2 (a) (i) State what is meant by a *vector* quantity.

.....

..... [1]

(ii) State the name of **one** vector quantity.

..... [1]

(b) An object of weight 16 N travels down a rough slope at constant speed, as shown in Fig. 2.1.

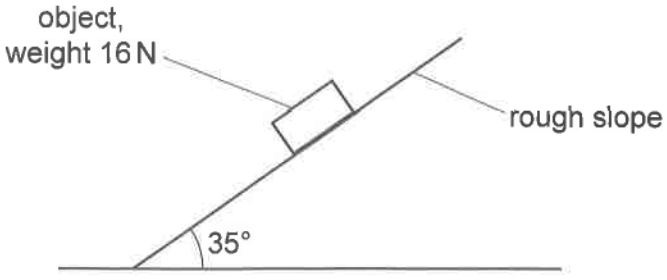

Fig. 2.1

The slope is at an angle of 35° to the horizontal.

(i) Calculate the component W of the weight acting down the slope.

W = ... N [1]

(ii) The object is now pulled up the rough slope at constant speed by a force P, as shown in Fig. 2.2.

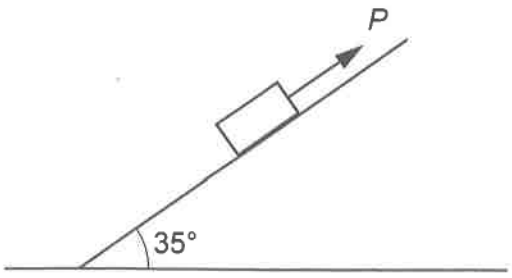

Fig. 2.2

The force P is parallel to the slope.

Determine the value of P.

P = ... N [2]

(c) Two isolated objects X and Y travel along the same straight line and then collide. They continue to travel along the same straight line after the collision.

Object X has a mass of 0.22 kg and object Y has a mass of 0.40 kg.

The variation of the velocity of X with time is shown in Fig. 2.3.

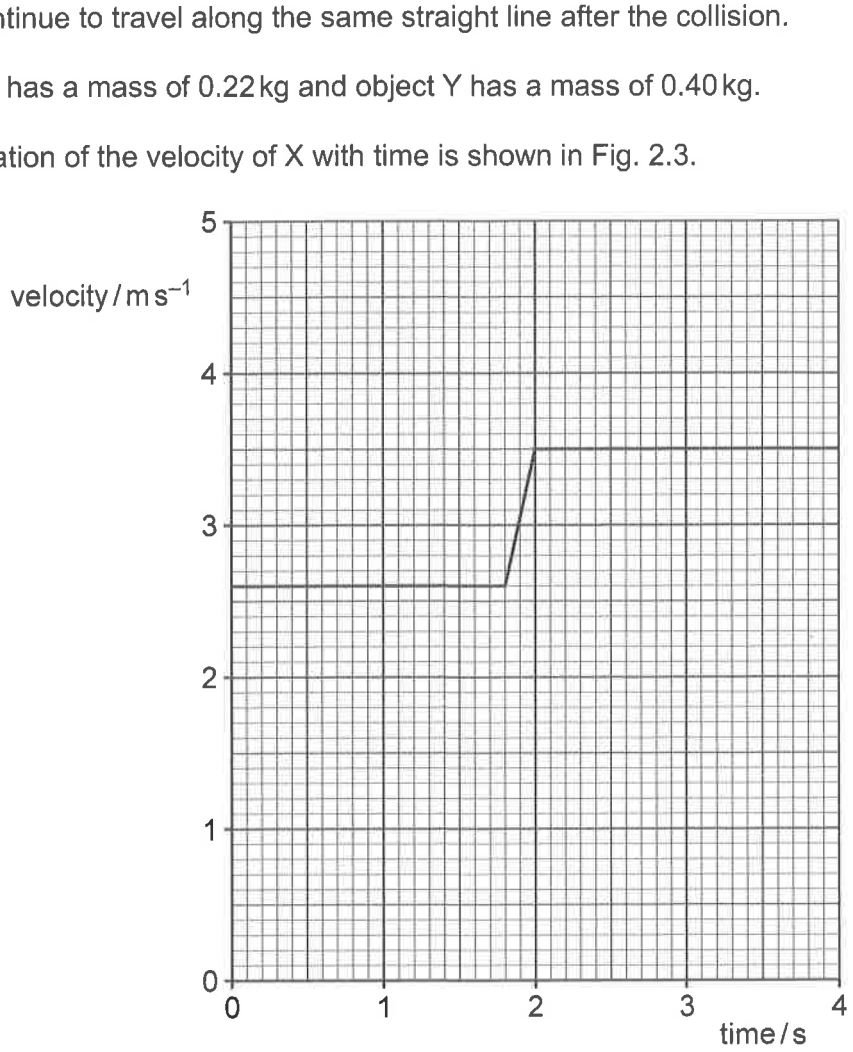

Fig. 2.3

(i) Calculate the impulse exerted on X due to the collision with Y.

impulse = ... Ns [2]

(ii) Before the collision, Y was travelling at a speed of 3.3 m s^{-1}.

Determine the speed v of Y after the collision.

v = ... m s^{-1} [2]

(iii) Determine the distance travelled by X during the time it is in contact with Y.

distance = ... m [2]

[Total: 11]