

- 2 A student sets out to investigate the oscillation of a mass suspended from the free end of a spring, as illustrated in Fig. 2.1.

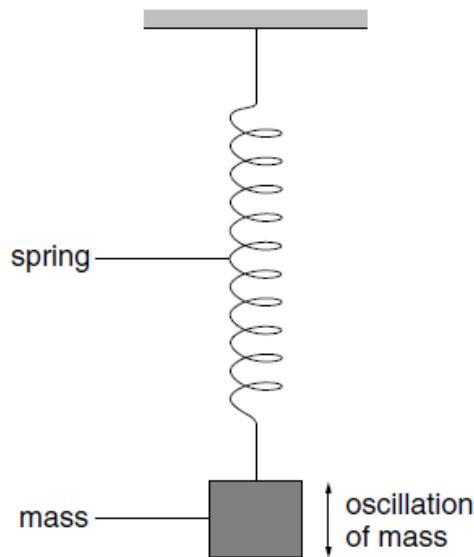


Fig. 2.1

The mass is pulled downwards and then released. The variation with time t of the displacement y of the mass is shown in Fig. 2.2.

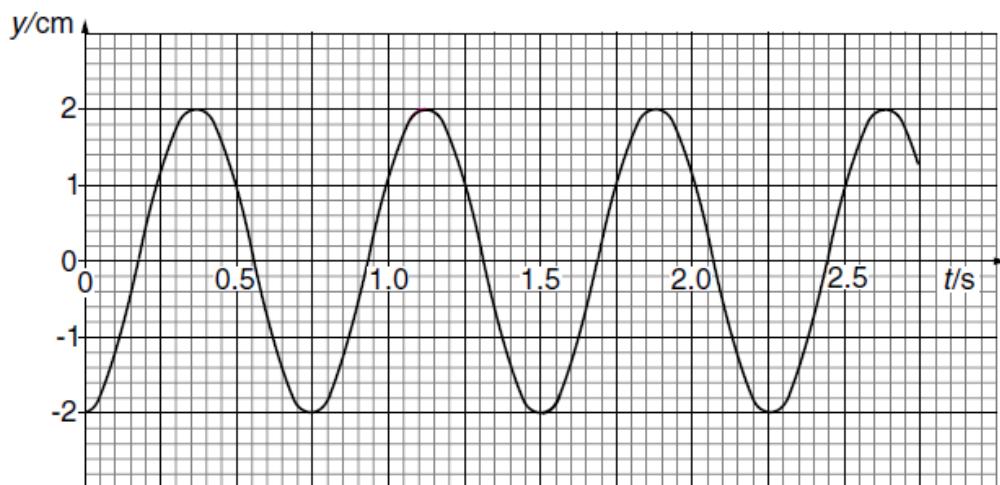


Fig. 2.2

- (a) Use information from Fig. 2.2

- (i) to explain why the graph suggests that the oscillations are undamped,

..... [1]

- (ii) to calculate the angular frequency of the oscillations,

angular frequency = rad s⁻¹ [2]

- (iii) to determine the maximum speed of the oscillating mass.

speed = m s⁻¹ [2]

- (b) (i) Determine the resonant frequency f_0 of the mass-spring system.

f_0 = Hz [1]

- (ii) The student finds that if short impulsive forces of frequency $\frac{1}{2} f_0$ are impressed on the mass-spring system, a large amplitude of oscillation is obtained. Explain this observation.

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..... [2]

[Total: 8]