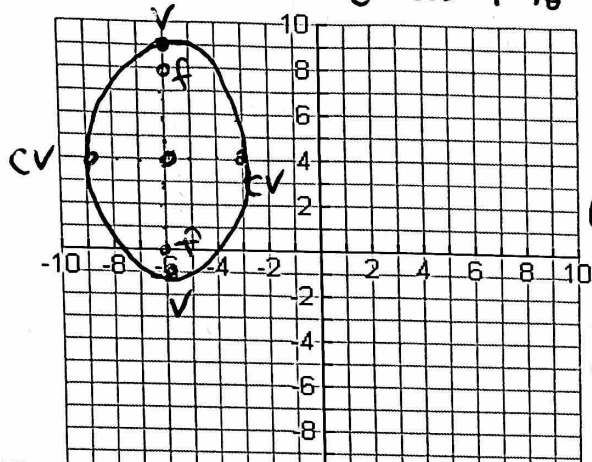


8.09 Ellipses - Day 2

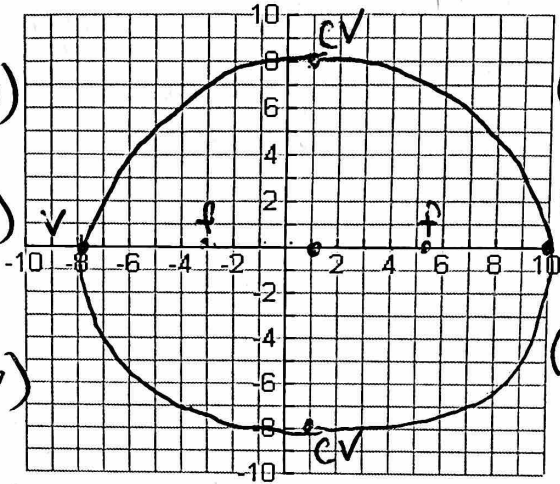
Review: For each ellipse, identify the coordinates of the center, the vertices, and co-vertices. Then graph.

1. $\frac{(x+6)^2}{9} + \frac{(y-4)^2}{25} = 1$ $c^2 = a^2 - b^2$
 $c^2 = 25 - 9 = 16$

2. $\frac{(x-1)^2}{81} + \frac{y^2}{64} = 1$ $c^2 = 81 - 64 = 17$



V: (-6, 9), (-6, -1)
 CV: (-9, 4), (3, 4)
 f: (-6, 8), (-6, 0)



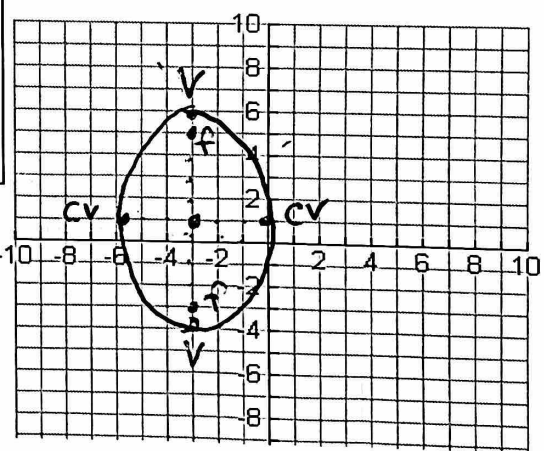
V: (10, 0), (-8, 0)
 CV: (1, 8), (1, -8)
 F: (1 + sqrt(17), 0), (1 - sqrt(17), 0)

How would you identify the characteristics of the ellipse if the equation is not in standard form?

Write the standard form of the equation of each ellipse and then graph the equation. List the coordinates of the center, foci, and the major and minor axis vertices. State the eccentricity of the ellipse.

3. $3x^2 + y^2 + 18x - 2y + 4 = 0$ $a = \sqrt{24}$
 $b = \sqrt{8}$
 $\frac{(x+3)^2}{8} + \frac{(y-1)^2}{24} = 1$ $c^2 = 24 - 8 = 16$
 $c = 4$

$a = \sqrt{24}$
 $b = \sqrt{8}$
 $c = 4$



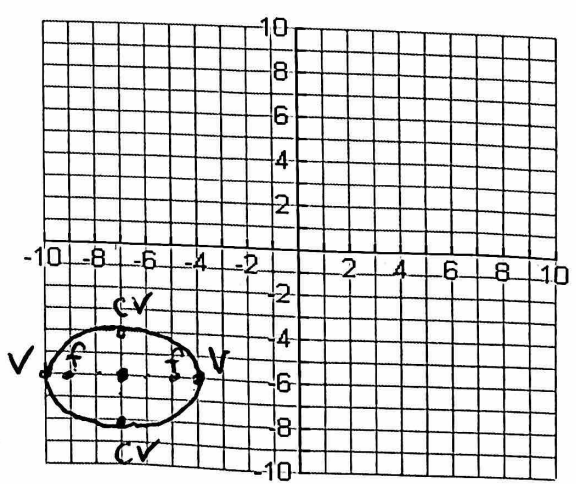
Standard Form: $\frac{(x+3)^2}{8} + \frac{(y-1)^2}{24} = 1$
 Center: (-3, 1) Vertices: (-3, 1 + sqrt(24)), (-3, 1 - sqrt(24))
 Co-Vertices: (-3 + sqrt(8), 1), (-3 - sqrt(8), 1)
 Foci: (-3, 5), (-3, -3) Eccentricity = $\frac{c}{a} = \frac{4}{\sqrt{24}}$

8.09 Practice

1. $4x^2 + 56x + 9y^2 + 108y = -484$
 $\frac{(x+7)^2}{9} + \frac{(y+6)^2}{4} = 1$ $c^2 = 9 - 4 = 5$
 $c = \sqrt{5}$

$a = 3$
 $b = 2$
 $c = \sqrt{5}$

Standard Form: $\frac{(x+7)^2}{9} + \frac{(y+6)^2}{4} = 1$
 Center: (-7, -6) Vertices: (-4, -6), (-10, -6)
 Co-Vertices: (-7, -4), (-7, -8)
 foci: (-7 + sqrt(5), -6), (-7 - sqrt(5), -6) eccentricity = $\frac{c}{a} = \frac{\sqrt{5}}{3}$

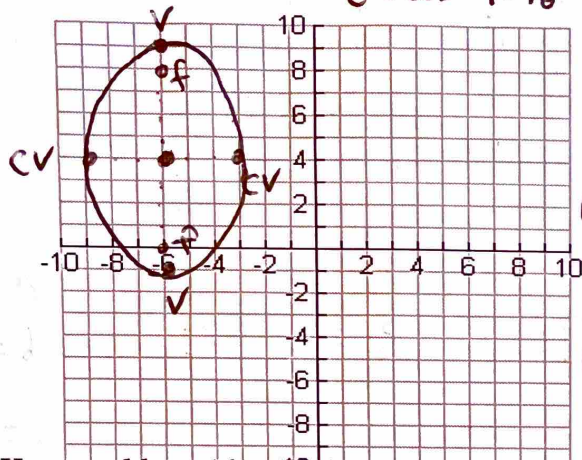


8.09 Ellipses - Day 2

Review: For each ellipse, identify the coordinates of the center, the vertices, and co-vertices. Then graph.

1. $\frac{(x+6)^2}{9} + \frac{(y-4)^2}{25} = 1$

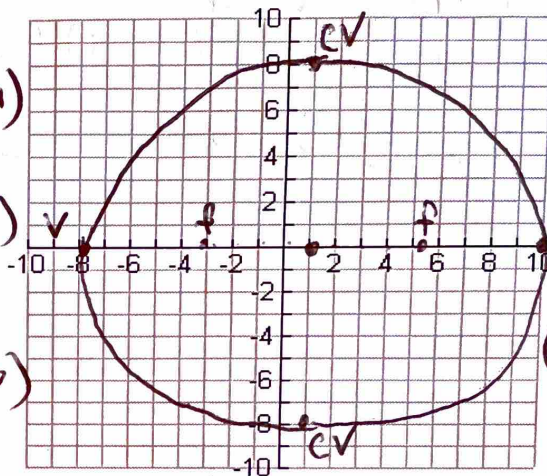
$c^2 = a^2 - b^2$
 $c^2 = 25 - 9 = 16$



V: (-6, 9), (-6, -1)
 CV: (-9, 4), (3, 4)
 f: (-6, 8), (-6, 0)

2. $\frac{(x-1)^2}{81} + \frac{y^2}{64} = 1$

$c^2 = 81 - 64 = 17$



V: (10, 0), (-8, 0)
 CV: (1, 8), (1, -8)
 F: (1 ± √17, 0)

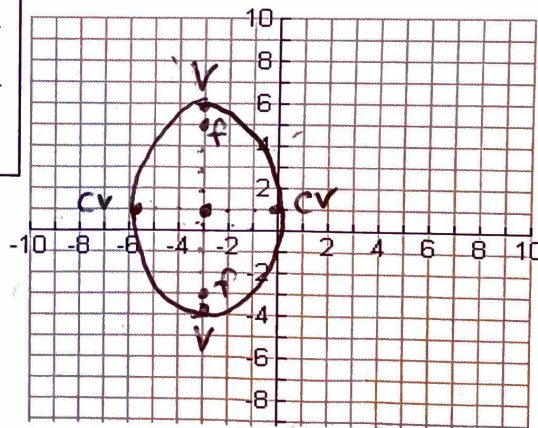
How would you identify the characteristics of the ellipse if the equation is not in standard form?

Write the standard form of the equation of each ellipse and then graph the equation. List the coordinates of the center, foci, and the major and minor axis vertices. State the eccentricity of the ellipse.

3. $3x^2 + y^2 + 18x - 2y + 4 = 0$

$\frac{(x+3)^2}{8} + \frac{(y-1)^2}{24} = 1$
 $c^2 = 24 - 8 = 16$
 $c = 4$

$a = \frac{\sqrt{24}}$
 $b = \frac{\sqrt{8}}$
 $c = 4$



Standard Form: _____

Center: (-3, 1) Vertices: (-3, 1 ± √24)

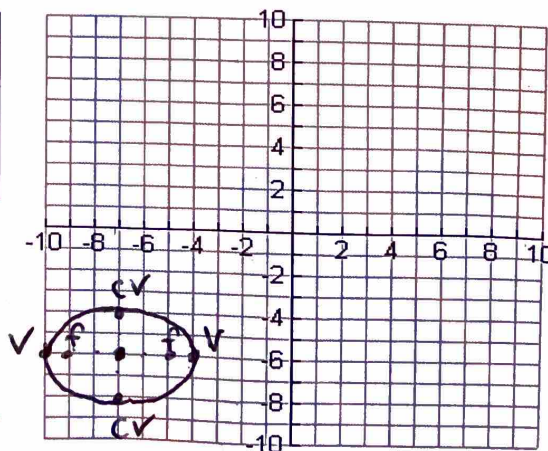
Co-Vertices: (-3 ± √8, 1) Eccentricity = $\frac{c}{a} = \frac{4}{\sqrt{24}}$

8.09 Practice

1. $4x^2 + 56x + 9y^2 + 108y = -484$

$\frac{(x+7)^2}{9} + \frac{(y+6)^2}{4} = 1$
 $c^2 = 9 - 4 = 5$
 $c = \sqrt{5}$

$a = 3$
 $b = 2$
 $c = \sqrt{5}$



Standard Form: _____

Center: (-7, -6) Vertices: (-4, -6), (-10, -6)

Co-Vertices: (-7, -4), (-7, -8)

foci: (-7 ± √5, -6) eccentricity = $\frac{c}{a} = \frac{\sqrt{5}}{3}$

$$3) 3x^2 + y^2 + 18x - 2y + 4 = 0$$

$$3x^2 + 18x + y^2 - 2y = -4$$

$$3\left(x^2 + 6x + \frac{9}{1}\right) + y^2 - 2y + \underline{1} = -4 + \underline{27} + \underline{1}$$

$$\left(\frac{b}{2}\right)^2 = \left(\frac{6}{2}\right)^2 = 9$$

$$\left(\frac{2}{2}\right)^2 = 1$$

$$3(x+3)(x+3) + (y-1)(y-1) = 24$$

$$\frac{3(x+3)^2}{24} + \frac{(y-1)^2}{24} = \frac{24}{24}$$

$$\frac{(x+3)^2}{8} + \frac{(y-1)^2}{24} = 1$$

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$$1) 4x^2 + 56x + 9y^2 + 108y = -484$$

$$4x^2 + 56x + 9y^2 + 108y = -484$$

$$4(x^2 + 14x + \underline{49}) + 9(y^2 + 12y + \underline{36}) = -484 + \underline{196} + \underline{324}$$

$$\left(\frac{b}{2}\right)^2 \rightarrow \left(\frac{14}{2}\right)^2 = 49$$

$$\left(\frac{12}{2}\right)^2 = 6^2 = 36$$

$$\frac{4(x+7)^2}{36} + \frac{9(y+6)^2}{36} = \frac{36}{36}$$

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

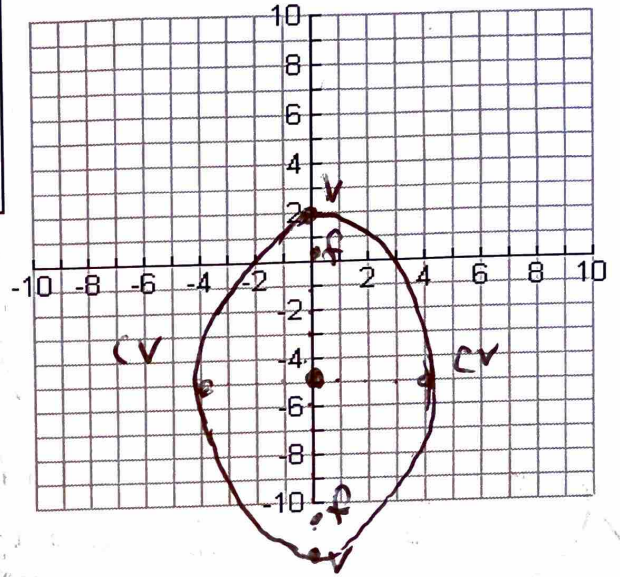
0

Foci: _____ Eccentricity = _____

2. $49x^2 + 16y^2 + 160y - 384 = 0$

$$\frac{x^2}{16} + \frac{(y+5)^2}{49} = 1 \quad \left| \begin{array}{l} c^2 = 49 - 16 \\ c^2 = 33 \end{array} \right.$$

$a =$	<u>7</u>
$b =$	<u>4</u>
$c =$	<u>$\sqrt{33}$</u>



Standard Form: _____

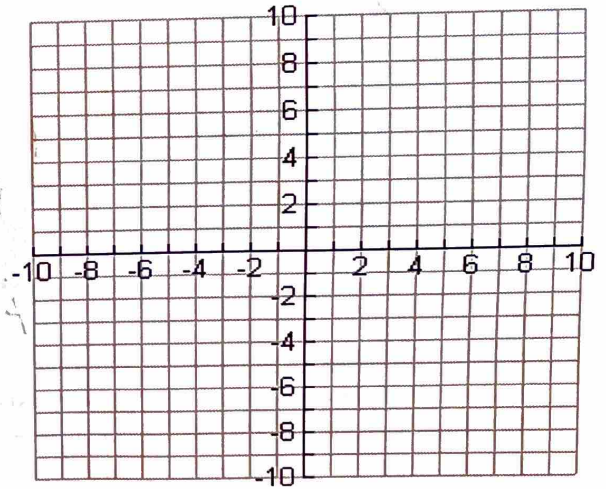
Center: (0, -5) Vertices: (0, -12)(0, 2)

Co-Vertices: (4, -5)(-4, -5) $\frac{c}{a} \rightarrow \frac{\sqrt{33}}{7}$

Foci: (0, -5 ± √33) Eccentricity = $\frac{\sqrt{33}}{7}$

3. $2x^2 + 18y^2 + 8x + 108y + 99 = 1$

$a =$	_____
$b =$	_____
$c =$	_____



Standard Form: _____

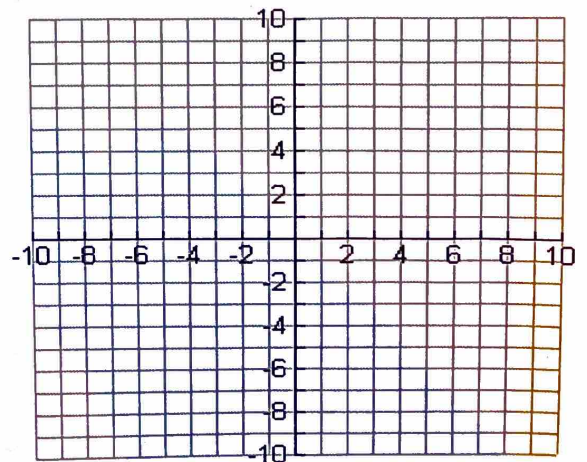
Center: _____ Vertices: _____

Co-Vertices: _____

Foci: _____ Eccentricity = _____

4. $18y^2 + 12x^2 - 144y - 48x = -120$

$a =$	_____
$b =$	_____
$c =$	_____



Standard Form: _____

Center: _____ Vertices: _____

Co-Vertices: _____

Foci: _____ Eccentricity = _____

$$2) 49x^2 + 16y^2 + 160y - 384 = 0 \quad \left(\frac{10}{2}\right)^2 = 25$$

$$49x^2 + 16(y^2 + 10y + \underline{25}) = 384 + \underline{400}$$

$$\frac{49x^2}{784} + \frac{16(y+5)^2}{784} = \frac{784}{784} \quad \left| \quad \frac{x^2}{16} + \frac{(y+5)^2}{49} = 1 \right.$$

8.10 Ellipses - Day 3

Date: _____

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

Write the equation of the ellipse in standard form that meets each set of conditions. Calculate a , b , and c . Graph, then list the coordinates of the center, foci, vertices, and co-vertices.

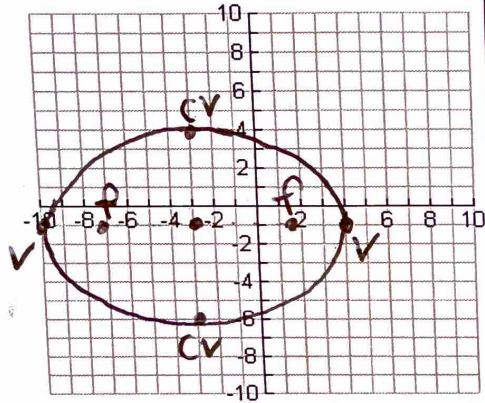
1. The center is at $(-3, -1)$, the length of the horizontal semi-major axis is 7 units, and the length of the semi-minor axis is 5 units.



2. The foci are at $(-2, 0)$ and $(2, 0)$ and $a = 7$.

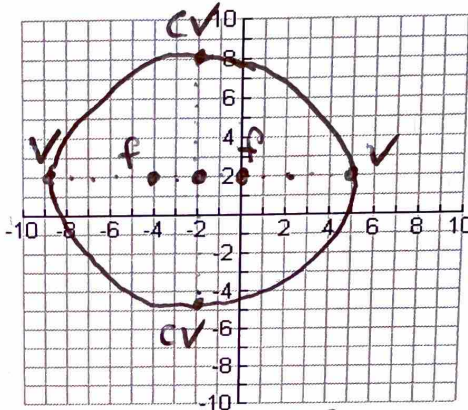
$(0, 2)$ $(-4, 2)$
 ~~$(-2, 0)$ $(2, 0)$~~

Center $(-2, 2)$



$$\begin{aligned} a &= 7 \\ b &= 5 \\ c &= \sqrt{24} \end{aligned}$$

$$\begin{aligned} c^2 &= 49 - 25 \\ c^2 &= 24 \\ c &= \sqrt{24} \end{aligned}$$



$$\begin{aligned} a &= 7 \\ b &= \sqrt{45} \\ c &= 2 \end{aligned}$$

$$\begin{aligned} c^2 &= a^2 - b^2 \\ 4 &= 7^2 - b^2 \\ 4 &= 49 - b^2 \\ b^2 &= 45 \quad b = \sqrt{45} \end{aligned}$$

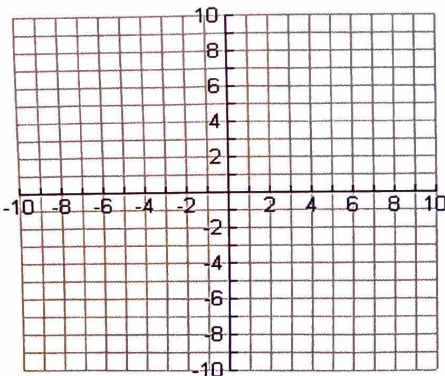
Standard Form: $\frac{(x+3)^2}{49} + \frac{(y+1)^2}{25} = 1$
 Vertices: $(-10, -1)(4, -1)$ Co-Vertices: $(-3, 4)(-3, -6)$
 Foci: $(-3 \pm \sqrt{24}, -1)$ Eccentricity: $\frac{\sqrt{24}}{7}$

Standard Form: $\frac{(x+2)^2}{49} + \frac{(y-2)^2}{45} = 1$
 Vertices: $(-2, 9)(-2, -5)$ Co-Vertices: $(-9, 2)(5, 2)$
 Center: $(-2, 2)$ Eccentricity: $\frac{2}{7}$

8.09 Practice

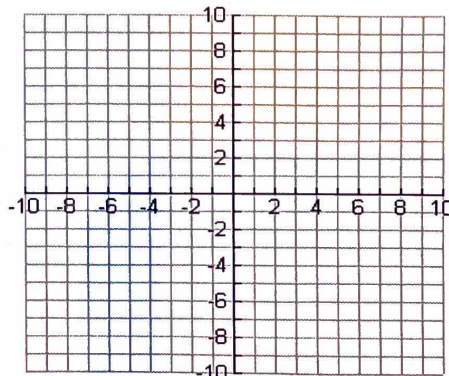
1. The length of the semi-major axis is twice the length of the horizontal semi-minor axis, the center is at the origin, and $b = 3$.

$$\begin{aligned} a &= \underline{\hspace{2cm}} \\ b &= \underline{\hspace{2cm}} \\ c &= \underline{\hspace{2cm}} \end{aligned}$$



2. The semi-major axis has a length of 6 units and the foci are at $(-1, 1)$ and $(-1, -5)$.

$$\begin{aligned} a &= \underline{\hspace{2cm}} \\ b &= \underline{\hspace{2cm}} \\ c &= \underline{\hspace{2cm}} \end{aligned}$$



Standard Form: _____
 Vertices: _____ Co-Vertices: _____
 Foci: _____ Eccentricity: _____

Standard Form: _____
 Vertices: _____ Co-Vertices: _____
 Center: _____ Eccentricity: _____