Ellipse:

Major and Minor Axis:
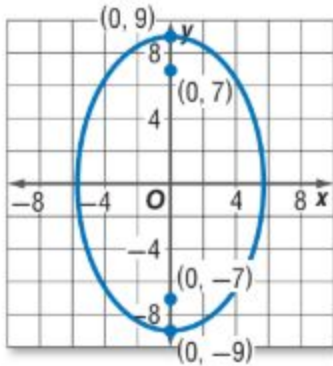
Constant Sum
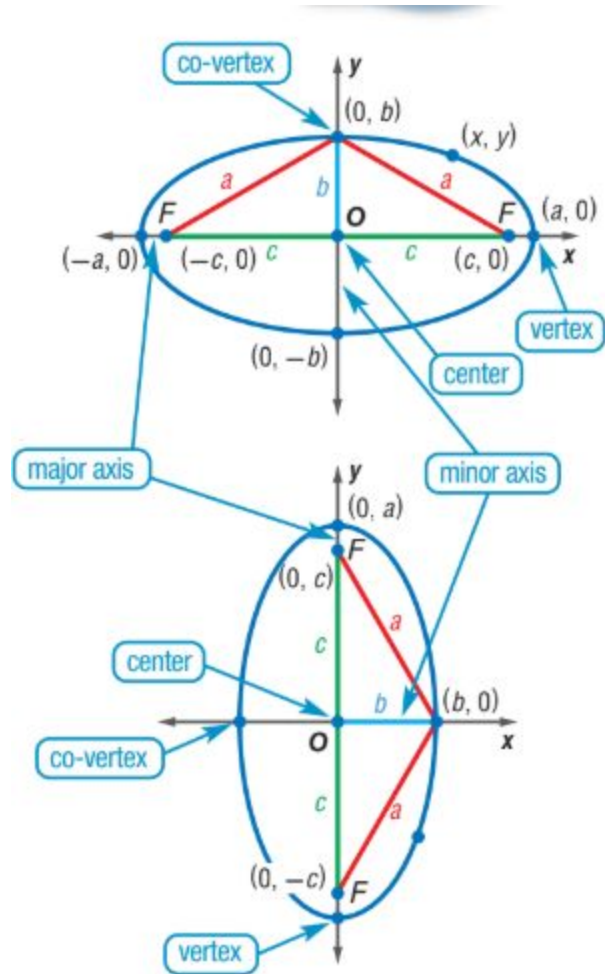
KeyConcept Equations of Ellipses Centered at the Origin		
Standard Form	$\dfrac{x^2}{a^2} + \dfrac{y^2}{b^2} = 1$	$\dfrac{y^2}{a^2} + \dfrac{x^2}{b^2} = 1$
Orientation	horizontal	vertical
Foci	$(c, 0), (-c, 0)$	$(0, c), (0, -c)$
Length of Major Axis	$2a$ units	$2a$ units
Length of Minor Axis	$2b$ units	$2b$ units

**Important Relationships:**

1. Write the equation for the ellipse:

2. Write an equation for an ellipse with vertices at (-4, 0) and (4, 0) and foci at (2, 0) and (-2, 0).

KeyConcept Equations of Ellipses Centered at (h, k)

| Standard Form	$\dfrac{(x-h)^2}{a^2} + \dfrac{(y-k)^2}{b^2} = 1$	$\dfrac{(y-k)^2}{a^2} + \dfrac{(x-h)^2}{b^2} = 1$
Orientation	horizontal	vertical
Foci	$(h \pm c, k)$	$(h, k \pm c)$
Vertices	$(h \pm a, k)$	$(h, k \pm a)$
Co-vertices	$(h, k \pm b)$	$(h \pm b, k)$

3. Write an equation for the ellipse with vertices at (6, -8) and (6, 4) and co-vertices at (3, -2) and (9, -2).

4. Write an equation for the ellipse with vertices at (-3, 8) and (9, 8) and co-vertices at (3, 12) and (3, 4).
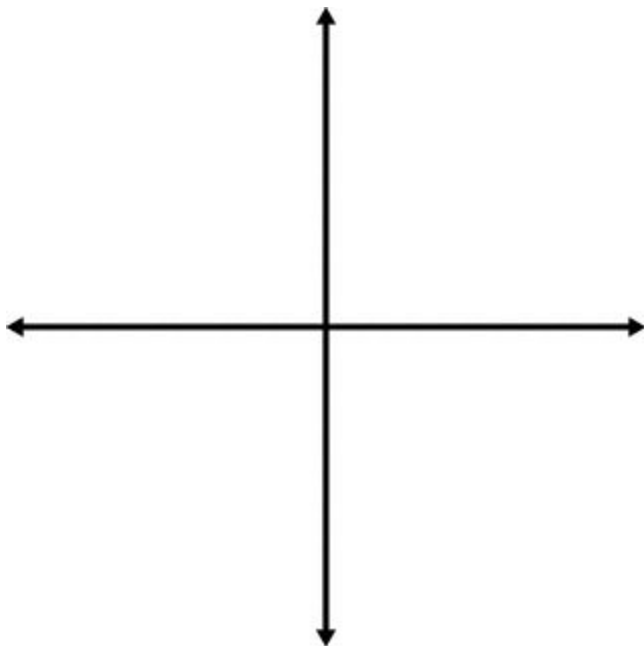
5. Find the coordinates of the center and foci, and the lengths of the major and minor axes of an ellipse with equation $25x^2 + 9y^2 + 250x - 36y + 436 = 0$. Then graph the ellipse.
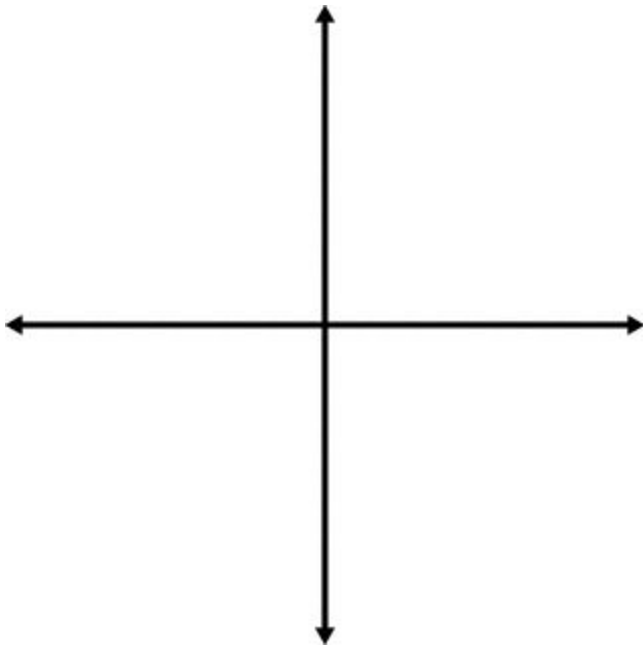
6. Find the coordinates of the center and foci and the lengths of the major and minor axes of the ellipse with equation $x^2 + 4y^2 - 2x + 24y + 21 = 0$. Then graph the ellipse.
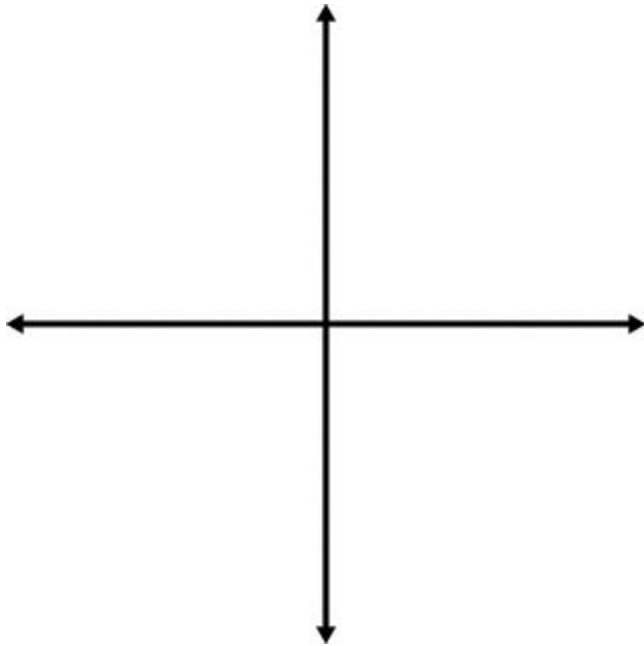
7. Find the coordinates of the center and foci and the lengths of the major and minor axes of the ellipse with equation $\frac{(y+1)^2}{64} + \frac{(x-5)^2}{28} = 1$. Then graph the ellipse.

8. Find the coordinates of the center and foci and the lengths of the major and minor axes of the ellipse with equation $4x^2 + y^2 - 32x - 4y + 52 = 0$. Then graph the ellipse.