

The Falling Object Problem

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Consider an object thrown straight up with an initial velocity of 112 feet/sec from the top of a building that is 160 feet tall.

Then h (the height of the object above the ground measured in feet) is a function of t (time elapsed in seconds) which is given by

$$h = -16t^2 + 112t + 160$$

- a) Which variable is the *independent* variable and which is the *dependent* variable?
- b) What will be the height of the object after 3 sec have elapsed?
- c) When will the height of the object be 320 feet?
- d) At what time will the object reach its maximum height?
- e) What is the maximum height attained?
- f) When will the object hit the ground?
- g) What is the *domain* and *range* of the function?
- h) What is the *average* velocity between times $t = 1$ and $t = 3$?
- i) What is the *average* velocity between times $t = 5$ and $t = 8$?
- **j) What is the *instantaneous* velocity at time $t = 3$?
- **k) What is the *instantaneous* velocity at time $t = 8$?
- **l) What is the *instantaneous* velocity at arbitrary time $t = a$?