

**4A: Momentum**

- **Momentum (p)** is “inertia in motion.”
- Momentum is a **vector** quantity with the standard metric unit of **Newton seconds (N\*s)** or (kg\* m/s).
- Momentum is the product of an object’s mass and its velocity.

$$p = mv$$

- A net force ( $\Sigma F$ ) acting on an object will cause that object to accelerate and change its momentum by changing the velocity.
- Impulse ( $\Delta p$ ) is the change in the momentum of an object.
- The **Impulse-Momentum Equation** relates the impulse of an object to the net force acting on it ( $\Sigma F$ ) and the amount of time that net force is acting (t).

$$\Delta p = m\Delta v = \Sigma F * t$$

**Reflection:**

**4B: Collisions**

- During a **collision** objects can change their individual momenta.
- In **elastic collisions** the colliding objects bounce off of each other.
- In **inelastic collisions** the colliding objects stick together.
  
- As long as there are no outside forces (friction, air resistance, etc), the total amount of momentum during a collision is conserved (remains constant).
- The **Law of Conservation of Momentum** describes what happens to momentum during a collision.

$$\Sigma p_i = \Sigma p_f$$

- **Total initial momentum** ( $\Sigma p_i$ ) is the sum of the momenta of each object before the collision.
- **Total final momentum** ( $\Sigma p_f$ ) is the sum of the momenta of each object after the collision.

Reflection: