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7. Particle A has mass m and particle B has mass $2m$.
The particles are moving in the same direction along the same straight line on a smooth horizontal surface.
Particle A collides directly with particle B.
Immediately before the collision, the speed of A is $3u$ and the speed of B is u.
The coefficient of restitution between A and B is e.

(a) (i) Show that the speed of B immediately after the collision is $\frac{5+2e}{3}u$

(ii) Find the speed of A immediately after the collision.

(7)

After the collision, B hits a smooth fixed vertical wall that is perpendicular to the direction of motion of B.

The coefficient of restitution between B and the wall is $\frac{1}{3}$

Particle B rebounds and there is a second collision between A and B.
The first collision between A and B occurs at a distance d from the wall.
The time between the two collisions is T.

Given that $e = \frac{1}{2}$

(b) find T in terms of d and u.

(6)

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