

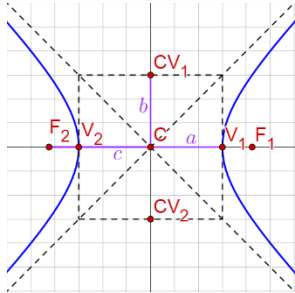
Precalculus

7-04 Hyperbolas

Set of all points in a plane where the _____ of the distances from two set points, _____, is constant.

- $d_1 - d_2 =$ _____.

Horizontal Hyperbola

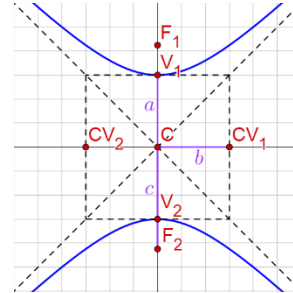


- Center (h, k)
- Horizontal Transverse Axis length $= 2a$
- Vertical Conjugate Axis length $= 2b$
- $c^2 = a^2 + b^2$
- Vertices $(h \pm a, k)$, Covertices $(h, k \pm b)$
- Foci $(h \pm c, k)$

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

- Asymptotes $y = k \pm \frac{b}{a}(x - h)$

Vertical Hyperbola



- Center (h, k)
- Vertical Transvers Axis length $= 2a$
- Horizontal Conjugate Axis length $= 2b$
- $c^2 = a^2 + b^2$
- Vertices $(h, k \pm a)$, Covertices $(h \pm b, k)$
- Foci $(h, k \pm c)$

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

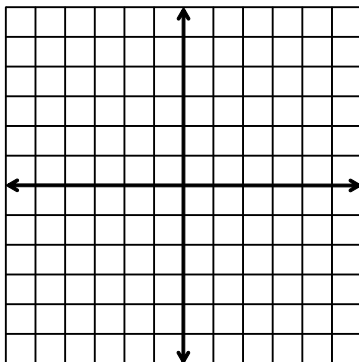
- Asymptotes $y = k \pm \frac{a}{b}(x - h)$

Eccentricity

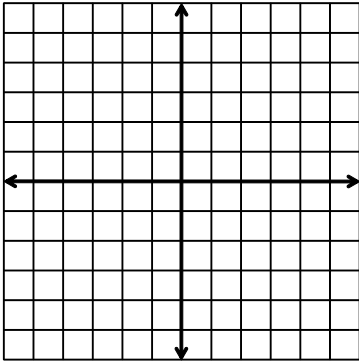
- $e = \frac{c}{a}$, where $e > 1$
- Big $e =$ _____ branches

Find the center, vertices, asymptotes, and foci of the hyperbola $4y^2 - 9x^2 = 36$.

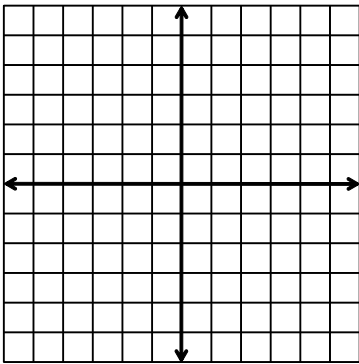
Find the standard form of the hyperbola centered at $(1, 2)$ with transverse axis length 10 and foci $(-5, 2)$ and $(7, 2)$.



Graph $\frac{(x-1)^2}{25} - \frac{(y-2)^2}{11} = 1$



Sketch the graph of $4x^2 - 9y^2 - 24x - 72y - 72 = 0$

**General form of conics**

$$Ax^2 + Cy^2 + Dx + Ey + F = 0$$

- Circle if $A = C$
- Parabola if $AC = 0$ (so $A = 0$ or $C = 0$)
- Ellipse if $AC > 0$
- Hyperbola if $AC < 0$

Classify the conics

$$4x^2 + 5y^2 - 9x + 8y = 0$$

$$2x^2 - 5x + 7y - 8 = 0$$

$$7x^2 + 7y^2 - 9x + 8y - 16 = 0$$

$$4x^2 - 5y^2 - x + 8y + 1 = 0$$