

Quadratic Applications Practice

In each of the following, underline key words, and solve each, showing all work.

1. The height, h (in meters), of a ball t seconds after it is thrown is given by the equation: $h = -5(t-3)^2 + 46.5$

a. Complete the table of values with the vertex and at least four other points. Graph the function.

Vertex (3, 46.5)

b. What is the maximum height the ball reaches?

46.5 m

c. How long does it take to reach the maximum height?

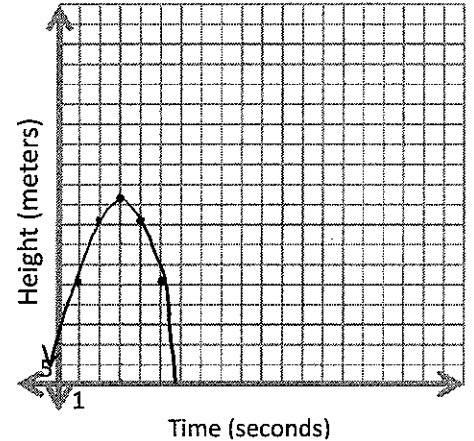
3 seconds

d. What was the height of the ball after 2 seconds?

$$h = -5(2-3)^2 + 46.5$$

$$h = 41.5 \text{ m}$$

t	h
1	26.5
2	41.5
3	46.5
4	41.5
5	26.5



d. From what height was the ball initially thrown?

$$h = -5(0-3)^2 + 46.5$$

$$h = 1.5 \text{ ft.}$$

e. After how many seconds does the ball hit the ground?

$$0 = -5(t-3)^2 + 46.5$$

$$-46.5 = -5(t-3)^2$$

$$15.5 = t-3$$

$$\pm\sqrt{15.5} = t-3$$

$$t+3$$

$$t = 3 \pm \sqrt{15.5}$$

$$t = 6.94 \text{ seconds}$$

2. After t seconds, a ball tossed in the air from the ground level reaches a height of h feet given by the equation $h = 144t - 16t^2$.

a. What is the initial height of the ball?

$$h = 0 \text{ feet}$$

b. What is the height of the ball after 3 seconds?

$$h = 144(3) - 16(3)^2$$

$$h = 288 \text{ ft.}$$

c. What is the maximum height the ball will reach?

$$h = -16t^2 + 144t$$

$$t = \frac{-144}{2(-16)}$$

$$t = 4.5$$

$$h = -16(4.5)^2 + 144(4.5) = 324 \text{ ft.}$$

d. Find the number of seconds the ball is in the air when it reaches a height of 224 feet.

$$224 = 144t - 16t^2$$

$$16t^2 - 144t + 224 = 0$$

$$16(t^2 - 9t + 14) = 0$$

$$16(t-7)(t-2) = 0$$

$$t = 7 \quad t = 2 \quad \text{After 2 seconds + 7 seconds}$$

e. After how many seconds will the ball hit the ground?

$$0 = 144t - 16t^2$$

$$0 = 16t(9-t)$$

$$16t = 0$$

$$9-t = 0$$

$$t = 0$$

$$t = 9 \text{ seconds}$$

3. The function $y = -.03(x-14)^2 + 6$ models the jump of a red kangaroo where x is the horizontal distance (in feet) and y is the height (in feet) from the ground.

a. What is the kangaroo's maximum height?

V: (14, 6)

6 Feet

b. At what horizontal distance does the kangaroo reach its max height?

14 feet

b. How long is the kangaroo's jump? (Hint: think about when the kangaroo's feet are on the ground)

$$0 = -.03(x-14)^2 + 6$$

$$-6 = -.03(x-14)^2$$

$$\sqrt{200} = \sqrt{(x-14)^2}$$

$$\pm 10\sqrt{2} = x-14$$

$$x = 14 + 10\sqrt{2} = 28.14 \text{ ft.}$$

28ft.
or

4. A rocket carrying fireworks is launched from a hill 80 feet above a lake. The rocket will fall into lake after exploding at its maximum height. The rocket's height above the surface of the lake is given by $h = -16t^2 + 64t + 80$, where h is in feet and t is the time in seconds.

a. What is the height of the rocket after 1.5 seconds?

b. When does the rocket reach its maximum height?

c. What is its maximum height?

d. How long will it take for the rocket to hit 128 feet?

e. After how many seconds after it is launched will the rocket hit the lake?

5. A town has a nature preserve with a rectangular field that measures 600 meters by 400 meters. The town wants to double the area of the field by adding a distance of x meters to the length and width, as shown.

a. What is the original area of the field?

b. What area should the new field have?

c. Write an equation for the area of the new field, in terms of x .

d. In order to achieve the correct area, what will the dimensions of the new field be?

