

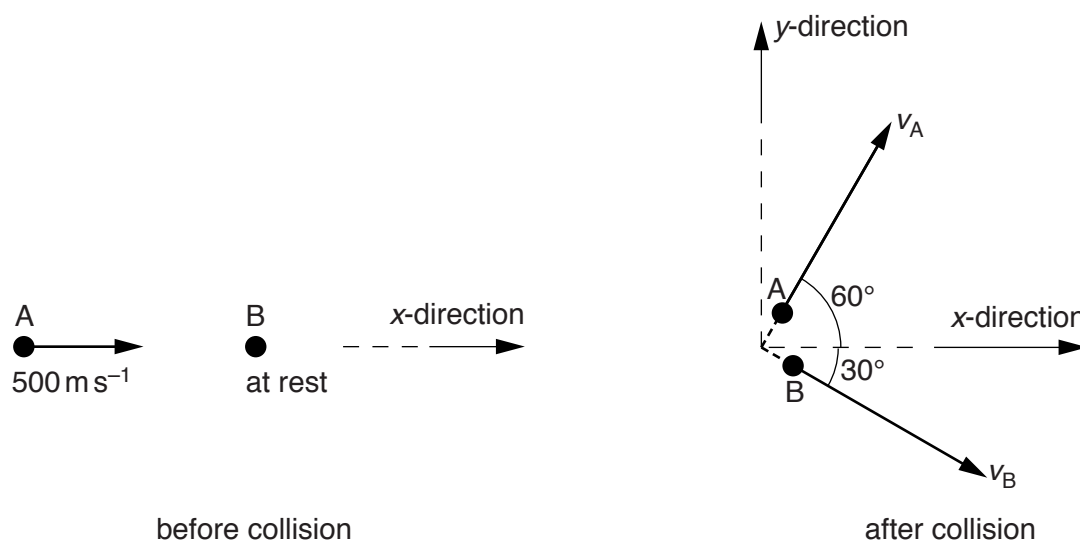
- 5 (a) State the law of conservation of momentum.

.....

.....

..... [2]

- (b) Two particles A and B collide elastically, as illustrated in Fig. 5.1.



**Fig. 5.1**

The initial velocity of A is  $500 \text{ m s}^{-1}$  in the x-direction and B is at rest.

The velocity of A after the collision is  $v_A$  at  $60^\circ$  to the x-direction. The velocity of B after the collision is  $v_B$  at  $30^\circ$  to the x-direction.

The mass  $m$  of each particle is  $1.67 \times 10^{-27} \text{ kg}$ .

- (i) Explain what is meant by the particles colliding *elastically*.

..... [1]

- (ii) Calculate the total initial momentum of A and B.

momentum = .....Ns [1]

(iii) State an expression in terms of  $m$ ,  $v_A$  and  $v_B$  for the total momentum of A and B after the collision

1. in the  $x$ -direction,

.....

2. in the  $y$ -direction.

.....

[2]

(iv) Calculate the magnitudes of the velocities  $v_A$  and  $v_B$  after the collision.

$v_A =$  .....  $\text{ms}^{-1}$

$v_B =$  .....  $\text{ms}^{-1}$   
[3]

[Total: 9]