

## Momentum

Q-1) What is momentum?  
> Momentum is the product of the mass of an object and its velocity

$$p = m \times v$$

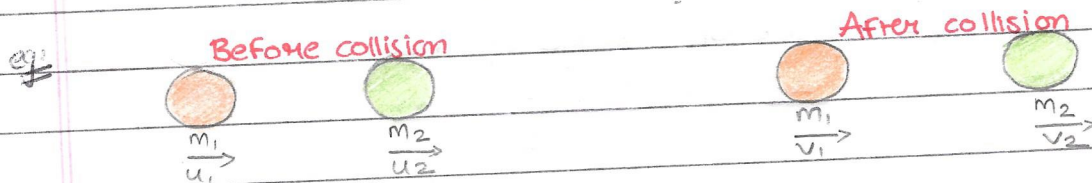
kg m/s  $\Rightarrow$  unit of momentum (p)

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.



same direction.

$$m_1 u_1 + m_2 u_2 = m_1 v_1 + m_2 v_2$$

see notebook for proof.

Q-3) Types of collisions.

- ① Elastic collision  $\rightarrow$  springy
- ② Inelastic collision.  $\rightarrow$  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.

(Type of object location on)

\* 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

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

momentum

\* Third Law:

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