EXAMPLE 4 Solve a quadratic equation

Solve $6(x-4)^2 = 42$. Round the solutions to the nearest hundredth.

$6(x-4)^2 = 42$ — Write original equation.

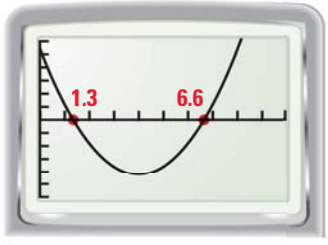
$(x-4)^2 = 7$ — Divide each side by 6.

$x - 4 = \pm\sqrt{7}$ — Take square roots of each side.

$x = 4 \pm \sqrt{7}$ — Add 4 to each side.

▶ The solutions are $4 + \sqrt{7} \approx 6.65$ and $4 - \sqrt{7} \approx 1.35$.

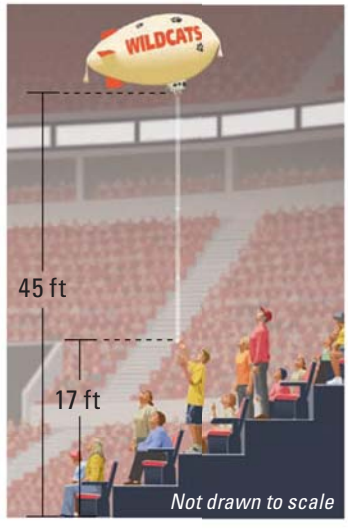
CHECK To check the solutions, first write the equation so that 0 is on one side as follows: $6(x-4)^2 - 42 = 0$. Then graph the related function $y = 6(x-4)^2 - 42$. The x-intercepts appear to be about 6.6 and about 1.3. So, each solution checks.



EXAMPLE 5 TAKS REASONING: Multi-Step Problem

ANOTHER WAY
For alternative methods for solving the problem in Example 5, turn to page 659 for the **Problem Solving Workshop**.

SPORTS EVENT During an ice hockey game, a remote-controlled blimp flies above the crowd and drops a numbered table-tennis ball. The number on the ball corresponds to a prize. Use the information in the diagram to find the amount of time that the ball is in the air.



Solution

STEP 1 **Use** the vertical motion model to write an equation for the height h (in feet) of the ball as a function of time t (in seconds).

$h = -16t^2 + vt + s$ — Vertical motion model

$h = -16t^2 + 0t + 45$ — Substitute for v and s.

DETERMINE VELOCITY
When an object is dropped, it has an initial vertical velocity of 0 feet per second.

STEP 2 **Find** the amount of time the ball is in the air by substituting 17 for h and solving for t.

$h = -16t^2 + 45$ — Write model.

$17 = -16t^2 + 45$ — Substitute 17 for h.

$-28 = -16t^2$ — Subtract 45 from each side.

$\frac{28}{16} = t^2$ — Divide each side by -16.

$\sqrt{\frac{28}{16}} = t$ — Take positive square root.

$1.32 \approx t$ — Use a calculator.

INTERPRET SOLUTION
Because the time cannot be a negative number, ignore the negative square root.

▶ The ball is in the air for about 1.32 seconds.