

- 2 (a) State Newton's second law of motion.

.....
.....[1]

- (b) A constant resultant force F acts on an object A. The variation with time t of the velocity v for the motion of A is shown in Fig. 2.1.

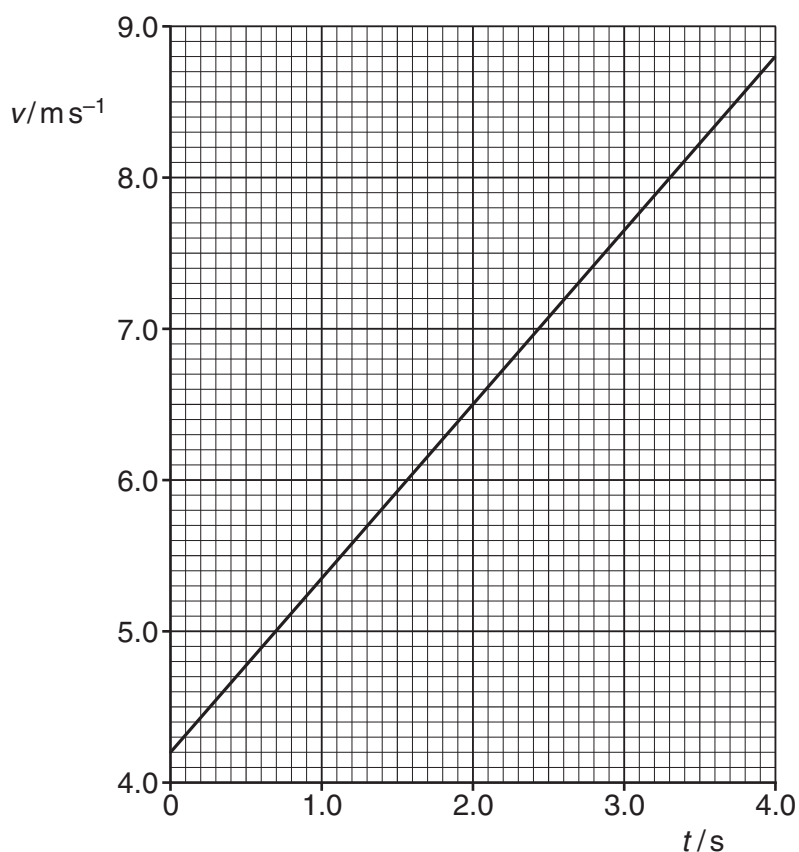


Fig. 2.1

The mass of A is 840 g.

Calculate, for the time $t = 0$ to $t = 4.0$ s,

- (i) the change in momentum of A,

change in momentum = kg m s⁻¹ [2]

- (ii) the force F .

$F =$ N [1]

- (c) The force F is removed at $t = 4.0\text{ s}$. Object A continues at constant velocity before colliding with an object B, as illustrated in Fig. 2.2.



Fig. 2.2

Object B is initially at rest. The mass of B is 730 g.
The objects A and B join together and have a velocity of 4.7 m s^{-1} .

- (i) By calculation, show that the changes in momentum of A and of B during the collision are equal and opposite.

[2]

- (ii) Explain how the answers obtained in (i) support Newton's third law.

.....

 [2]

- (iii) By reference to the speeds of A and B, explain whether the collision is elastic.

.....
 [1]

[Total: 9]