Answer **all** the questions in the space provided.

1 **(a)** Fig. 1.1 shows a block of mass 0.30 kg released from rest at a height of 0.10 m above a light spring of force constant 80 N m^{-1}. The block lands on the light board and compresses a vertical spring before rebounding. The spring obeys Hooke's law. Assume that all the energy the block loses becomes elastic potential energy in the spring.

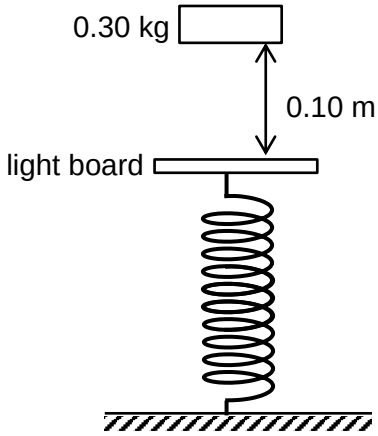

Fig. 1.1

(i) Calculate the maximum compression of the spring.

maximum compression = …… m [2]

(ii) When the spring is compressed, the block attains a maximum kinetic energy before coming to a momentary stop. At the position where the block has maximum kinetic energy,

1. show that the compression of the spring is 0.037 m, and

[1]

2. determine the maximum kinetic energy attained by the block using energy considerations.

maximum kinetic energy = …… J [3]

(iii) On Fig. 1.2, show the variation with position of the block of the kinetic energy (label this KE), gravitational potential energy (label this GPE) and elastic potential energy (label this EPE) of the block-spring system.

Take the gravitational potential energy to be zero when the spring is at maximum compression.

There is no need to indicate numerical values.

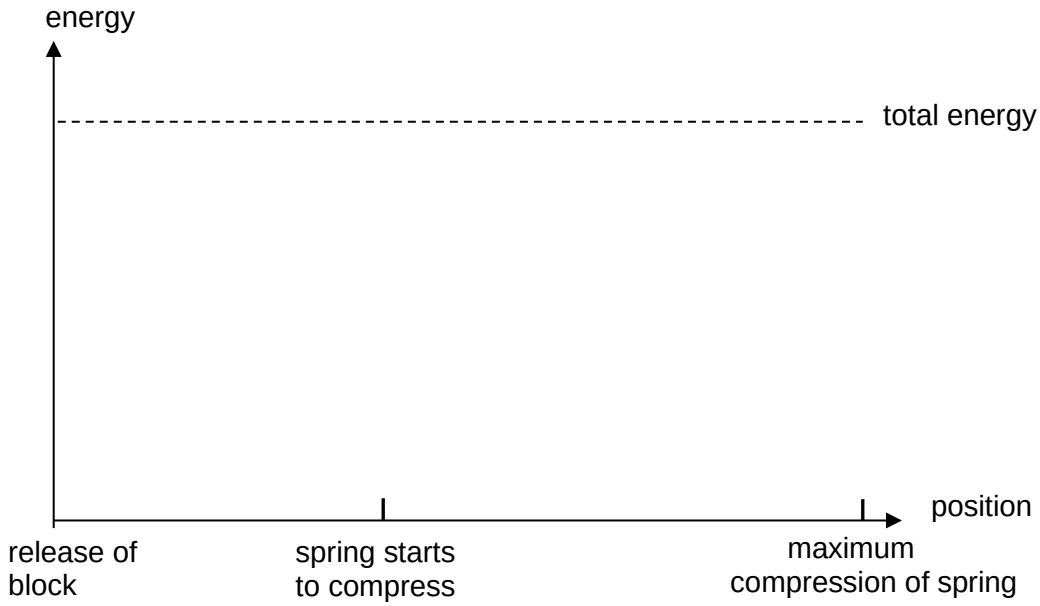

Fig. 1.2

[3]