CHALLENGE **Determine the value(s) of k for which the expression is a perfect square trinomial.**

40. $x^2 + kx + 36$ **41.** $4x^2 + kx + 9$ **42.** $16x^2 + kx + 4$

43. $25x^2 + 10x + k$ **44.** $49x^2 - 84x + k$ **45.** $4x^2 - 48x + k$

PROBLEM SOLVING

EXAMPLE 6 on p. 602 for Exs. 46–48

46. FALLING BRUSH While standing on a ladder, you drop a paintbrush from a height of 25 feet. After how many seconds does the paintbrush land on the ground?

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47. FALLING OBJECT A hickory nut falls from a branch that is 100 feet above the ground. After how many seconds does the hickory nut land on the ground?

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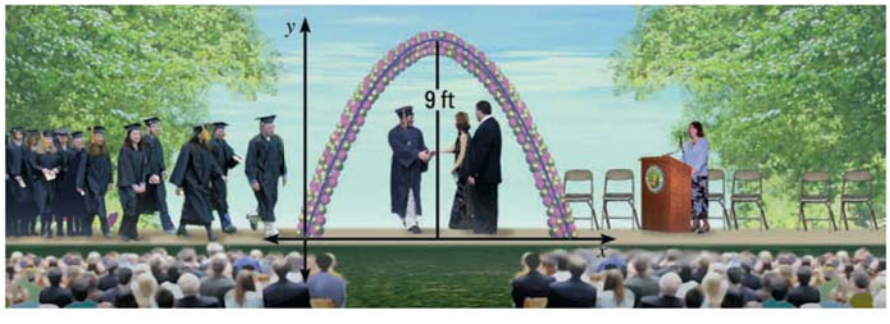
48. GRASSHOPPER A grasshopper jumps straight up from the ground with an initial vertical velocity of 8 feet per second.

a. Write an equation that gives the height (in feet) of the grasshopper as a function of the time (in seconds) since it leaves the ground.

b. After how many seconds is the grasshopper 1 foot off the ground?

49. TAKS REASONING A ball is thrown up into the air from a height of 5 feet with an initial vertical velocity of 56 feet per second. How many times does the ball reach a height of 54 feet? *Explain* your answer.

50. TAKS REASONING An arch of balloons decorates the stage at a high school graduation. The balloons are tied to a frame. The shape of the frame can be modeled by the graph of the equation $y = -\frac{1}{4}x^2 + 3x$ where x and y are measured in feet.



a. Make a table of values that shows the height of the balloon arch for $x = 0$, 2, 5, 8, and 11 feet.

b. For what additional values of x does the equation make sense? *Explain*.

c. At approximately what distance from the left end does the arch reach a height of 9 feet? Check your answer algebraically.

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