10.4 Assess Your Understanding

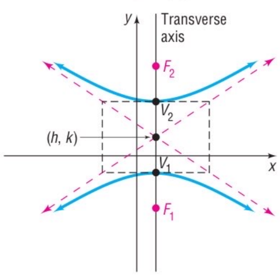
'Are You Prepared?' *Answers are given at the end of these exercises. If you get a wrong answer, read the pages listed in red.*

1. The distance d from $P_1 = (3, -4)$ to $P_2 = (-2, 1)$ is $d =$ ______. (p. 3)
2. To complete the square of $x^2 + 5x$, add ______. (p. A48)
3. Find the intercepts of the equation $y^2 = 9 + 4x^2$. (pp. 11–12)
4. ***True or False*** The equation $y^2 = 9 + x^2$ is symmetric with respect to the x-axis, the y-axis, and the origin. (pp. 12–14)
5. To graph $y = (x - 5)^3 - 4$, shift the graph of $y = x^3$ to the (left/right) ____ unit(s) and then (up/down) ____ unit(s). (pp. 90–99)
6. Find the vertical asymptotes, if any, and the horizontal or oblique asymptote, if any, of $y = \frac{x^2 - 9}{x^2 - 4}$. (pp. 191–194)

Concepts and Vocabulary

7. A(n) ________ is the collection of points in the plane the difference of whose distances from two fixed points is a constant.
8. For a hyperbola, the foci lie on a line called the ________ ______.

Answer Problems 9–11 using the figure.

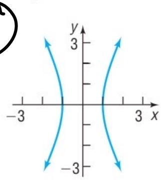


9. The equation of the hyperbola is of the form
   (a) $\frac{(x - h)^2}{a^2} - \frac{(y - k)^2}{b^2} = 1$
   (b) $\frac{(y - k)^2}{a^2} - \frac{(x - h)^2}{b^2} = 1$
10. If the center of the hyperbola is $(2, 1)$ and $a = 3$, then the coordinates of the vertices are ______ and ______.
11. If the center of the hyperbola is $(2, 1)$ and $c = 5$, then the coordinates of the foci are ______ and ______.
12. In a hyperbola, if $a = 3$ and $c = 5$, then $b =$ ____.
13. For the hyperbola $\frac{x^2}{4} - \frac{y^2}{9} = 1$, the value of a is ____, the value of b is ____, and the transverse axis is the ____-axis.
14. For the hyperbola $\frac{y^2}{16} - \frac{x^2}{81} = 1$, the asymptotes are ______ and ______.

Skill Building

In Problems 15–18, the graph of a hyperbola is given. Match each graph to its equation.

(A) $\frac{x^2}{4} - y^2 = 1$ (B) $x^2 - \frac{y^2}{4} = 1$ (C) $\frac{y^2}{4} - x^2 = 1$ (D) $y^2 - \frac{x^2}{4} = 1$

15.


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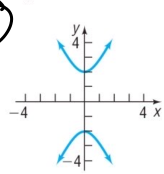

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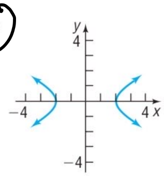

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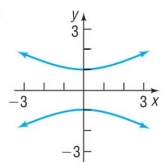

In Problems 19–28, find an equation for the hyperbola described. Graph the equation.

19. Center at $(0, 0)$; focus at $(3, 0)$; vertex at $(1, 0)$
20. Center at $(0, 0)$; focus at $(0, 5)$; vertex at $(0, 3)$
21. Center at $(0, 0)$; focus at $(0, -6)$; vertex at $(0, 4)$
22. Center at $(0, 0)$; focus at $(-3, 0)$; vertex at $(2, 0)$
23. Foci at $(-5, 0)$ and $(5, 0)$; vertex at $(3, 0)$
24. Focus at $(0, 6)$; vertices at $(0, -2)$ and $(0, 2)$
25. Vertices at $(0, -6)$ and $(0, 6)$; asymptote the line $y = 2x$
26. Vertices at $(-4, 0)$ and $(4, 0)$; asymptote the line $y = 2x$
27. Foci at $(-4, 0)$ and $(4, 0)$; asymptote the line $y = -x$
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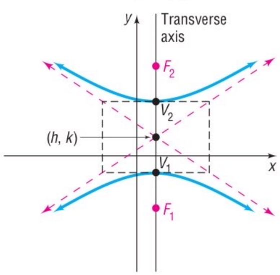

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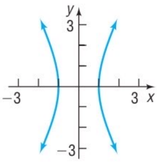

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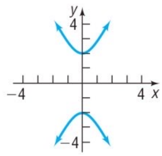

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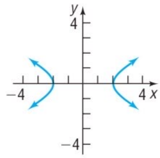

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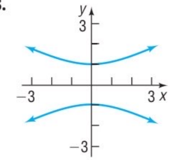

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