

# Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

## 8 Momentum

### Exercise B, Question 8

#### Question:

Two particles,  $A$  and  $B$ , collide. The table gives the masses and velocities of the particles.

Particle	Mass	Velocity before collision	Velocity after collision
$A$	1 kg	$(8\mathbf{i} + 15\mathbf{j}) \text{ m s}^{-1}$	$(\mathbf{i} + 6\mathbf{j}) \text{ m s}^{-1}$
$B$	4 kg	$(-\mathbf{i} - 2\mathbf{j}) \text{ m s}^{-1}$	$\mathbf{v} \text{ m s}^{-1}$

Find  $\mathbf{v}$ .

#### Solution:

Using conservation of momentum

$$\begin{aligned}
 1(8\mathbf{i} + 15\mathbf{j}) + 4(-\mathbf{i} - 2\mathbf{j}) &= 1(\mathbf{i} + 6\mathbf{j}) + 4\mathbf{v} \\
 4\mathbf{i} + 7\mathbf{j} &= \mathbf{i} + 6\mathbf{j} + 4\mathbf{v} \\
 3\mathbf{i} + \mathbf{j} &= 4\mathbf{v} \\
 \therefore \mathbf{v} &= 0.75\mathbf{i} + 0.25\mathbf{j} \text{ m s}^{-1}.
 \end{aligned}$$