1 Fig. 1.1 shows block A of mass 1.5 kg held against a spring with a force *F*. The spring is compressed by 2.0 cm.

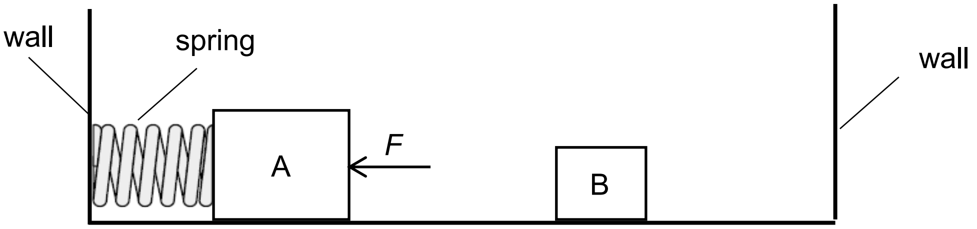

Fig. 1.1

The force *F* is then removed and the block A accelerates to the right before losing contact with the spring with a speed of 0.50 m s^{-1} as shown in Fig. 1.2. Block A collides elastically head-on with block B. The mass of block B is 0.50 kg.

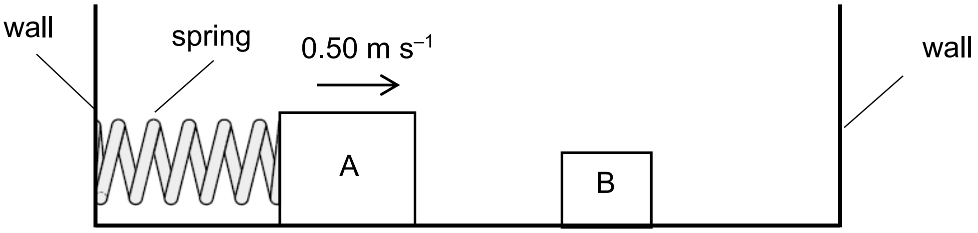

Fig. 1.2

Air resistance and frictional forces are negligible.

(a) Determine the speed of block B after the collision with block A.

final speed of block B = ………………………………… m s^{-1} [3]

(b) Fig 1.3 shows the variation with time of the force acting on block A during the collision with block B.

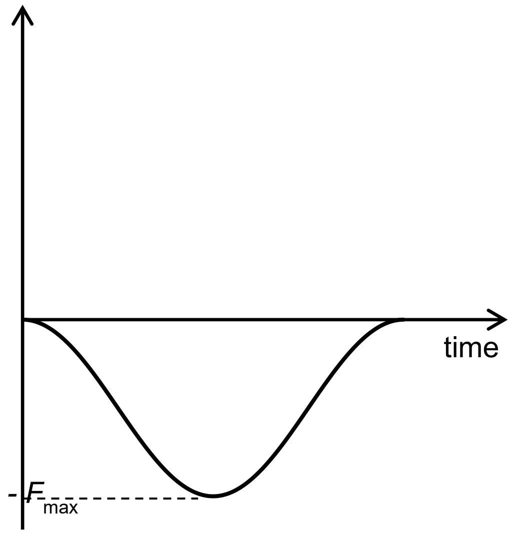

Fig. 1.3

(i) Sketch on Fig. 1.3, the corresponding graph to show how the force on block B varies with time during the collision between block A and block B. [1]

(ii) Explain how your graph shows that the total momentum of the blocks remains unchanged during the collision.

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(c) Block B hits the wall elastically, rebounds and collides with block A. Block A then moves and compresses the spring. State, with a reason, whether the maximum compression of the spring will be greater than, less than or equal to 2.0 cm.

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