



# PROJECTILE MOTION

1. A soccer ball is kicked from the ground with an initial upward velocity of 90 feet per second. The equation  $h(t) = -16t^2 + 90t$  gives the height  $h$  of the ball after  $t$  seconds.
  - a. How many seconds will it take for the ball to reach its maximum height?
  - b. What is the maximum height of the ball?
  - c. Give the domain and range of the function.
2. An apple is launched directly upward at 64 feet per second from a platform 80 feet high. The equation for this apple's height  $h$  at time  $t$  seconds after launch is  $h(t) = -16t^2 + 64t + 80$ . What is the height of the apple after 3 seconds?
3. A toy rocket is launched vertically upward from a 12 foot platform with an initial velocity of 128 feet per second. Its height,  $h$ , at time  $t$  seconds after launch is given by the equation  $h(t) = -16t^2 + 128t + 12$ . How long will it take the rocket to reach the ground?
4. A penny is dropped off the Empire State Building, which is 1,250 feet tall. If the penny's pathway can be modeled by the equation  $h(t) = -16t^2 + 1250$ , how long would it take the penny to strike a 6 foot tall person?

1a. \_\_\_\_\_

b. \_\_\_\_\_

c. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. Some fireworks are fired vertically into the air from the ground at an initial speed of 80 feet per second. The equation for this object's height  $h$  at time  $t$  seconds after launch is  $h(t) = -16t^2 + 80t$ . Find the domain of the function.
6. The Apollo's Chariot, a roller coaster at Busch Gardens, moves at 101 feet per second. The height  $h$  of the ride at time  $t$  seconds can be represented by the equation  $h(t) = -16t^2 + 101t + 10$ . What is the maximum height reached by this ride?
7. Eva is jumping on a trampoline. Her height  $h$  at time  $t$  can be modeled by the equation  $h(t) = -16t^2 + 20t + 6$ . Would Eva reach a height of 14 feet?
8. A diver is standing on a platform 25 feet above the pool. He jumps from the platform at an initial velocity of 10 ft/s.
- Use the formula  $h(t) = -16t^2 + vt + s$  where  $h$  is his height above the water at time  $t$  seconds,  $v$  is the starting upward velocity, and  $s$  is his starting point to write an equation to model the dive.
  - Find the diver's height after 2 seconds.
9. An astronaut on the Moon throws a baseball upward with an initial velocity of 10 meters per second, letting go of the baseball 2 meters above the ground. The equation of the baseball pathway can be modeled by  $h(t) = -0.8t^2 + 10t + 2$ . The same experiment is done on Earth, in which the pathway is modeled by equation  $h(t) = -4.9t^2 + 10t + 2$ . How much longer would the ball stay in the air on the Moon compared to on Earth?

5. \_\_\_\_\_

6. \_\_\_\_\_

7. \_\_\_\_\_

8a. \_\_\_\_\_

b. \_\_\_\_\_

9. \_\_\_\_\_