1 One end of a spring is fixed to a support. A mass is attached to the other end of the spring. The arrangement is shown in Fig. 1.1.

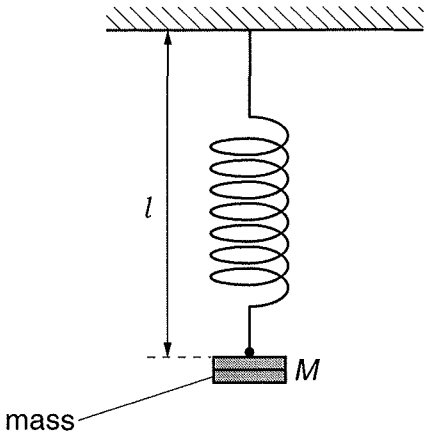

Fig. 1.1

The arrangement is used to determine the length l of the spring when mass M is attached to the spring. The procedure is repeated for different values of M.
The variation of mass M with length l is shown in Fig. 1.2.

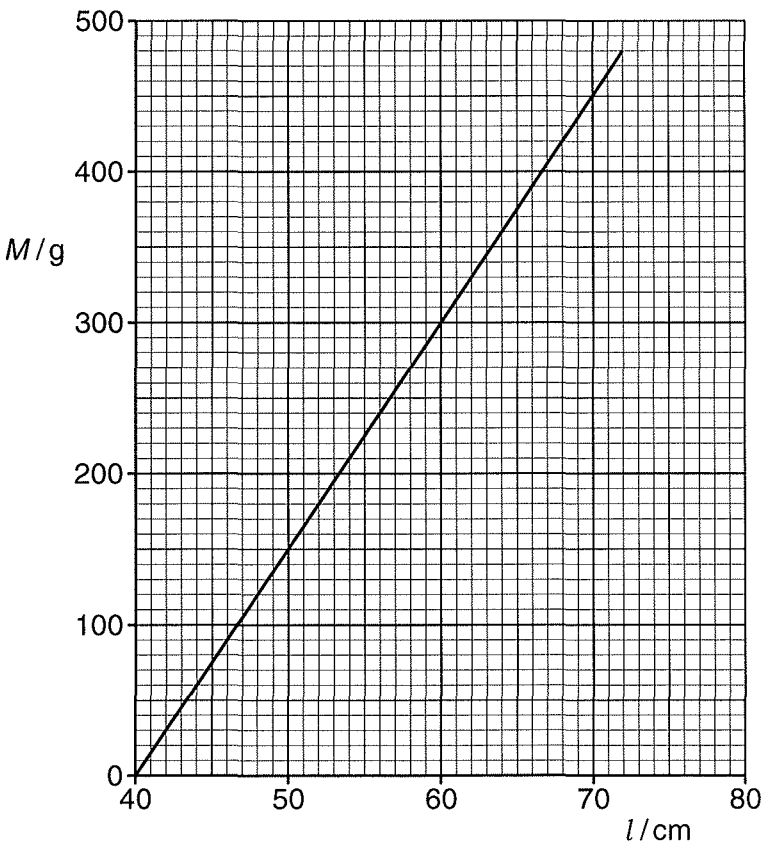

Fig. 1.2

(a) Calculate the energy stored in the spring when it is extended to a length l of 70.0 cm.

energy = ... J [2]

(b) A mass of 300 g is attached to the spring and is held at rest with length l of 40.0 cm. The mass is then released and the spring extends.

(i) State the energy changes in the mass-spring system as the mass falls to its lowest position from its point of release. Numerical values are not required.

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.....

.....

..... [2]

(ii) Use your answer in **(a)** to calculate the speed of the mass when the spring has extended by 30.0 cm from its point of release.

speed = ... $m\,s^{-1}$ [4]

(iii) Calculate the distance fallen by the mass from its point of release before it first comes to rest.

distance = ... m [3]