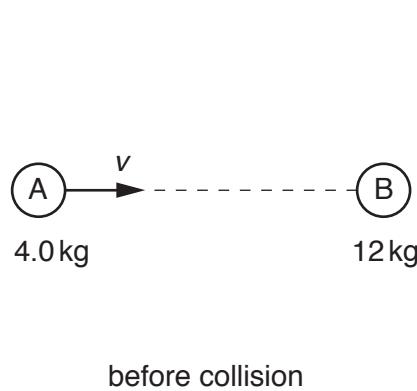


- 3 (a) State the principle of conservation of momentum.

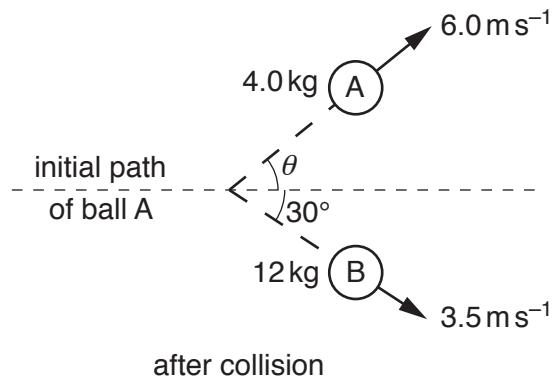
.....
.....
.....

[2]

- (b) Ball A moves with speed v along a horizontal frictionless surface towards a stationary ball B, as shown in Fig. 3.1.



before collision



after collision

Fig. 3.1

Fig. 3.2 (not to scale)

Ball A has mass 4.0 kg and ball B has mass 12 kg.

The balls collide and then move apart as shown in Fig. 3.2.

Ball A has velocity 6.0 m s^{-1} at an angle of θ to the direction of its initial path.

Ball B has velocity 3.5 m s^{-1} at an angle of 30° to the direction of the initial path of ball A.

- (i) By considering the components of momentum at right-angles to the direction of the initial path of ball A, calculate θ .

$$\theta = \dots \text{ } [3]$$

- (ii) Use your answer in (i) to show that the initial speed v of ball A is 12 m s^{-1} . Explain your working.

[2]

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

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[Total: 10]