

- 5 A steel ball on the end of a thin string oscillates with small oscillations, as shown in Fig. 5.1.

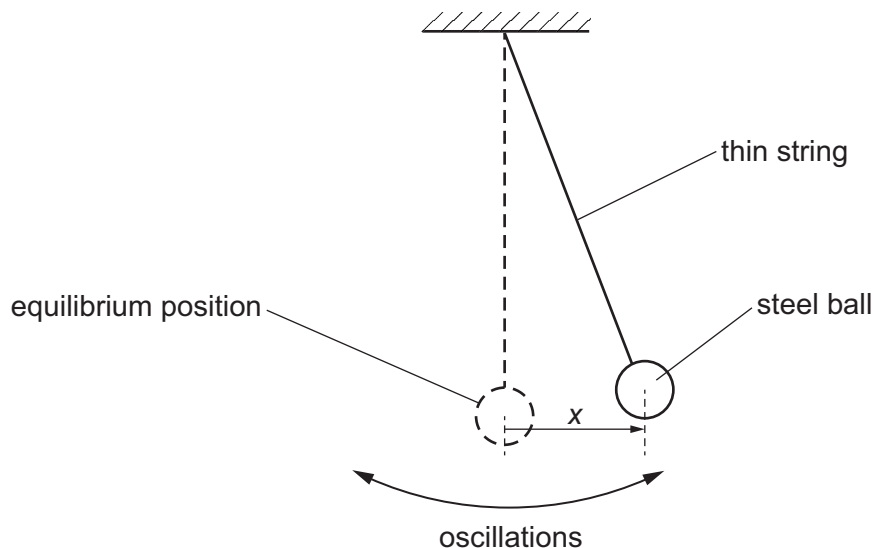


Fig. 5.1 (not to scale)

The displacement of the centre of the ball from its equilibrium position is x .

- (a) Fig. 5.2 shows the variation with x of the acceleration a of the ball.

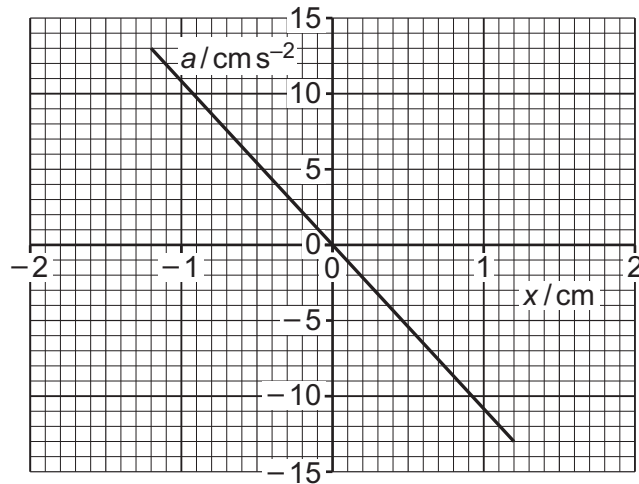


Fig. 5.2

- (i) Explain how Fig. 5.2 shows that the oscillations of the ball are simple harmonic.

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..... [2]

- (ii) Determine the period T of the oscillations.

$$T = \dots\dots\dots \text{ s [3]}$$

- (b) At time $t = 0$, when the displacement of the ball has its maximum value, the ball is immersed in a trough containing thick oil so that the ball is just below the surface of the oil. This results in the subsequent motion of the ball being heavily damped.

- (i) State what is meant by damping.

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 [2]

- (ii) On Fig. 5.3, sketch a possible variation of the displacement x of the ball with t between $t = 0$ and $t = 2T$.

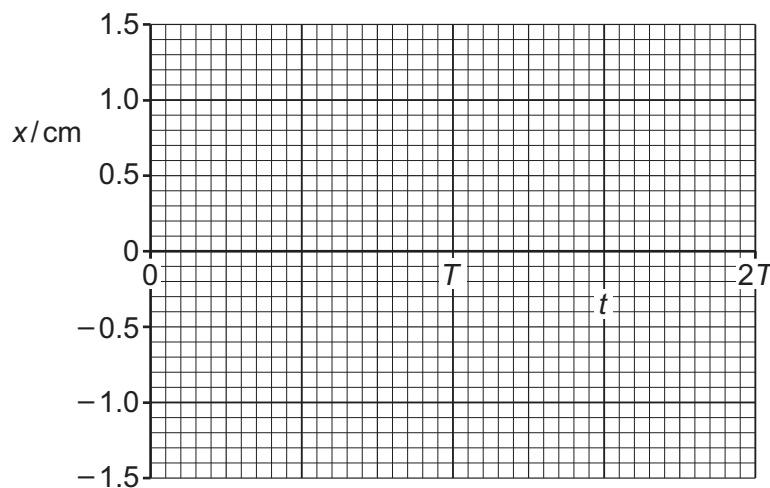


Fig. 5.3

[3]

[Total: 10]