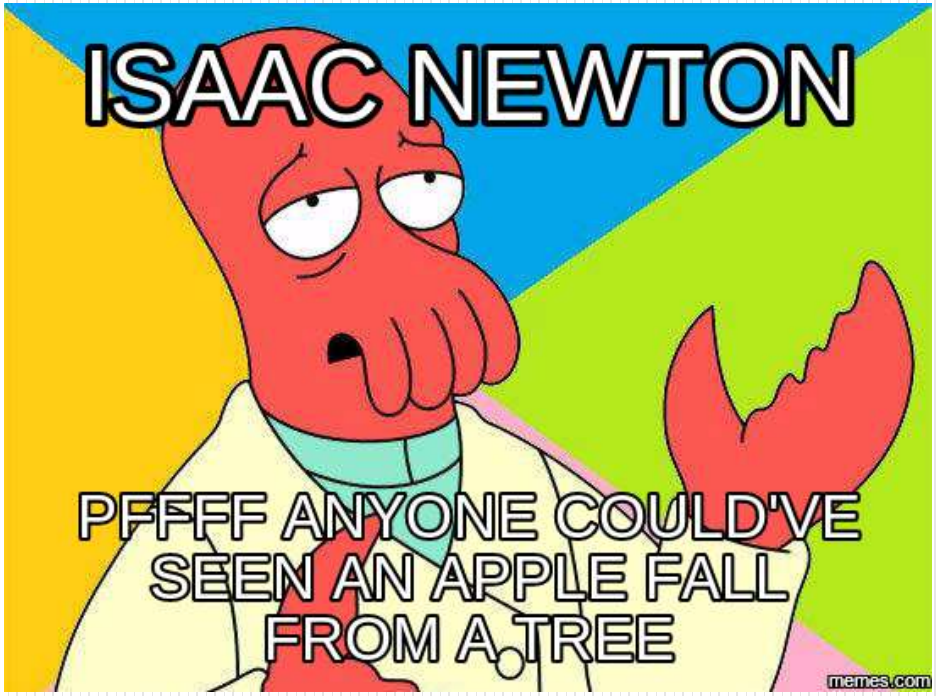
# Vertical 1D Motion



# Gravity

- Gravity is a force that attracts massive objects towards one another.
- On Earth, gravity causes everything to accelerate at a constant rate of **9.8 $m/s^2$ downwards.**

- Note: Direction is extremely important when solving vertical motion problems.

# Kinematic Equations

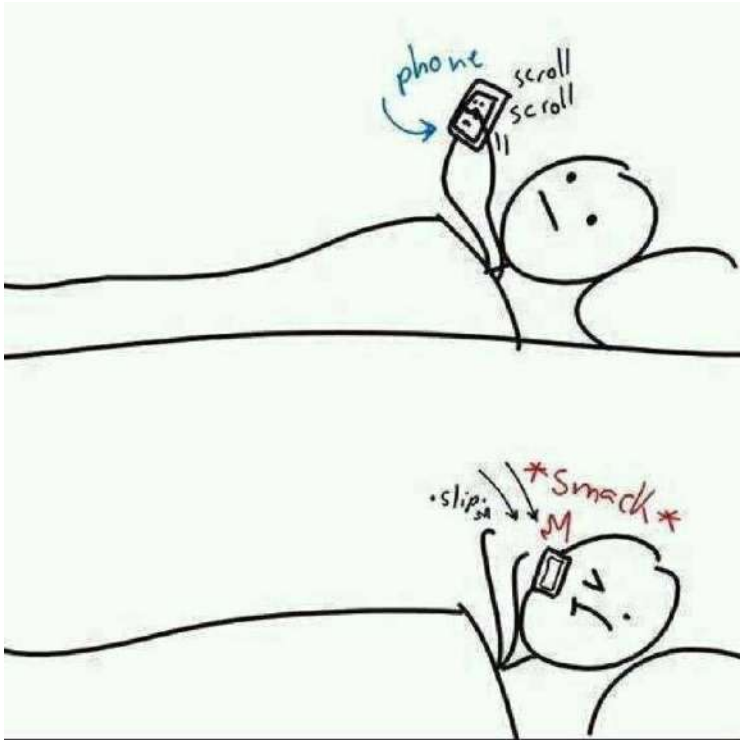
$$d = \frac{1}{2}at^2 + v_0 t$$

$$v = at + v_0$$

$$v^2 = 2ad + {v_0}^2$$

# Practice Problem

- While Anne is on her cell phone while laying down in bed, she accidentally drops it on her face. How fast is the phone going if she held it at arm's length away (about 0.75 m)?



# Anatomy of a Projectile

# Practice Problem

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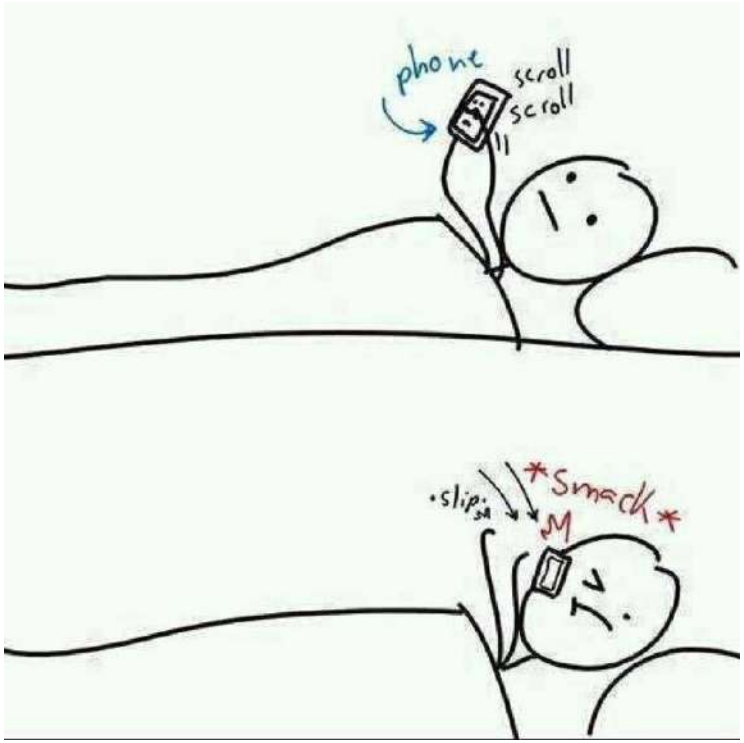
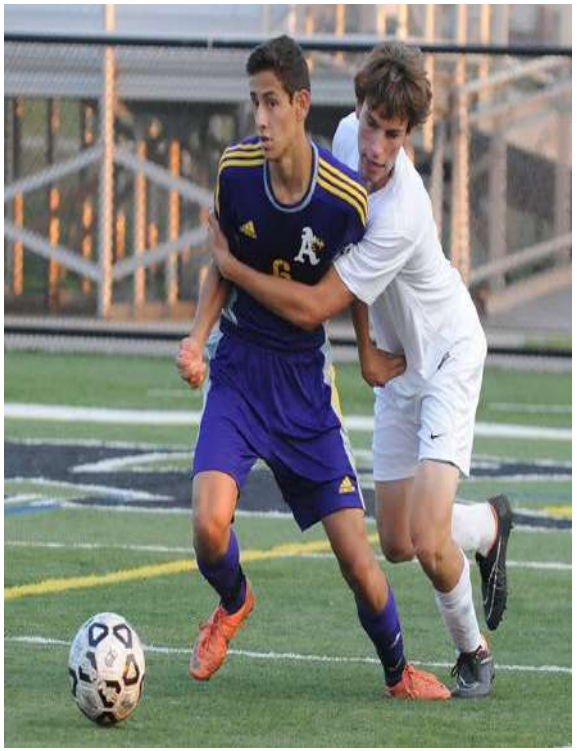


# Another one

- Erik kicks a soccer ball straight upwards with an initial velocity of 25 m/s. How much time does it take before it reaches the ground again?



# Follow Up Question

SUBMIT A PICTURE OF YOUR ANSWERS & WORK ON GOOGLE CLASSROOM!

1) What is the acceleration on Earth? What direction does it always go?
2) I throw a pencil up with an initial velocity of 6 m/s. How high does the pencil go?
3) While walking outside a branch falls from a tree in front of you. It took 7.4 seconds to hit the ground. How tall is the tree?