

8.13b Ellipses and Hyperbolas Review WS #2

Date _____

Key

1. Write the equation of the ellipse in standard form. Graph the ellipse and identify requested parts.

$$3x^2 + y^2 - 48x - 4y + 184 = 0$$

$$3x^2 - 48x + y^2 - 4y = -184$$

$$3(x^2 - 16x + 64) + y^2 - 4y + 4 = -184 + 192 + 4$$

$$\left(\frac{16}{2}\right)^2 = 64$$

$$\left(\frac{4}{2}\right)^2 = 4$$

$$\frac{3(x-8)^2}{12} + \frac{(y-2)^2}{12} = 1$$

$$\begin{aligned} a &= \sqrt{12} = 2\sqrt{3} \updownarrow \\ b &= 2 \leftrightarrow \\ c^2 &= a^2 - b^2 \\ c^2 &= 12 - 4 = 8 \\ c &= 2\sqrt{2} \updownarrow \end{aligned}$$

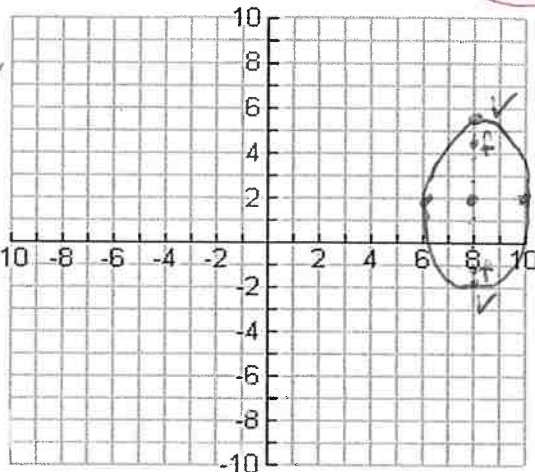
Standard Form:

$$\frac{(x-8)^2}{4} + \frac{(y-2)^2}{12} = 1$$

Center: $(8, 2)$ Vertices: $(8, 2 \pm 2\sqrt{3})$

Foci: $(8, 2 \pm 2\sqrt{2})$ Co-Vertices: $(6, 2), (10, 2)$

Eccentricity = $\frac{c}{a} \rightarrow \frac{2\sqrt{2}}{2\sqrt{3}} = \frac{\sqrt{2}}{\sqrt{3}}$



2. Write the equation of an ellipse with center $(-2, -1)$, a horizontal major axis of length 10 and a minor axis of length 5.

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

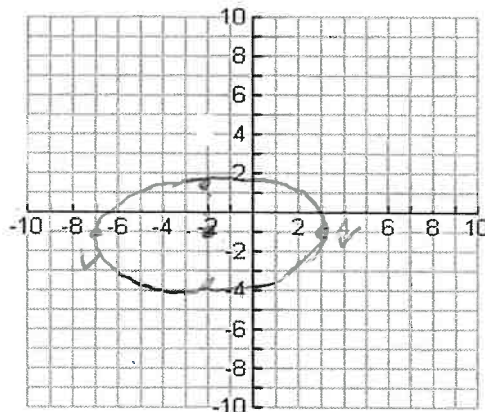
$$\frac{(x+2)^2}{5^2} + \frac{(y+1)^2}{2.5^2} = 1$$

$$a = 5$$

$$b = 2.5$$

Equation:

$$\frac{(x+2)^2}{25} + \frac{(y+1)^2}{6.25} = 1$$



3. Write an equation of the ellipse with a vertex at $(0, 7)$ and a co-vertex at $(-3, 0)$

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

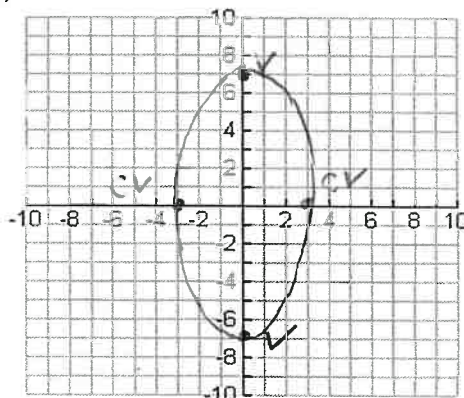
$$a = 7$$

$$b = 3$$

center $(0, 0)$

$$\frac{(x-0)^2}{9} + \frac{(y-0)^2}{49} = 1$$

Equation:



4. Identify the characteristics of the hyperbola. Then, graph the hyperbola and label all parts.

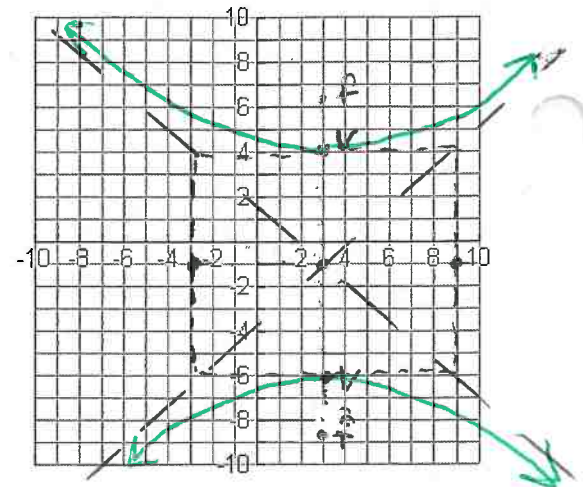
$$\frac{(y+1)^2}{25} - \frac{(x-3)^2}{36} = 1$$

$$a = \downarrow 5 \quad b = \leftarrow 6 \quad c = \downarrow \sqrt{61}$$

$$c^2 = a^2 + b^2$$

$$c^2 = 25 + 36 = 61$$

$$c = \sqrt{61}$$



Center: $(3, -1)$

Vertices: $(3, 4), (3, -6)$

Foci: $(3, -1 \pm \sqrt{61})$

Asymptotes: $y + 1 = \pm \frac{5}{6}(x - 3)$

Eccentricity: $\frac{\sqrt{61}}{5}$

5. Write the equation of the hyperbola in standard form. Identify the center, vertices, foci, asymptotes, and eccentricity. Graph the hyperbola and label all parts. $3x^2 - 4y^2 - 30x - 8y + 59 = 0$

$$3x^2 - 30x - 4y^2 - 8y = -59$$

$$3(x^2 - 10x + 25) - 4(y^2 + 2y + 1) = -59 + 75 + -4$$

$$\left(\frac{10}{2}\right)^2 = 25$$

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

$$\frac{3(x-5)^2}{12} - \frac{4(y+1)^2}{12} = \frac{12}{12}$$

Standard Form: $\frac{(x-5)^2}{4} - \frac{(y+1)^2}{3} = 1$

$$a = \leftarrow 2 \quad b = \downarrow \sqrt{3} \quad c = \leftarrow \sqrt{7} \quad c^2 = a^2 + b^2$$

$$c^2 = 4 + 3$$

$$c = \sqrt{7}$$

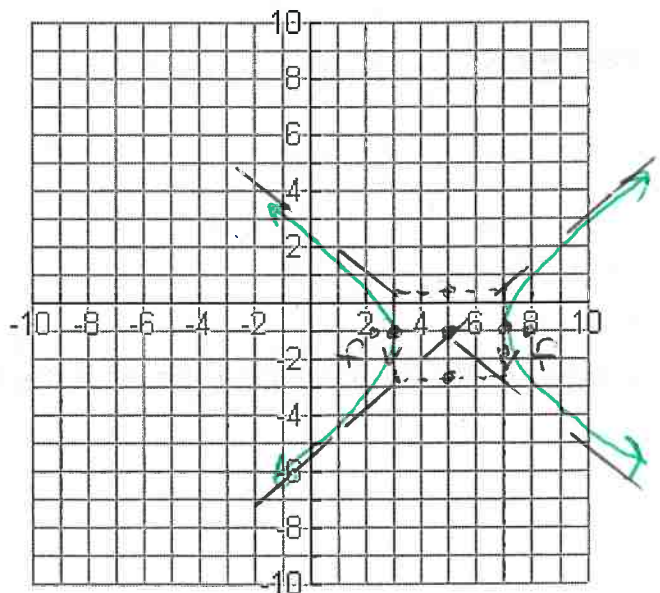
Center: $(5, -1)$

Vertices: $(3, -1), (7, -1)$

Foci: $(5 \pm \sqrt{7}, -1)$

Asymptotes: $y + 1 = \pm \frac{\sqrt{3}}{2}(x - 5)$

Eccentricity: $\frac{\sqrt{7}}{2}$



6. Write an equation of a hyperbola with center at (2, -3), a focus at (8, -3) and one vertex at (6, -3).

$$c^2 = a^2 + b^2$$

$$6^2 = 4^2 + b^2$$

$$a = \underline{4} \quad b = \underline{2\sqrt{5}} \quad c = \underline{6} \quad b^2 = 20$$

$$b = \sqrt{20} = 2\sqrt{5}$$

$$\frac{(x-2)^2}{16} - \frac{(y+3)^2}{20} = 1$$

Standard Form: _____

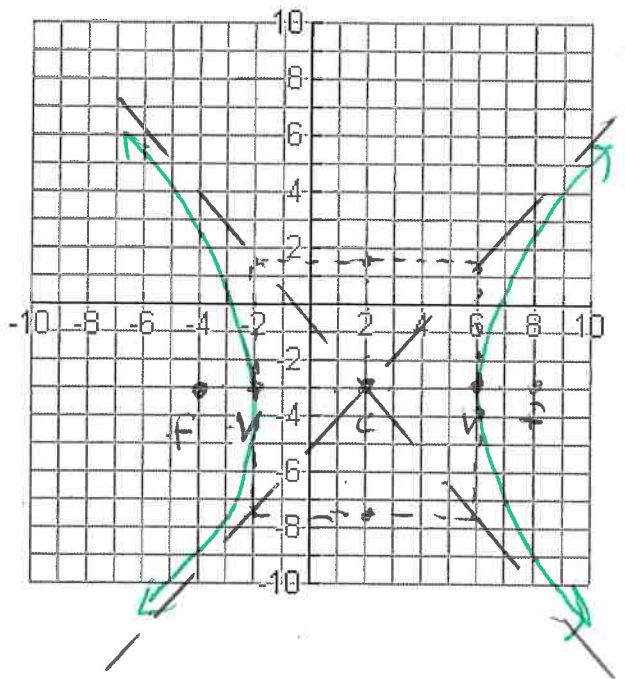
Center: $(2, -3)$

Vertices: $(-2, -3), (6, -3)$

Foci: $(-4, -3), (8, -3)$

Asymptotes: $y + 3 = \pm \frac{2\sqrt{5}}{4}(x - 2)$

Eccentricity: $\frac{6}{4}$ or $\frac{3}{2}$



7. Match the general form equation to the type of conic section it represents.

A) $127 - 3x^2 + 3y^2 - 24x + 10y = 0$ opposite signs \rightarrow hyperbola

B) $4 - x^2 - 16x - 14y = 0$ only 1 variable is squared \rightarrow parabola

C) $253 - 2x^2 = 2y^2 + 15x$ $253 - 2x^2 - 2y^2 = 15x$ same coefficient, same signs
 circle

D) $1 - 5y^2 - 3x^2 + 12x = 16y$ same signs, different coefficients \rightarrow ellipse

Parabola: B

Circle: C

Ellipse: D

Hyperbola: A