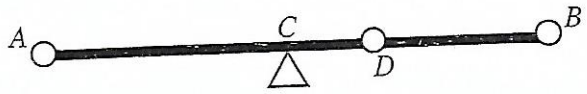
1. The diagram shows a uniform rod AB, with three particles attached to the rod at A, B and D, resting horizontally in equilibrium on a smooth support at C, the mid-point of AB.

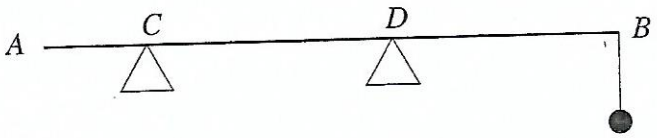


The length of AB is 1·8 m and its mass is 1·5 kg. The masses of the particles at A, D and B are 0·8 kg, 0·5 kg and 0·4 kg respectively.

(a) Find the magnitude of the reaction of the support at C. [2]

(b) Calculate the distance CD. [4]

2. The diagram shows a uniform straight rod AB, of length 3·8 m, resting horizontally in equilibrium on two smooth supports at C and D with an object of mass 2·2 kg freely suspended from point B.



The mass of the rod is 4·4 kg, AC = 0·4 m and AD = 2·6 m. Calculate the magnitudes of the reactions at C and D. [7]

3. The diagram shows a uniform plank AB, of length 6·0 m and weight 300 N, resting horizontally on two smooth supports at C and D. The lengths of AC and AD are 0·8 m and 4·8 m respectively.

When a load of WN is attached at B, the reaction at C has magnitude 75 N.

(a) Find the value of W. [4]

(b) Find the magnitude of the reaction at D. [2]

4. The diagram shows a uniform rod AB, of mass 4 kg and length 1·6 m, with a particle, of mass 0·5 kg, attached at a point C of the rod, where AC = 0·5 m.
The rod is resting horizontally in equilibrium on two smooth supports at points X and Y of the rod, where AX = 0·6 m and AY = 1·2 m.

(a) Calculate the reaction at X and the reaction at Y. [7]

(b) When an additional particle of mass M kg is attached to the point C, the rod is on the point of turning about X. Calculate the value of M. [4]