1 **(a)** Fig. 1.1 shows two identical balls on a smooth surface. Ball A moves with a speed of v m s^{-1} towards a stationary ball B.

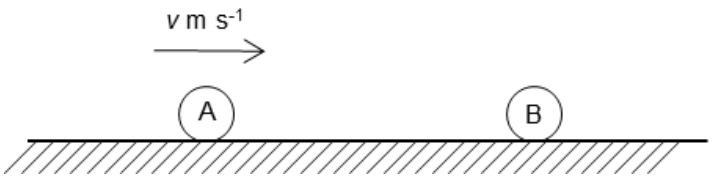

Fig. 1.1

Explain why it is not possible for ball A to move in the opposite direction after colliding with ball B.

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……..... [2]

(b) Fig. 1.2 shows a 2.5 kg crate moving towards a stationary 2.0 kg crate on a smooth surface.

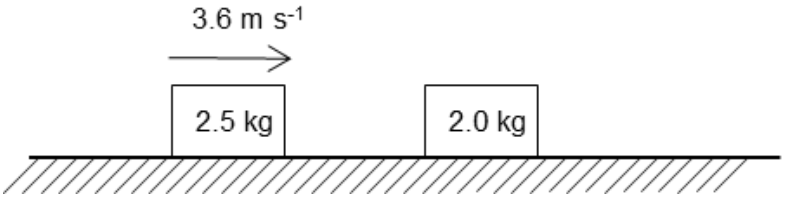

Fig. 1.2

The two crates collide elastically.

(i) Determine the speed of the 2.5 kg crate after collision.

speed = …… m s^{-1} [3]

(ii) The collision takes place over a period of 0.50 s.

Determine the average force that the 2.5 kg crate exerts on the 2.0 kg crate.

average force = …… N [2]

(c) The crates are carrying tomatoes. A particular 3.0 kg crate has a speed of 1.5 m s^{-1} just before it slides down a 2.0 m high rough slope inclined an at an angle of 30° to the horizontal as shown in Fig. 1.3.

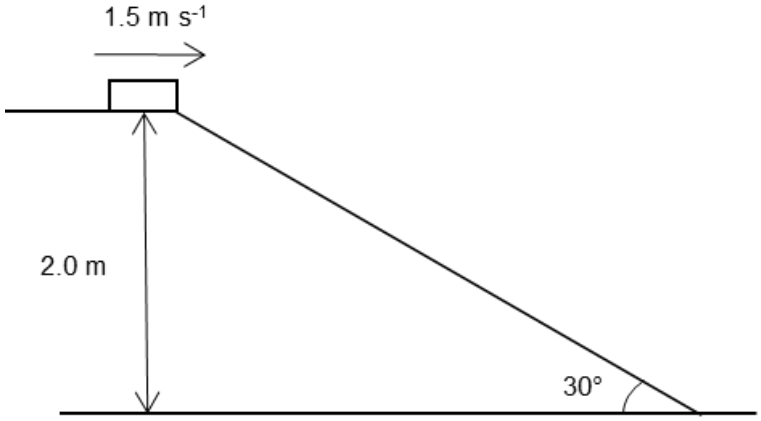

Fig. 1.3

An average frictional force of 15 N is exerted on the crate as it slides down the slope.

(i) Determine the speed of the crate when it reaches the bottom of the slope.

speed = …… m s^{-1} [3]

(ii) A co-worker suggested to replace the rough slope with a smooth one so that the crate can reach the bottom of the slope in a shorter time.

Suggest and explain a possible reason why this suggestion should not be implemented.

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……..… [2]

[Total: 12]