A2. This question is about impulse.

(a) A net force of magnitude F acts on a body. Define the *impulse* I of the force. *[1]*

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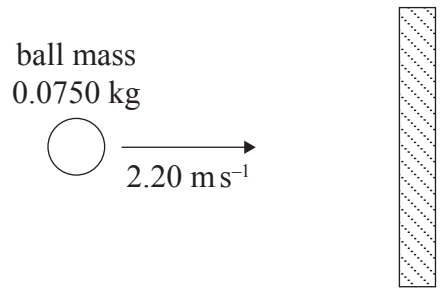
(b) A ball of mass 0.0750 kg is travelling horizontally with a speed of 2.20 $m\,s^{-1}$. It strikes a vertical wall and rebounds horizontally.



Due to the collision with the wall, 20 % of the ball's initial kinetic energy is dissipated.

(i) Show that the ball rebounds from the wall with a speed of 1.97 $m\,s^{-1}$. *[2]*

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(ii) Show that the impulse given to the ball by the wall is 0.313 N s. *[2]*

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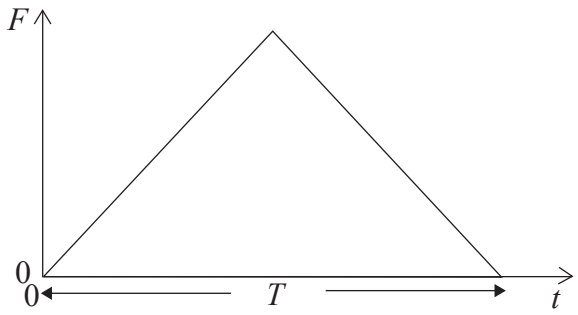
(Question A2 continued)

(c) The ball strikes the wall at time $t = 0$ and leaves the wall at time $t = T$.

The sketch graph shows how the force F that the wall exerts on the ball is assumed to vary with time t.



The time T is measured electronically to equal 0.0894 s.

Use the impulse given in (b)(ii) to estimate the average value of F. *[4]*

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