Momentum

Velocity cannot change unless **force** is applied

impulse is **force** · time force is applied

- unit is **Newtons**
- $N = m\,a$ (mass) (acceleration)

In a **Collision**, equal **force** is exerted on both objects.

Σ **Momentum** stays the same in a **Closed system**

Newton's 2nd Law Rearranged

$F = ma$

$a = (\Delta v / \Delta t)$

$F = m(\Delta v / \Delta t)$

$F\Delta t = m\Delta v$

A **force** applied for some **time** will **change** the **velocity** of the **mass**.

$F\Delta t = m\Delta v$

Momentum: mass and velocity of the object.

We use p to represent momentum

Impulse: average net force × time

Large impulses can result from:
- large force little time
- small force large time

Cars today crumple to add time to stop

Collisions reduce the force

More **momentum** means **harder to stop**.

Example:

2200 kg car is going at 26 m/s.

$p = mv$

$p = 2200 \cdot 26$

$p = 57200$ kg·m/s

(kg·m/s: unit)