

A Level Physics A
H556/01 Modelling physics

Question Set 16

- 1 (a) Use the equations for momentum and kinetic energy to derive an expression for the kinetic energy E_k of a particle in terms of its momentum p and mass m . [2]
- (b) Fig. 20.1 shows an electric motor used to lift and lower a load.

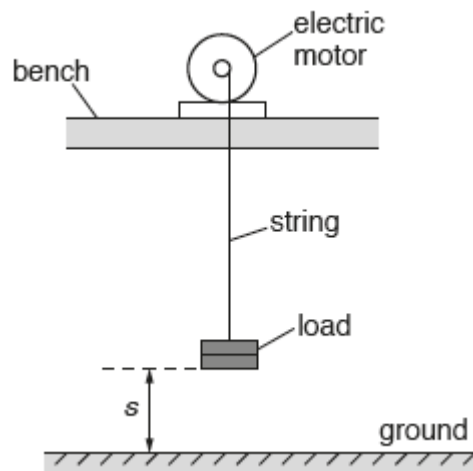


Fig. 20.1

At time $t = 0$ the load is on the ground with displacement $s = 0$. Fig. 20.2 shows the variation of the displacement s of the load with time t .

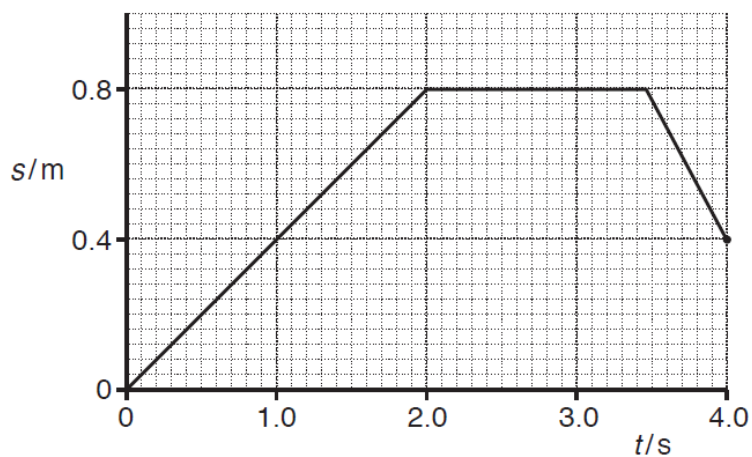


Fig. 20.2

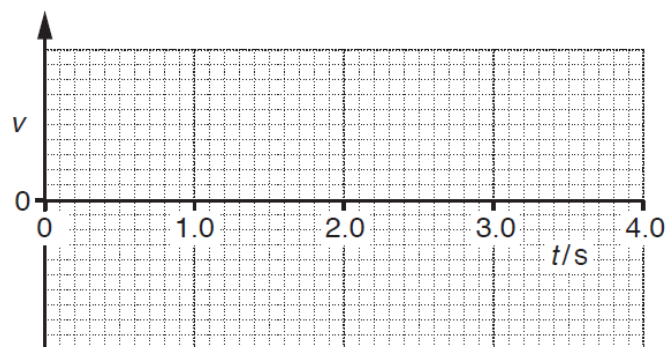


Fig. 20.3

(i) On Fig. 20.3, sketch a graph to show the variation of the velocity v of the load with time t . You do not need to insert a scale on the v axis. [3]

(ii) Describe how the kinetic energy and the gravitational potential energy of the load varies from $t = 0$ to $t = 2.0$ s. [2]

(iii) During the **downward** journey of the load, the string breaks at $t = 4.0$ s. It then falls vertically towards the ground. The mass of the load is 120 g. Air resistance is negligible.

1 Calculate the velocity V of the load just before it hits the ground.

$$V = \dots\dots\dots \text{ms}^{-1} \quad [2]$$

2 The load hits the ground and comes to **rest** in a time interval of 25 ms.

Calculate the average force F exerted by the ground on the load.

$$F = \dots\dots\dots \text{N} \quad [2]$$

Total Marks for Question Set 16: 11

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