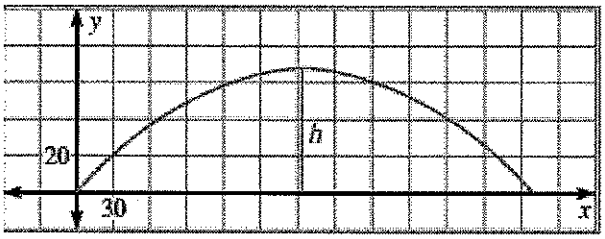
Algebra 1B Name_____

Quadratic Word Problems Practice

Read each situation carefully to understand what is being asked. Show ALL work in completing each of the following. Round to the nearest hundredth (.01), as needed:

1. The parabolic arches that support the roof of the Dallas Convention Center can be modeled by the graph of the equation $y = -0.0019x^2 + 0.71x$ (graphed below), where x and y are measured in feet.



A. At what distance across the arch does the maximum height occur?

$x = \frac{-.71}{(2(-.0019))}$

$x = 186.84$ ft.

B. What is the maximum height of the arch?

$y = -.0019(186.84)^2 + .71(186.84)$

$y = 66.33$ ft.

**A function that may be used to model any vertical motion is given by $h = -16t^2 + v \bullet t + s$, where h is height in feet, t is time in seconds, v is the initial upward velocity in feet per second, and s is the initial height in feet. Use this function to complete #2 and #3:

2. Cedar Point is building a ride that launches riders vertically with an initial velocity of 96 ft/sec., from a launch pad that sits 27 feet above ground level. Write the function that would model the riders' vertical motion: $h = -16t^2 + 96t + 27$

3. Lauren dove into a swimming pool from a 15-foot-high diving board with an initial upward velocity of 8 feet per second.

A. What was Lauren's initial height above the water? 15ft.

B. Write the function that would model Lauren's vertical motion:

$h = -16t^2 + 8t + 15$

C. What is the maximum height that Lauren would reach?

$t = \frac{-8}{2(-16)}$

$t = .25$

$h = -16(.25)^2 + 8(.25) + 15$

$h = 16$ ft.

D. How long does it take for Lauren to enter the water?

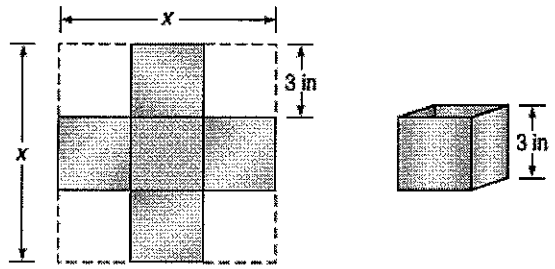
$0 = -16t^2 + 8t + 15$

$0 = -1(16t^2 - 8t - 15)$

$0 = -1(4t + 3)(4t - 5)$

$t = -3/4 \quad t = 5/4$

4. Holly can make an open-topped box out of a square piece of cardboard by cutting 3-inch squares from the corners and folding up the sides to meet. The volume of the resulting box is $V = 3x^2 - 36x + 108$, where x is the original side length of the cardboard.



A. What is the volume of the box if the original length of each side of the cardboard was 14 inches?

$V = 3(14)^2 - 36(14) + 108$

$V = 192 \text{ in}^3$

B. What is the original side length of the cardboard when the volume of the box is 27 in^3?

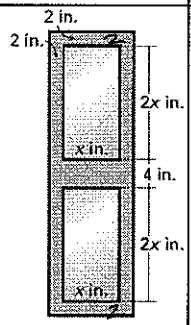
$0 = 3x^2 - 36x + 81$

$0 = 3(x^2 - 12x + 27)$

$0 = 3(x-9)(x-3)$

$x = 9 \quad x = 3$ 9 inches

5. You plan on making a wall hanging that contains two small mirrors as shown.



A. In terms of x, what is the width of the wall hanging?

$x + 4$

B. In terms of x, what is the height of the wall hanging?

$4x + 8$

C. Write a polynomial function of the area, A, of the hanging, in terms of x.

$A = (4x+8)(x+4)$

$A = 4x^2 + 24x + 32$

D. If the area of the hanging is to be 480 in^2, what will the dimensions of each mirror be?

$480 = 4x^2 + 24x + 32$

$0 = 4x^2 + 24x - 448$

$0 = 4(x^2 + 6x - 112)$

$0 = 4(x+14)(x-8) \quad x = 8$

8 x 16

6. In your own words, briefly explain how to determine each of the following from a quadratic function:

A. Direction of Opening:

B. x-intercepts

C. Vertex

D. y-intercept

E. Axis of Symmetry

F. Solutions of a quadratic equation, given the graph of the corresponding function.