

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

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

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

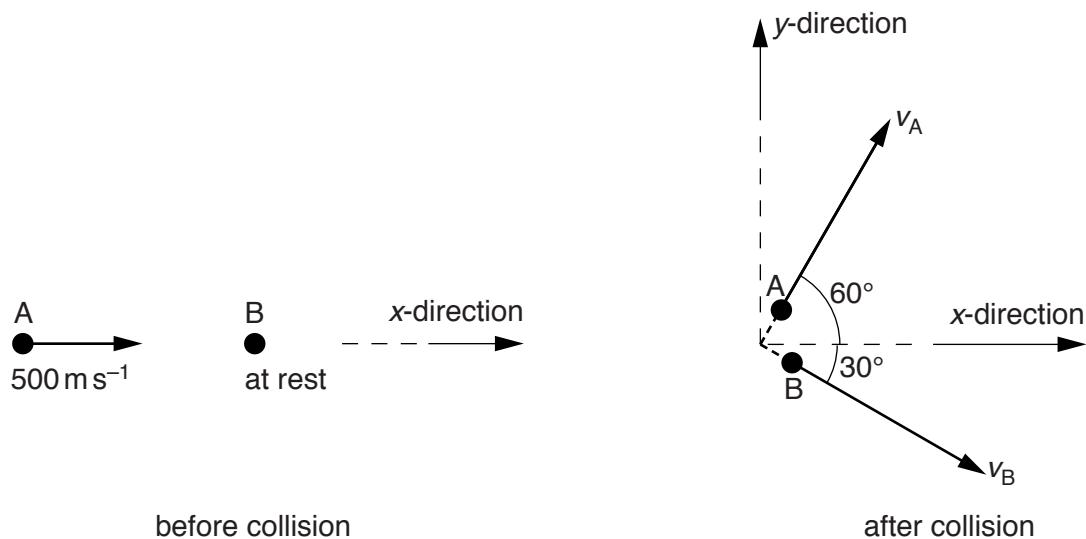


Fig. 5.1

The initial velocity of A is 500 ms^{-1} in the x -direction and B is at rest.

The velocity of A after the collision is v_A at 60° to the x -direction. The velocity of B after the collision is v_B at 30° 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.

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

$$v_B = \dots \text{ ms}^{-1}$$

[3]

[Total: 9]