

- 3 (a) State the principle of conservation of momentum.

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..... [2]

- (b) An object of mass  $2m$  is travelling at a speed of  $5.0 \text{ m s}^{-1}$  in a straight line. It collides with an object of mass  $3m$  which is initially stationary, as shown in Fig. 3.1.

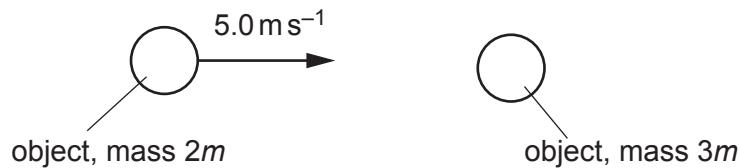


Fig. 3.1

After the collision, the object of mass  $2m$  moves with velocity  $v$  at an angle of  $30^\circ$  to its original direction of motion.

The object of mass  $3m$  moves with velocity  $w$  also at an angle of  $30^\circ$ , as shown in Fig. 3.2.

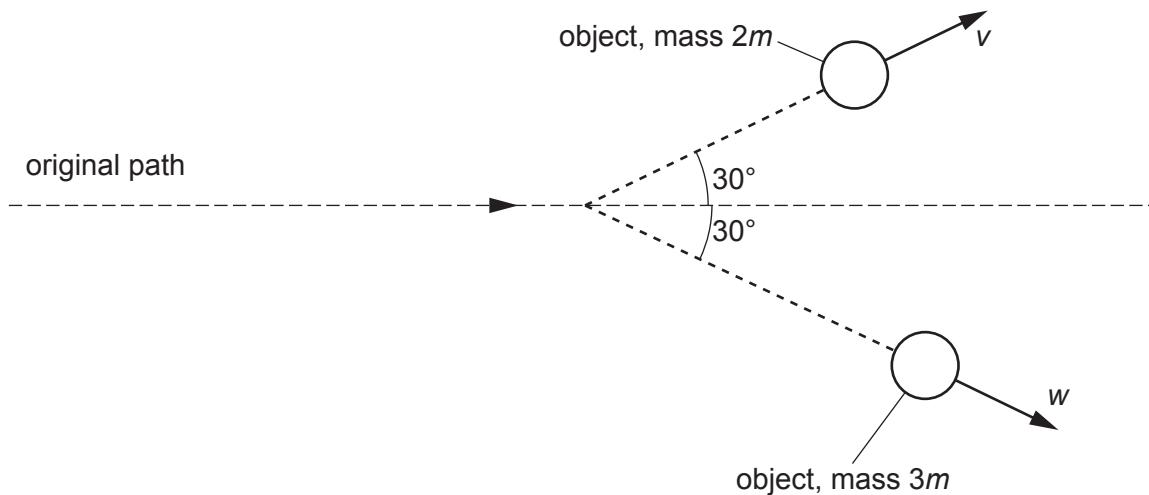


Fig. 3.2

By considering the conservation of momentum in two dimensions, calculate the magnitudes of  $v$  and  $w$ .

$$v = \dots \text{ ms}^{-1}$$

$$w = \dots \text{ ms}^{-1}$$

[4]

- (c) An object of mass 4.2 kg is travelling in a straight line at a speed of  $6.0 \text{ ms}^{-1}$ . The object is brought to rest in a distance of 0.050 m by a constant force.

Calculate the magnitude of this force.

$$\text{force} = \dots \text{ N} \quad [3]$$