



# Calculus 1 Workbook

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Physics

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MATH

## POSITION, VELOCITY, AND ACCELERATION

- 1. Find the velocity  $v(t)$ , speed, and acceleration  $a(t)$  at  $t = 2$  of the position function.

$$s(t) = -\frac{t^3}{3} + t^2 + 3t - 1$$

- 2. Find the velocity  $v(t)$ , speed, and acceleration  $a(t)$  at  $t = 1$  of the position function.

$$s(t) = \frac{t^2 - 3}{t^3}$$

- 3. Find the velocity  $v(t)$ , speed, and acceleration  $a(t)$  at  $t = 4$  of the position function.

$$s(t) = \frac{t^2}{2t + 4}$$



## BALL THROWN UP FROM THE GROUND

- 1. A ball is thrown straight upward from the ground with an initial velocity of  $v_0 = 86$  ft/sec. Assuming constant gravity, find the maximum height, in feet, that the ball attains, the time, in seconds, that it's in the air, as well as the ball's velocity, in ft/sec, when it hits the ground.
  
- 2. A ball is thrown straight upward from the top of a building, which is 56 feet above the ground, with an initial velocity of  $v_0 = 48$  ft/sec. Assuming constant gravity, find the maximum height, in feet, that the ball attains, the time, in seconds, that it's in the air, as well as the ball's velocity, in ft/sec, when it hits the ground.
  
- 3. A ball is thrown straight upward from a bridge, which is 24 meters above the water, with an initial velocity of  $v_0 = 20$  m/sec. Assuming constant gravity, find the maximum height, in meters, that the ball attains, the time, in seconds, that it's in the air, as well as the ball's velocity, in m/sec, when it hits the water below.



## COIN DROPPED FROM THE ROOF

- 1. A rock is dropped from the top of an 800 foot tall cliff, with an initial velocity of  $v_0 = 0$  ft/sec. Assuming constant gravity, when does the rock hit the ground, and what is its velocity when it hits the ground?
  
- 2. A rock is tossed from the top of a 300 foot tall cliff, with an initial velocity of  $v_0 = 15$  ft/sec. Assuming constant gravity, when does the rock hit the ground, and what is its velocity when it hits the ground?
  
- 3. A coin is tossed downward from the top of a 36 meter tall building, with an initial velocity of  $v_0 = 6$  m/sec. Assuming constant gravity, when does the rock hit the ground, and what is its velocity when it hits the ground?



