

1 (a) (i) Define *impulse*.

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

(ii) State the principle of *conservation of linear momentum*.

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.....  
..... [2]

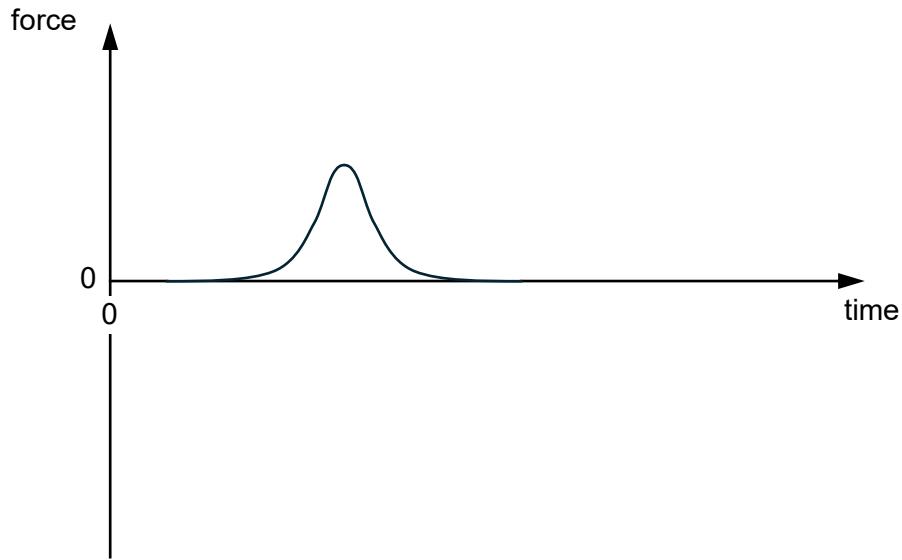
- (b) Two isolated objects, X and Y travel along the same straight line with speeds  $3.5 \text{ m s}^{-1}$  and  $2.0 \text{ m s}^{-1}$  respectively as shown in Fig. 1.1. The objects collide elastically and continue to travel along the same straight line after the collision.



Fig. 1.1

Object X has a mass of 0.5 kg and object Y has a mass of 0.25 kg.

The variation with time of the force exerted by object X on object Y during the collision is shown in Fig. 1.2.



**Fig. 1.2**

- (i) Sketch on Fig. 1.2 the variation with time of the force exerted by object Y on object X during the collision. Label this line  $F$ . [1]
- (ii) State and explain whether, during the collision it is possible for both objects to be at rest simultaneously.

.....

.....

..... [2]

- (iii) The area under the graph given in Fig. 1.2 is  $0.50 \text{ N s}$ . Use the information in (b) to calculate the velocity of object Y after the collision.

velocity of object Y = .....  $\text{m s}^{-1}$  [3]

[Total: 9]

