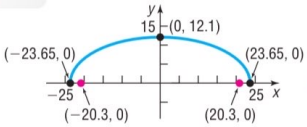
$$\frac{x^2}{23.65^2} + \frac{y^2}{147.2325} = 1$$



The height of the room at its center is $b = \sqrt{147.2325} \approx 12.1$ feet.

Now Work PROBLEM 71

10.3 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 $P_1 = (2, -5)$ to $P_2 = (4, -2)$ is $d =$ _____. (p. 3)
2. To complete the square of $x^2 - 3x$, add _____. (pp. A29–A30)
3. Find the intercepts of the equation $y^2 = 16 - 4x^2$. (pp. 11–12)
4. The point that is symmetric with respect to the y-axis to the point $(-2, 5)$ is _____. (pp. 12–14)
5. To graph $y = (x + 1)^2 - 4$, shift the graph of $y = x^2$ to the (left/right) _____ unit(s) and then (up/down) _____ unit(s). (pp. 90–99)
6. The standard equation of a circle with center at $(2, -3)$ and radius 1 is _____. (pp. 34–37)

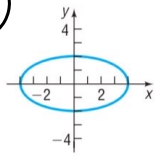
Concepts and Vocabulary

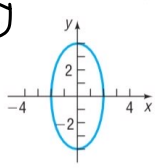
7. A(n) _____ is the collection of all points in the plane the sum of whose distances from two fixed points is a constant.
8. For an ellipse, the foci lie on a line called the _____ axis.
9. For the ellipse $\frac{x^2}{4} + \frac{y^2}{25} = 1$, the vertices are the points _____ and _____.
10. For the ellipse $\frac{x^2}{25} + \frac{y^2}{9} = 1$, the value of a is _____, the value of b is _____, and the major axis is the _____-axis.
11. If the center of an ellipse is $(2, -3)$, the major axis is parallel to the x-axis, and the distance from the center of the ellipse to its vertices is $a = 4$ units, then the coordinates of the vertices are _____ and _____.
12. If the foci of an ellipse are $(-4, 4)$ and $(6, 4)$, then the coordinates of the center of the ellipse are _____.

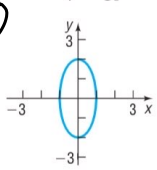
Skill Building

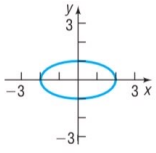
In Problems 13–16, the graph of an ellipse is given. Match each graph to its equation.

(A) $\frac{x^2}{4} + y^2 = 1$ (B) $x^2 + \frac{y^2}{4} = 1$ (C) $\frac{x^2}{16} + \frac{y^2}{4} = 1$ (D) $\frac{x^2}{4} + \frac{y^2}{16} = 1$

13.


14.


15.


16.


In Problems 17–26, find the vertices and foci of each ellipse. Graph each equation.

17. $\frac{x^2}{25} + \frac{y^2}{4} = 1$
18. $\frac{x^2}{9} + \frac{y^2}{4} = 1$
19. $\frac{x^2}{9} + \frac{y^2}{25} = 1$
20. $x^2 + \frac{y^2}{16} = 1$
21. $4x^2 + y^2 = 16$
22. $x^2 + 9y^2 = 18$
23. $4y^2 + x^2 = 8$
24. $4y^2 + 9x^2 = 36$
25. $x^2 + y^2 = 16$
26. $x^2 + y^2 = 4$

In Problems 27–38, find an equation for each ellipse. Graph the equation.

27. Center at $(0, 0)$; focus at $(3, 0)$; vertex at $(5, 0)$
28. Center at $(0, 0)$; focus at $(-1, 0)$; vertex at $(3, 0)$