Hyperbolas (Section H-3)

* Standard form for a hyperbola:

$$\frac{(x-h)^2}{a^2} \ominus \frac{(y-k)^2}{b^2} = 1 \quad \underline{\text{OR}} \quad \frac{(y-k)^2}{a^2} \ominus \frac{(x-h)^2}{b^2} = 1$$

always the 1st number, not necessarily the largest!

opens L/R

opens up/down

* The variables MUST be subtracted!
* center: (h,k) foci: $c^2 = a^2 + b^2$
* you move "a" distance in the x-direction & "b" distance in the y-direction for opening L/R.
* you move "a" distance in the y-direction & "b" distance in the x-direction for opening up/down.
* Transverse axis: $TA = 2a$
* Conjugate axis: $CA = 2b$
* Start out like you are making an ellipse. Then make a box instead of an ellipse. The asymptotes go through the corners of the box. Then graph parabolas through the vertices.
* Hyperbolas centered @ the origin:

$$\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1 \quad \underline{\text{OR}} \quad \frac{y^2}{a^2} - \frac{x^2}{b^2} = 1$$

Secondary Math 2 Honors

Name_____ ID: 1

Hyperbola Notes (Section H-3)

Date_____ Period____

(V) (F) (TA) (CA)

Identify the vertices, foci, length of the transverse axis, and length of the conjugate axis of each. Then sketch the graph.

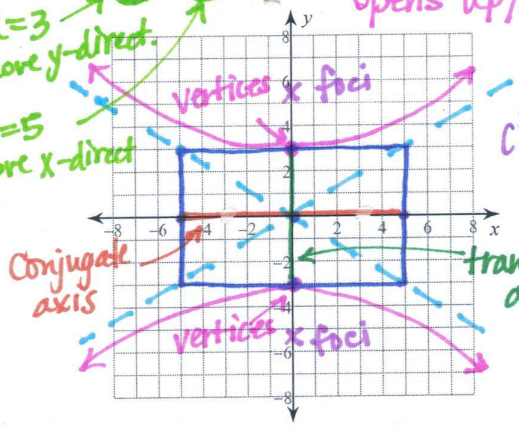
1) $\frac{y^2}{9} - \frac{x^2}{25} = 1$

center: (0,0)

opens up/down

a=3 move y-direct.

b=5 more x-direct



$c^2 = 9+25$

$c = \pm\sqrt{34}$

V: (0,3) & (0,-3)

F: $(0,\sqrt{34})$ & $(0,-\sqrt{34})$

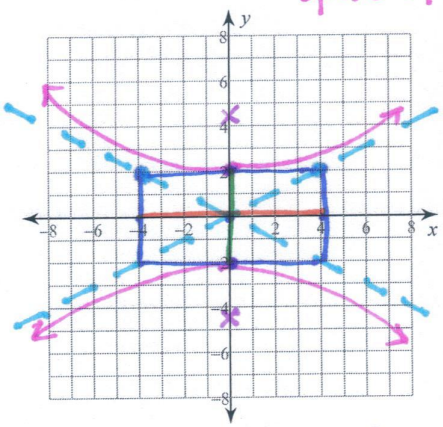
TA: 6 units

CA: 10 units

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

center: (0,0)

opens up/down



$c^2 = 4+16$

$c = \pm\sqrt{20}$

V: (0,2) & (0,-2)

F: $(0,\sqrt{20})$ & $(0,-\sqrt{20})$

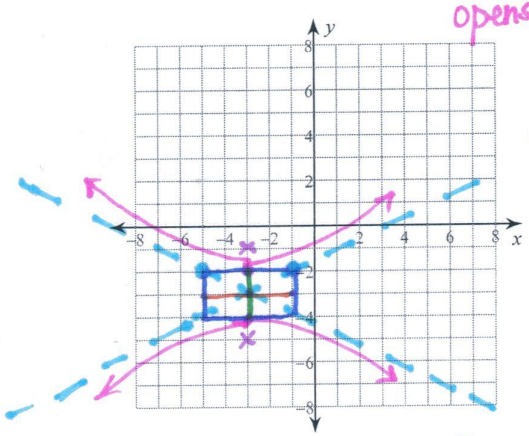
TA: 4 units

CA: 8 units

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

center: (-3,-3)

opens up/down



$c^2 = 1+4$

$c = \pm\sqrt{5}$

V: (-3,-2) & (-3,-4)

F: $(-3,-3+\sqrt{5})$ & $(-3,-3-\sqrt{5})$

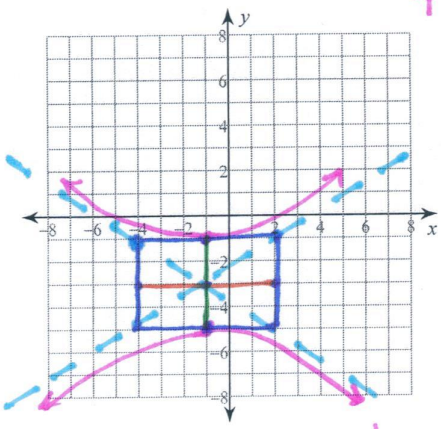
TA: 2 units

CA: 4 units

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

center: (-1,-3)

opens up/down



$c^2 = 4+9$

$c = \pm\sqrt{13}$

V: (-1,-1) & (-1,-5)

F: $(-1,-3+\sqrt{13})$ & $(-1,-3-\sqrt{13})$

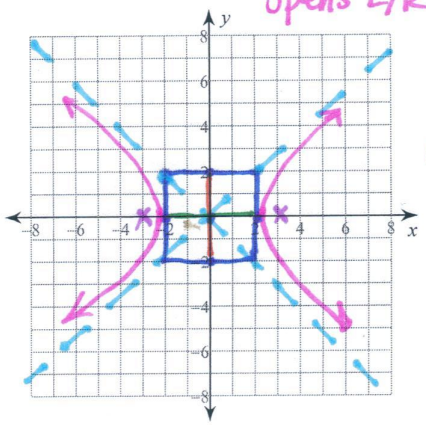
TA: 4 units

CA: 6 units

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

center: (0,0)

opens L/R



$c^2 = 4+4$

$c = \pm\sqrt{8}$

V: (2,0) & (-2,0)

F: $(\sqrt{8},0)$ & $(-\sqrt{8},0)$

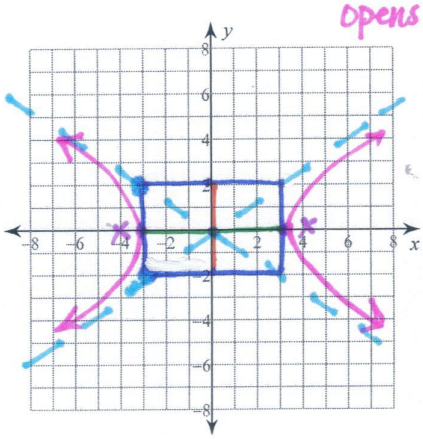
TA: 4 units

CA: 4 units

6) $\frac{x^2}{9} - \frac{y^2}{4} = 1$

center: (0,0)

opens L/R



$c^2 = 9+4$

$c = \pm\sqrt{13}$

V: (3,0) & (-3,0)

F: $(\sqrt{13},0)$ & $(-\sqrt{13},0)$

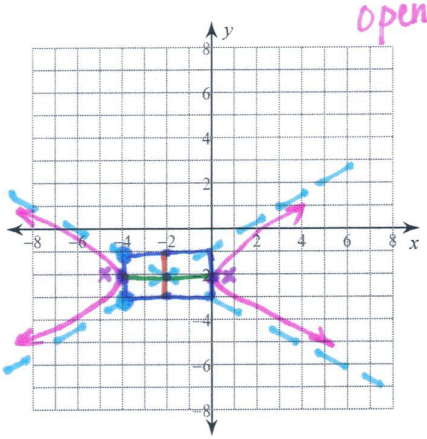
TA: 6 units

CA: 4 units

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

center: (-2,-2)

opens L/R



$c^2 = 4+1$

$c = \pm\sqrt{5}$

V: (0,-2) & (-4,-2)

F: $(-2+\sqrt{5},-2)$ & $(-2-\sqrt{5},-2)$

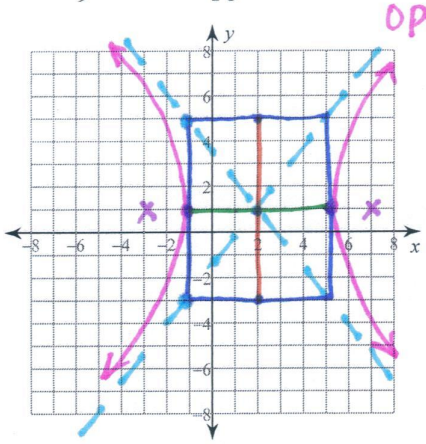
TA: 4 units

CA: 2 units

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

center: (2,1)

opens L/R



$c^2 = 9+16$

$c = \pm 5$

V: (5,1) & (-1,1)

F: (7,1) & (-3,1)

TA: 6 units

CA: 8 units