Acceleration

$$A = (V_f - V_i)/(t_f - t_i)$$

Speed up/Slow down

- If Acceleration and Velocity have the same sign, the motion is speeding up (going away from zero).
- If Acceleration and Velocity have opposite signs, the motion is slowing down (going toward zero).
- If Acceleration and Velocity are at 90 degrees with respect to each other, the motion is circular motion.

Motion in a straight line and uniform (= constant) acceleration

- Vavg = (Vi + Vf)/2 (m/s)
- Vf = Vi + (A x t) (m/s)
- D = (Vi x t) + (1/2 x A x t^2) (m)
- Vf^2 = Vi^2 + (2 x A x D)

- (N.B. #4 has no time; #3 has time)

Free Fall

- Galileo Galilei (1564 – 1642)
- “at a given location on the Earth and in the absence of air resistance, all objects fall with the same constant acceleration.”
- We call this acceleration due to gravity on earth with the symbol, g = 9.8 m/s/s.

Falling from a tower.

- Suppose a ball is dropped from a tower 70 m high. How long will it take to strike the ground?
- D = (Vi x t) + (1/2 x A x t^2)
- 70 m = 0 + (1/2 x 9.8 x t^2)
- 70/4.9 = t^2
- 3.7 seconds = t

Group Activity
(D = (Vi x t) + (1/2 x A x t^2)

- 1. How long did it take King Kong to fall straight down from the Empire State Building (443 m)?
- 2. A kangaroo jumps to a vertical height of 2.7 m. How long does it take to fall back?
- 3. The best rebounders in basketball have a vertical leap of about 1.2 m. How long does it take to fall back?