5 Fig. 5.1 shows a pendulum consisting of a metal sphere suspended by a thin string.

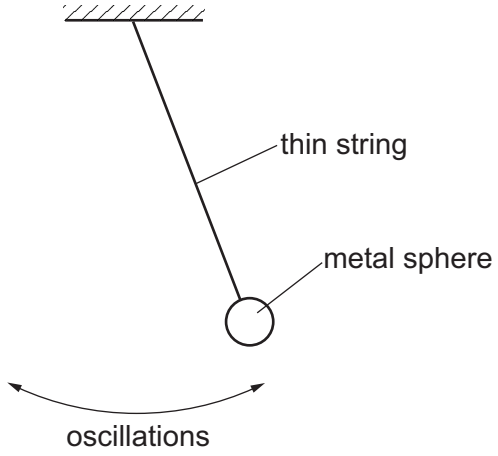

Fig. 5.1 (not to scale)

The sphere undergoes small oscillations about its equilibrium position. The oscillations may be considered to be simple harmonic.

Fig. 5.2 shows the variation with time t of the displacement x of the sphere from its equilibrium position.

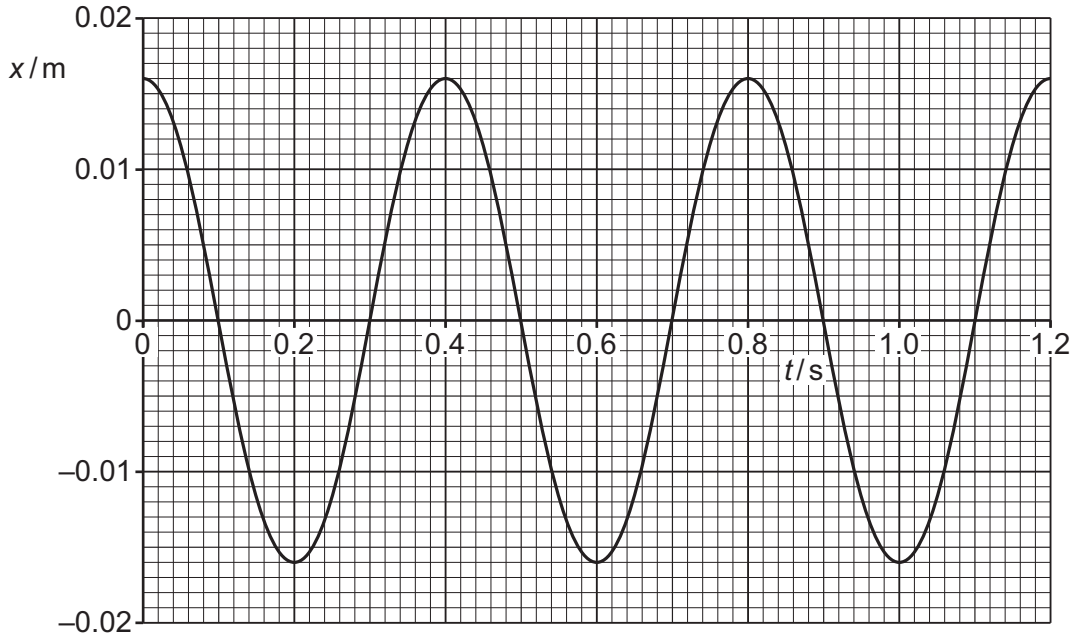

Fig. 5.2

(a) On Fig. 5.1, draw an arrow, from the centre of the sphere, to represent the direction of the resultant force acting on the sphere when it is in the position shown. [1]

(b) The mass of the sphere is 0.15 kg.

(i) State the amplitude of the oscillations.

amplitude = ... m [1]

(ii) Determine the angular frequency of the oscillations.

angular frequency = ... rad s^{-1} [2]

(iii) Calculate the total energy of the oscillations.

total energy = ... J [2]

(c) On Fig. 5.3, sketch the variation with x of the kinetic energy E_K of the sphere.

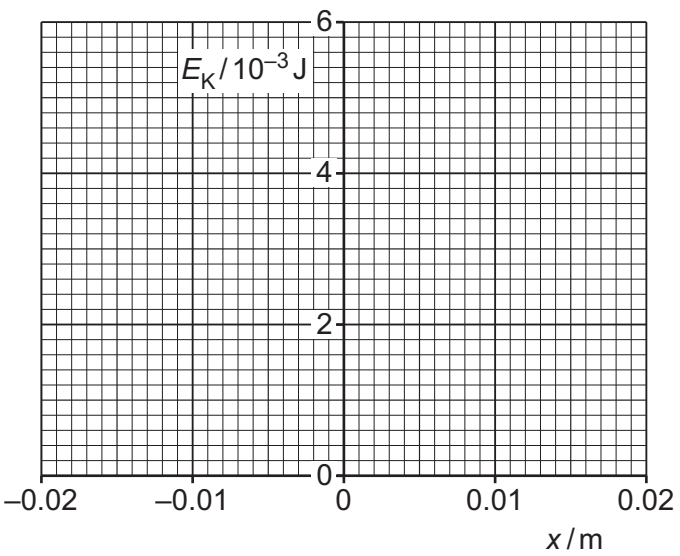

Fig. 5.3

[3]

[Total: 9]