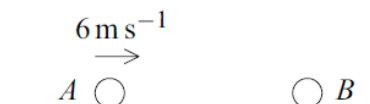


Mechanics 1 Momentum Questions

- 1 A particle A moves across a smooth horizontal surface in a straight line. The particle A has mass 2 kg and speed 6 m s^{-1} . A particle B , which has mass 3 kg , is at rest on the surface. The particle A collides with the particle B .



- (a) If, after the collision, A is at rest and B moves away from A , find the speed of B .
(3 marks)
- (b) If, after the collision, A and B move away from each other with speeds $v \text{ m s}^{-1}$ and $4v \text{ m s}^{-1}$ respectively, as shown in the diagram below, find the value of v .



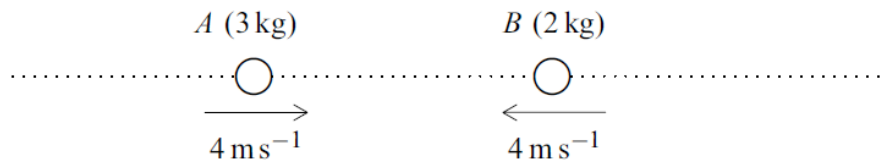
- 8 Two particles, A and B , are moving on a smooth horizontal surface.

The particle A has mass $m \text{ kg}$ and is moving with velocity $\begin{bmatrix} 5 \\ -3 \end{bmatrix} \text{ m s}^{-1}$.

The particle B has mass 0.2 kg and is moving with velocity $\begin{bmatrix} 2 \\ 3 \end{bmatrix} \text{ m s}^{-1}$.

- (a) Find, in terms of m , an expression for the total momentum of the particles. (2 marks)
- (b) The particles A and B collide and form a single particle C , which moves with velocity $\begin{bmatrix} k \\ 1 \end{bmatrix} \text{ m s}^{-1}$, where k is a constant.
- (i) Show that $m = 0.1$. (3 marks)
- (ii) Find the value of k . (3 marks)
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- 1 Two particles A and B have masses of 3 kg and 2 kg respectively. They are moving along a straight horizontal line towards each other. Each particle is moving with a speed of 4 m s^{-1} when they collide.



- (a) If the particles coalesce during the collision to form a single particle, find the speed of the combined particle after the collision. *(3 marks)*
- (b) If, after the collision, A moves in the same direction as before the collision with speed 0.4 m s^{-1} , find the speed of B after the collision. *(3 marks)*
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- 2 Two particles, A and B , are moving on a smooth horizontal surface. Particle A has mass 2 kg and velocity $\begin{bmatrix} 3 \\ -2 \end{bmatrix} \text{ m s}^{-1}$. Particle B has mass 3 kg and velocity $\begin{bmatrix} -4 \\ 1 \end{bmatrix} \text{ m s}^{-1}$. The two particles collide, and they coalesce during the collision.

- (a) Find the velocity of the combined particles after the collision. *(3 marks)*
- (b) Find the speed of the combined particles after the collision. *(2 marks)*
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