One-Dimensional Motion – Acceleration

The time rate of change of velocity is **acceleration**. Acceleration is a **vector** quantity and is defined as the **change of velocity per unit of time**.
The equation is:

$$a = \frac{\Delta v}{t}$$

Since velocity's units are meters per seconds, and time's units are seconds, acceleration's units are meters per seconds squared or **m/s²**.

The symbol " Δ " simply means "change in". This requires you to subtract the initial velocity from the final velocity. Therefore:

$$\Delta v = v_f - v_i$$

Quick Example:

1.) A car increases its velocity from 20 m/s to 45 m/s. What is its change in velocity?

During the course of the year, we will only be working with **constant acceleration.** With constant acceleration, we may also find average velocity "v" to be equal to:

$$V = \frac{v + v}{2}$$

Acceleration Examples:

2.) A golf ball starts from rest. A golfer hits the ball and it travels 80 m/s in 5 seconds. Determine the **acceleration** of the ball.

3.) A football is thrown 10 m/s and is caught and brought to **rest** in 4 seconds. Determine the acceleration of the ball. (Be careful with the change in velocity!)

4.) A paper airplane has an acceleration of 5 m/s^2. If it is thrown from rest, how fast will it be going in 3 seconds?

5.) A truck's change in velocity is 15 m/s. If its acceleration is 3 m/s^2, how long did it take the truck to accelerate to this velocity?