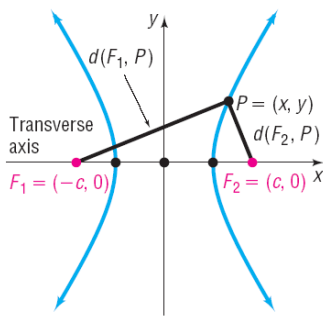
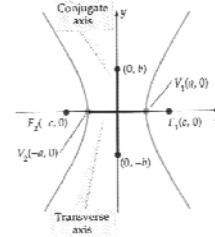


Section 11.4

The Hyperbola

HYPERBOLAS

A **hyperbola** is the collection of all points in the plane the difference of whose distances from two fixed points (**foci**) is a positive constant.



$$d(F_1, P) - d(F_2, P) = 2a$$

HYPERBOLAS WITH CENTER AT (h, k)

The standard form of an equation for a hyperbola with center at (h, k) is:

$$\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1 \quad \text{if the transverse axis is horizontal.}$$

$$\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1 \quad \text{if the transverse axis is vertical.}$$

HYPERBOLA FACTS

- **center:** (h, k)
- **vertices:** a units from center in both directions
- **foci:** c units from center in both directions where $c^2 = a^2 + b^2$.
- **eccentricity:** $e = \frac{c}{a}$

CONIC SECTION FLOW CHART

