

## Quadratic Applications Practice

1. **Forensic Science:** Police are investigating the shooting of a police helicopter. They found a weapon at the scene of the crime that has a suspect's fingerprints on it. Forensic experts have deduced that the weapon is capable of firing with an initial velocity of 980 ft/sec.

A) Write the equation to represent this situation.  $h(t) = -16t^2 + 980t$

B) If the helicopter was flying at an altitude of 7000 feet at the time it was shot, is it possible that this weapon shot the helicopter? Explain your answer.

yes - max height is 15006 ft

2. An arrow is shot upward with an initial velocity of 64 ft/sec.

A) Write the equation to represent this situation.  $h(t) = -16t^2 + 64t$

B) How long after the arrow is released does it reach its maximum height?

2 sec

C) What is the maximum height?

64 ft

3. The Empire State building is 1250 feet tall. If an object is thrown upward from the top of the building at an initial velocity of 35 ft/sec, how long will it be before the object hits the ground? (Write the equation to represent this situation).

$$h(t) = -16t^2 + 35t + 1250$$

ground in 10 sec.

4. An object is fired upwards from the top of a 200 ft tower at a velocity of 80 ft/sec. Write the equation to represent this situation. Find the maximum height reached by the object and the time that height is reached.

$$h(t) = -16t^2 + 80t + 200$$

max height: 300 ft in 2.5 sec.

5. A punter kicks a football with an initial velocity of 128 ft/sec. What is the hang time of the punt? How long after the ball is released does it reach its maximum height? What is the height?

$$h(t) = -16t^2 + 128t$$

hang time 8 sec  
max height of 256 ft in 4 sec.

6. An airplane drops feed bags to horses wintering in a mountain pasture. When dropped from a plane at 1000 feet above the horses, the approximate height  $h$  of the feet bags after  $t$  seconds is modeled by the quadratic equation  $h = -16t^2 + 1000$ .

A) How long will it take the feed bags to reach the ground?

7.9 sec.

7. A projectile is fired straight up at an initial velocity of 64 ft/sec. The equation is  $h = 64t - 16t^2$ ,  $h$  = height,  $t$  = time. Find when the projectile reaches its highest point and how high will it be?

max height 64 ft in 2 sec.

8. The revenue equation of a company in terms of price, is  $r = -15p^2 + 300p + 12000$ . Graph and find the price that will yield the maximum profit. Determine the maximum profit.

price is \$10 for max profit of \$13,500

9. A projectile is fired straight up at an initial velocity of 80 ft/sec. The equation is  $h = 80t - 16t^2$ .

A) How high will the projectile be in 3 seconds?

96 ft

B) How long will it take the projectile to reach 90 ft?

1.7 sec

C) When will the projectile reach its maximum height?

2.5 sec.

D) How high will that be?

100 ft

E) When will the projectile reach the ground?

5 sec

10. The weekly revenue for a company is  $r = -3p^2 + 60p + 1060$ .

A) What price will yield a maximum profit?

\$10

B) What is that maximum profit?

\$1360

C) What is the price when the revenue is \$1220?

\$3.17, \$16.83

D) Is there a price for which the revenue would be \$1500?

no max profit is only \$1360

11. If a firework is shot from an initial height of 10 ft with an initial velocity of 75 ft/sec,

A) Write the equation for the height of the firework.

$h(t) = -16t^2 + 75t + 10$

B) What is its maximum height?

97.89 ft

C) When does it hit the ground?

4.82 sec.

D) At what two times does the firework reach 80 ft?

1.29 sec / 3.4 sec.

E) Why are there two times when this happens?

rises then falls

F) If a bird was flying at 100 ft above ground level, would it be in danger of being hit by the firework? Explain why or why not.

no max height is only 97.89 ft.