4 **(a)** Define *moment of a force*.

.....

.....[1]

(b) An arrangement for lifting heavy loads is shown in Fig. 4.1.

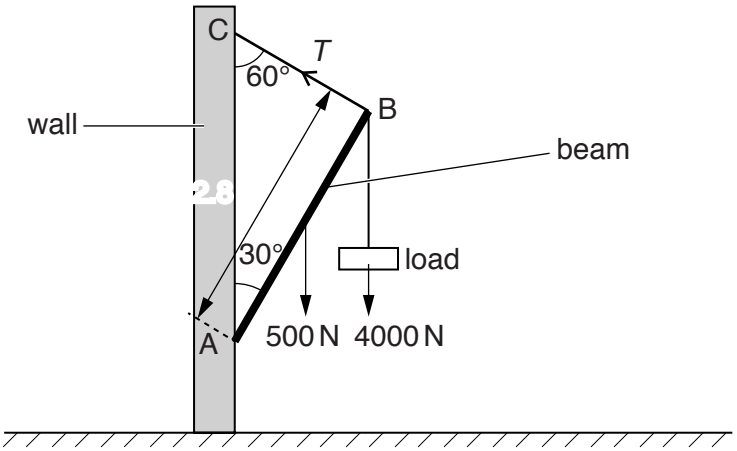

Fig. 4.1

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 A, show that T is 2.1 kN.

[2]

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

T_v = ... N [1]

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

.....

.....[2]