2 Two identical balls A and B approach each other along the same straight line on a smooth horizontal surface, as shown in Fig 2.1.

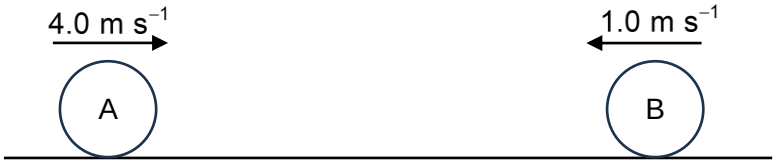

Fig. 2.1

At time $t = 0$ s, ball A moves towards ball B with a speed of 4.0 m s^{-1}, while ball B moves towards ball A with a speed of 1.0 m s^{-1}. Each ball has a mass of 0.50 kg.

At time $t = 0.50$ s, the balls undergo a head-on elastic collision and are in contact for a duration of 0.25 s.

After the collision, ball A moves with velocity v_A and ball B moves with velocity v_B.

(a) Explain whether both balls could be stationary at the same time during the collision.

.....

.....

.....

.....

..... [2]

(b) Show that v_B is 4.0 m s^{-1}.

[2]

(c) Calculate the magnitude of the average force on ball A during the collision.
Explain your working.

force = ... N [3]

(d) Fig. 2.2 shows the variation with time t of the momentum p_A of ball A and momentum p_B of ball B before the collision.

On Fig. 2.2, complete the graphs for p_A and p_B from $t = 0.50$ s to $t = 1.5$ s.

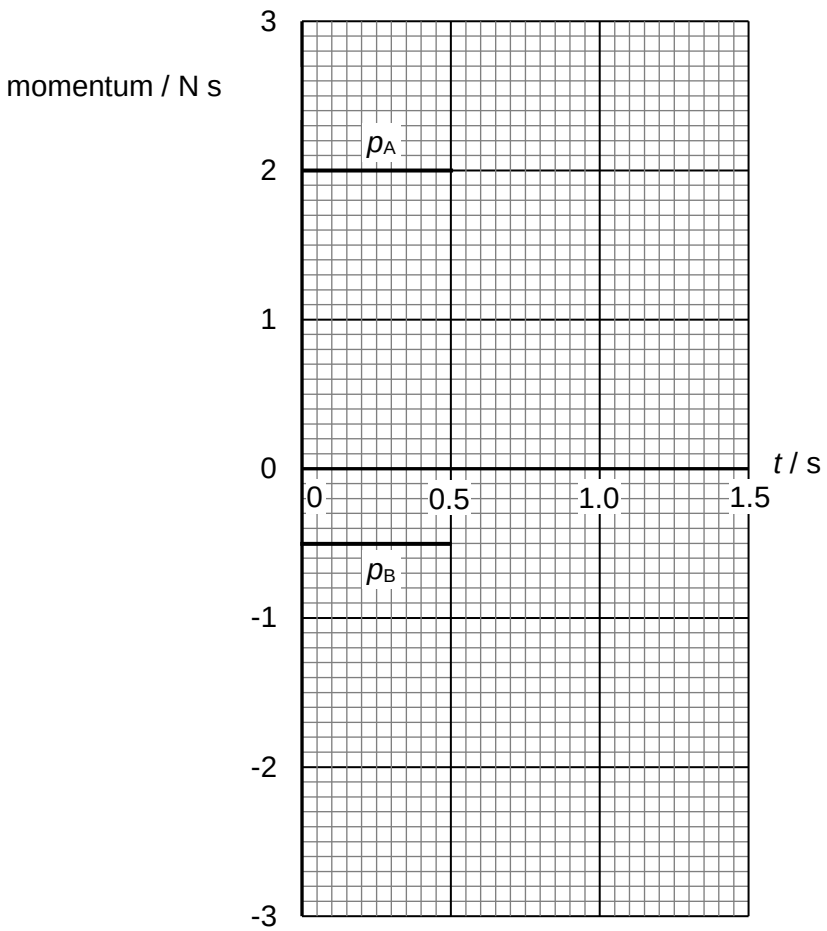

Fig. 2.2

[2]

[Total: 9]