Free-Fall Motion

Free-fall refers to motion under the influence of the gravitational force only. It is another example of motion with constant acceleration.

Kinematic Equations
$v_f = v_i + a_y \Delta t$
$y_f = y_i + v_i \Delta t + \frac{1}{2} a_y (\Delta t)^2$
$v_f^2 = v_i^2 + 2 a_y \Delta y$

kinematic variables

Δy =

v_{i} =

v_{f} =

$|a_{\mathrm{y}}| = g$

Δt =

1. **Throwing a Rock.**
   a. A rock is thrown upward from a 50 m high cliff with an initial speed of 20 m/s. Five seconds after release the magnitude of its velocity is closest to...?
   (Let g = 10 m/s^2)

   b. A rock is thrown upward from a 50 m high cliff with an initial speed of 20 m/s. The maximum height of the rock (measured from atop the cliff) is closest to…?
   (Let g = 10 m/s^2)

2. **Stone in a Well.**
   A stone dropped down a well accelerates with a constant value of g = 10 m/s^2 and hits the bottom after a time t = 3.0 s. The depth of the well is closest to...?

More Practice: How far and how fast?

Suppose that a dropped rock is equipped with a speedometer and an odometer.

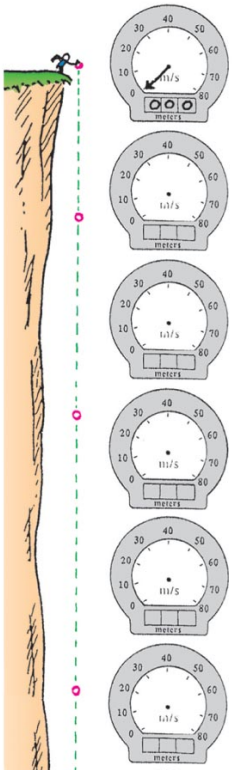
Each second the speed readings increase by:

$$v_f = v_i + a_y \, \Delta t$$

And each second the distance from the origin increases by:

$$y_f = y_i + v_i \, \Delta t + \frac{1}{2} a_y (\Delta t)^2$$

Complete the speedometer and odometer readings.



	v:	y_f:
t = 0 s	0 m/s	0 m