Student: Cole Lamers **Date:** 07/04/19	**Instructor:** Kelly Galarneau **Course:** CA&T Internet (70263) Galarneau	**Assignment:** 10.4 The Hyperbola

1. Complete the sentence below.

   A(n) _____ is the collection of points in the plane, the difference of whose distances from two fixed points is a constant.

   A(n) hyperbola is the collection of points in the plane, the difference of whose distances from two fixed points is a constant.

2. Fill in the blank with the most appropriate term or phrase.

   The line segment between the vertices of the hyperbola is called the transverse axis of the hyperbola.

3. Complete the following statement.

   The standard equation of the hyperbola with center (0,0), vertices $(\pm a,0)$, and foci $(\pm c,0)$ is $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, where $b^2 =$ _____.

   The standard equation of the hyperbola with center (0,0), vertices $(\pm a,0)$, and foci $(\pm c,0)$ is $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$, where $b^2 = c^2 - a^2$.

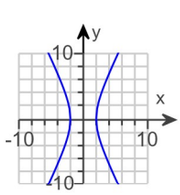
4. Determine whether the following sentence is True or False.

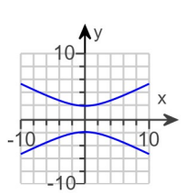
   The graph of $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$ is a hyperbola.

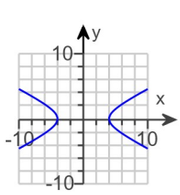
   Choose the correct answer below.

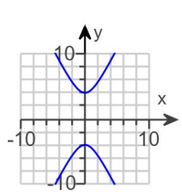
   - ○ False
   - ✔ True

5. Match the equation $\frac{x^2}{4} - \frac{y^2}{16} = 1$ with one of the following graphs.



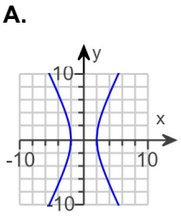




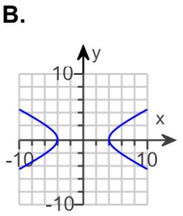


Choose the correct graph below.

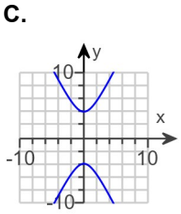
- ✔ **A.**



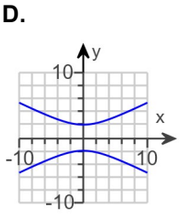
- ○ **B.**



- ○ **C.**



- ○ **D.**



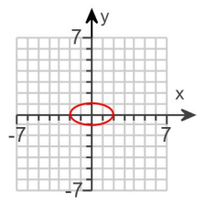
6.

Graph the hyperbola on paper and then choose the correct graph.

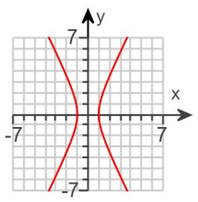
$$\frac{y^2}{1} - \frac{x^2}{4} = 1$$

Choose the correct graph on the right.

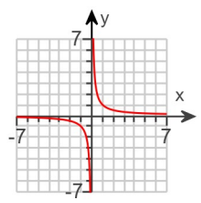
A.



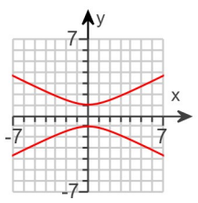
B.



C.

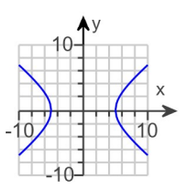


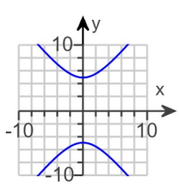
D. ✔

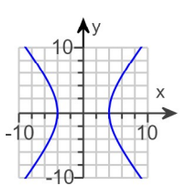


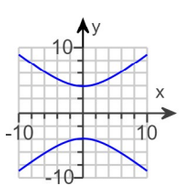
7.

Match the equation $25x^2 - 16y^2 = 400$ with one of the following graphs.



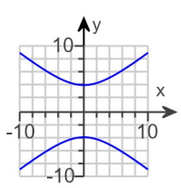




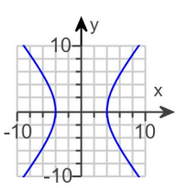


Choose the correct graph below.

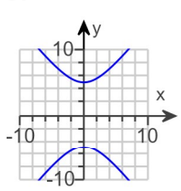
A.



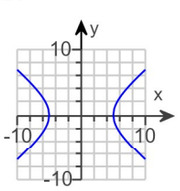
B. ✔



C.



D.



8. The equation of a hyperbola is given. Complete parts **(a)** through **(e)**.

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

(a) Find the vertices, the foci, and the transverse axis of the hyperbola.

The vertices are $(-1,0),(1,0)$.
(Type an ordered pair. Type exact answers, using radicals as needed. Use a comma to separate answers.)

The foci are $\left(\sqrt{122},0\right),\left(-\sqrt{122},0\right)$.
(Type an ordered pair. Type exact answers, using radicals as needed. Use a comma to separate answers.)

Does the hyperbola have its transverse axis on the x-axis or y-axis?

- y-axis
- x-axis

(b) State how the hyperbola opens. Choose the correct answer below.

- The hyperbola opens left and right.
- The hyperbola opens up and down.

(c) Find the vertices of the fundamental rectangle.

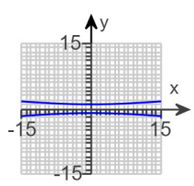
The vertices of the fundamental rectangle are $(1,11),(-1,-11),(-1,11),(1,-11),$.
(Type an ordered pair. Type exact answers, using radicals as needed. Use a comma to separate answers.)

(d) Write the equations of the asymptotes. Choose the correct answer below.

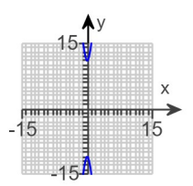
The equations of the asymptotes are $y = \pm$ 11x .
(Simplify your answer. Use integers or fractions for any numbers in the expression.)

(e) Graph the hyperbola by using the vertices and the asymptotes. Choose the correct graph below.

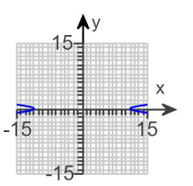
A.



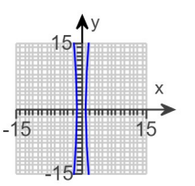
B.



C.



D.



9. Watch the video and then solve the problem given below.

Click here to watch the video.[1]

Does the hyperbola $\frac{y^2}{15} - \frac{x^2}{20} = 1$ have its transverse axis on the x-axis or the y-axis?

Choose the correct answer below.

- y-axis
- x-axis

1: http://mediaplayer.pearsoncmg.com/assets/UJ2e7Sd82GW3DB7JBd9aB9EUjIPl8TJ6?clip=1

10. Watch the video and then solve the problem given below.

Click here to watch the video.[2]

Find the standard form of the equation of a hyperbola with vertices $(0, \pm 12)$ and foci $(0, \pm 13)$.

The standard form of the hyperbola is $\frac{y^2}{144} - \frac{x^2}{25} = 1$.
(Type an equation. Type your answer in standard form.)

2: http://mediaplayer.pearsoncmg.com/assets/UJ2e7Sd82GW3DB7JBd9aB9EUjIPl8TJ6?clip=3

11. Watch the video and then solve the problem given below.

Click here to watch the video.[3]

Determine the asymptotes of the hyperbola $\frac{x^2}{25} - \frac{y^2}{16} = 1$.

Choose the correct answer below.

- **A.** $y = -\frac{5}{4}x;\ y = \frac{5}{4}x$
- **B.** $y = -\frac{4}{5}x;\ y = \frac{4}{5}x$
- **C.** $y = -\frac{16}{25}x;\ y = \frac{16}{25}x$
- **D.** $y = -\frac{25}{16}x;\ y = \frac{25}{16}x$

3: http://mediaplayer.pearsoncmg.com/assets/UJ2e7Sd82GW3DB7JBd9aB9EUjIPl8TJ6?clip=4

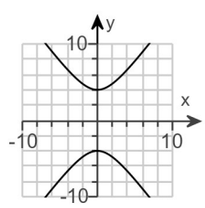
12. Find the equation of a hyperbola with vertices $(\pm 4,0)$ and foci $(\pm 5,0)$. Graph the hyperbola.

Which of the following is the equation of the hyperbola? Select the correct choice below and fill in the answer box to complete your choice.

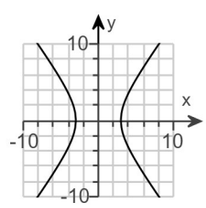
- **A.** $\frac{x^2}{16} - \frac{y^2}{9} = 1$
- **B.** $\frac{y^2}{\quad} - \frac{x^2}{\quad} = 1$

Choose the correct graph below.

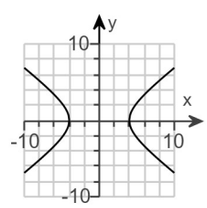
A.



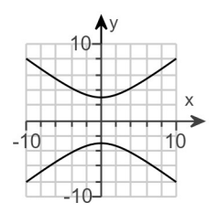
B.



C.



D.



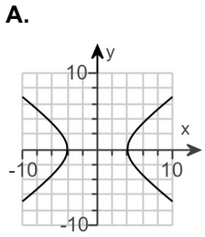
13. Find the equation of a hyperbola with vertices $(0,\pm 4)$ and foci $(0,\pm 5)$. Graph the hyperbola.

Which of the following is the equation of the hyperbola? Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

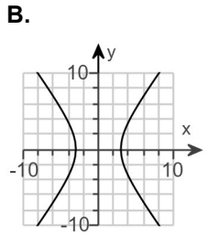
- **A.** $\frac{y^2}{16} - \frac{x^2}{9} = 1$
- **B.** $\frac{x^2}{\quad} - \frac{y^2}{\quad} = 1$

Choose the correct graph below.

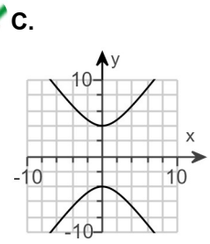
A.



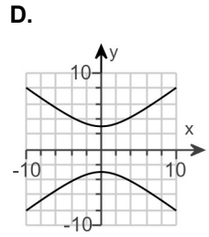
B.



C.



D.



14. Find an equation for the hyperbola satisfying the following conditions. Graph the hyperbola.

Center (0,0), vertex (3,0), focus (6,0)

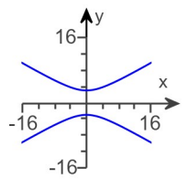
Choose the correct standard form, and complete the equation.

A. $\frac{x^2}{9} - \frac{y^2}{27} = 1$

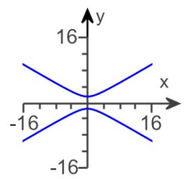
B. $\frac{y^2}{\quad} - \frac{x^2}{\quad} = 1$

Choose the correct graph below.

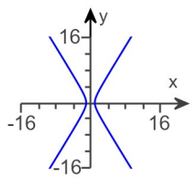
A.



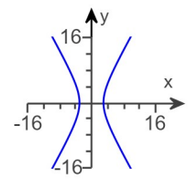
B.



C.



D.



15. Find an equation for the hyperbola satisfying the following conditions. Graph the hyperbola.

Center (0,0), vertex (0,3), focus (0,5)

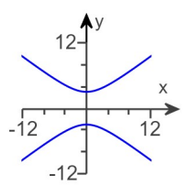
Choose the correct standard form, and complete the equation.

A. $\frac{y^2}{9} - \frac{x^2}{16} = 1$

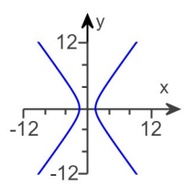
B. $\frac{x^2}{\quad} - \frac{y^2}{\quad} = 1$

Choose the correct graph below.

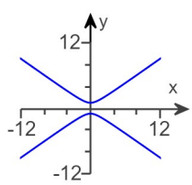
A.



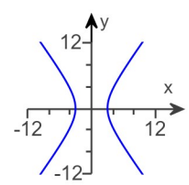
B.



C.



D.



16. Find the equation of a hyperbola with foci $(0, \pm 7)$ and the length of the transverse axis 6. Graph the hyperbola.

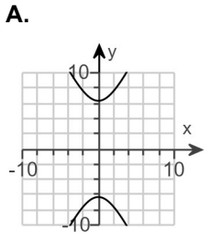
Which of the following is the equation of the hyperbola? Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

A. $\frac{y^2}{9} - \frac{x^2}{40} = 1$

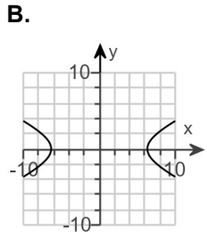
B. $\frac{x^2}{\quad} - \frac{y^2}{\quad} = 1$

Choose the correct graph below.

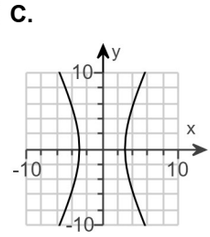
A.



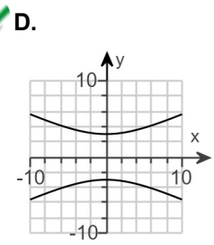
B.



C.



D.



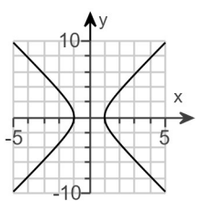
17. Find the equation of a hyperbola with foci $(\pm\sqrt{5},0)$ and asymptotes $y = \pm 2x$. Graph the hyperbola.

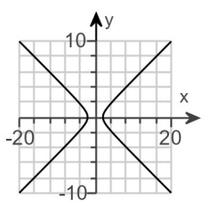
Which of the following is the equation of the hyperbola? Select the correct choice below and, if necessary, fill in the answer boxes to complete your choice.

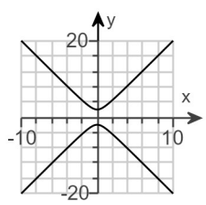
A. $\dfrac{y^2}{\quad} - \dfrac{x^2}{\quad} = 1$

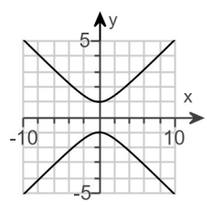
B. $\dfrac{x^2}{1} - \dfrac{y^2}{4} = 1$

Choose the correct graph below.

A. 

B. 

C. 

D. 

18. The eccentricity of a hyperbola, denoted by e, is defined as follows.

$$e = \frac{\text{Distance between the foci}}{\text{Distance between the vertices}} = \frac{2c}{2a} = \frac{c}{a}$$

Find the eccentricity and the length of the latus rectum of the following hyperbola.

$9x^2 - 64y^2 = 576$

The eccentricity e is $\dfrac{\sqrt{73}}{8}$.

(Simplify your answer. Type an integer or a fraction. Type an exact answer, using radicals as needed.)

The length of the latus rectum is $\dfrac{9}{4}$. (Simplify your answer. Type an integer or a fraction.)