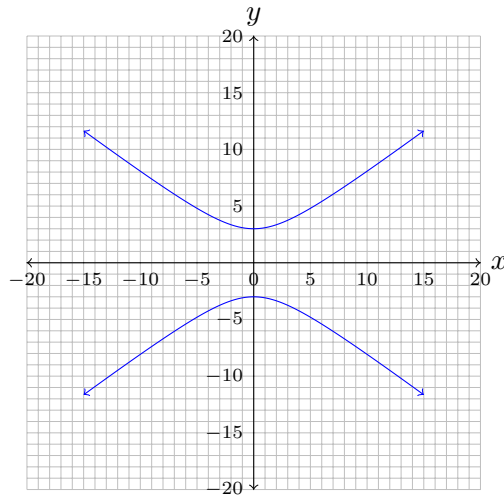


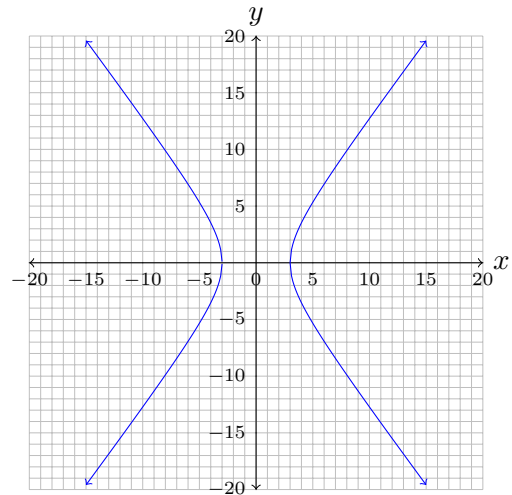
## COLLEGE ALGEBRA QUIZ

(1) Which of the following is the graph of  $16y^2 - 9x^2 = 144$ ?

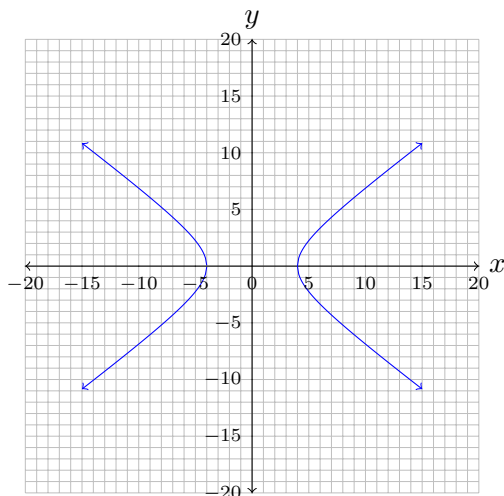
Solution: (a)



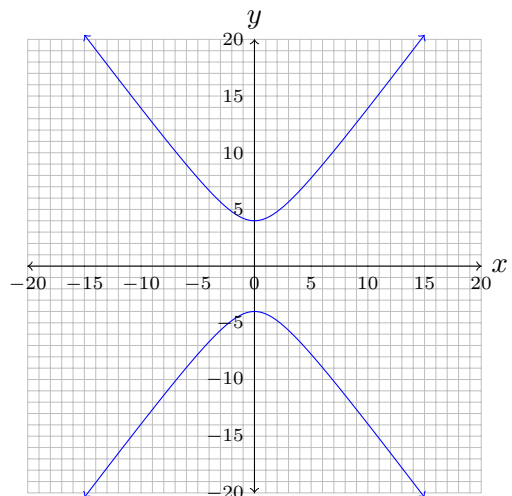
(a)



(b)



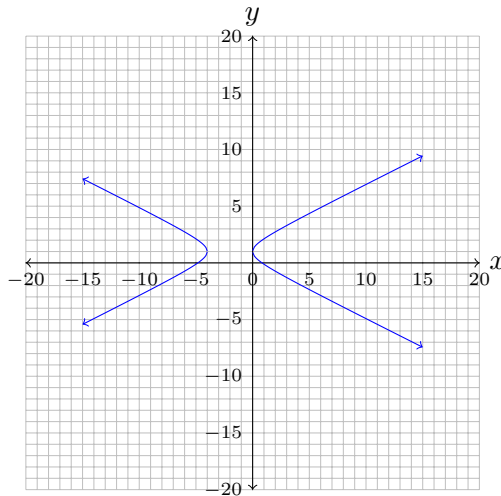
(c)



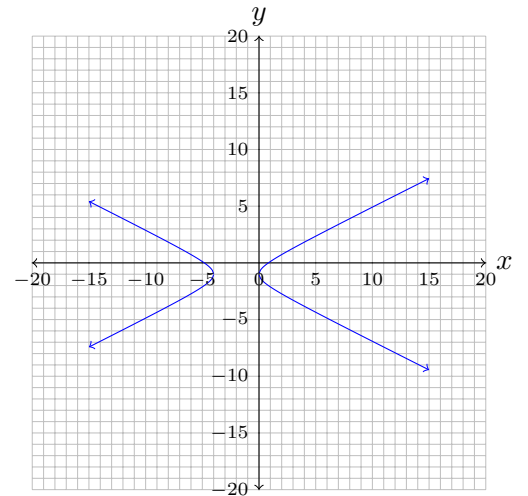
(d)

(2) Which of the following is the graph of  $\frac{(x+2)^2}{4} - \frac{(y-1)^2}{9} = 1$ ?

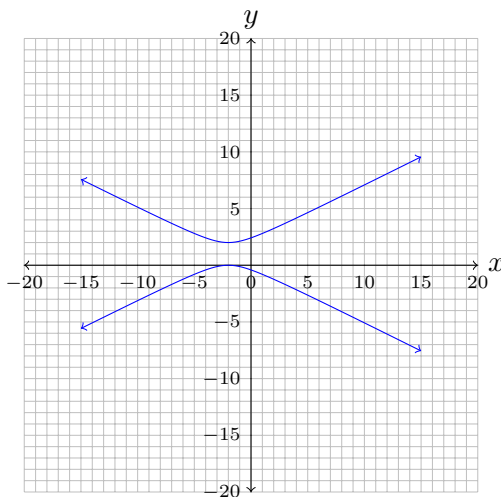
Solution: (a)



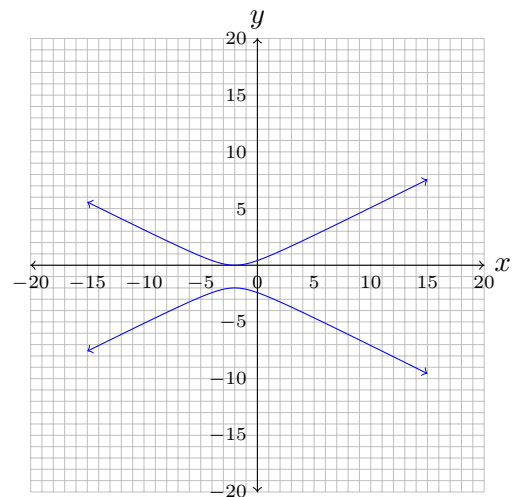
(a)



(b)



(c)



(d)

- (3) Which of the following is the center, the vertices, the foci, and the asymptotes of the hyperbola given by  $25x^2 - 16y^2 + 150x + 32y - 191 = 0$ ?

**Solution:** (a)

(a) Center at  $(-3, 1)$ ;

Vertices at  $(-7, 1)$ ,  $(1, 1)$ ;

Foci at  $(-9.4, 1)$ ,  $(3.4, 1)$ ;

Asymptotes are  $y = \frac{5}{4}x + \frac{19}{4}$  and  $y = -\frac{5}{4}x - \frac{11}{4}$

(b) Center at  $(3, -1)$ ;

Vertices at  $(-1, -1)$ ,  $(7, -1)$ ;

Foci at  $(-3.4, -1)$ ,  $(9.4, -1)$ ;

Asymptotes are  $y = \frac{5}{4}x - \frac{19}{4}$  and  $y = -\frac{5}{4}x + \frac{11}{4}$

(c) Center at  $(1, -3)$ ;

Vertices at  $(-3, -3)$ ,  $(5, -3)$ ;

Foci at  $(-5.4, -3)$ ,  $(7.4, -3)$ ;

Asymptotes are  $y = \frac{5}{4}x - \frac{17}{4}$  and  $y = -\frac{5}{4}x - \frac{7}{4}$

(d) Center at  $(-1, 3)$ ;

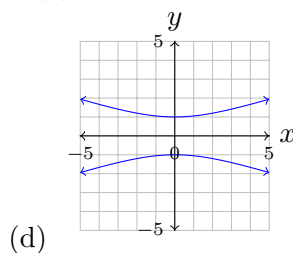
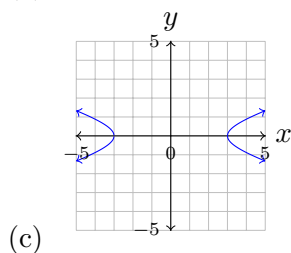
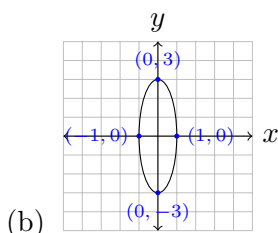
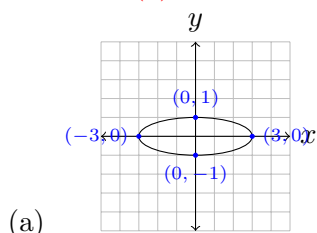
Vertices at  $(-5, 3)$ ,  $(4, 3)$ ;

Foci at  $(-7.4, 3)$ ,  $(5.4, 3)$ ;

Asymptotes are  $y = \frac{5}{4}x + \frac{17}{4}$  and  $y = -\frac{5}{4}x + \frac{7}{4}$

- (4) Which of the following is the graph of  $x^2 + 9y^2 = 9$ ?

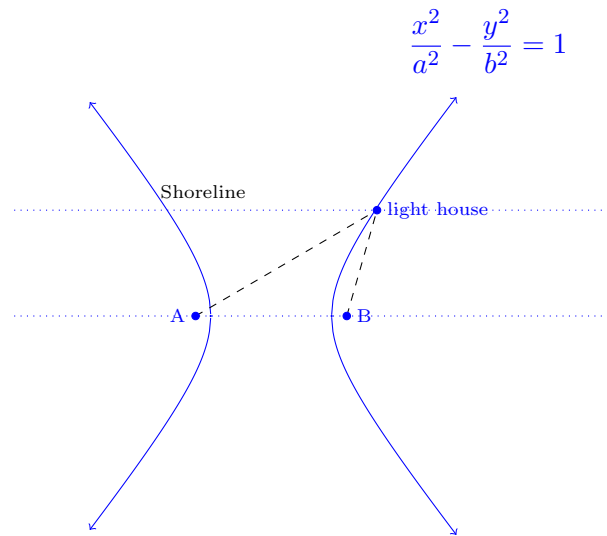
**Solution:** (a)



- (5) Ships A and B are 500 mi apart, parallel to the shoreline. They both send signals to a light house at the same time. Assume the ships are not moving. The signal from B is received 250 micro-seconds before the signal from A. Both signals travel at the speed of light which is 0.186 miles per micro-seconds. Let the positions of A and B be the foci of a hyperbola on which the light house is located. Then determine which of the following is the equation of this hyperbola.

Range Difference = speed of light  $\times$  time difference of arrival.

Remember that for any point on a hyperbola, the absolute value of the range difference to each of the foci, is equal to  $2a$ .



**Solution: (a)**

- (a)  $\frac{x^2}{540.56} - \frac{y^2}{61959.42} = 1$   
 (b)  $\frac{x^2}{62500} - \frac{y^2}{250000} = 1$   
 (c)  $\frac{x^2}{2162.25} - \frac{y^2}{13463} = 1$   
 (d)  $\frac{x^2}{778.41} - \frac{y^2}{39221.59} = 1$

(6) Which of the following is true regarding the asymptotes of a hyperbola?

**Solution:** (i)

(a) The graph of a hyperbola does not include the asymptotes, since the coordinates of the asymptotes will not satisfy the equation of the hyperbola.

(b) The graph of a hyperbola does include the asymptotes, since the coordinates of the asymptotes will satisfy the equation of the hyperbola.

(c) The graph of the hyperbola intersects the asymptotes.

(d) Hyperbolas do not have asymptotes.

(i) Only (a)

(ii) Only (b)

(iii) (b) and (c)

(iv) Only (d)