

- 2 Fig. 2.1 shows a box with a piece of plasticine attached outside it. A light spring is attached to the box and the box is initially at rest. After some time, the plasticine detaches and falls, as shown in Fig. 2.2.

The box in Fig. 2.2 starts to oscillate in simple harmonic motion.

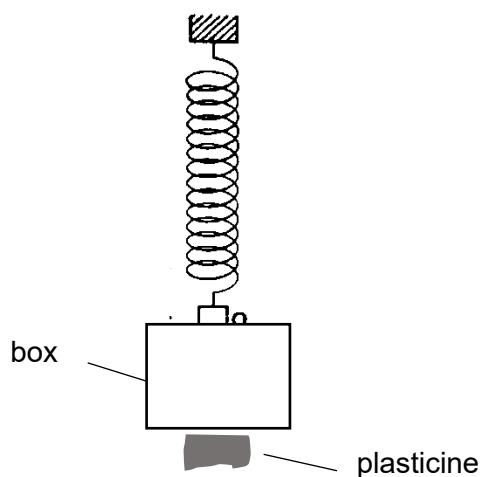


Fig. 2.1

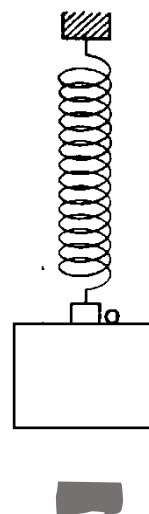


Fig. 2.2

- (a) Explain why the box in Fig. 2.2 starts to oscillate.

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..... [3]

- (b) The mass of the plasticine is 20.0 g and the mass of the box is 100.0 g.

- (i) Show that the magnitude of the maximum acceleration of the box's oscillation in Fig. 2.2 is 1.96 m s^{-2} .

Fig.

- (ii) The box in Fig. 2.2 moves a distance 5.00 cm from its lowest position to its highest position. Calculate the period of the oscillation.

[2]

period = s [3]

- (c) The box in Fig. 2.2 continues to oscillate after the plasticine detaches. The box is at its lowest position at time $t = 0.0$ s.

On Fig. 2.3, sketch the variation with time t of the displacement x of the box for at least two cycles of its oscillation.

Assume negligible air resistance.



Fig. 2.4

[2]

[Total: 10]