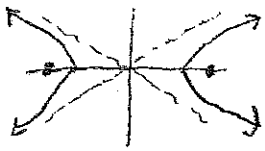


Hyperbolas

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

① Find Center

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

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.

Equation is a lot like an ellipse

$9x^2-16y^2-18x-64y-199=0$

$9x^2-18x-16y^2-64y=199$

$9(x^2-2x+1)-16(y^2+4y+4)=199+9-64$

$\frac{9(x-1)^2}{144}-\frac{16(y+2)^2}{144}=\frac{144}{144}$

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

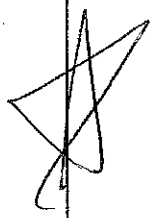
Graph the Hyperbola & Find its foci

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

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.

$$\frac{(y-1)^2}{49} - \frac{(x-2)^2}{169} = 1$$

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

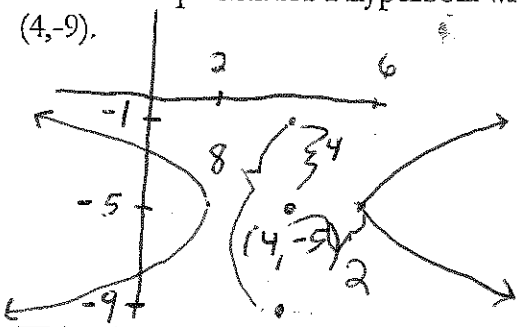
$$\frac{(x+7)^2}{9} - \frac{(y+1)^2}{49} = 1$$

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

- (0, 2) → center
- Horizontal since foci lie on horizontal line.
- $c = 5$, $a = 2$
- $5^2 = 2^2 + b^2$
- $\sqrt{21} = b$

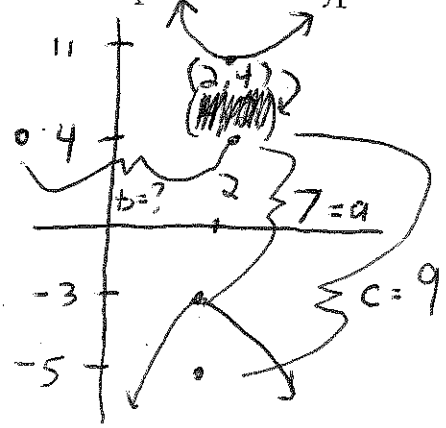
$$\frac{x^2}{4} - \frac{(y-2)^2}{21} = 1$$

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



$$\frac{(x-4)^2}{4} - \frac{(y+5)^2}{16} = 1$$

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



$$\frac{(y-4)^2}{49} - \frac{(x-2)^2}{32} = 1$$

$7^2 + b^2 = 9^2$

$b = \sqrt{32}$

Name: _____ Date: _____

Period: _____ Advanced Algebra

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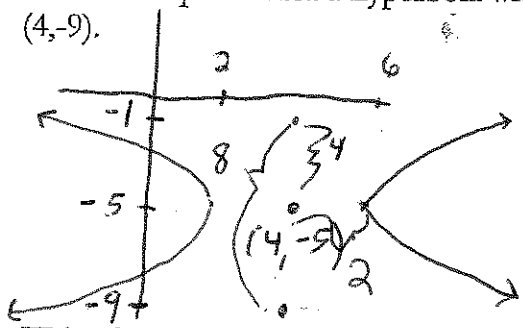

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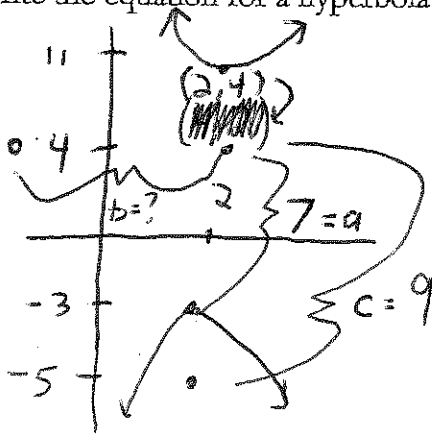

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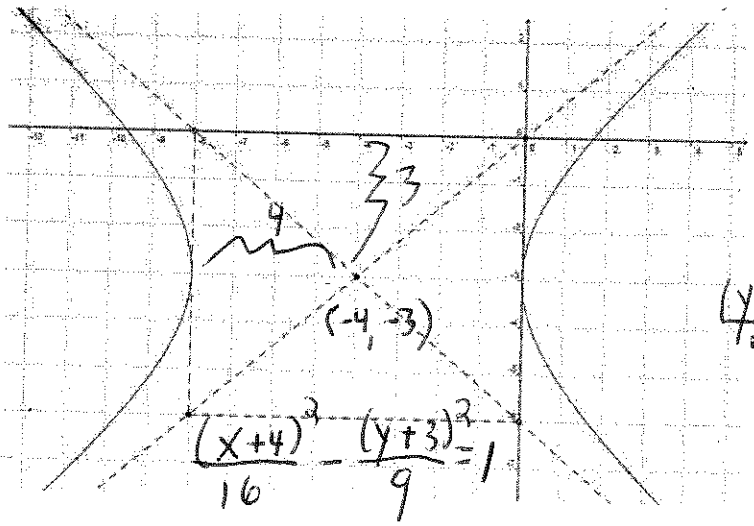
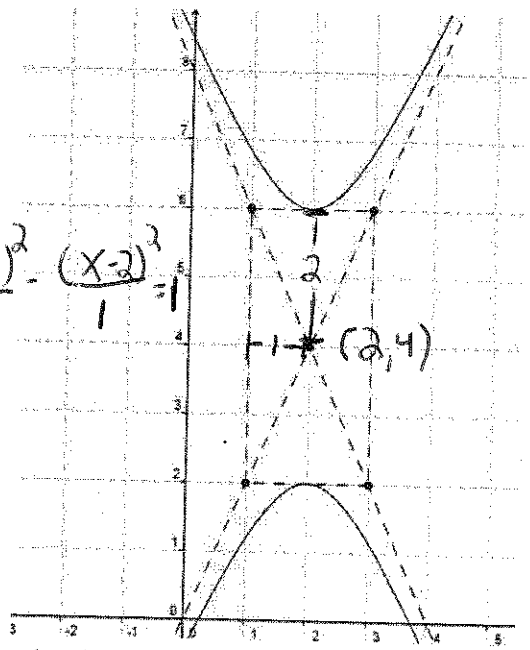
6.



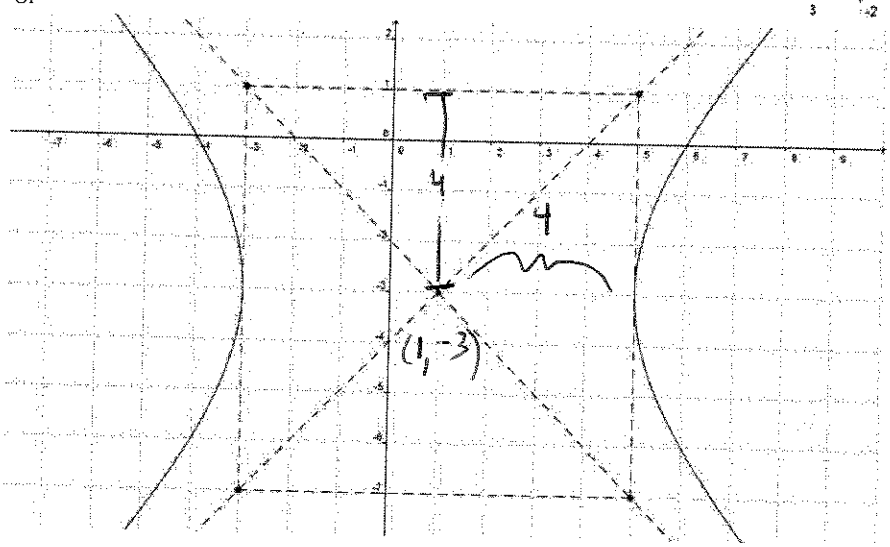
$$\frac{(x+4)^2}{16} - \frac{(y+3)^2}{9} = 1$$

7.



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

8.



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

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

9.