foh-sie

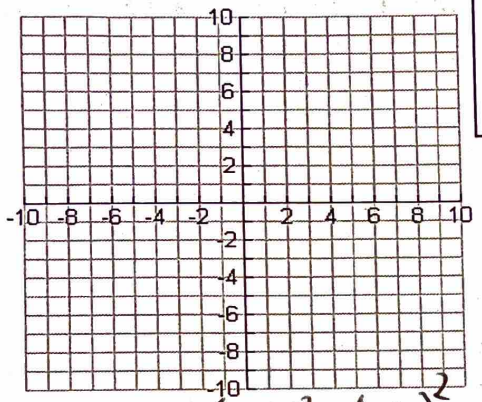
8.10 Ellipses – Day 3

Date: _____

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.

(h, k)



a = 7
b = 5
c = $2\sqrt{6}$

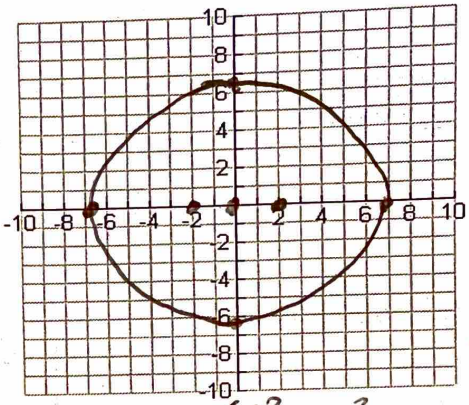
Standard Form: $\frac{(x+3)^2}{49} + \frac{(y+1)^2}{25} = 1$

Vertices: _____ Co-Vertices: _____

Foci: $-3 \pm 2\sqrt{6}, -1$ Eccentricity: $\frac{2\sqrt{6}}{7}$

2. The foci are at (–2, 0) and (2, 0) and *a* = 7.

c = 2



a = 7
b = $\sqrt{45}$
c = 2

$c^2 = a^2 - b^2$
$4 = 49 - b^2$
$b^2 = 45$
$b = \sqrt{45} \to 3\sqrt{5}$

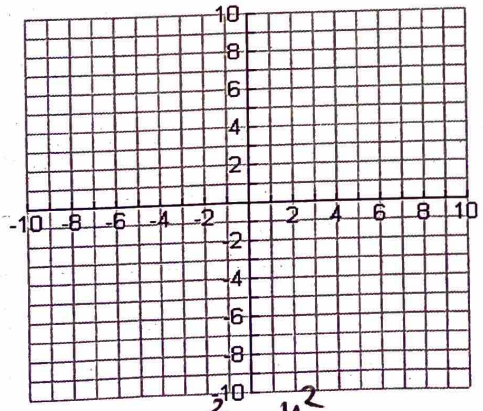
Standard Form: $\frac{(x)^2}{49} + \frac{y^2}{45} = 1$

Vertices: $(-7, 0)(7, 0)$ Co-Vertices: $(0, 0 \pm \sqrt{45})$

Center: $(0, 0)$ 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.



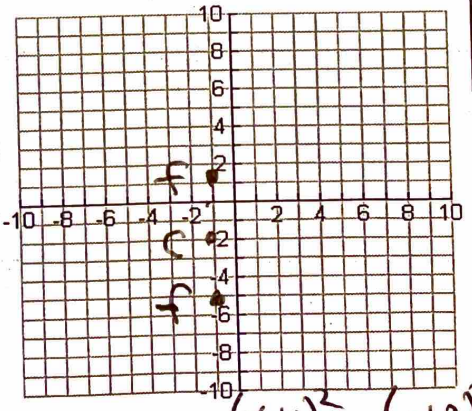
a = 6
b = 3
c = $3\sqrt{3}$

Standard Form: $\frac{x^2}{9} + \frac{y^2}{36} = 1$

Vertices: _____ Co-Vertices: _____

Foci: $(0, 0 \pm 3\sqrt{3})$ Eccentricity: $\frac{\sqrt{3}}{2}$

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



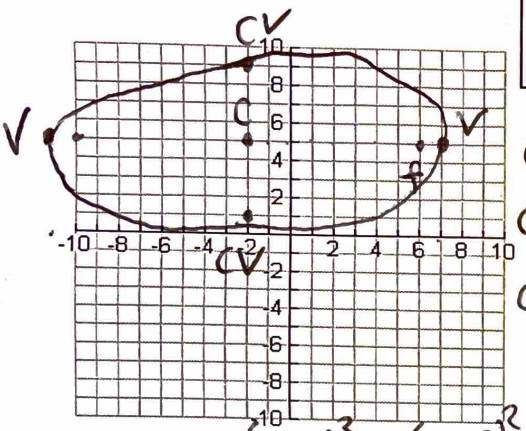
a = 6
b = $3\sqrt{3}$
c = 3

Standard Form: $\frac{(x+1)^2}{27} + \frac{(y+2)^2}{36} = 1$

Vertices: $(-1, 4)(-1, -8)$ Co-Vertices: $-1 \pm 3\sqrt{3}, -2$

Center: _____ Eccentricity: _____

3. The endpoints of the major axis are (-11, 5) and (7, 5). The endpoints of the minor axis are at (-2, 9) and (-2, 1).



a = 9
b = 4
c = $\sqrt{65}$

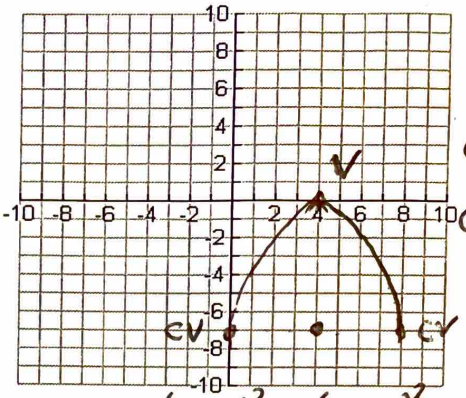
$c^2 = a^2 - b^2$
$c^2 = 81 - 16$
$c^2 = 65$

Standard Form: $\frac{(x+2)^2}{81} + \frac{(y-5)^2}{16} = 1$

Center: $(-2, 5)$ Foci: $(-2 \pm \sqrt{65}, 5)$

Eccentricity: $\frac{\sqrt{65}}{9}$

4. The ellipse is tangent to the x-axis and the y-axis and the center is (4, -7).



a = 7
b = 4
c = $\sqrt{33}$

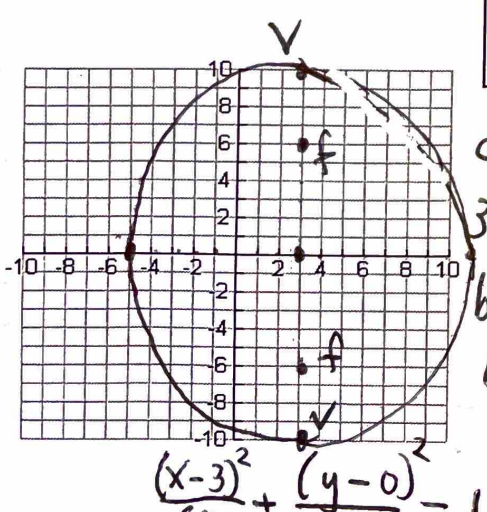
$c^2 = a^2 - b^2$
$c^2 = 49 - 16$
$c^2 = 33$

Standard Form: $\frac{(x-4)^2}{16} + \frac{(y+7)^2}{49} = 1$

Vertices: $(4, 0)(4, -14)$ Co-Vertices: $(0, -7)(8, -7)$

Foci: $(4, -7 \pm \sqrt{33})$ Eccentricity: $\frac{\sqrt{33}}{7}$

5. The vertical major axis is 20 units, the center is at (3, 0), and the eccentricity equals $\frac{3}{5}$. $\frac{c}{a}$



a = 10
b = 8
c = 6

$c^2 = a^2 - b^2$
$36 = 100 - b^2$
$b^2 = 64$
$b = 8$

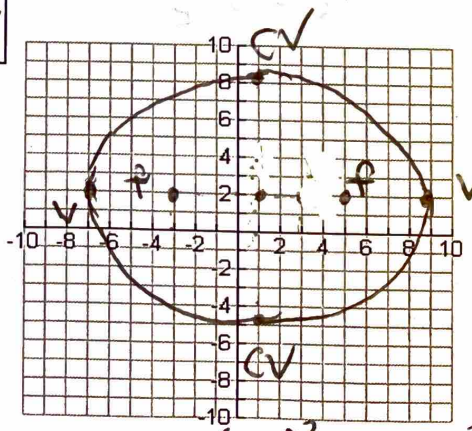
Standard Form: $\frac{(x-3)^2}{64} + \frac{(y-0)^2}{100} = 1$

Vertices: $(3, 10)(3, -10)$ Co-Vertices: $(-5, 0)(11, 0)$

Foci: $(3, 6), (3, -6)$

6. The foci are at (-3, 2) and (5, 2) and the eccentricity equals 0.5

$\frac{c}{a} \to \frac{1}{2} \to \frac{4}{8}$



a = 8
b = $4\sqrt{3}$
c = 4

$c^2 = a^2 - b^2$
$16 = 64 - b^2$
$48 = b^2$
$b = \sqrt{48} = 4\sqrt{3}$

Standard Form: $\frac{(x-1)^2}{64} + \frac{(y-2)^2}{48} = 1$

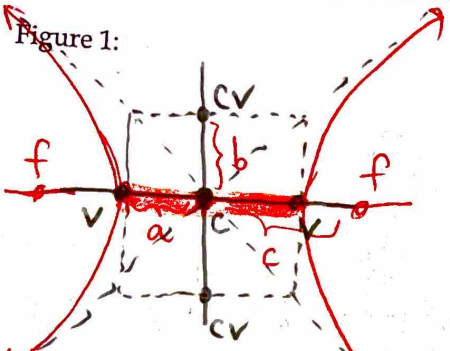
Vertices: $(9, 2)(-7, 2)$ Co-Vertices: $(2, 8)(2, -5)$

Center: $(1, 2)$

8.11 Hyperbolas – Day 1 Date: _____

Hyperbola: a conic section where the difference of the distance from 2 fixed points (foci) is a constant.

Figure 1:

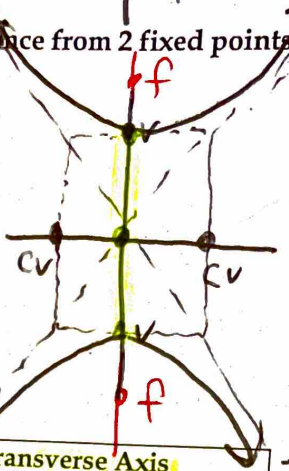


Center:

Vertices:

Foci:

Asymptotes:



Horizontal Transverse Axis	Vertical Transverse Axis
$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$	$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$
Center: (h, k) Vertices: (h ± a, k) Foci: (h ± c, k) Eccentricity = $\frac{c}{a}$ $a^2 + b^2 = c^2$ Asymptotes: $y - k = \pm\frac{b}{a}(x - h)$	Center: (h, k) Vertices: (h, k ± a) Foci: (h, k ± c) Eccentricity = $\frac{c}{a}$ $a^2 + b^2 = c^2$ Asymptotes: $y - k = \pm\frac{a}{b}(x - h)$

Transverse axis: Axis that connect the vertices:

Conjugate axis: Axis connecting the coverticies

Examples: Graph the Hyperbola. State the center, vertices, foci, eccentricity, and asymptotes.

1. $\frac{(x+1)^2}{16} - \frac{(y-1)^2}{9} = 1$

$a=4$
$b=3$

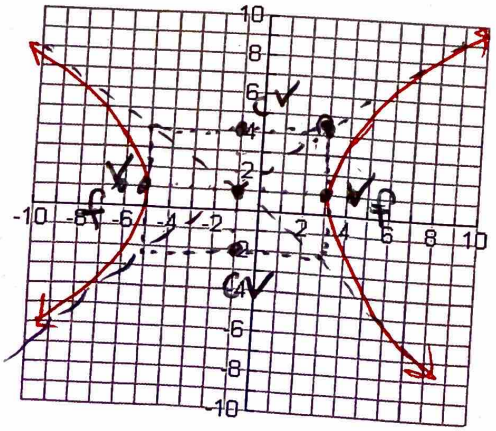
$c^2 = 16+9$
$c^2 = 25$
$c = 5$

Center: $(-1, 1)$ Eccentricity: $\frac{5}{4}$

Vertices: $(-5, 1)\ (3, 1)$

Foci: $(-6, 1),\ (4, 1)$

Asymptotes: $y - 1 = \pm\frac{3}{4}(x+1)$



2. $\frac{(y-3)^2}{4} - \frac{(x+5)^2}{25} = 1$

$a = 2$
$b = 5$

Center: $(-5, 3)$ Eccentricity: ____

Vertices: $(-5, 5)\ (-5, 1)$

Foci: $(-5, 3 \pm \sqrt{29})$

Asymptotes: $y - 3 = \pm\frac{2}{5}(x+5)$

$c^2 = a^2 + b^2$
$c^2 = 4 + 25$
$c^2 = 29$
$c = \sqrt{29}$