

A load is suspended from the free end of a helical spring.

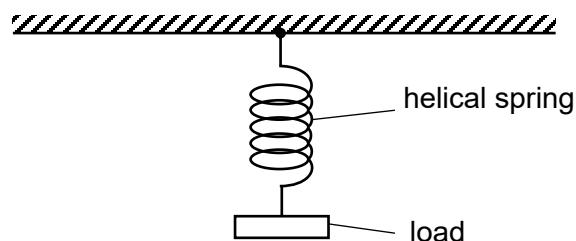


Fig. 4.1

The load is then displaced vertically downwards and released. The load undergoes simple harmonic oscillation. The variation of the displacement of the load x with the time t is given in Fig. 4.2 where the load is at its equilibrium position when $t = 0$.

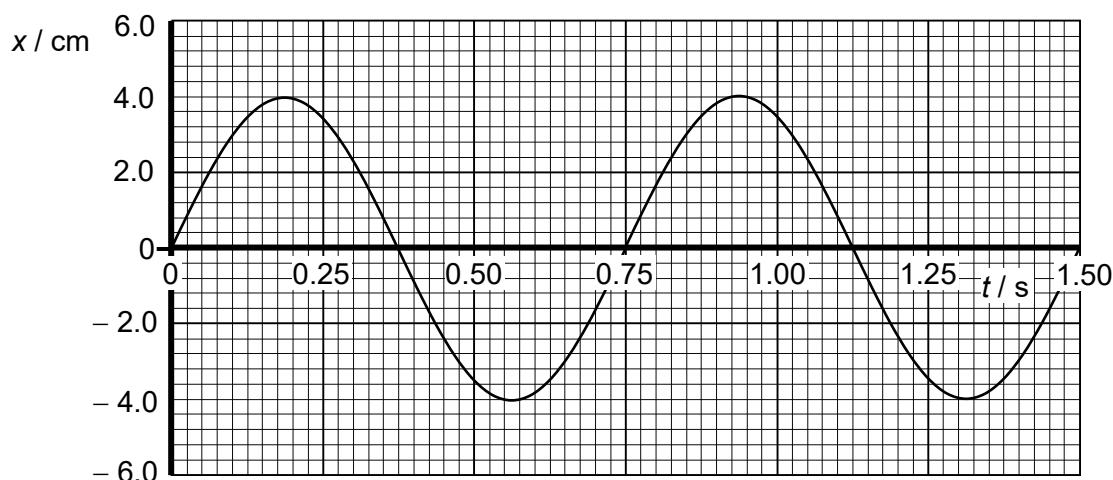


Fig. 4.2

(a)

Determine the angular frequency of the oscillation.

angular frequency = rad s⁻¹

[1]

(b)

Determine the maximum acceleration experienced by the mass.

maximum acceleration = m s⁻²

[1]

(c)

Given that the tension acting on the mass at the lowest position is 25 N, show that the mass of the load is 2.0 kg.

[2]

(d)

On Fig. 4.3, sketch the variation with time t of the kinetic energy E_k for the first 1.00 s.

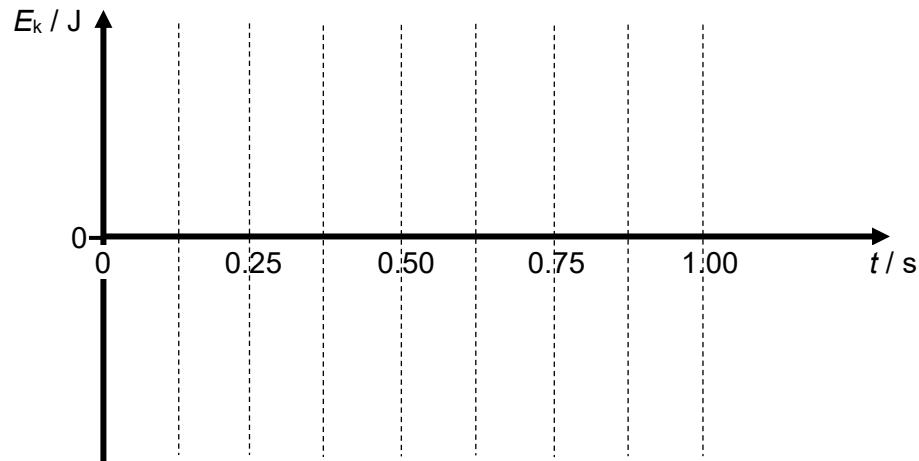


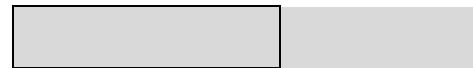
Fig. 4.3

[2]



(e)

On Fig. 4.4, sketch the variation with displacement x of the acceleration a of the load.



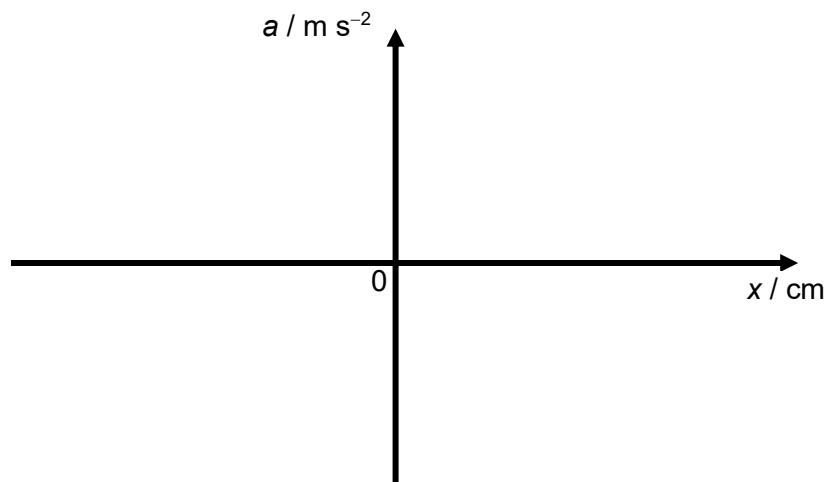
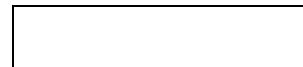


Fig. 4.4

[2]



[Total: 8]