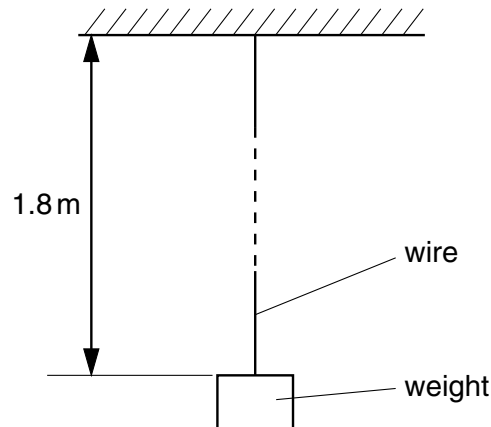


- 9 An aluminium wire of length 1.8 m and area of cross-section  $1.7 \times 10^{-6} \text{ m}^2$  has one end fixed to a rigid support. A small weight hangs from the free end, as illustrated in Fig. 9.1.



**Fig. 9.1**

The resistance of the wire is  $0.030 \, \Omega$  and the Young modulus of aluminium is  $7.1 \times 10^{10} \text{ Pa}$ .

The load on the wire is increased by 25 N.

**(a)** Calculate

- (i)** the increase in stress,

increase = ..... Pa

- (ii)** the change in length of the wire.

change = ..... m  
[4]

- 3 (a) Explain what is meant by the *centre of gravity* of an object.

.....

.....

.....[2]

- (b) A non-uniform plank of wood XY is 2.50 m long and weighs 950 N. Force-meters (spring balances) A and B are attached to the plank at a distance of 0.40 m from each end, as illustrated in Fig. 3.1.

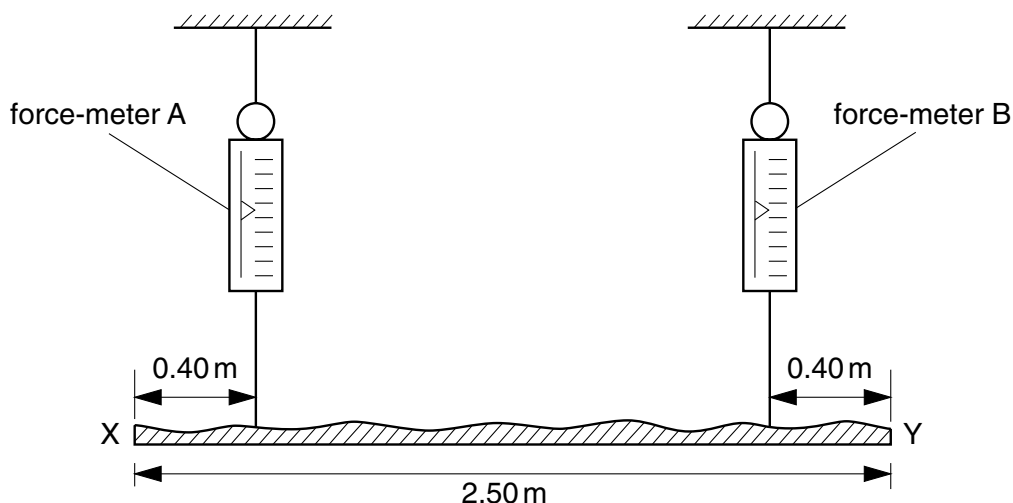


Fig. 3.1

When the plank is horizontal, force-meter A records 570 N.

- (i) Calculate the reading on force-meter B.

reading = ..... N

- (ii) On Fig. 3.1, mark a likely position for the centre of gravity of the plank.
- (iii) Determine the distance of the centre of gravity from the end X of the plank.

distance = ..... m

[6]

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

1 Distinguish between the *mass* of a body and its *weight*.

mass .....

.....

weight .....

.....[4]

2 A student determines the acceleration of free fall using the apparatus illustrated in Fig. 2.1.

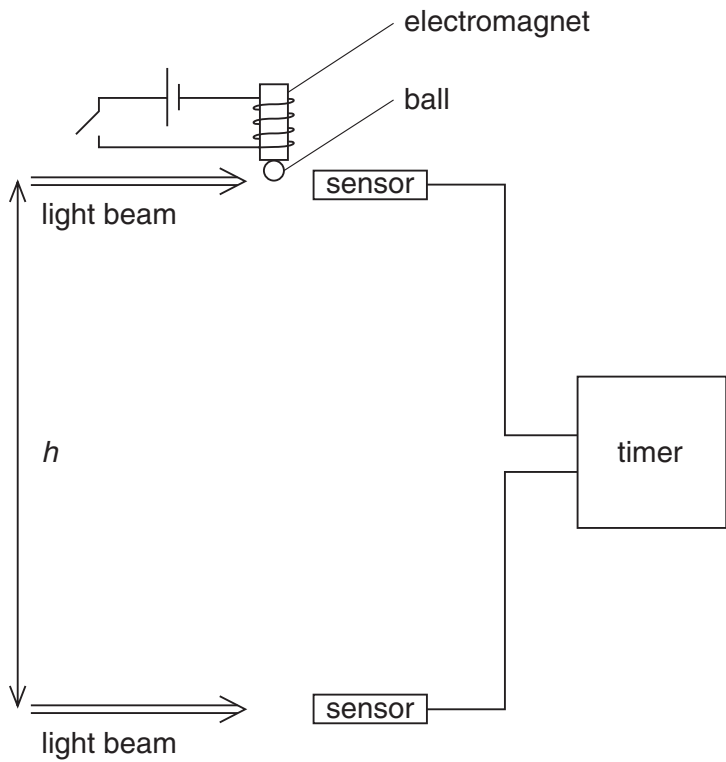
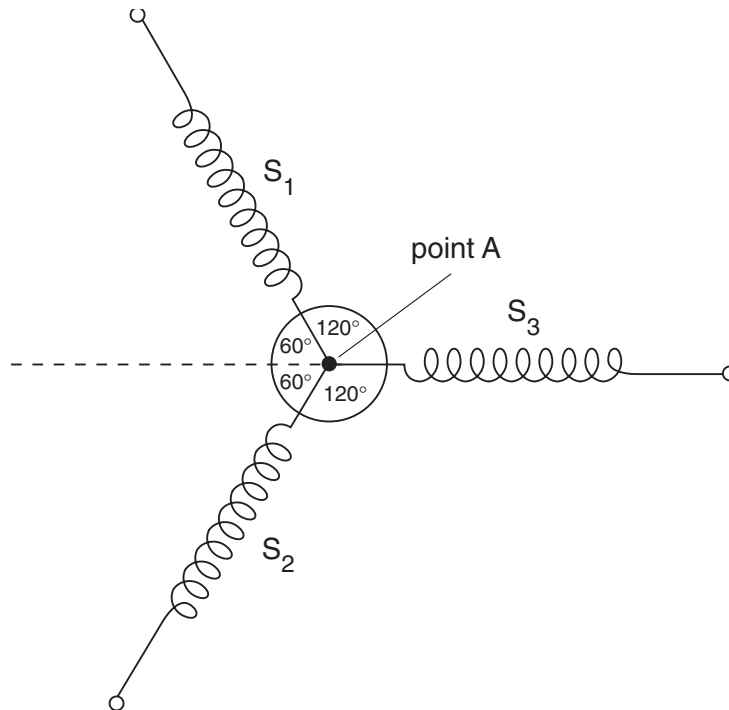


Fig. 2.1

- 3 (a) State the two conditions necessary for the equilibrium of a body which is acted upon by a number of forces.

1. ....  
.....
2. ....  
.....[2]

- (b) Three identical springs  $S_1$ ,  $S_2$  and  $S_3$  are attached to a point A such that the angle between any two of the springs is  $120^\circ$ , as shown in Fig. 3.1.

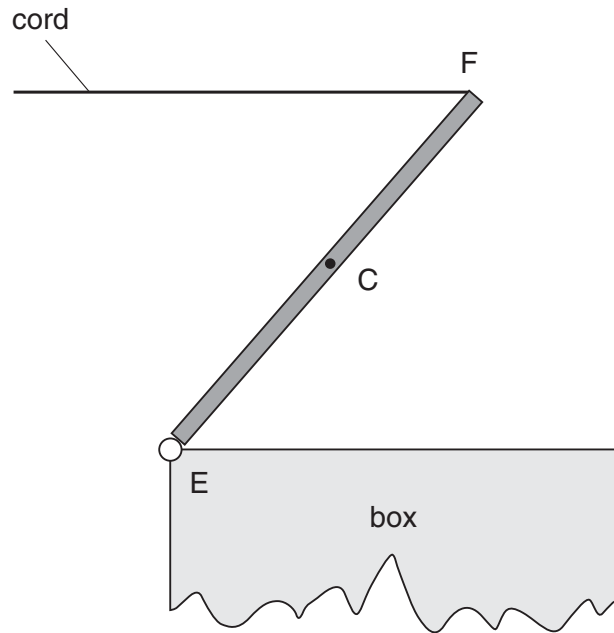


**Fig. 3.1**

The springs have extended elastically and the extensions of  $S_1$  and  $S_2$  are  $x$ . Determine, in terms of  $x$ , the extension of  $S_3$  such that the system of springs is in equilibrium. Explain your working.

extension of  $S_3$  = ..... [3]

- (c) The lid of a box is hinged along one edge E, as shown in Fig. 3.2.



**Fig. 3.2**

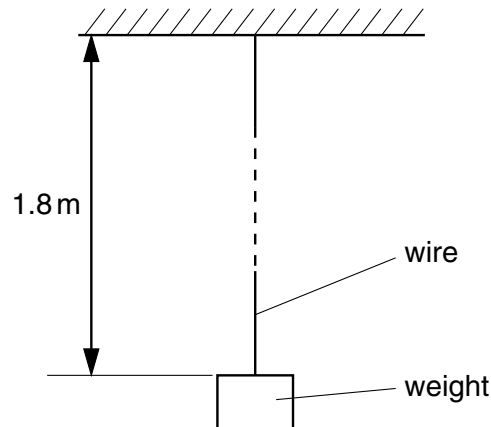
The lid is held open by means of a horizontal cord attached to the edge F of the lid. The centre of gravity of the lid is at point C.

On Fig. 3.2 draw

- (i) an arrow, labelled W, to represent the weight of the lid,
- (ii) an arrow, labelled T, to represent the tension in the cord acting on the lid,
- (iii) an arrow, labelled R, to represent the force of the hinge on the lid.

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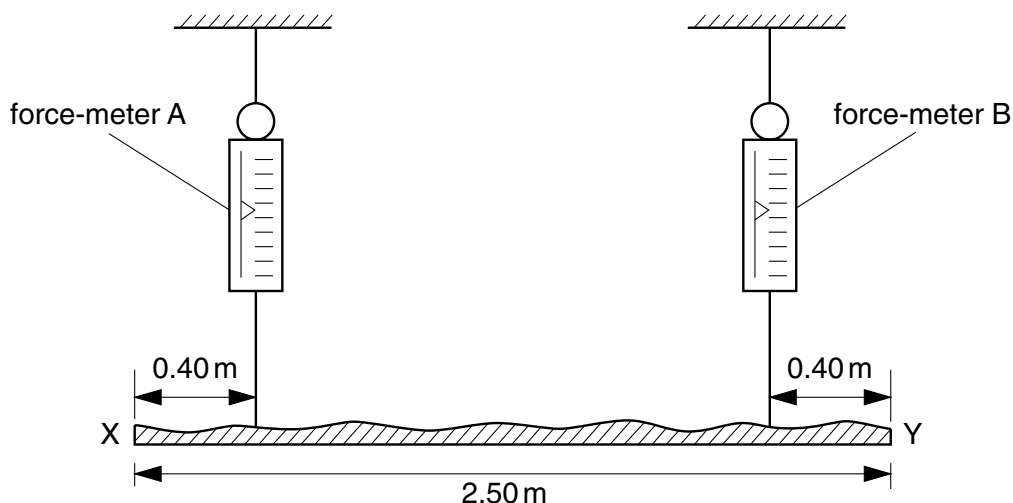


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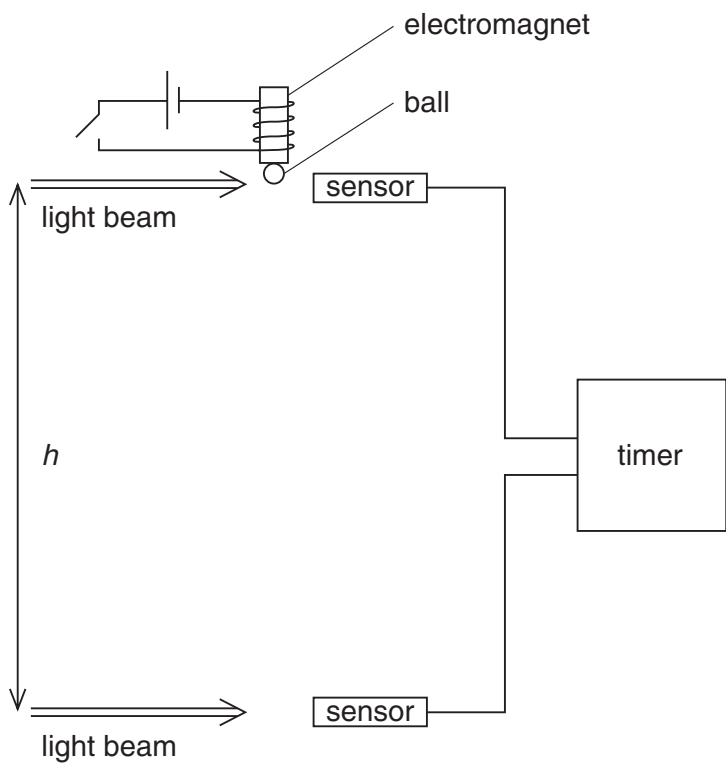


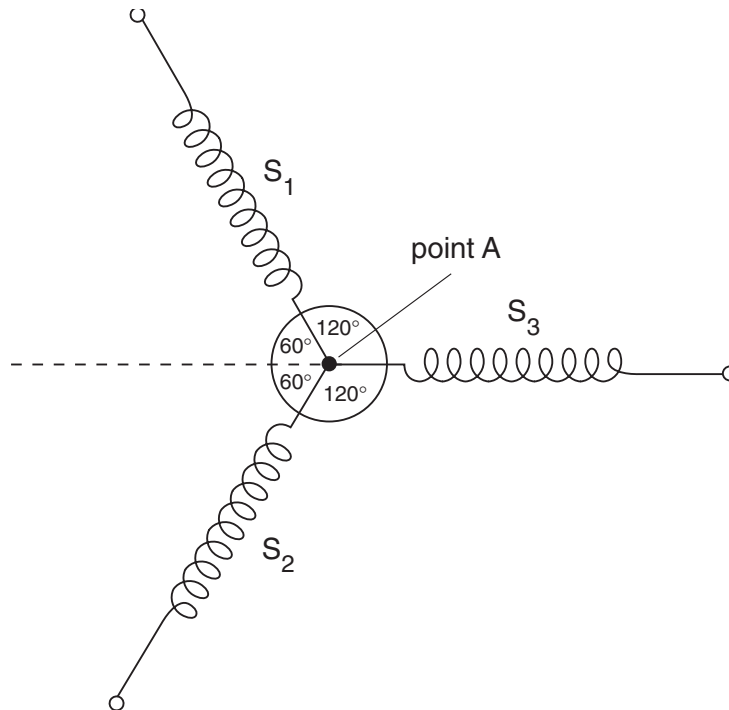
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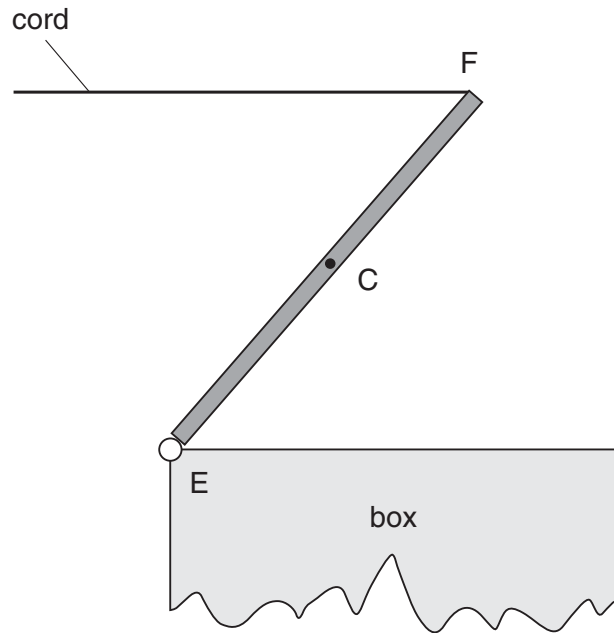


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