2 A wooden block moves along a horizontal frictionless surface, as shown in Fig. 2.1.

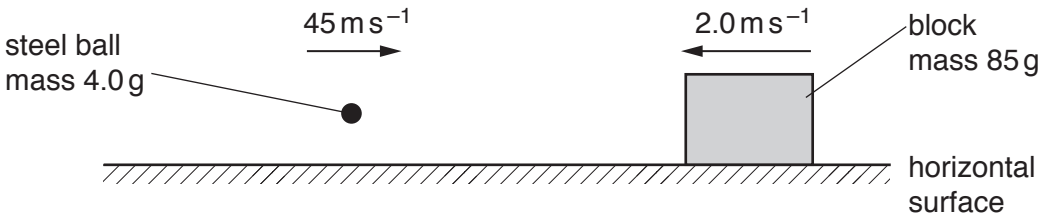

Fig. 2.1

The block has mass 85 g and moves to the left with a velocity of 2.0 m s^{-1}. A steel ball of mass 4.0 g is fired to the right. The steel ball, moving horizontally with a speed of 45 m s^{-1}, collides with the block and remains embedded in it. After the collision the block and steel ball both have speed *v*.

(a) Calculate *v*.

v = ... m s^{-1} [2]

(b) (i) the block and ball, state

1. the relative speed of approach before collision,

relative speed of approach = ... m s^{-1}

2. the relative speed of separation after collision.

relative speed of separation = ... m s^{-1}
[1]

(ii) your answers in **(i)** to state and explain whether the collision is elastic or inelastic.

.....

..... [1]

(c) Newton's third law to explain the relationship between the rate of change of momentum of the ball and the rate of change of momentum of the block during the collision.

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.....

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..... [2]

[Total: 6]