### Speed

Average speed is the total distance traveled by an object divided by the time taken to travel that distance.

**Instantaneous speed** is an object's speed at a given instant of time.



## Acceleration

Acceleration of an object is the rate of change of its velocity and is a vector quantity. For straight-line motion, average acceleration is the rate of change of speed:

Acceleration =  $\frac{\text{change in speed}}{\text{time interval}}$   $a = \frac{v_f - v_i}{t}$ 



## Acceleration

#### **3 Types of Acceleartion**

**Speeding Up** 

**Slowing Down** 

Turning







## **Newton's Law of Gravity**



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  - This illustrates the way scientists can use indirect methods to perform seemingly "impossible tasks"



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Gravitational force on apple = F =  $\left(\frac{GmM}{R^2}\right)$  = mg  $M = \left(\frac{gR^2}{G}\right) = \frac{(9.8m/s^2)(6.4 \times 10^6 m)^2}{6.67 \times 10^{-11} N \cdot m^2 / kg^2} = 6 \times 10^{24} kg$