

1 A steel ball is placed on the inside surface of a hollow circular cone. The ball moves in a horizontal circle at constant speed, as shown in Fig. 1.1.

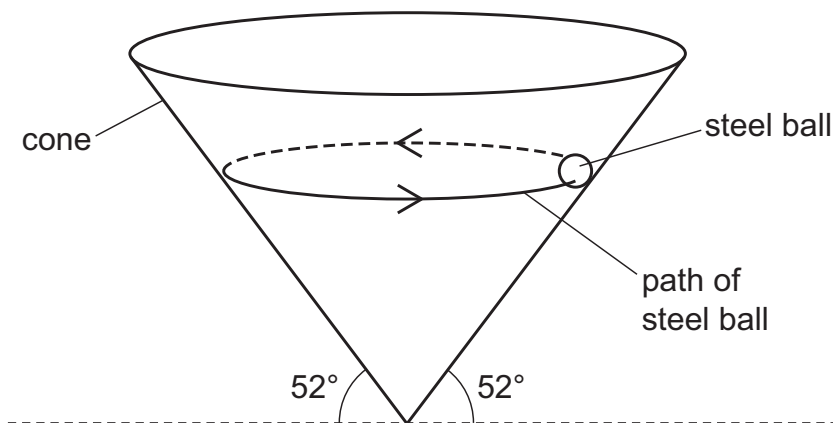


Fig. 1.1

The angle of the side of the cone to the horizontal is 52° . There is no friction between the ball and the cone.

(a) Fig. 1.2 shows a cross-section through the cone and the steel ball.

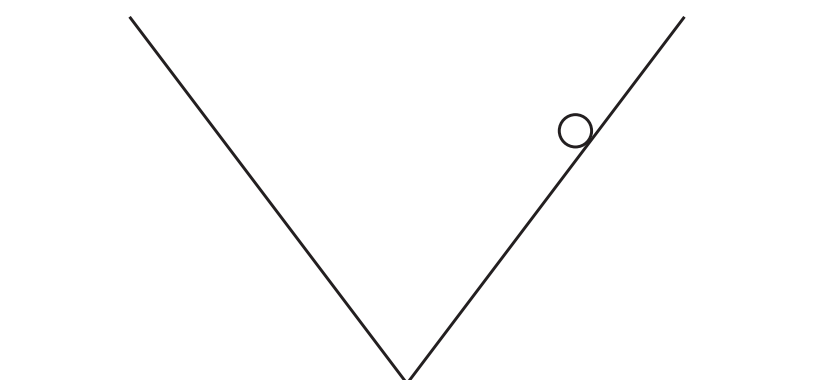


Fig. 1.2

On Fig. 1.2, draw labelled arrows to show the **two** forces acting on the ball. [1]

(b) Describe how the forces acting on the ball cause its acceleration to be centripetal.

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 [2]

(c) The ball moves in a circle of radius 0.15 m.

Show that the speed of the ball is 1.4 ms^{-1} .

[3]

(d) Calculate the angular speed ω of the ball.

$\omega = \dots\dots\dots \text{ rads}^{-1}$ [2]

(e) The speed of the ball is increased.

Explain why the radius of the circular path of the ball increases.

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 [1]