4 **(a)** State the principle of conservation of momentum.

.....

.....

.....[2]

(b) A ball X and a ball Y are travelling along the same straight line in the same direction, as shown in Fig. 4.1.

Fig. 4.1

Ball X has mass 400 g and horizontal velocity 0.65 m s^{-1}.
Ball Y has mass 600 g and horizontal velocity 0.45 m s^{-1}.

Ball X catches up and collides with ball Y. After the collision, X has horizontal velocity 0.41 m s^{-1} and Y has horizontal velocity v, as shown in Fig. 4.2.

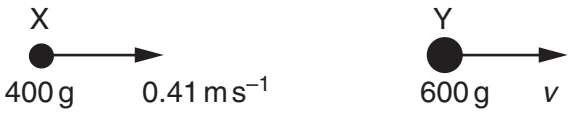

Fig. 4.2

Calculate

(i) the total initial momentum of the two balls,

momentum = ... N s [3]

(ii) the velocity v,

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

(iii) the total initial kinetic energy of the two balls.

kinetic energy = ... J [3]

(c) Explain how you would check whether the collision is elastic.

.....

.....[1]

(d) Newton's third law to explain why, during the collision, the change in momentum of X is equal and opposite to the change in momentum of Y.

.....

.....

.....

.....[2]