Fee Fall

Key Facts:

1. Under the force of gravity objects fall towards the centre of the Earth (down) at a constant acceleration.

2. Air resistance causes objects to fall at different speeds depending on their mass and shape but we will generally ignore air resistance in this course.

3. On the surface of Earth the gravitational field strength (the acceleration of objects) is $-9.8\ m/s^2$. Unless stated otherwise this is the value we will use in this course.

4. An object which is thrown upwards will have velocity of 0 at its highest point.

5. On level ground an object thrown up will have $V_f = -V_i$.

Example Problem #1: A coin is dropped in a wishing well and hits the bottom after 2.4 seconds. How deep is the well?

$d = v_0 t + \frac{1}{2} a t^2$

$a = -9.8\ m/s^2$

$t = 2.4\ sec$

$v_0 = 0$

$d =$

$d = -28.22$

Well is 28 m deep

Example Problem #2: A football is kicked up in the air at 15.0 m/s. How high does it go?

$V_0 = 15.0 m/s$

$a = -9.8 m/s^2$

$d = ?$

$V_f = 0$

$V_f^2 = V_0^2 + 2ad$

$d = 11 m$

What is its total hangtime?

$V_0 = 15.0 m/s$

$a = -9.8 m/s^2$

$V_f = -15.0 m/s$

$V_f = V_0 + at$

$t = 3.1 sec$

Example Problem #3:

A student stands on the edge of a cliff and throws a ball in the air at 12.0 m/s

How long does it take for the ball to come back down to the same height as the student?

$V_0 = 12.0 m/s$

$a = -9.8 m/s^2$

$V_f = -12 m/s$

Use $V_f = V_0 + at$

$t = 2.4 sec$

If it falls all the way to the bottom of the cliff, how fast is it traveling when it hits the ground?