



2. A body of mass 2kg is initially at rest on a smooth horizontal plane. A horizontal force of magnitude 4.5N acts on the body for 6s. Find:

a) The magnitude of the impulse given to the body by the force

b) The final speed of the body

3. A ball of mass 0.2kg hits a vertical wall at right angles with a speed of  $3.5\text{ms}^{-1}$ . The ball rebounds from the wall with speed  $2.5\text{ms}^{-1}$ . Find the magnitude of the impulse the ball exerts on the wall.

## 1B Conservation of Momentum

1. A particle of mass 2kg is moving with speed  $3\text{ms}^{-1}$  on a smooth horizontal plane. Particle Q of mass 3kg is at rest on the plane. Particle P collides with Q and after the collision Q moves away with a speed of  $2\frac{1}{3}\text{ms}^{-1}$ . Find:
  - a) The speed and direction of the motion of P after the collision

- b) The magnitude of the impulse received by P and by Q in the collision

2. Two particles, P and Q of mass 2kg and 4kg respectively are moving towards each other along the same straight line on a smooth horizontal plane. The particles collide. Before the collision, the speeds of P and Q are  $3\text{ms}^{-1}$  and  $2\text{ms}^{-1}$ . Given that the magnitude of the impulse due to the collision is 7Ns, find:

a) The speed and direction of P after the collision

b) The speed and direction of Q after the collision

3. Two particles, A and B, of masses 8kg and 2kg respectively, are connected by a light inextensible string. The particles are at rest on a smooth horizontal plane with the string slack. Particle A is projected directly away from B with speed  $4\text{ms}^{-1}$ .

a) Find the speed of the particles when the string goes taut

b) Find the magnitude of the impulse transmitted through the string when it goes taut



3. A particle of mass  $0.15\text{kg}$  is moving with velocity  $(20\mathbf{i} - 10\mathbf{j})\text{ms}^{-1}$  when it collides with a particle of mass  $0.25\text{kg}$  moving with velocity  $(16\mathbf{i} - 8\mathbf{j})\text{ms}^{-1}$ . The two particles coalesce and form one particle of mass  $0.4\text{kg}$ . Find the velocity of the combined particle.