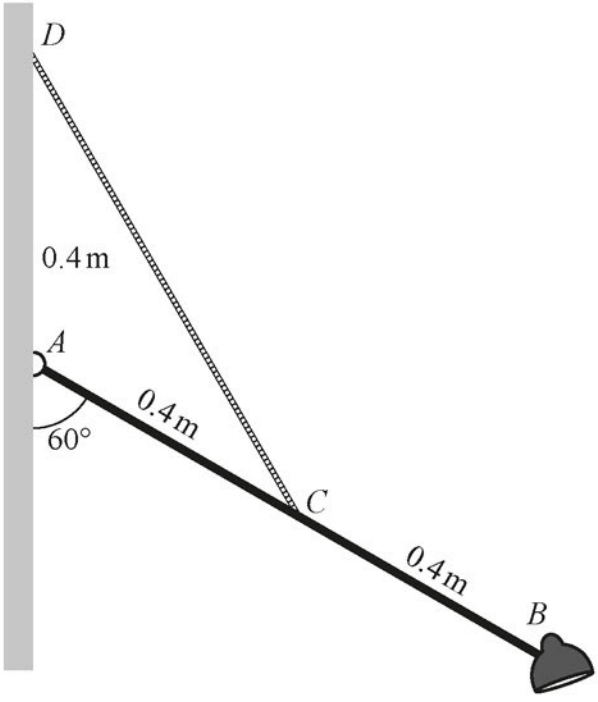
10



The diagram shows a wall-mounted light. It consists of a rod AB of mass 0.25 kg and length 0.8 m which is freely hinged to a vertical wall at A, and a lamp of mass 0.5 kg fixed at B. The system is held in equilibrium by a chain CD whose end C is attached to the midpoint of AB. The end D is fixed to the wall a distance 0.4 m vertically above A. The rod AB makes an angle of 60° with the downward vertical.

The chain is modelled as a light inextensible string, the rod is modelled as uniform and the lamp is modelled as a particle.

(a) By taking moments about A, determine the tension in the chain. **[4]**

(b) (i) Determine the magnitude of the force exerted on the rod at A. **[4]**

(ii) Calculate the direction of the force exerted on the rod at A. **[2]**

(c) Suggest one improvement that could be made to the model to make it more realistic. **[1]**