

Intermediate Algebra
Applications of Quadratics Homework

* Encourage G.Calc.

1. A water balloon is catapulted into the air so that its height h , in meters, after t seconds is $h(t) = -4.9t^2 + 27t + 2.4$.

a. How high is the balloon after 1 second? Give an exact answer.

$$h(1) = -4.9(1)^2 + 27(1) + 2.4$$

$$= -4.9 + 27 + 2.4 = \boxed{24.5 \text{ meters}}$$

b. Find the number of seconds the ball is in the air when it reaches a height of 30 meters. Round your final answer to the nearest tenth of a second.

$$30 = -4.9t^2 + 27t + 2.4$$

$$0 = -4.9t^2 + 27t - 27.6$$

$$x = \frac{-27 \pm \sqrt{27^2 - 4(-4.9)(-27.6)}}{-9.8}$$

$$= \frac{-27 \pm \sqrt{188.04}}{-9.8} = \boxed{\begin{matrix} 1.4 \text{ sec} \\ 4.2 \text{ sec} \end{matrix}}$$

c. What is the maximum height of the balloon? Round your final answer to the nearest tenth of a meter.

vertex y value

$$(2.8, 39.6)$$

$$\boxed{39.6 \text{ meters}}$$

d. When will the balloon burst as it hits the ground? Round your final answer to the nearest tenth of a second.

$$x \leftarrow 0 = -4.9t^2 + 27t + 2.4$$

$$\boxed{x = 5.6 \text{ seconds}}$$

2. A football is punted into the air. Its height h , in meters, after t seconds is given by $h = -4.9t^2 + 24.5t + 1$.

a. How high is the ball after 1 second?

$$x=1 \quad y = \boxed{20.6 \text{ meters}}$$

b. Find the maximum height of the ball to one decimal place.

$$(2.5, 31.6)$$

$$\boxed{31.6 \text{ meters}}$$

c. When does the ball reach its maximum height?

$$\boxed{2.5 \text{ seconds}}$$

d. When does the ball hit the ground? Round your final answer to the nearest hundredth of a second.

$$x = \boxed{5.04 \text{ seconds}}$$

G.Calc

3. While playing basketball this weekend Taylor shoots an air-ball. The height in feet of the ball is given by $h(t) = -16t^2 + 32t + 8$. How long will it take the ball to strike the ground? What is the maximum height of the ball? Round your final answer to the nearest tenth of a second.

2.2 seconds
to hit the ground

Vertex
(1, 24)
24 feet

4. The value of Mollie's stock portfolio is given by the function $V(t) = 50 + 73t - 3t^2$, where V is the value of the portfolio in hundreds of dollars and t is the time in months.

- a. How much money did Mollie start with? y intercept (0, 50)

\$ 5000

- b. When will the value of Mollie's portfolio be at a maximum? Vertex

(12.17, 494.08)

12 months \rightarrow \approx \$ 49,400

5. Trent is hitting baseballs. When he tosses the ball into the air, his hand is 5 feet above the ground. He hits the ball when it falls back to a height of 4 feet. The height of the ball is given by $h = 5 + 25t - 16t^2$, where t is in seconds. What is the maximum height the ball attains? Round your final answer to the nearest tenth of a foot.

Vertex (.78, 14.8)

14.8 feet