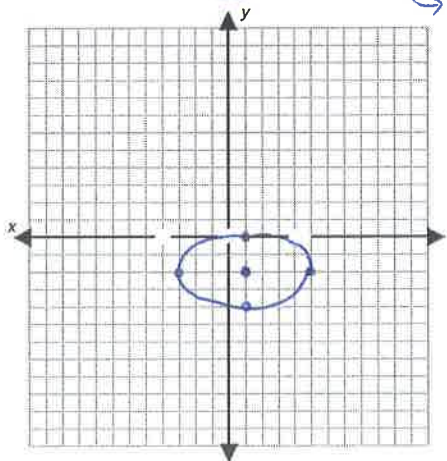
9. Endpoints of Major Axis: $(7,9)$ & $(7,3)$ ← center is halfway between
 Endpoints of Minor Axis: $(5,6)$ & $(9,6)$



$a=3$; $b=2$; center $(7,6)$

$$\boxed{\frac{(x-7)^2}{4} + \frac{(y-6)^2}{9} = 1}$$

10. Major axis horizontal with length 8; minor axis with length 4; center $(1, -2)$



major axis = $2a$ minor axis = $2b$

$$8 = 2a$$

$$a = 4$$

$$4 = 2b$$

$$b = 2$$

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