

Solutionbank M1

Heinemann Modular Maths for Edexcel AS and A-level

8 Momentum

Exercise A, Question 16

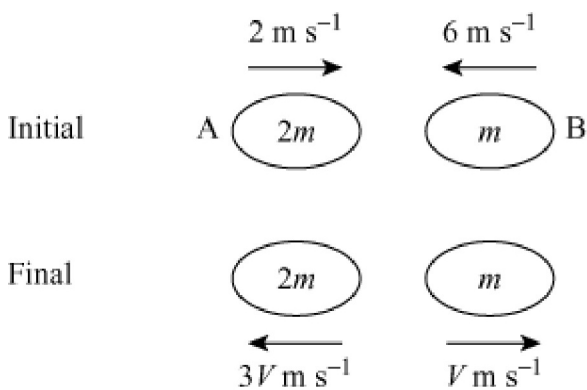
Question:

Two particles, A and B , of masses $2m$ kg and m kg, respectively, are moving directly **towards** each other on a smooth horizontal surface. The speeds of A and B are 2 m s^{-1} and 6 m s^{-1} , respectively.

The particles A and B collide and subsequently move directly **away** from each other with speeds $3V \text{ m s}^{-1}$ and $V \text{ m s}^{-1}$, respectively.

Find the value of V . [A]

Solution:



Using conservation of momentum (with speeds to the 'left' as positive)

$$\begin{aligned}
 6m - 2 \times 2m &= 3V \times 2m - V \times m \\
 2m &= 5mV \\
 \therefore V &= \frac{2}{5} \\
 &= 0.4 \text{ m s}^{-1}.
 \end{aligned}$$