42. **GRAPHING CALCULATOR** Consider the function $y = a(x - h)^2 + k$ where $a = 1$, $h = 3$, and $k = -2$. Predict the effect of each change in a, h, or k described in parts (a)–(c). Use a graphing calculator to check your prediction by graphing the original and revised functions in the same coordinate plane.

a. a changes to -3 **b.** h changes to -1 **c.** k changes to 2

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

43. $y = 5(x - 2.25)^2 - 2.75$ **44.** $g(x) = -8(x + 3.2)^2 + 6.4$ **45.** $y = -0.25(x - 5.2)^2 + 8.5$

46. $y = -\frac{2}{3}\left(x - \frac{1}{2}\right)^2 + \frac{4}{5}$ **47.** $f(x) = -\frac{3}{4}(x + 5)(x + 8)$ **48.** $g(x) = \frac{5}{2}\left(x - \frac{4}{3}\right)\left(x - \frac{2}{5}\right)$

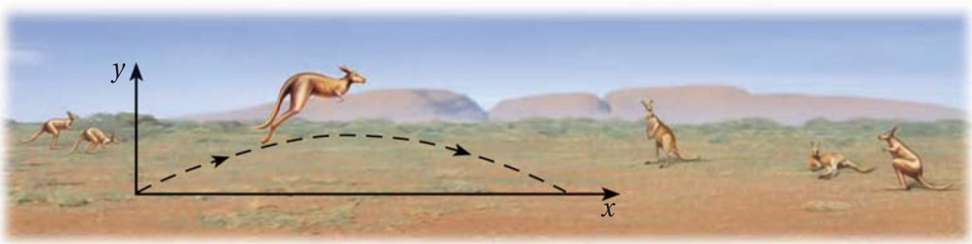
49. **TAKS REASONING** Write two different quadratic functions in intercept form whose graphs have axis of symmetry $x = 3$.

50. **CHALLENGE** Write $y = a(x - h)^2 + k$ and $y = a(x - p)(x - q)$ in standard form. Knowing the vertex of the graph of $y = ax^2 + bx + c$ occurs at $x = -\frac{b}{2a}$, show that the vertex of the graph of $y = a(x - h)^2 + k$ occurs at $x = h$ and that the vertex of the graph of $y = a(x - p)(x - q)$ occurs at $x = \frac{p + q}{2}$.

PROBLEM SOLVING

EXAMPLES 2 and 4 on pp. 246–247 for Exs. 51–54

51. **BIOLOGY** The function $y = -0.03(x - 14)^2 + 6$ models the jump of a red kangaroo where x is the horizontal distance (in feet) and y is the corresponding height (in feet). What is the kangaroo's maximum height? How long is the kangaroo's jump?



52. **CIVIL ENGINEERING** The arch of the Gateshead Millennium Bridge forms a parabola with equation $y = -0.016(x - 52.5)^2 + 45$ where x is the horizontal distance (in meters) from the arch's left end and y is the distance (in meters) from the base of the arch. What is the width of the arch?

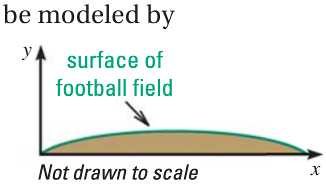
53. **MULTI-STEP PROBLEM** Although a football field appears to be flat, its surface is actually shaped like a parabola so that rain runs off to both sides. The cross section of a field with synthetic turf can be modeled by

$$y = -0.000234x(x - 160)$$

where x and y are measured in feet.

a. What is the field's width?

b. What is the maximum height of the field's surface?



= WORKED-OUT SOLUTIONS on p. WS1   = TAKS PRACTICE AND REASONING