

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

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- (b) Two balls, X and Y, move along a horizontal frictionless surface, as shown from above in Fig. 4.1.

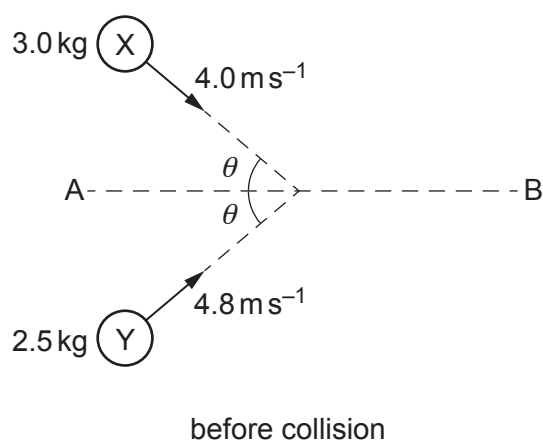


Fig. 4.1 (not to scale)

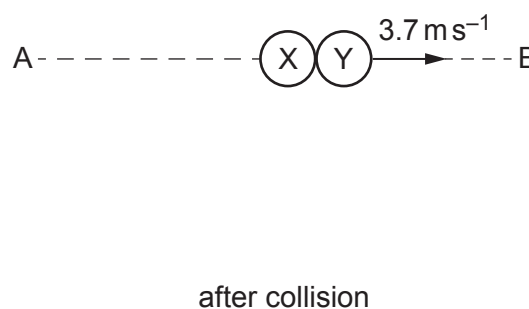


Fig. 4.2 (not to scale)

Ball X has a mass of 3.0 kg and a velocity of 4.0 m s^{-1} in a direction at angle θ to a line AB. Ball Y has a mass of 2.5 kg and a velocity of 4.8 m s^{-1} in a direction at angle θ to the line AB.

The balls collide and stick together. After colliding, the balls have a velocity of 3.7 m s^{-1} along the line AB on the horizontal surface, as shown in Fig. 4.2.

- (i) By considering the components of the momenta along the line AB, calculate θ .

$\theta = \dots\dots\dots^\circ$ [3]

- (ii) By calculation of kinetic energies, state and explain whether the collision of the balls is inelastic or perfectly elastic.

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[Total: 7]