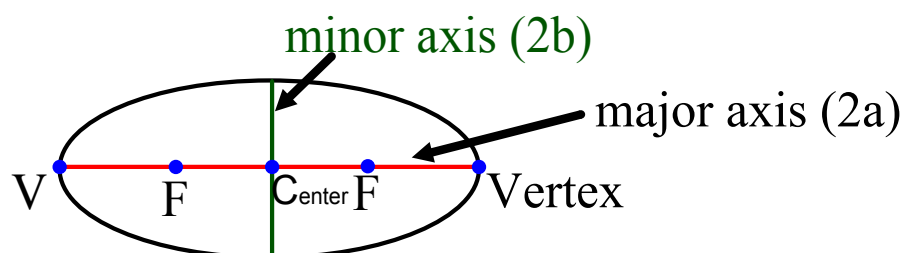


## 8.2 Ellipses

#83

**ellipse**: a set of all points in a plane whose distances from two fixed points (**foci**) in the plane have a constant sum.



**foci** - focus plural (always on major axis)

**focal axis** - line through the foci

**center** - midpoint of the foci (intersection of major & minor axes)

**vertices** - points where ellipse intersects the major axis

**major axis** - chord through the foci (longer)

**minor axis** - chord through the center perpendicular to the major axis (shorter)

pythagorean relationship:  $a^2 = b^2 + c^2$

**Ellipse - Standard form**  
horizontal

#84

Standard Eq	$\frac{(x-h)^2}{a^2} + \frac{(y-k)^2}{b^2} = 1$
<b>Center</b>	$(h, k)$
Foci	$(h \pm c, k)$
<b>Vertices</b>	$(h \pm a, k)$
<b>Focal axis</b>	$y = k$
<b>Pythagorean Relationship</b>	$a^2 = b^2 + c^2$

**Ellipse - Standard form**  
vertical

#84-  
back

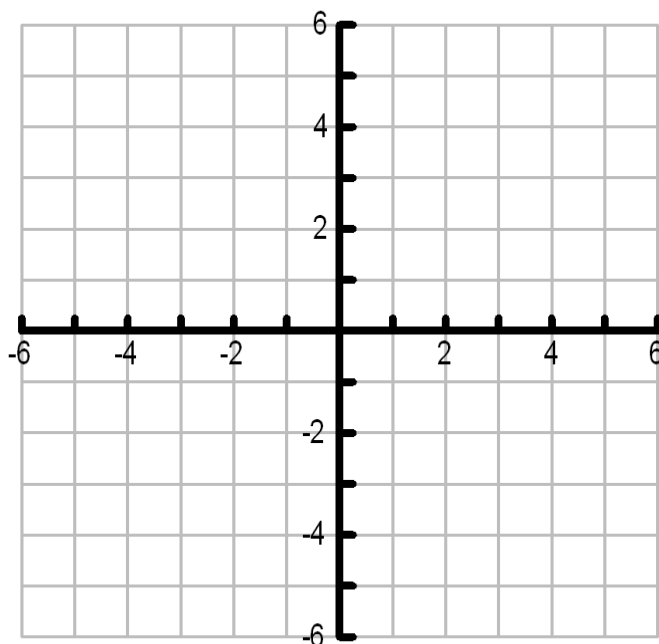
Standard Eq	$\frac{(y-k)^2}{a^2} + \frac{(x-h)^2}{b^2} = 1$
<b>Center</b>	$(h, k)$
Foci	$(h, k \pm c)$
<b>Vertices</b>	$(h, k \pm a)$
<b>Focal axis</b>	$x = h$
<b>Pythagorean Relationship</b>	$a^2 = b^2 + c^2$

Find the vertices and foci of  $4x^2 + 9y^2 = 36$

Find the vertices and foci of  $\frac{x^2}{16} + \frac{y^2}{7} = 1$

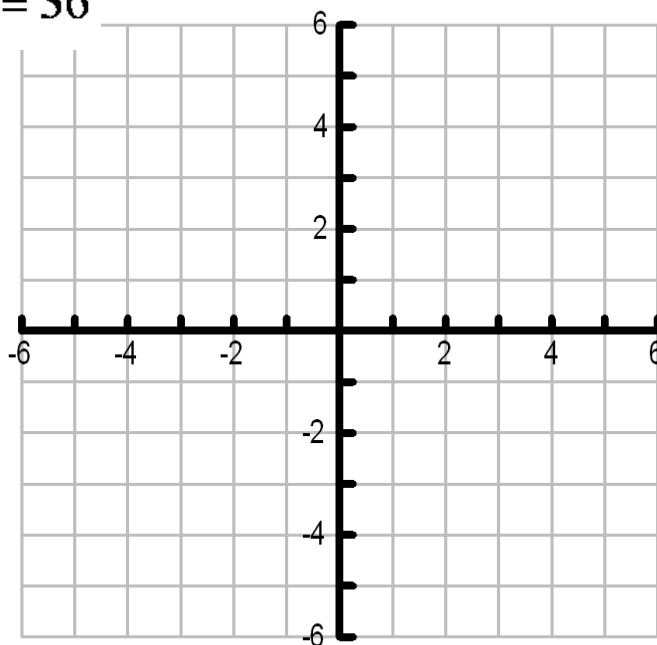
Find the center, vertices, and foci. Sketch a graph.

$$\frac{(x-2)^2}{25} + \frac{(y+1)^2}{16} = 1$$



Find the center, vertices, and foci. Sketch a graph.

$$9(x-2)^2 + 4(y+3)^2 = 36$$



Write the equation of the ellipse:

Major axis endpts:  $(\pm 5, 0)$

minor axis length 4

Write the equation of the ellipse:

foci:  $(1, -4)$  and  $(5, -4)$

major axis endpts:  $(0, -4)$  and  $(6, -4)$

## Ellipse - General Form

#85

$$Ax^2 + Cy^2 + Dx + Ey + F = 0$$

Steps:

1. move variables to left & constants to right side of eq. to complete the square
2. Group like variables
3. If  $x^2$  &  $x$  terms, complete sq. for  $x$ 's
4. If  $y^2$  &  $y$  terms, complete sq. for  $y$ 's
5. Write each sq. in factored form.
6. Need to have 1 on rt. so divide both sides by value on rt.
7. Simplify
8. result is in graphing form

Write the equation of the ellipse in standard form:

$$9x^2 + 16y^2 + 54x - 32y - 47 = 0$$