1 **(a)** Spring A of force constant 3.0 N m^{-1} and spring B of force constant 2.0 N m^{-1} are attached to a non-uniform plank CD of mass 0.15 kg as shown in Fig. 1.1. In order for the plank to remain horizontal, spring A is placed 12 cm away from X, the centre of gravity (c.g.) of plank CD whereas spring B is placed at a distance *d* away. Both springs are extended by 30 cm.

Take *g* to be 10 m s^{-2}.

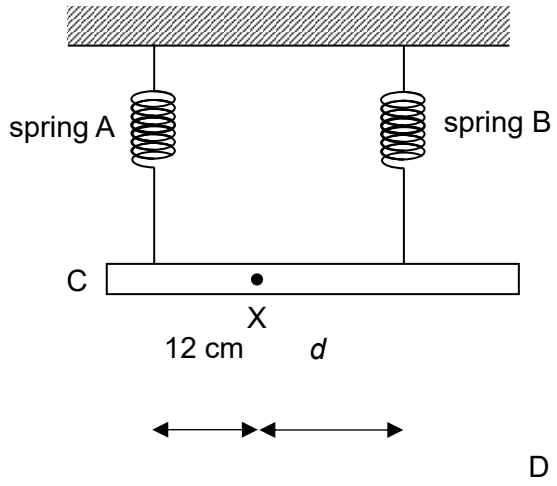

Fig. 1.1

(i) determine *d*,

d = …….. cm [2]

(ii) determine the effective force constant of the two springs.

effective force constant = …… N m^{-1} [2]

(b) A block of mass 0.050 kg with negligible dimension is now placed on top of the plank at a distance of 8.0 cm away from X as shown in Fig. 1.2. The position of springs A and B are adjusted so that the plank CD remains horizontal.

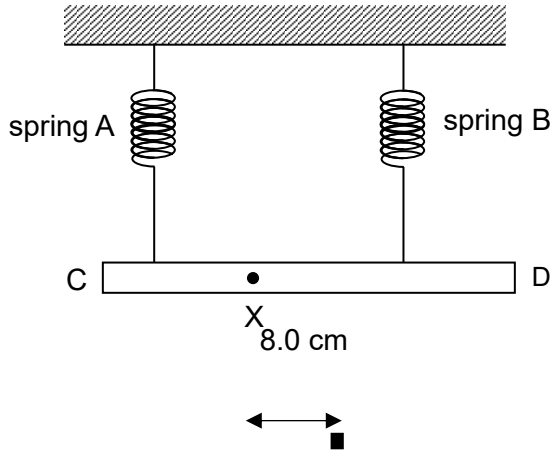

Fig. 1.2

(i) calculate the new extension of spring A and B,

extension = ……. m [2]

(ii) calculate the increase in elastic potential energy of the system in Fig 1.2 as compared to that in Fig. 1.1.

increase in elastic potential energy = ……. J [2]

(c) The plank CD and the block of mass are then removed from the springs as shown in Fig. 1.3.

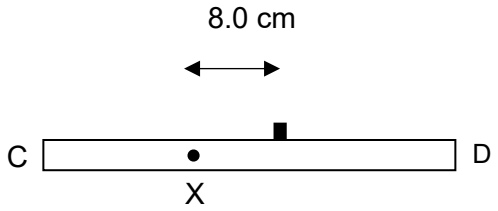

Fig. 1.3

Determine the distance of the effective c.g. of the plank and block from X.

distance = ……. m [2]

[Total: 10]

Question 2 begins over the page