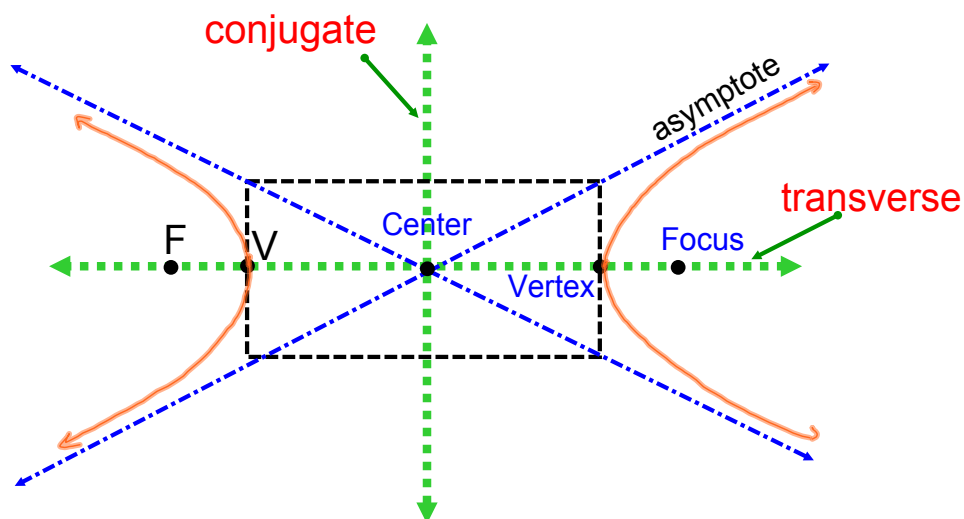


8.3 Hyperbolas

#86

hyperbola: a set of all points in a plane whose distances from two fixed points (**foci**) in the plane have a constant difference.



focal axis - line through the foci

center - midpoint of the seg. connecting foci or vertices

vertices - points where hyperbola intersects the focal axis

asymptotes - the 2 guidelines the hyperbola approaches but never crosses

transverse axis - a line segment $2a$ units long whose endpoints lie on the vertices (through the foci)

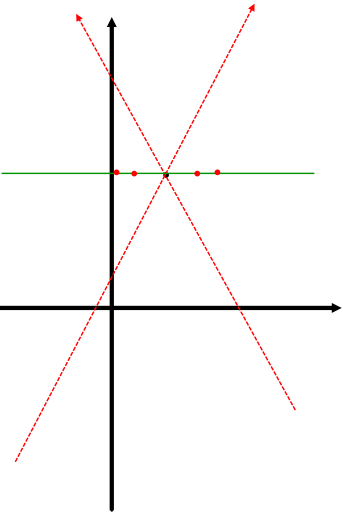
conjugate axis - line segment $2b$ units long that is \perp to the transverse axis

pythagorean relationship: $c^2 = a^2 + b^2$

Hyperbola - Standard Form
horizontal

#87

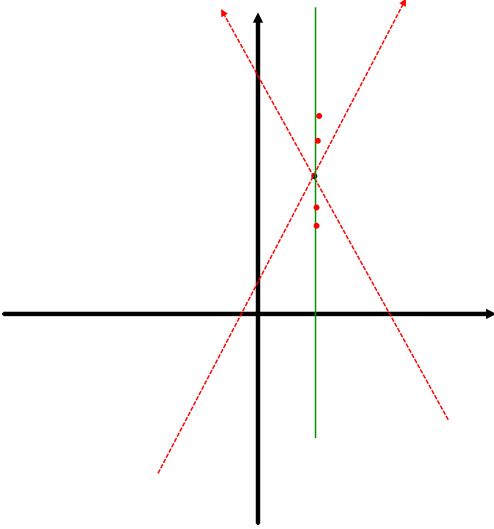
Standard Eq	$\frac{(x-h)^2}{a^2} - \frac{(y-k)^2}{b^2} = 1$
Center	(h, k)
Foci	$(h \pm c, k)$
Vertices	$(h \pm a, k)$
Asymptotes	$y = \pm \frac{b}{a}(x-h) + k$
Pythagorean Relationship	$a^2 + b^2 = c^2$



Hyperbola - Standard Form
vertical

#87 -
back

Standard Eq	$\frac{(y-k)^2}{a^2} - \frac{(x-h)^2}{b^2} = 1$
Center	(h, k)
Foci	$(h, k \pm c)$
Vertices	$(h, k \pm a)$
Asymptotes	$y = \pm \frac{a}{b}(x-h) + k$
Pythagorean Relationship	$a^2 + b^2 = c^2$

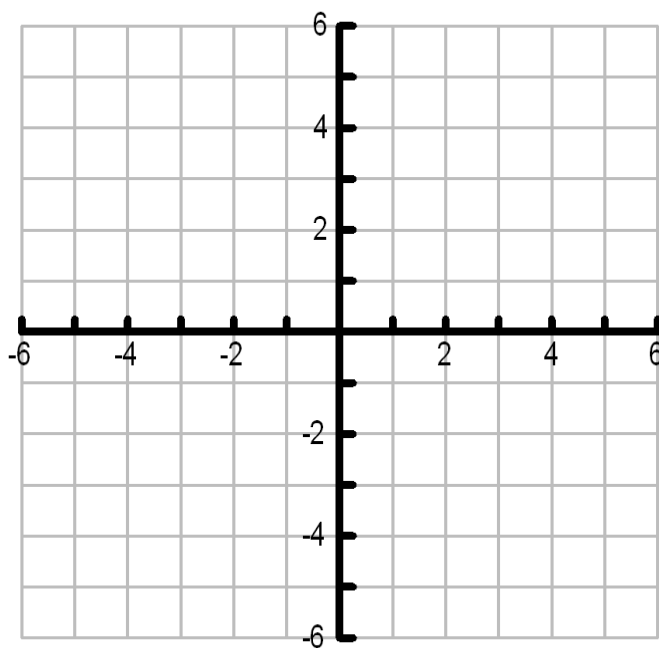


Find the center, vertices and foci of the hyperbola

$$\frac{x^2}{16} - \frac{y^2}{7} = 1$$

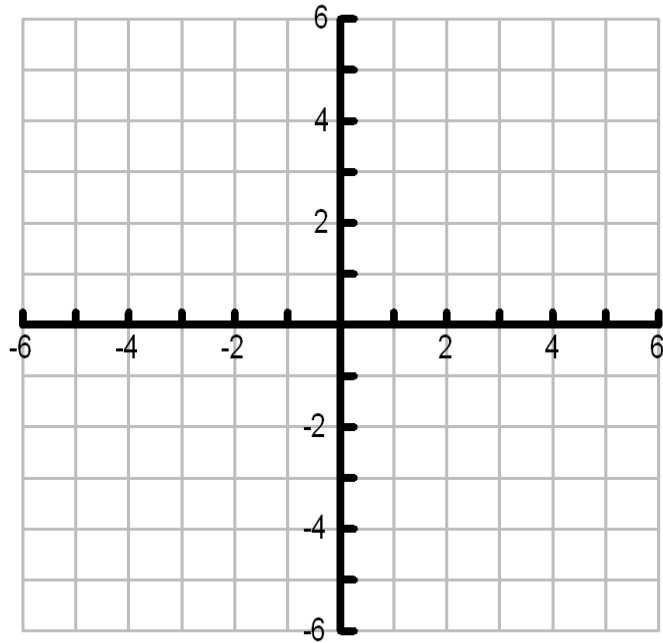
Find the center, vertices, and foci. Sketch a graph.

$$\frac{x^2}{16} - \frac{y^2}{49} = 1$$



Find the center, vertices, and foci. Sketch a graph.

$$4(y-1)^2 - 9(x-3)^2 = 36$$



Write the equation of the hyperbola:

foci: $(\pm 3, 0)$

trans. axis length 4

Write the equation of the hyperbola:

trans axis endpts: (2, 3) and (2, -1)

conj. axis = 6

Hyperbola - General Form

#88

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

when A is neg - vertical hyp. or C is neg - horizontal hyp.

Steps:

1. move variables to left & constants to right side of eq. to complete the square
2. Group like variables
3. If x^2 & x terms, complete sq. for x 's
4. If y^2 & y terms, complete sq. for y 's
5. Write each completed sq. in factored form.
6. Need to have 1 on rt. so divide both sides by value on rt.
7. Simplify
8. result is in graphing form

Write the equation of the hyperbola in standard form:

$$5x^2 - 4y^2 - 40x - 16y = 36$$