

- 2 (a) Define moment of a force.

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[1]

- (b) An arrangement for lifting heavy loads is shown in Fig. 2.1.

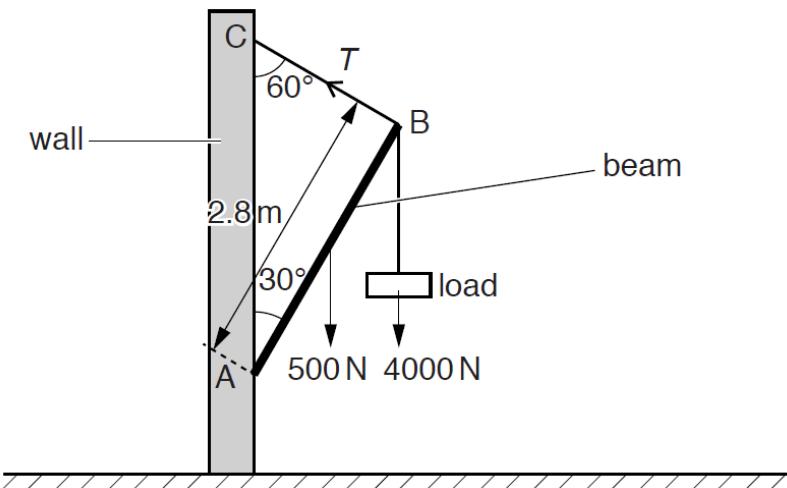


Fig. 2.1

A uniform metal beam AB is pivoted on a vertical wall at A. The beam is supported by a wire joining end B to the wall at C. The beam makes an angle of 30° with the wall and the wire makes an angle of 60° with the wall.

The beam has length 2.8 m and weight of 500 N. A load of 4000 N is supported from B. The tension in the wire is T . The beam is in equilibrium.

- (i) By taking moments about an appropriate point, show that T is 2.1 kN.

[1]

- (ii) Calculate the vertical component T_v of the tension T .

$$T_v = \dots \text{ N} \quad [1]$$

- (iii) Explain why T_v does not equal the sum of the load and the weight of the beam although the beam is in equilibrium.

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[1]

- (iv) Determine the magnitude and direction of the reaction force on the beam at A.

force magnitude = N

direction = [4]

[Total: 8]

