3.1 Further Mechanics: Momentum, Impulse and Collisions: 10-minute Pack

AQA 7367 · Calculator allowed · about 10 minutes

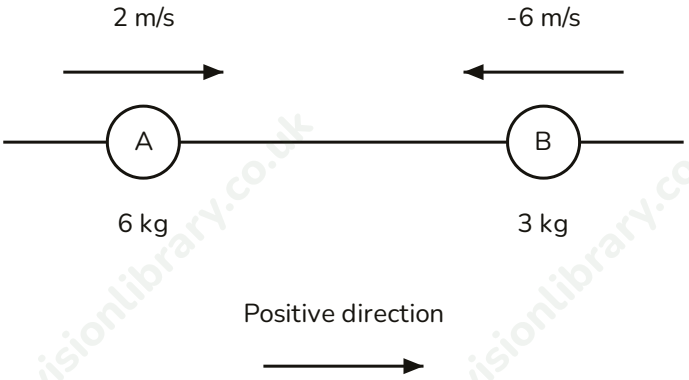
Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Two smooth spheres A and B, of masses 6 kg and 3 kg, are moving in the same straight line on a smooth horizontal table. A has velocity 2 m/s and B has velocity -6 m/s, both measured in the same direction along the line. The spheres collide directly, and the coefficient of restitution between them is 1/4.

Diagram NOT accurately drawn



(a) Find the velocities of A and B immediately after the collision. **(4)**

(b) Find the magnitude of the impulse exerted by A on B in the collision. **(2)**

(c) Find the total kinetic energy lost in the collision. **(3)**

(Total for Question 1 is 9 marks)

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Mark scheme · 3.1 Further Mechanics: Momentum, Impulse and Collisions: 10-minute Pack

Question 1

(a) conservation of momentum: m1 u1 + m2 u2 = m1 v1 + m2 v2	**M1**
(a) Newton's experimental law: v2 - v1 = e(u1 - u2)	**M1**
(a) v1 = -4/3 m/s	**A1**
(a) v2 = 2/3 m/s	**A1**
(a) Answer: v_A = -4/3 m/s, v_B = 2/3 m/s	
(b) impulse = change in momentum of B	**M1**
(b) 3(2/3 - (-6)) = 20 N s	**A1**
(b) Answer: 20 N s	
(c) KE before - KE after	**M1**
(c) before 66 J, after 6 J	**A1**
(c) loss = 60 J	**A1**
(c) Answer: 60 J	

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