

# Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

## 8 Momentum

### Exercise B, Question 4

#### Question:

Two particles both have mass 5 kg and are moving with velocities  $(9\mathbf{i} - 6\mathbf{j}) \text{ m s}^{-1}$  and  $(6\mathbf{i} + 6\mathbf{j}) \text{ m s}^{-1}$  when they collide and coalesce. Describe the direction in which they move after the collision and their speed.

#### Solution:

Using conservation of momentum with mass of coalesced particle as 10 kg;

$$5(9\mathbf{i} - 6\mathbf{j}) + 5(6\mathbf{i} + 6\mathbf{j}) = 10\mathbf{v}$$

$$75\mathbf{i} = 10\mathbf{v}$$

$$\therefore \mathbf{v} = 7.5\mathbf{i}$$

$\therefore$  The coalesced particles move parallel to the unit vector  $\mathbf{i}$  at  $7.5 \text{ m s}^{-1}$ .