

## More Quadratic Word Problems (MQWP)

**Solve and check. Put your answer in a complete sentence.**

- 1) A person throws a ball upward while standing on top of a barn that is 18 feet high. The ball has an initial velocity of 64 ft/s. The motion of the ball is modeled by the equation  $h(t) = -16t^2 + 64t + 18$ , where  $h$  is the height of the ball (in feet) after  $t$  seconds.
  - a) At what time does the ball reach its maximum height?
  - b) What is the maximum height?
  - c) At what time does the ball hit the ground?
  
- 2) An object is launched directly upward at 64 feet per second (ft/s) from a platform 80 feet high. The equation for the object's height  $s$  at time  $t$  seconds after launch is  $s(t) = -16t^2 + 64t + 80$ , where  $s$  is in feet.
  - a) At what time does the object reach its maximum height?
  - b) What is the maximum height?
  - c) At what time does the object hit the ground?
  
- 3) We are standing on the top of a 1680 ft tall building and throw a small object upwards. At every second, we measure the distance of the object from the ground. Exactly  $t$  seconds after we threw the object, its height, (measured in feet) is  $h(t) = -16t^2 + 256t + 1680$ 
  - a) Find  $h(3)$ . ( $h(3)$  represents the object's position 3 seconds after we threw it.)
  - b) How much does the object travel during the two seconds between 5 seconds and 7 seconds?
  - c) How long does it take for the object to reach a height of 2640 ft?
  - d) How long does it take for the object to hit the ground?

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- 4) An object is launched at 19.6 meters per second (m/s) from a 58.8-meter tall platform. The equation for the object's height  $s$  at time  $t$  seconds after launch is  $s(t) = -4.9t^2 + 19.6t + 58.8$ , where  $s$  is in meters.
  - a) At what time does the ball reach its maximum height?
  - b) What is the maximum height?
  - c) At what time does the ball hit the ground?
  
- 5) A dud missile is fired straight into the air from a military installation. The missile's height is given by the formula;  $h(t) = -16t^2 + 400t + 100$ 
  - a. How high is the missile after 4.5 seconds?
  - b. At what time will the missile reach its maximum height?
  - c. What is the maximum height the missile will reach?
  - d. When will the missile be 2,500 feet above the ground?
  - e. When will the missile be 100 feet above the ground?

- 6) A model rocket is launched from the top of a cliff that is 384 feet high with an upward speed of 160 ft/s. The height  $h$  of an object  $t$  seconds after being released can be modeled by the equation::  

$$h(t) = -16t^2 + 160t + 384$$
(a) How many seconds after the launch does the rocket reach its maximum height?  
(b) Determine the maximum height attained by the rocket (to the nearest foot)  
(c) How many seconds after the launch does the rocket reach the ground?
- 7) A juggler tosses a ball into the air. The ball leaves the juggler's hand 5 feet above the ground and has an initial velocity of 31 feet per second. The height  $h$  of an object  $t$  seconds after being released can be modeled by the equation::  $h(t) = -16t^2 + 31t + 5$   
a. How long will it take the ball to reach its maximum height?  
b. If the juggler catches the ball when it falls back to a height of 3 feet, then how long will the ball be in the air? (A diagram may help make the problem clearer.)
- 8) We throw an object upward from the top of a 1200 ft tall building. The height of the object, (measured in feet)  $t$  seconds after we threw it is  $h(t) = -16t^2 + 160t + 1200$   
a) Where is the object 3 seconds after we threw it?  
b) How long does it take for the object to hit the ground?  
c) How long does it take for the object to reach its maximum height?
- 9) A ball is thrown straight up from the top of a 64 foot tall building with an initial speed of 48 feet per second. The height of the ball as a function of time can be modeled by the function  

$$h(t) = -16t^2 + 48t + 64$$
a) How long will it take for the ball to hit the ground?  
b) How long will it take for the ball to reach its maximum height?  
c) What is the maximum height of the ball?
- 10) A ball is thrown straight up from the top of a 112 foot tall building with an initial speed of 96 feet per second. The height of the ball as a function of time can be modeled by the function  

$$h(t) = -16t^2 + 96t + 112$$
a) How long will it take for the ball to reach its maximum height?  
b) When will the ball reach a height of 240 feet?  
c) What is the maximum height of the ball?
- 11) A ball is thrown straight up from the top of a 24 foot tall building with an initial speed of 40 feet per second. The height of the ball as a function of time can be modeled by the function  

$$h(t) = -16t^2 + 40t + 24$$
a) How long will it take for the ball to hit the ground?  
b) How long will it take for the ball to reach 40 feet?  
c) How long will it take for the ball to reach its maximum height?  
d) What is the maximum height of the ball?

- 12) A ball is thrown straight up from the top of a 192 foot tall building with an initial speed of 64 feet per second. The height of the ball as a function of time can be modeled by the function  

$$h(t) = -16t^2 + 64t + 192$$
 a) When will the ball reach a height of 112 feet?  
 b) When will the ball hit the ground?  
 c) What is the maximum height the ball will reach?
- 13) A ball is thrown straight up from the top of a 30 foot tall building with an initial speed of 74 feet per second. The height of the ball as a function of time can be modeled by the function  

$$h(t) = -16t^2 + 74t + 30$$
 a) How long will it take for the ball to hit the ground?  
 b) How long will it take for the ball to reach its maximum height?  
 c) What is the maximum height?  
 d) How long will it take for the ball to reach

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- 14) A water balloon is catapulted into the air so that its height  $h$ , in metres, after  $t$  seconds is  $f(x) = -4.9x^2 + 27x + 2.4$
- a) How high is the balloon after 1 second?  
 b) What is the maximum height of the balloon?  
 c) When will the balloon burst as it hits the ground?
- 15) A ball is thrown straight up from the top of a 224 foot tall building with an initial speed of 80 feet per second. The height of the ball as a function of time can be modeled by the function  

$$h(t) = -16t^2 + 80t + 224$$
 When will the ball reach a height of 308 feet?

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- 16) A football is punted into the air. Its height  $h$ , in metres, after  $t$  seconds is given by the equation  $f(x) = -9.4x^2 + 5.24x + 1$
- a) How high is the ball after 1 second?  
 b) Find the maximum height of the ball to one decimal place.  
 c) When does the ball reach its maximum height?  
 d) When does the ball hit the ground?
- 17) An object is 4900 ft above the ground. The object falls, and its height is given by the quadratic function:  $h(t) = -16t^2 + 4900$  The height of the object above the ground is in feet and the time,  $t$ , is in seconds.
- a) Determine when the object hits the ground

## Answers to More Quadratic Word Problems (MQWP)

- 1) a) 2 seconds b) 82 feet c) approximately 4.3 seconds  
2) a) 2 seconds b) 144 feet c) 5 seconds  
3) a) 2304 ft b) 128 ft c) 6 seconds and 10 seconds d) 21 seconds  
4) a) 2 seconds b) 117.6 feet c) 6 seconds  
5) a. 1576 ft b. 12.5 sec c. 2600 ft d.  $t = 10$  sec or 15 sec e. 0 sec or 25 sec.  
6) a. 5 sec b. 784 ft c. 12 sec.                      7) a.  $\frac{31}{32}$  sec b. 2 sec.  
8) a) 1536 ft b) 15 seconds c) 5 seconds                      9) a) 4 seconds b) 1.5 seconds c) 100 feet  
10) a) 3 seconds b) 2 seconds and 4 seconds c) 258 feet  
11) a) 3 seconds b) 1 and 2 seconds c) 1.25 seconds d) 39 feet  
12) a) 5 seconds b) 6 seconds c) 256 feet  
13) a) 3 seconds b)  $\frac{37}{16}$  seconds or approximately 2.3 seconds c) approximately 32.3 feet  
14) a) 24.5 feet b) approximately 141.5 feet c) approximately 5.6 seconds  
15) a) 1.5 seconds and 3.5 seconds                      16) a) 20.6 m; b) 31.6 m; c) 2.5 s; d) 5.04 seconds  
17) a)  $t = 70/4$  sec ( 17.5 sec )