2

(a)

State the *principle of conservation of momentum*.

……

……

……. [2]

(b)

Two frictionless trolleys A and B are moving along a horizontal straight line, as illustrated in Fig. 2.1.

6.40 m s^{-1} 0.30 m s^{-1}

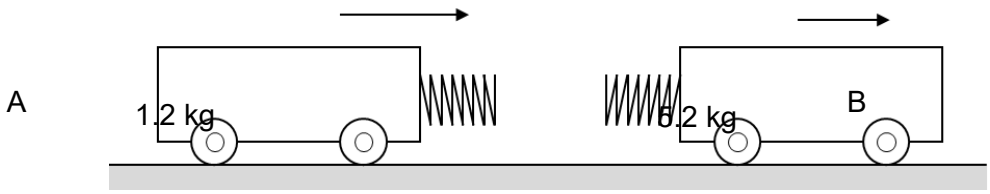

Fig. 2.1

Trolley A has mass 1.2 kg and a velocity of 6.40 m s^{-1}. Trolley B has mass 5.2 kg and a velocity of 0.30 m s^{-1}.

At 0.20 s, the two trolleys collide elastically and are in contact for a duration of 0.47 s and trolley A moves in the opposite direction after the collision.

(i)

Show that the velocity of trolley B after the collision is 2.6 m s^{-1}.

[3]

(ii)

Calculate the average force *F* that B exerts on A during the collision.

F = ... N [3]

(iii)

Sketch on Fig. 2.2, the velocity-time graph for trolley A. The velocity-time graph of trolley B has been provided.

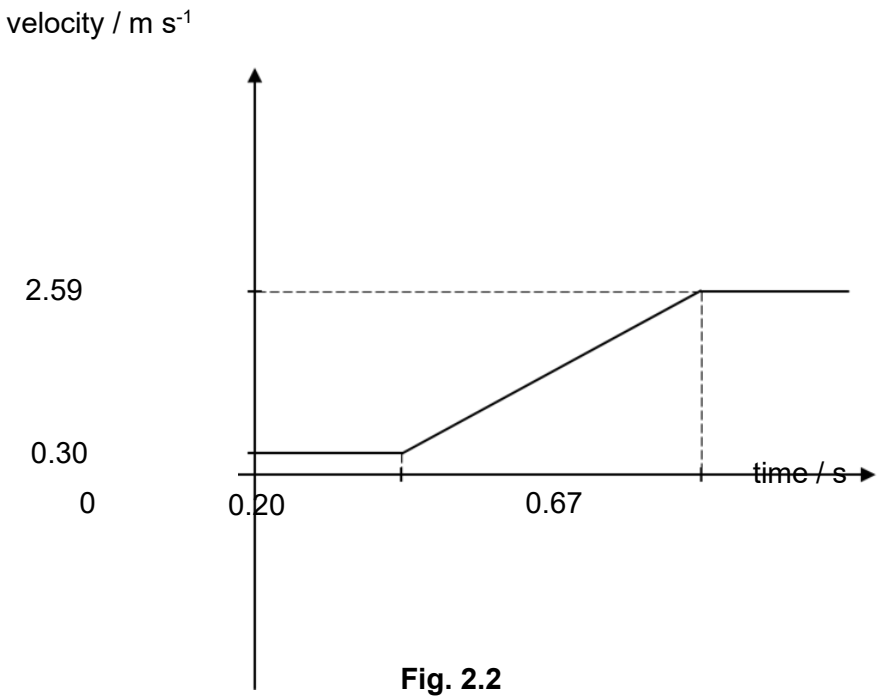

Fig. 2.2

[2]

(iv)

Indicate on Fig. 2.2 the time at which the two trolleys are the closest to each other. Label this time as t_c.

[1]

(v)

Discuss why the collision is elastic even though the magnitude of the kinetic energy of the system at t_c is not the same as that before the collision.

…….....

…….....

…….....

……..... [2]