

11.3 Hyperbolas

Warm-Up Thursday (notecard)

1. Which equation does not represent an ellipse?

A. $3x^2 + 3y^2 = 27$ *CIRCLE*

B. $x^2 + 4y^2 = 16$

C. $9x^2 + y^2 = 1$

D. $(x+2)^2 + 6(y-1)^2 = 36$

Clearly write your answer and explain WHY it is correct.

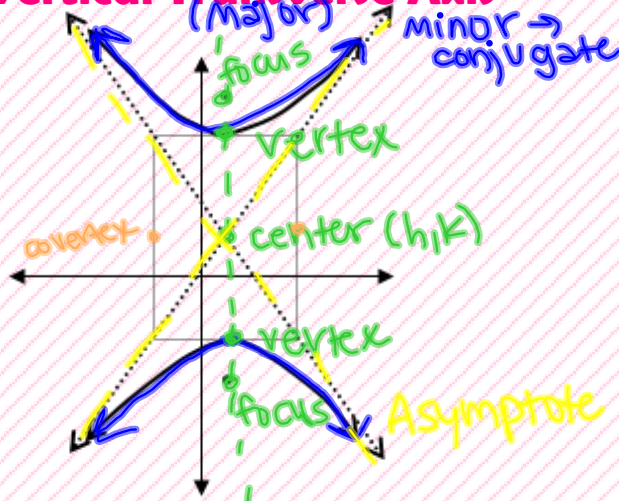
About Me

1. Would you rather have a flying carpet or a car that can drive underwater?
2. Would you rather never run out of battery power for whatever phone and tablet you own or always have free Wi-Fi wherever you go?

hyperbolas

definition: The set of all points P in a plane such that the difference of the distances from P to two fixed points F_1 and F_2 , called the foci, is constant.

Vertical Transverse Axis



Line segment joining vertices > transverse axis
Midpoint of this axis – center

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

Y is first (positive)

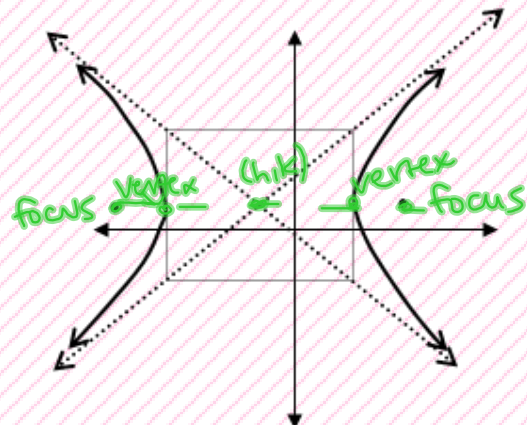
a^2 is first

$$c^2 = a^2 + b^2$$

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

X is first

Horizontal Transverse Axis



$$c^2 = a^2 + b^2$$

examples

①

Find vertices and foci of the hyperbola.

horiz. $\frac{x^2}{49} - \frac{y^2}{36} = 1$

$a^2 = 49$
 $b^2 = 36$
center: (0,0)

$$c^2 = a^2 + b^2$$

$$= 49 + 36$$

$$c^2 = 85$$

$$c = \sqrt{85}$$

vertices:
(7,0) & (-7,0)
a units from center
foci:
($\sqrt{85}$, 0) & (- $\sqrt{85}$, 0)
c units from center

②

Write equation in standard form. Find foci and vertices.

$$\frac{25x^2}{100} - \frac{4y^2}{100} = \frac{100}{100}$$

$$\frac{x^2}{4} - \frac{y^2}{25} = 1$$

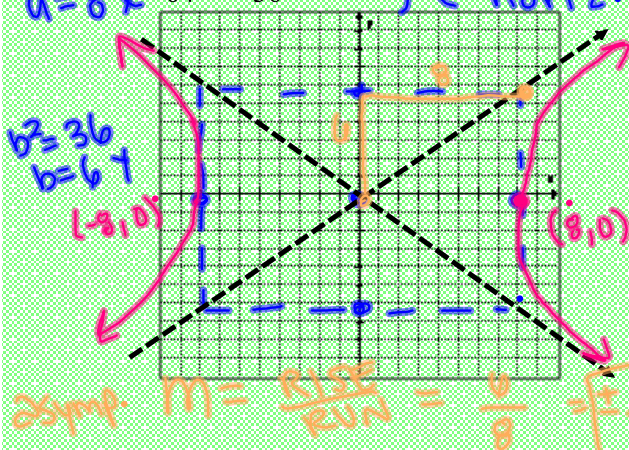
hyperbolas

How to graph hyperbolas:

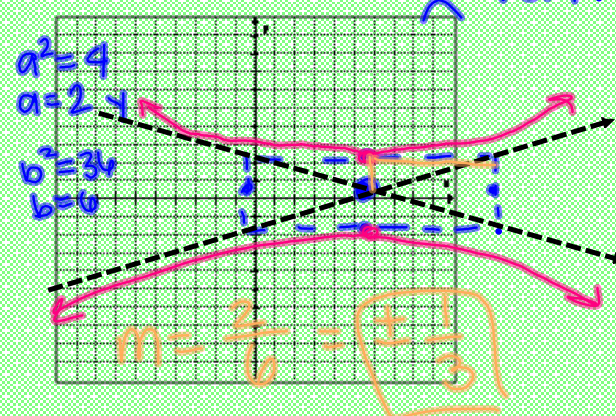
1. Write the equation in standard form
2. Find Center (h, k)
3. What direction does it open? (left) / (right) / (up) / (down)
4. Find vertices
5. Draw rectangle
6. Draw Asymptotes (diagonals)
7. Sketch Graph
8. Winner Winner Chicken Dinner you are all done

Sketch the graph, then find the equations of the asymptotes.

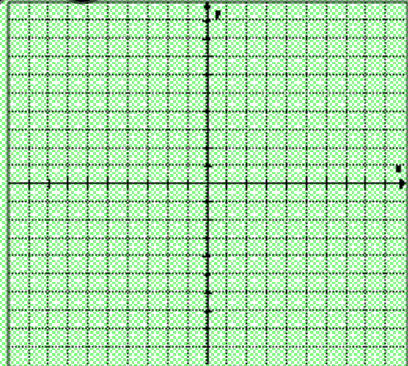
1. $\frac{x^2}{64} - \frac{y^2}{36} = 1$ center $(0, 0)$ (horiz.)



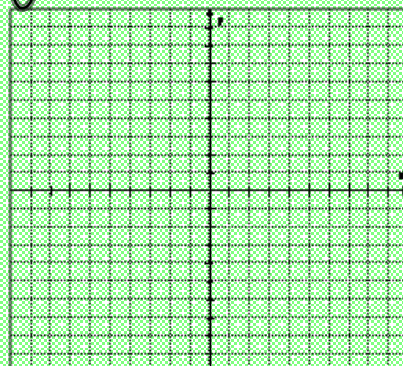
2. $\frac{(y-1)^2}{4} - \frac{(x-5)^2}{36} = 1$ center: $(5, 1)$ (vert.)



3. $25x^2 - 4y^2 = 100$



4. $\frac{y^2}{49} - \frac{x^2}{36} = 1$



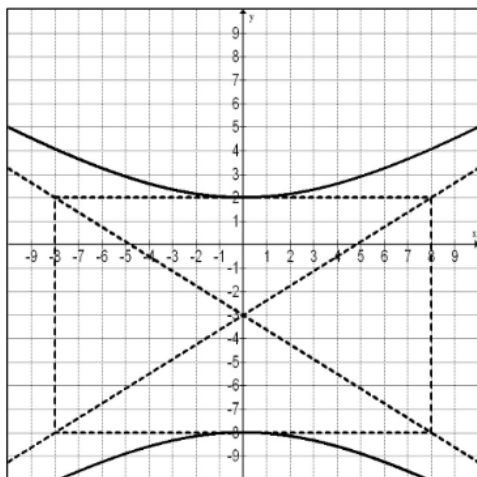
11.3 Practice – Hyperbolas Day 1

Name _____ Date _____ Period _____

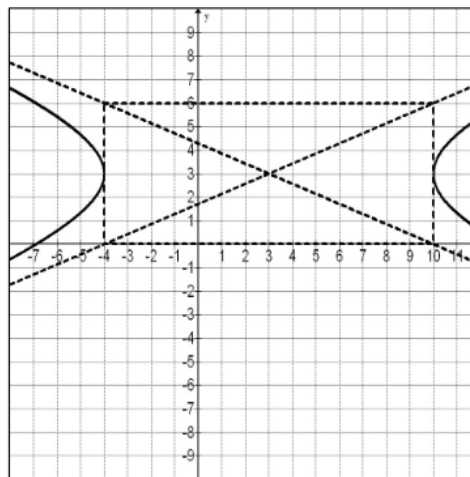
#1-2, 3-10 odds

Write the equation in standard form for each hyperbola.

1.



2.



Find the critical values for each hyperbola and then graph.

3. $\frac{x^2}{64} - \frac{y^2}{36} = 1$

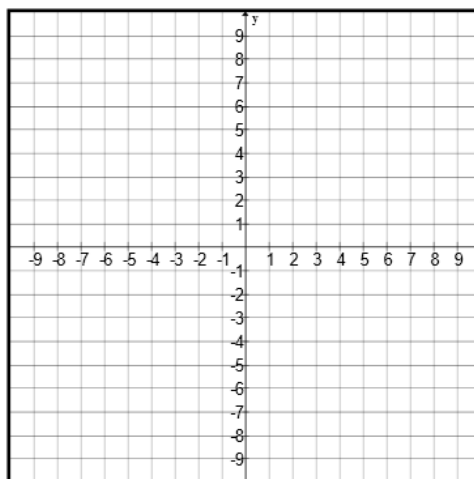
Center _____

Vertices _____

Co-vertices _____

Foci _____

Slopes of Asymptotes _____



4. $\frac{y^2}{25} - \frac{x^2}{81} = 1$

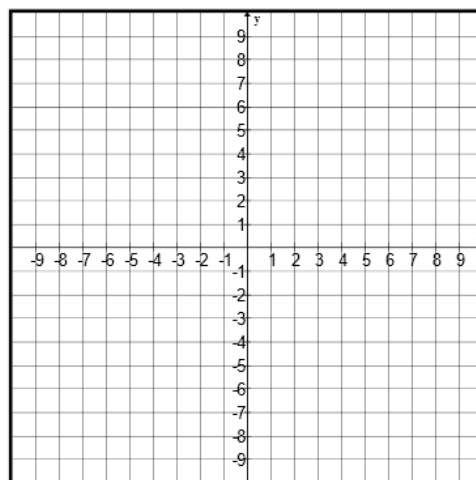
Center _____

Vertices _____

Co-vertices _____

Foci _____

Slopes of Asymptotes _____



5. $\frac{y^2}{81} - \frac{x^2}{16} = 1$

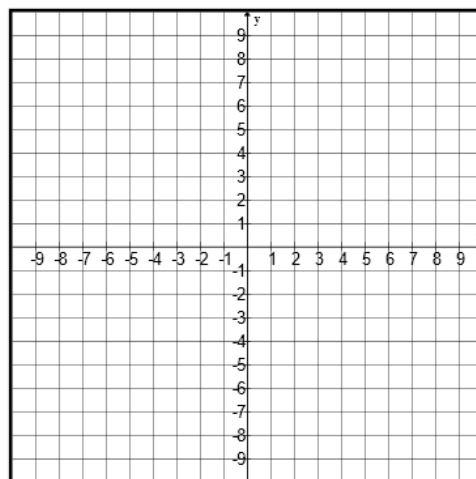
Center _____

Vertices _____

Co-vertices _____

Foci _____

Slopes of Asymptotes _____



6. $\frac{x^2}{4} - \frac{y^2}{121} = 1$

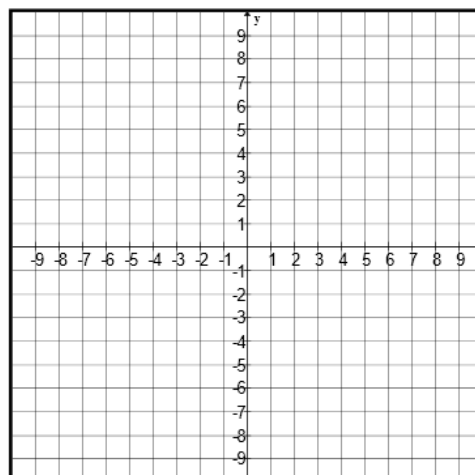
Center _____

Vertices _____

Co-vertices _____

Foci _____

Slopes of Asymptotes _____



7. $\frac{(y-1)^2}{64} - \frac{(x+2)^2}{36} = 1$

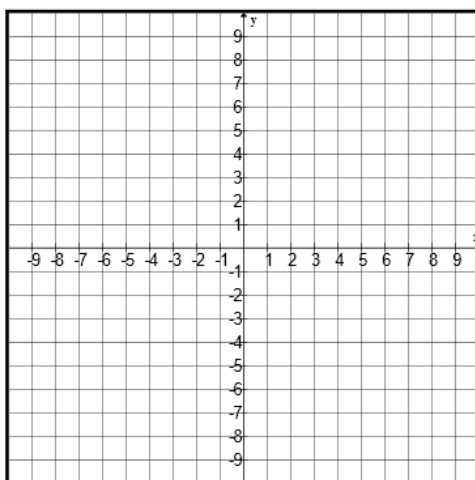
Center _____

Vertices _____

Co-vertices _____

Foci _____

Slopes of Asymptotes _____



8. $\frac{(x+5)^2}{25} - \frac{(y-3)^2}{16} = 1$

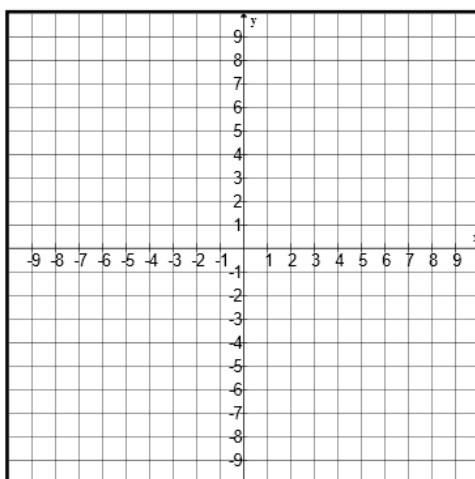
Center _____

Vertices _____

Co-vertices _____

Foci _____

Slopes of Asymptotes _____



9. $\frac{(y-8)^2}{25} - \frac{(x+6)^2}{36} = 1$

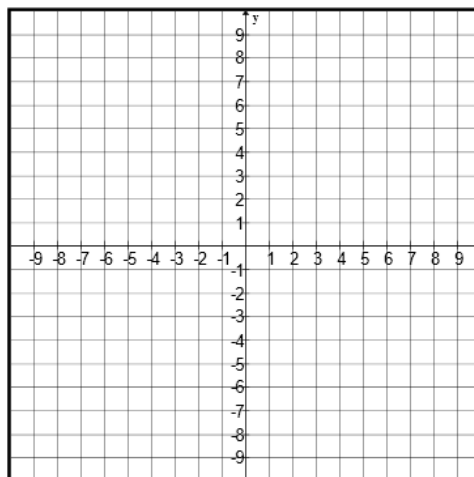
Center _____

Vertices _____

Co-vertices _____

Foci _____

Slopes of Asymptotes _____



10. $\frac{(x-6)^2}{9} - \frac{(y-2)^2}{16} = 1$

Center _____

Vertices _____

Co-vertices _____

Foci _____

Slopes of Asymptotes _____

