EXAMPLE 4
on p. 239
for Exs. 33–38

MINIMUMS OR MAXIMUMS **Tell whether the function has a *minimum value* or a *maximum value*. Then find the minimum or maximum value.**

33. $y = -6x^2 - 1$ **34.** $y = 9x^2 + 7$ **35.** $f(x) = 2x^2 + 8x + 7$

36. $g(x) = -3x^2 + 18x - 5$ **37.** $f(x) = \frac{3}{2}x^2 + 6x + 4$ **38.** $y = -\frac{1}{4}x^2 - 7x + 2$

39. **TAKS REASONING** What is the effect on the graph of the function $y = x^2 + 2$ when it is changed to $y = x^2 - 3$?

(A) The graph widens. (B) The graph narrows.

(C) The graph opens down. (D) The vertex moves down the y-axis.

40. **TAKS REASONING** Which function has the widest graph?

(A) $y = 2x^2$ (B) $y = x^2$ (C) $y = 0.5x^2$ (D) $y = -x^2$

IDENTIFYING COEFFICIENTS **In Exercises 41 and 42, identify the values of *a*, *b*, and *c* for the quadratic function.**

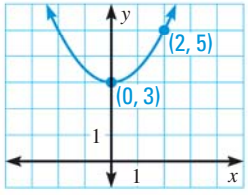
41. The path of a basketball thrown at an angle of 45° can be modeled by $y = -0.02x^2 + x + 6$.

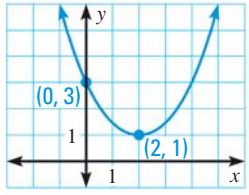
42. The path of a shot put released at an angle of 35° can be modeled by $y = -0.01x^2 + 0.7x + 6$.

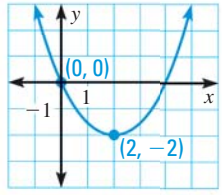
43. **TAKS REASONING** Write three different quadratic functions whose graphs have the line $x = 4$ as an axis of symmetry but have different y-intercepts.

MATCHING **In Exercises 44–46, match the equation with its graph.**

44. $y = 0.5x^2 - 2x$ **45.** $y = 0.5x^2 + 3$ **46.** $y = 0.5x^2 - 2x + 3$

A.


B.


C.


MAKING A GRAPH **Graph the function. Label the vertex and axis of symmetry.**

47. $f(x) = 0.1x^2 + 2$ **48.** $g(x) = -0.5x^2 - 5$ **49.** $y = 0.3x^2 + 3x - 1$

50. $y = 0.25x^2 - 1.5x + 3$ **51.** $f(x) = 4.2x^2 + 6x - 1$ **52.** $g(x) = 1.75x^2 - 2.5$

53. **TAKS REASONING** The points (2, 3) and (−4, 3) lie on the graph of a quadratic function. *Explain* how these points can be used to find an equation of the axis of symmetry. Then write an equation of the axis of symmetry.

54. **CHALLENGE** For the graph of $y = ax^2 + bx + c$, show that the y-coordinate of the vertex is $-\frac{b^2}{4a} + c$.