Momentum

Q-1) What is momentum?

> Momentum is the product of the mass of an object and its velocity.

$$p = m \times v$$

kg m/s => unit of momentum (p)

Q-2) What is conservation of momentum?

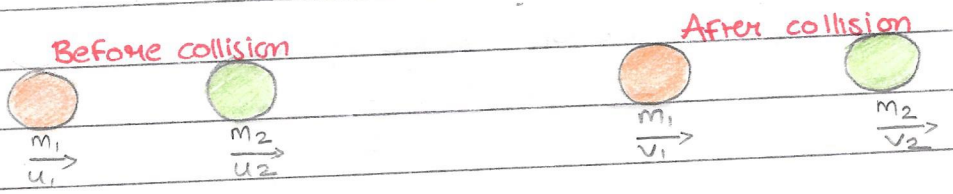
> Within a closed loop system (no external force is applied), the total momentum in any direction is constant.

OR

For a closed loop system, in any direction

total momentum before collision = total momentum after collision.

eg:



same direction.

$$m_1u_1 + m_2u_2 = m_1v_1 + m_2v_2$$

see notebook for proof.

Q-3) Types of collisions.

> ① Elastic collision -> springy
> ② Inelastic collision. -> sticky

Elastic collision

* k.e. conserved
* momentum conserved
* total energy conserved

Inelastic collision.

* k.e. not conserved
* momentum conserved
* total energy conserved.

In elastic collision.

relative initial velocity = relative final velocity

$$u_1 - u_2 = -(v_1 - v_2)$$

Q-4) Newton's Laws of motion.

* First Law:

An object will remain at rest or keep travelling at constant velocity unless acted upon by a resultant force.

* Second Law:

The resultant force acting on an object is equal to the rate of change of momentum. The resultant force and the change in momentum are in the same direction.

Force = rate of change of momentum

$$F = \frac{\Delta p}{t} = \frac{m_1 v_1 - m_1 u_1}{t}$$

* Third law:

When two bodies interact, the forces they exert on each other are equal and opposite.