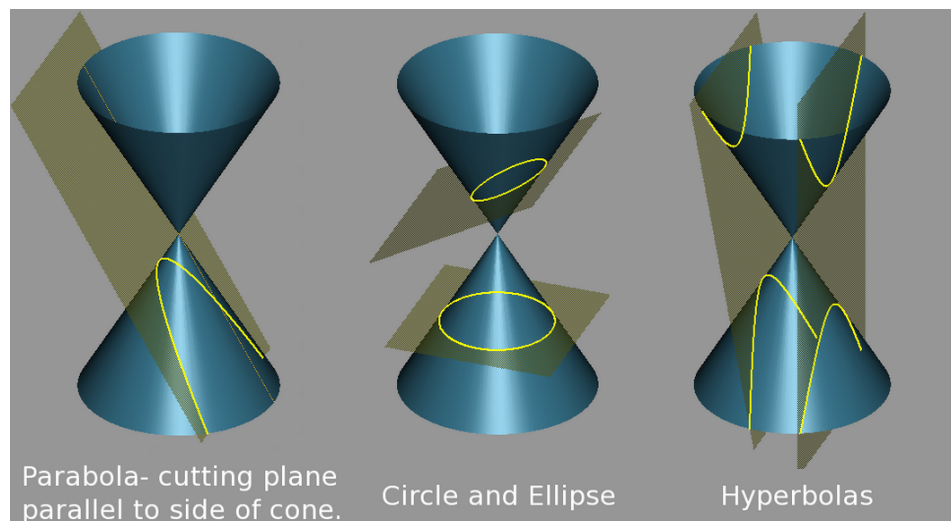
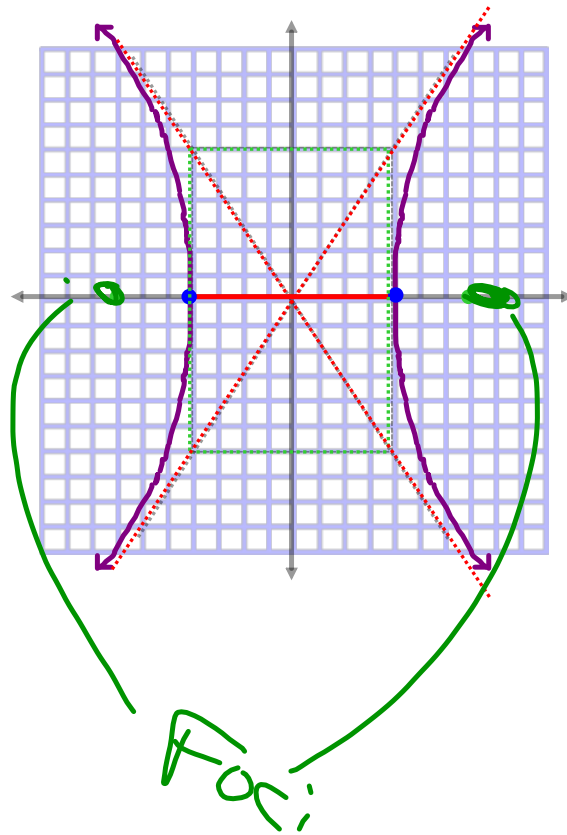


9.5 Graph Hyperbolas

Conic Sections:



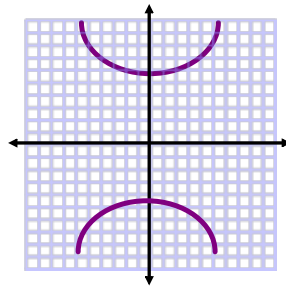
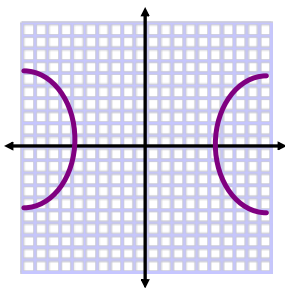
Parts of a hyperbola:



Standard Form:

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

There are 2 types of hyperbolas:



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

Center: (h, k)

Vertices: $(h \pm a, k)$

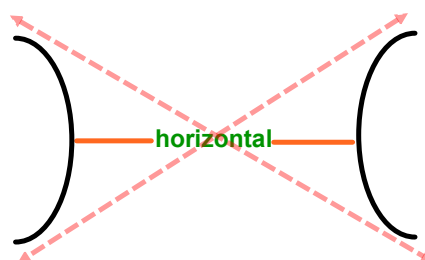
Co-Vertices: $(h, k \pm b)$

Foci: $(h \pm c, k)$

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

To Graph:

- 1) Draw a box through the vertices & co-vertices
- 2) Draw the diagonal asymptotes through the corners of the box
- 3) Draw 2 arcs through the vertices approaching the asymptotes.



	Distance Midpoint 1	Parabola
	Circle	Ellipse
Here!!		
		5 6

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

Center: (h, k)

Vertices: $(h, k \pm b)$

Co-Vertices: $(h \pm a, k)$

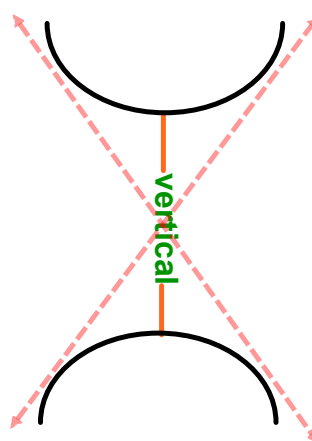
Foci: $(h, k \pm c)$

To Graph:

- 1) Draw a box through the vertices & co-vertices
- 2) Draw the diagonal asymptotes through the corners of the box
- 3) Draw 2 arcs through the vertices approaching the asymptotes.

Same as horizontal

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

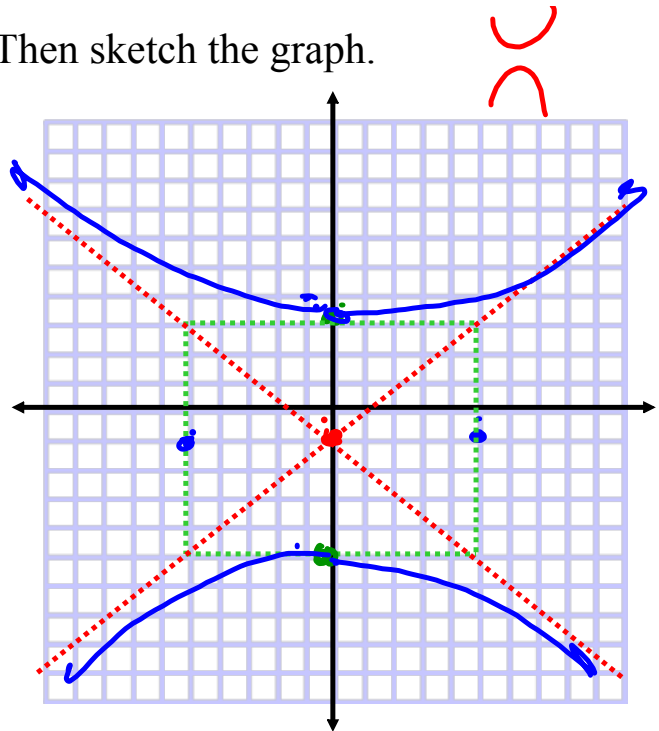


Distance Midpoint 1	Parabola
Circle 3 4	Elipse
Here!! 5 6	

Identify the vertices and foci of each. Then sketch the graph.

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

4 5



Center: $(0, -1)$
 Vertices: $(0, 3)$ $(0, -5)$
 Co-Vertices: $(-5, -1)$ $(5, -1)$
 Foci: $(0, 5.4)$ $(0, -7.4)$

Foci: $(h, k \pm c)$
 $(0, -1 \pm 6.4)$

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

$$c^2 = 16 + 25$$

$$\sqrt{c^2} = \sqrt{41}$$

$$c = 6.4$$

$$d. \quad \underline{x^2} - \underline{4y^2} + \underline{2x} - \underline{8y} - 19 = 0$$

+19 +19

$$x^2 + 2x - (-4y^2 - 8y) = 19$$

$$\frac{x^2 + 2x}{4} - 4(y^2 + 2y) = \frac{19}{4}$$

$$\frac{x^2 + 2x + 1}{4} - \frac{y^2 + 2y + 1}{1} = \frac{19}{4} + 4 - 1$$

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

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

b.

Vertices: $(9, 3), (9, -23)$

Foci: $(9, -10 + \sqrt{185}), (9, -10 - \sqrt{185})$

$$h = 9$$

$$k = -10$$

$$a = 4$$

$$b = 13$$

$$k + b = 3$$

$$-10 + b = 3$$

$$b = 13$$

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

$$\sqrt{185}^2 = a^2 + 13^2$$

$$185 = a^2 + 169$$

$$16 = a^2$$

$$a = 4$$

$$\frac{(y+10)^2}{169} - \frac{(x-9)^2}{16} = 1$$