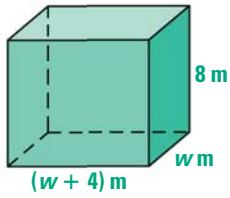
USING THE DISCRIMINANT **Tell whether the vertex of the graph of the function lies above, below, or on the *x*-axis. *Explain* your reasoning.**

34. $y = x^2 - 3x + 2$ **35.** $y = 3x^2 - 6x + 3$ **36.** $y = 6x^2 - 2x + 4$

37. $y = -15x^2 + 10x - 25$ **38.** $y = -3x^2 - 4x + 8$ **39.** $y = 9x^2 - 24x + 16$

40. **TAKS REASONING** Write a function of the form $y = ax^2 + bx + c$ whose graph has one x-intercept.

41. **TAKS REASONING** Use the rectangular prism shown.



a. The surface area of the prism is 314 square meters. Write an equation that you can solve to find the value of w.

b. Use the discriminant to determine the number of values of w in the equation from part (a).

c. Solve the equation. Do the value(s) of w make sense in the context of the problem? *Explain.*

CHALLENGE **Find all values of *k* for which the equation has (a) two solutions, (b) one solution, and (c) no solution.**

42. $2x^2 + x + 3k = 0$ **43.** $x^2 - 4kx + 36 = 0$ **44.** $kx^2 + 5x - 16 = 0$

PROBLEM SOLVING

EXAMPLE 4 on p. 680 for Exs. 45–46

45. **BIOLOGY** The amount y (in milliliters per gram of body mass per hour) of oxygen consumed by a parakeet during flight can be modeled by the function $y = 0.06x^2 - 4x + 87$ where x is the speed (in kilometers per hour) of the parakeet.

a. Use the discriminant to show that it is possible for a parakeet to consume 25 milliliters of oxygen per gram of body mass per hour.

b. Find the speed(s) at which the parakeet consumes 25 milliliters of oxygen per gram of body mass per hour. Round your solution(s) to the nearest tenth.

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46. **FOOD** For the period 1950–1999, the average amount y (in pounds per person per year) of butter consumed in the United States can be modeled by $y = 0.0051x^2 - 0.37x + 11$ where x is the number of years since 1950. According to the model, did the butter consumption in the United States ever reach 5 pounds per person per year? If so, in what year(s)?

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47. **TAKS REASONING** The frame of the tent shown is defined by a rectangular base and two parabolic arches that connect the opposite corners of the base. The graph of $y = -0.18x^2 + 1.6x$ models the height y (in feet) of one of the arches x feet along the diagonal of the base. Can a child that is 4 feet tall walk under one of the arches without having to bend over? *Explain.*

= WORKED-OUT SOLUTIONS on p. WS1

= TAKS PRACTICE AND REASONING