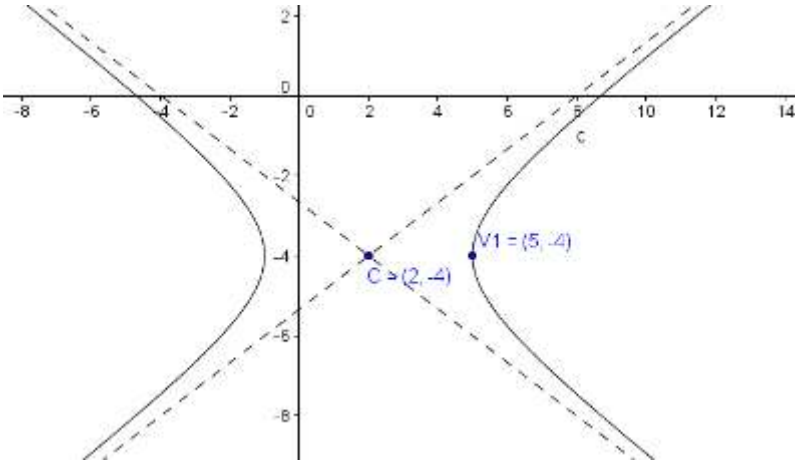


GeoGebra Dynamic Worksheet: Hyperbola 1 Answer Sheet

Go to www.doublecrosseducation.com/fetc.htm. Click on Hyperbola 1.
This shows the graph of the hyperbola in the form:

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

You can manipulate the graph by changing the value(s) of h, k, a, and b which are called the **parameters** of the equation. In this worksheet we will examine how each of these parameters changes the graph of the hyperbola.

- *Start with h = 0 k = 0 and a = 2, b = 3.*

  1. Write the equation of this hyperbola using the form above. $\frac{x^2}{4} - \frac{y^2}{9} = 1$
  2. Write the coordinates of:
     a) the center *(0,0)*

     b) the vertices and co-vertices *Vertices: (2,0) (-2,0)*
     Co-vert: (0,3) (0,-3)

- *Set h = 0, k = 0, a = 3, b = 2.*

  3. Write the equation for this hyperbola. $\frac{x^2}{9} - \frac{y^2}{4} = 1$
  4. Write the coordinates of:
     i. the center (0,0)

     ii. the vertices and co-vertices *Vertices: (3,0) (-3,0)*
     Co-vert: (0,2) (0,-2)

Use the equation $c^2 = a^2 + b^2$ to find c and plot the foci.

Set h = 2, k = 0, a = 2, b = 3.

  5. Write the equation for this hyperbola. $\frac{(x-2)^2}{4} - \frac{y^2}{9} = 1$
  6. Write the coordinates of:
     i. the center *(2,0)*
     ii. the vertices *(0,0) (4,0)*

- *Set h = -2, k = -1, a = 2, b = 5.*

  7. Write the equation for this hyperbola. $\frac{(x+2)^2}{4} - \frac{(y+1)^2}{25} = 1$

  8. Write the coordinates of:
     a) the center *(-2,-1)*

     b) the vertices and co-vertices *Vertices: (0,-1) (-4,-1)*
        Co-vert: (-2,4) (-2, -6)

     c) Write the equations for the asymptotes $y+1 = \pm\frac{5}{2}(x-2)$

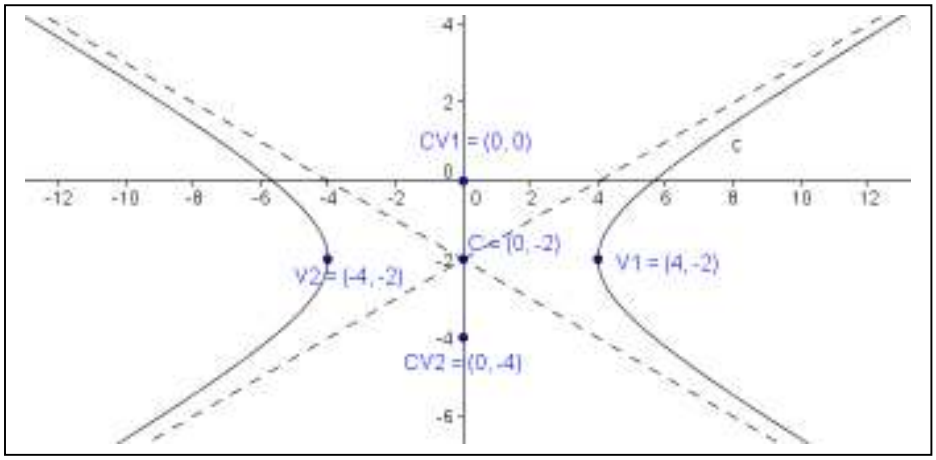
     Use $y - k = \pm\frac{b}{a}(x-h)$

- Summarize how changing the value of h and k, a and b in the equation affects the graph of the hyperbola. Include any effects on the center, vertices, co-vertices, and asymptotes.

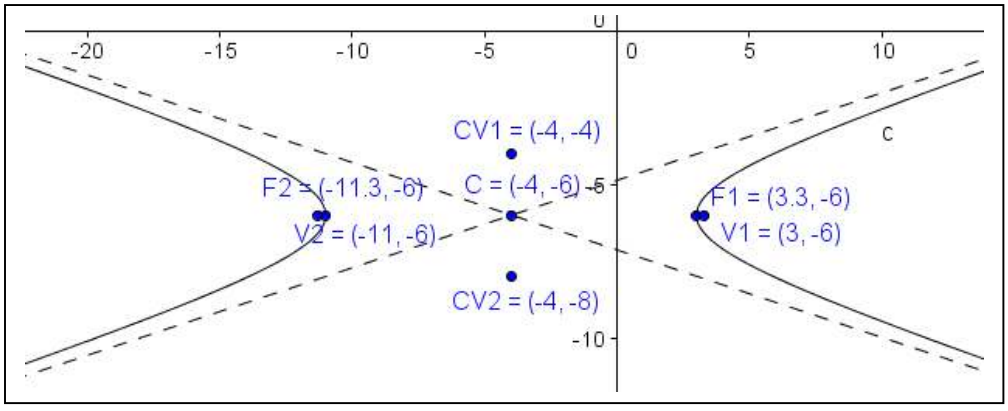
The values h and k control the center of the hyperbola. Parameter a is the distance from the center to the vertex (left and right) and b is the distance from the center to each co-vertex (up and down). All of the hyperbolas have a horizontal transverse axis because they are all $x^2 - y^2$ *forms. The slopes of the asymptotes are all* $\pm\frac{b}{a}$.

Use the Dynamic Worksheet to help you to sketch a graph of each of the hyperbolas below. Show the location of the center, vertices, co-vertices, and asymptotes.

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

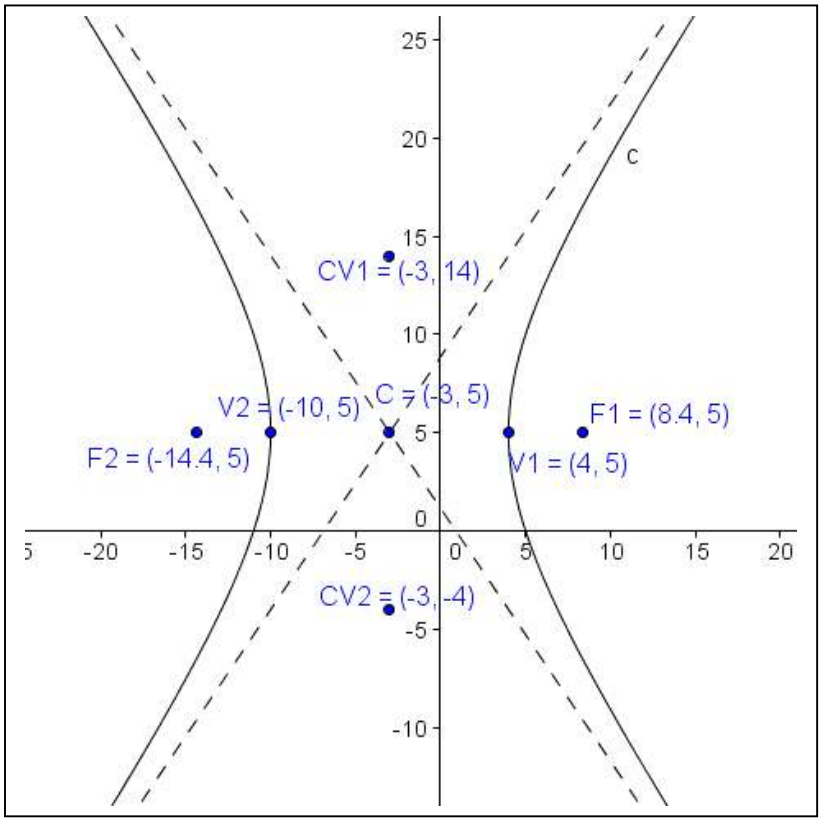


10. $\frac{(x+4)^2}{49} - \frac{(y+6)^2}{4} = 1$



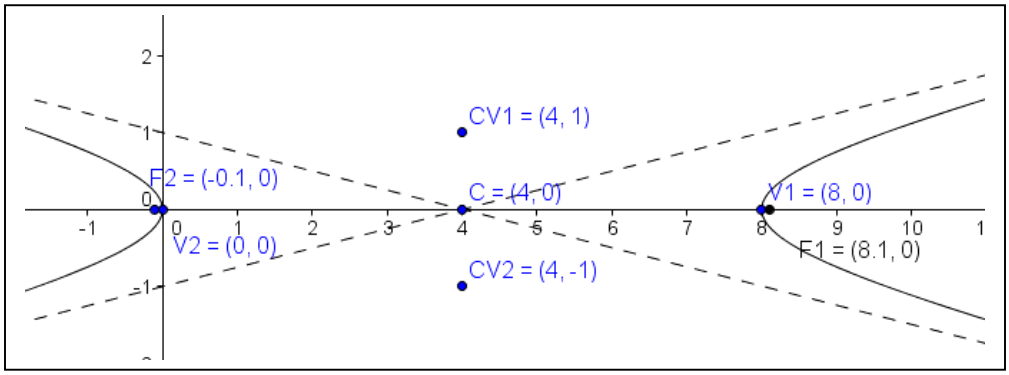
11.

$$\frac{(x+3)^2}{49} - \frac{(y-5)^2}{81} = 1$$



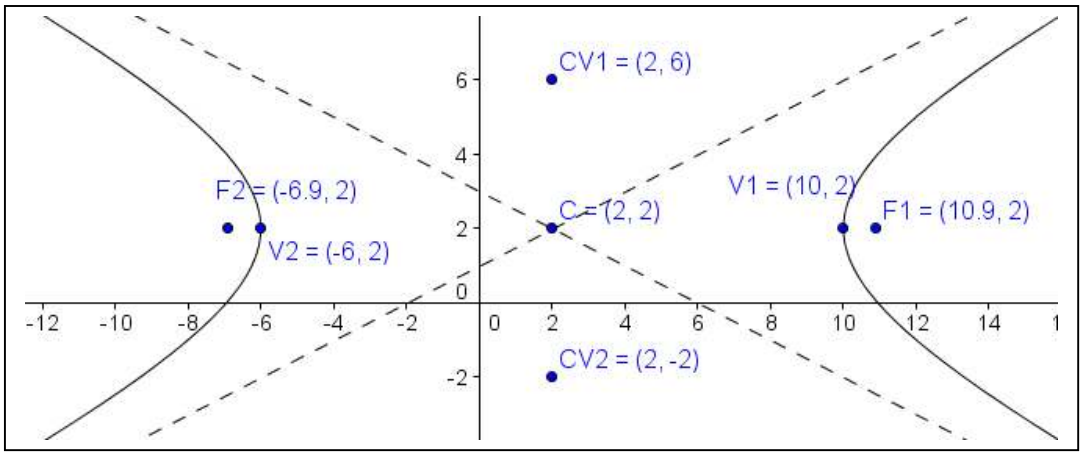
Graph each hyperbola below without using the Dynamic Worksheet.

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

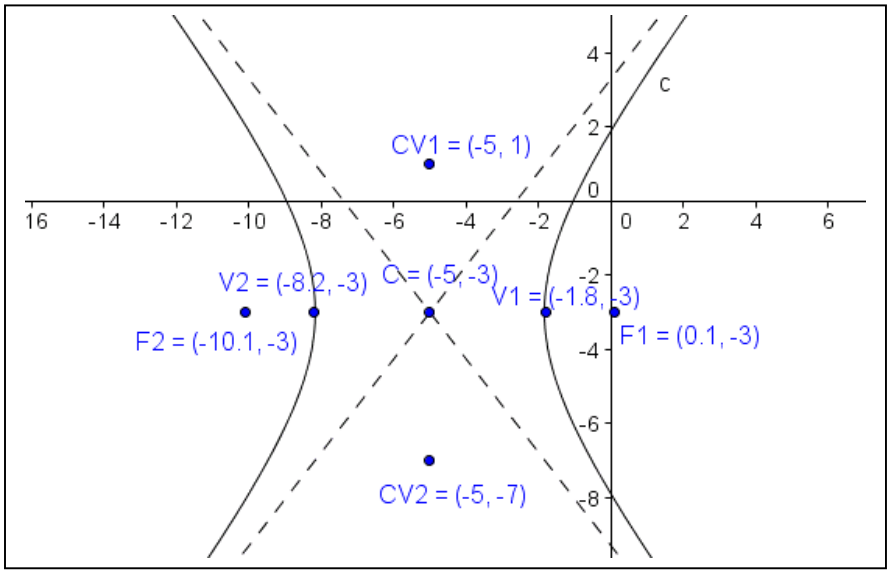


13.

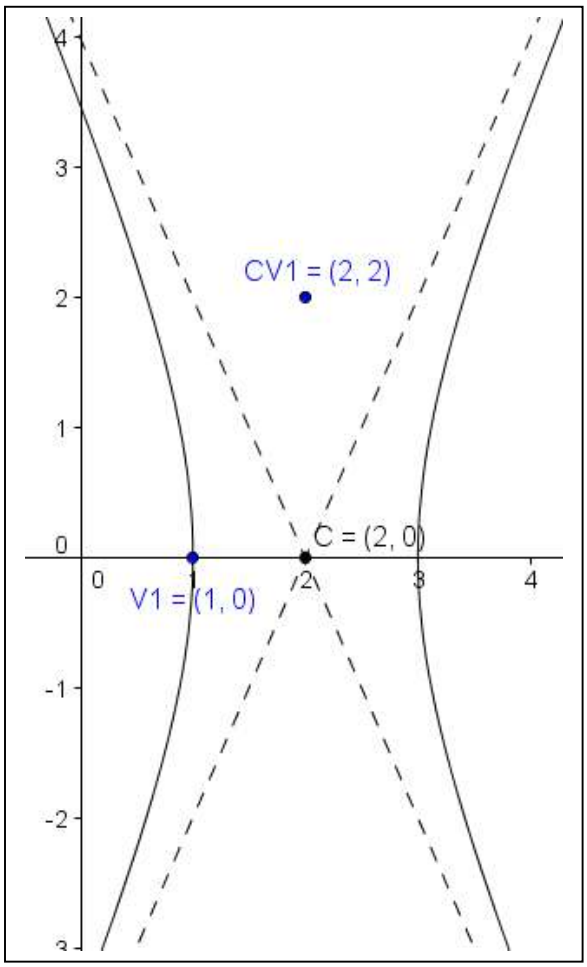
$$\frac{(x-2)^2}{64} - \frac{(y-2)^2}{16} = 1$$



14. $\dfrac{(x+5)^2}{10} - \dfrac{(y+3)^2}{16} = 1$



15. Write the equation for the hyperbola shown below. List the center, coordinates of the vertices and co-vertices, foci and equations of the asymptotes.

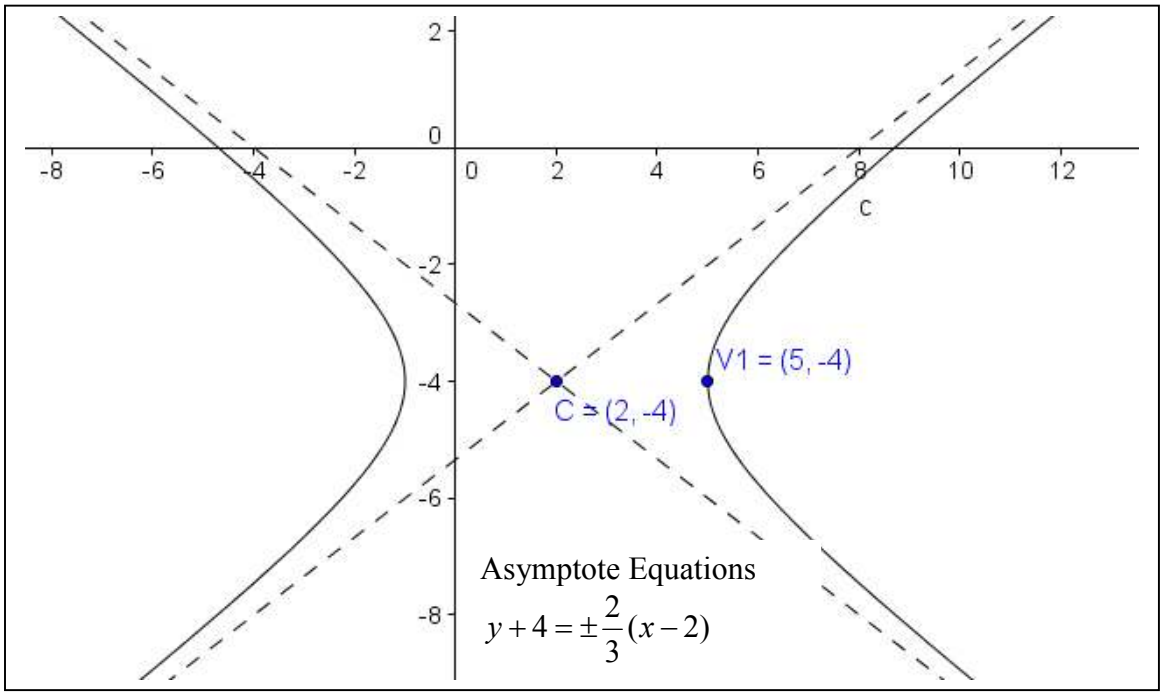


Equation: $(x-2)^2 - \dfrac{y^2}{4} = 1$

Vertices: (1,0) (3,0)
Co-vert: (2,2) (2, -2)

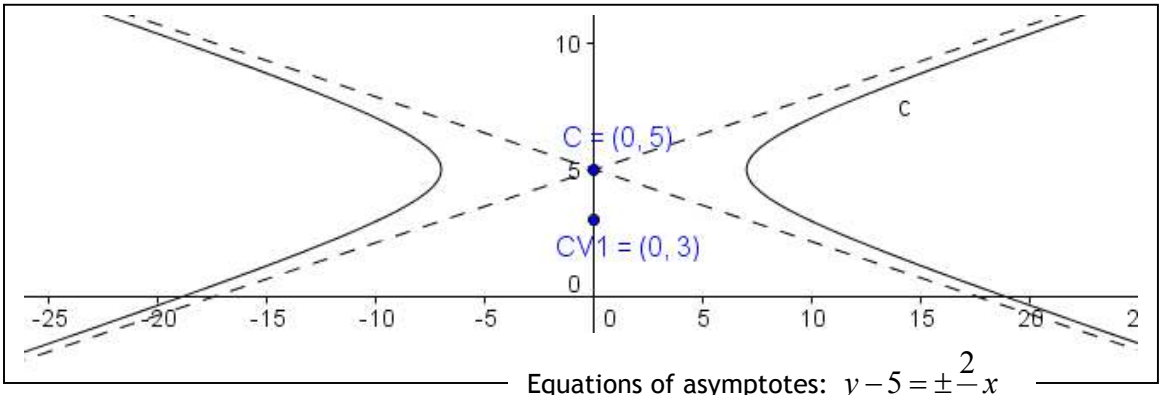
Asymptotes: $y = \pm 2(x-2)$

16. Write the equation for the hyperbola shown below. List the center, coordinates of the vertices and co-vertices, foci. *EQ:* $\frac{(x-2)^2}{9}-\frac{(y+4)^2}{4}=1$



Vert: (-1,-4) (5,-4) Co-vert: (2,-2) (2, -6)

17. Write the equation for the hyperbola shown below. List the center, coordinates of the vertices and co-vertices, foci. *EQ:* $\frac{x^2}{49}-\frac{(y-5)^2}{4}=1$



Vert: (7,5) (-7,5)
Co-vert: (0,3) (0,7)