

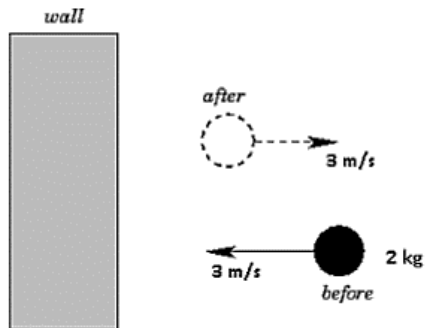
**SUVA SANGAM COLLEGE**

**YEAR 12**

**PHYSICS**

**WORKSHEET 11**

**STRAND 1 MECHANICS**

NO.	<b>CONCEPT IN BRIEF: MOMENTUM</b> <b>CHANGE IN MOMENTUM.</b> Change in momentum = Final momentum - Initial momentum <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"><math display="block">\Delta p = p_f - p_i</math></div>
1	A ball of 2kg was thrown against a wall at 3m/s to the left and rebounds at 3 m/s. What is the change in momentum of the body?  <p>The diagram illustrates a ball of mass 2 kg moving towards a vertical wall. Before the collision, the ball is moving to the left at 3 m/s. After the collision, the ball is moving to the right at 3 m/s. The wall is represented by a vertical grey rectangle on the left.</p>
2	<b>CONCEPT IN BRIEF: MOMENTUM</b> <b>IMPULSE</b> <ul style="list-style-type: none"><li>• Impulse is the product of the average force and the time interval over which the force is applied. <math>F \times \Delta t = \Delta p</math> <b>Impulse = change in momentum.</b> (Ns)                      (Kgm/s)</li></ul>
2.	How long must a 300kg satellite, in orbit, fire its thruster rocket in order to increase its speed from 500m/s to 600m/s? The force exerted by the thruster when firing is 1500N

## CONCEPT IN BRIEF: MOMENTUM

### CONSERVATION OF MOMENTUM IN TWO DIMENSIONS

- Momentum is conserved in collision and explosion

$$\text{Momentum before collision / explosions} = \text{Momentum after collision / explosions}$$

Masses move separately

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

Masses stick together

$$m_1 u_1 + m_2 u_2 = (m_1 + m_2) v_c$$

### Elastic and Inelastic collisions

An **elastic** collision is one in which the total kinetic energy is the same before and after collision.

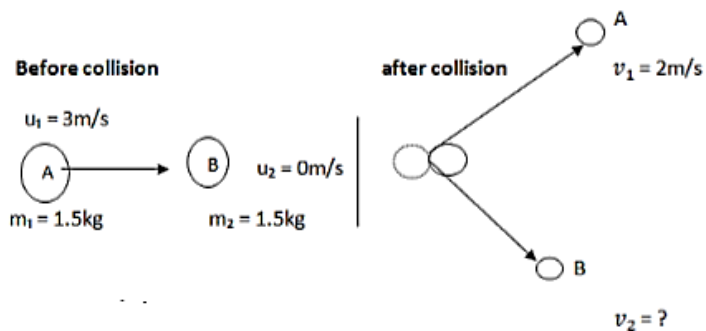
$$KE_i = KE_f$$

An **inelastic** collision is one in which the total kinetic energy before collision is not equal to the total kinetic energy after collision. If the object sticks together after collision, the collision is said to be completely inelastic.

$$KE_i \neq KE_f$$

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A bowling ball, A, of mass 1.5kg and travelling to the right at 3.0m/s hits an identical ball, B, which is stationary. Ball A moves off at 2.0m/s at an angle of 90° to the direction in which B moves.



- Find the speed of the ball B after collision.
- Find the direction of ball A after the collision.
- Find the direction of the ball B after the collision.
- Show that collision is elastic collision