

2 (a) (i) Define linear momentum.

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..... [1]

(ii) State whether linear momentum is a vector or a scalar quantity.

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..... [1]

(b) A durian of mass 2.0 kg falls to the ground and hits the ground with a velocity of  $18.0 \text{ m s}^{-1}$  vertically downward. It does not bounce but sticks to the ground.

(i) Calculate the momentum of the durian just before it hits the ground.

momentum = .....  $\text{kg m s}^{-1}$  [2]

(ii) Determine the impulse on the durian and the change in kinetic energy of the durian which occur as a result of the collision.

impulse = .....  $\text{kg m s}^{-1}$

change in kinetic energy = ..... J [3]

(c) A steel ball is released from rest and falls through a height.

Assume that air resistance is negligible.

Explain how the law of conservation of linear momentum can be applied in the above example.

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..... [2]