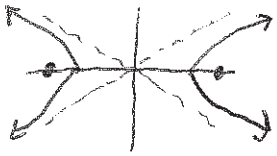


Hyperbolas

A locus (set of points) in a plane whose distances from 2 fixed points (Foci) differ by a constant.

How to Graph

① Find Center

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

Center = (h,k)

② Find a & b / opens horizontally

③ Draw a rectangle (w/ a dotted line) using these four points: $(h+a,k)$, $(h-a,k)$, $(h,k+b)$, $(h,k-b)$.

④ Draw the asymptotes through (h,k) with $m = \pm b/a$

⑤ Find c → $c^2 = a^2 + b^2$

⑥ Draw Foci: $(h+c,k)$ & $(h-c,k)$

⑦ Draw Hyperbola

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

Center = (h,k)

② Find a & b / opens vertically

③ Draw a rectangle (w/ a dotted line) using these four points: $(h+b,k)$, $(h-b,k)$, $(h,k+a)$, $(h,k-a)$

④ Draw the asymptotes through (h,k) with $m = \pm a/b$

⑤ Find c → $c^2 = a^2 + b^2$

⑥ Draw Foci: $(h,k+c)$ & $(h,k-c)$

⑦ Draw Hyperbola.

Hyperbolas

A locus of points in a plane whose distances from 2 fixed points (foci) differ by a constant

Differences from the Ellipse

Ellipse	Hyperbola
a > c	a < c
b = distance from center to covertices	b = distance from center to the other sides of the rectangle
a is always the bigger denominator	a is always the first denominator

If *P (x, y)* is a point on the conic & F1 and F2 are the foci

PF1 + PF2 = 2a $\qquad$ *|PF1 - PF2| = 2a*

Hyperbola Formula

$$\frac{(x-h)^2}{a^2}-\frac{(y-k)^2}{b^2}=1, \text{ where } b^2=c^2-a^2 \text{ since } c>a$$

Asymptotes

There are two asymptotes that guide the graph of the hyperbola. We need to use our "rectangle" to help figure out the equations of the asymptotes.

The slope of the asymptotes is always

$$\pm\frac{b}{a}$$

Graph the Hyperbola & Find its foci

$$\frac{y^2}{9}-\frac{x^2}{36}=1$$

Graph the Hyperbola & Find its foci

$$\frac{(x-3)^2}{25}-\frac{(y+2)^2}{16}=1$$

Name: _____ Date: _____
Period: _____ Advanced Algebra

Writing Equations for Hyperbolas

1. Write the equation for a hyperbola with center (2,1), vertical transverse axis of length 14 and conjugate axis of length 26.

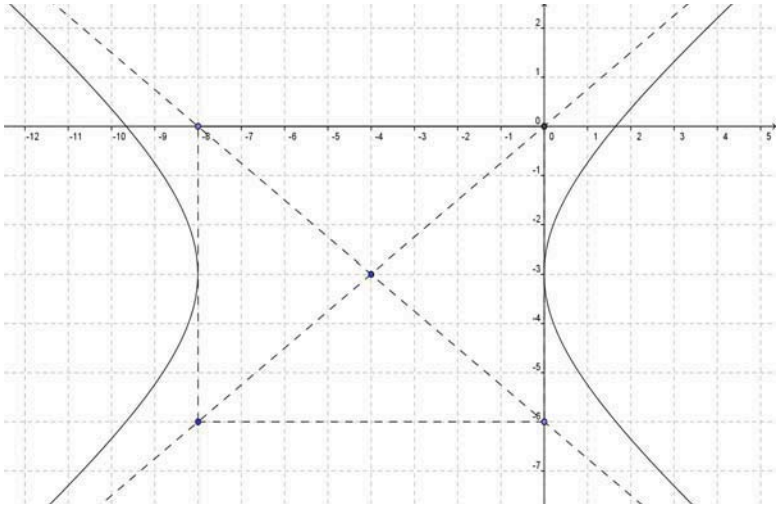
2. Write the equation for a hyperbola with center (-7, -1) with horizontal transverse axis of length 6 and conjugate axis of length 14.

3. Write the equation for a hyperbola with foci (-5,2) and (5,2) and transverse axis of length 4.

4. Write the equation for a hyperbola with vertices at (6,-5) and (2,-5) and covertices at (4,-1) and (4,-9).

5. Write the equation for a hyperbola with vertices at (2,-3) and (2,11) and foci at (2,-5) and (2,13)

6.



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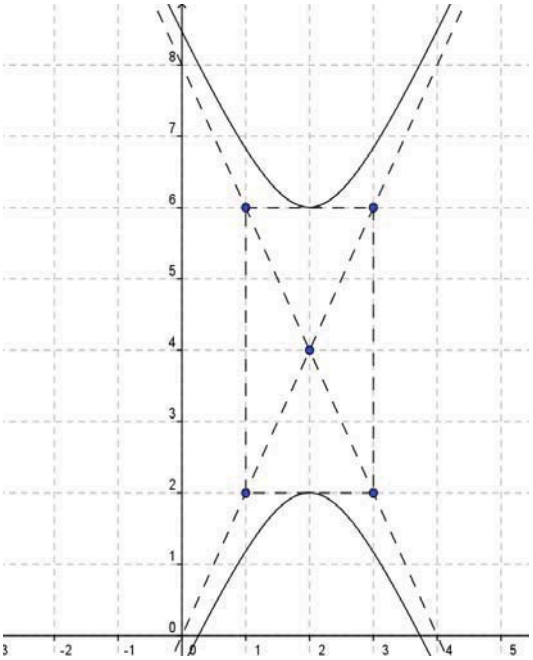

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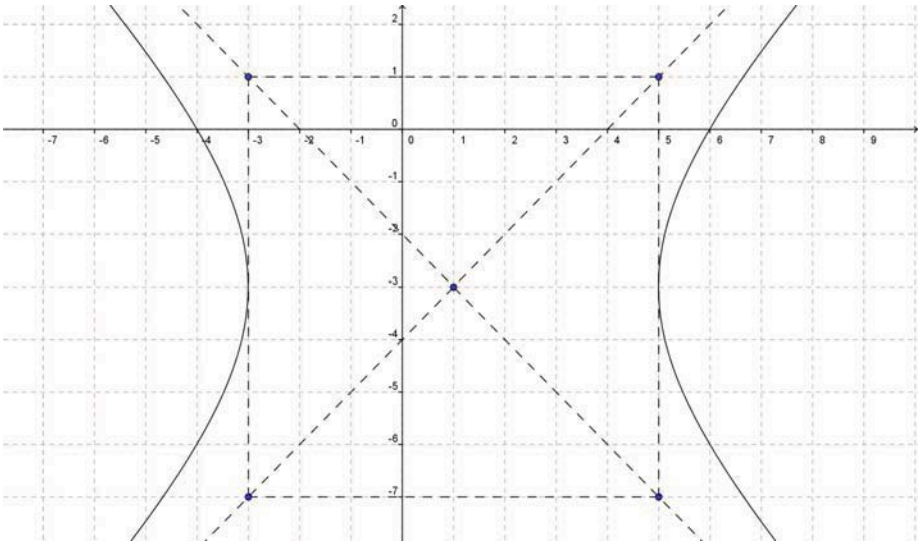

9.