Freely Falling Bodies

Acceleration of a freely falling body near the surface of the earth depends on the earth's gravity.

- Since gravity on the earth may vary from place to place, the value of the acceleration may also vary. We will use an approximate value of 9.8 m/s^2 for the acceleration of freely falling bodies (denoted by the symbol g).

Since gravity is a force that acts downward, g has a negative value.

Therefore, $a = g = -9.8\ m/s^2$

$v_f = v_i + gt$

$d = v_i t + \frac{1}{2} gt^2$

- Example 1
- A stone is dropped from the top of a tall building. What is the displacement of the stone after 3.00 seconds?

- (-44.1 m)

- Falling Body Tips

1. g = -9.8 m/s2
2. dropped vi = 0
3. thrown down vi ≠ 0
4. vf (downward) ≠ 0
5. downward displacement is negative
6. time up = time down
7. numbers coming out of a radical may be + or -

Try these!

1. A stone is thrown vertically downward from a 200 meter cliff at an initial velocity of 5.00 m/s.

a. What is the stone's final velocity?

2. A ball is dropped from the top of a 123 m cliff. Ignoring air resistance, find:

a. the amount of time it takes for it to hit the ground below and

b. the final velocity of the ball