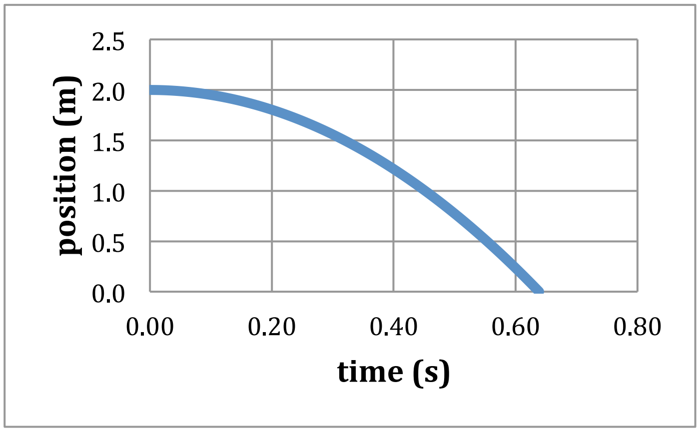
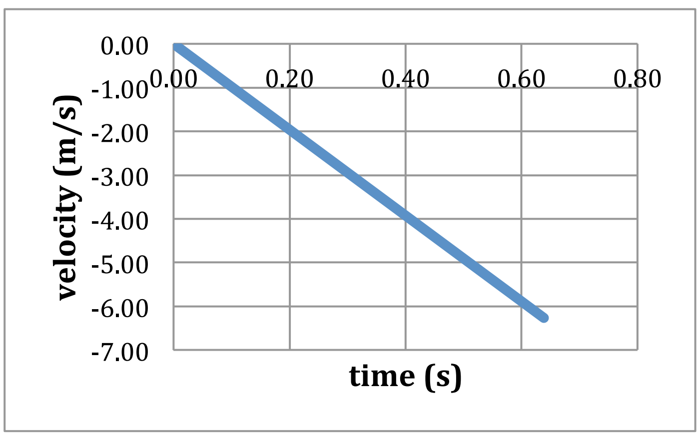
Flipping Physics Lecture Notes:
Graphing the Drop of a Ball from 2.0 Meters
An Introductory Free-Fall Acceleration Problem

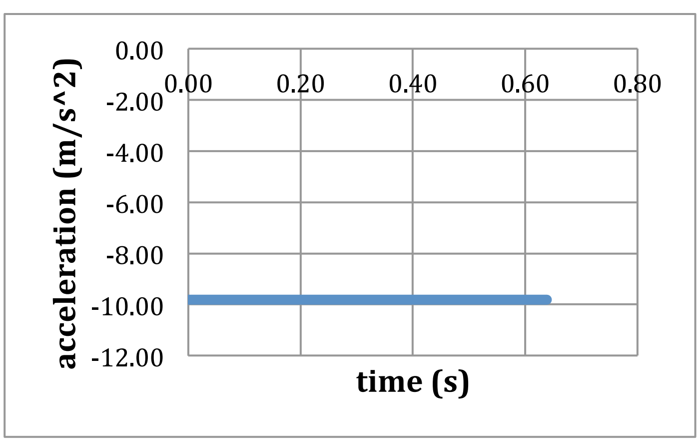
Example Problem: Mr.p drops a medicine ball from a height of 2.0 m above the ground. (a) What is the velocity of the ball right before it strikes the ground? (b) How long did the ball fall?

In the previous example we solved parts (a) and (b) and now we are going to draw the Position, Velocity and Acceleration as a function of time graphs.

Knowns: $\Delta y = -2.0\ m$, $a_y = -9.81\ m/s^2$, $v_{iy} = 0$;
Determined variables: $v_{fy} = -6.26418 \approx -6.3\ m/s$, $\Delta t = 0.638551 \approx 0.64$ seconds







Acceleration vs. Time:
The easiest graph actually is acceleration vs. time. We know it is an object in free-fall; therefore its acceleration is constant and has a value of $-9.81\ m/s^2$. So we draw a horizontal line at $-9.81\ m/s^2$.

Velocity vs. Time:
Next, the slope of a velocity vs. time graph is acceleration; therefore the velocity vs. time graph has a constant slope of $-9.81\ m/s^2$. We also know the initial velocity is zero. That completes our velocity vs. time graph.

Position vs. Time:
The initial position is 2.0 meters.

We also know the slope of the position vs. time graph is velocity and the velocity at zero seconds is zero, therefore the initial slope of the position vs. time graph needs to be zero.

As time increases, the velocity gets more and more negative and therefore the slope of the position vs. time graph needs to get more and more negative. So the graph will be a curve the goes down.

We also know that the position of zero corresponds to a time of 0.638551 seconds, so we can approximate our position vs. time graph.

(we could go through and figure out several points for a better approximation, however, this is good enough for today.)