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1. Two particles, P and Q, of mass m_1 and m_2 respectively, are moving on a smooth horizontal plane. The particles are moving towards each other in opposite directions along the same straight line when they collide directly. Immediately before the collision, both particles are moving with speed u.

The direction of motion of each particle is reversed by the collision.

Immediately after the collision, the speed of Q is $\frac{1}{3}u$.

(a) Find, in terms of m_2 and u, the magnitude of the impulse exerted by P on Q in the collision.

(3)

(b) Find, in terms of m_1, m_2 and u, the speed of P immediately after the collision.

(3)

(c) Hence show that $m_2 > \frac{3}{4} m_1$

(2)

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Question 1 continued

Q1

(Total 8 marks)