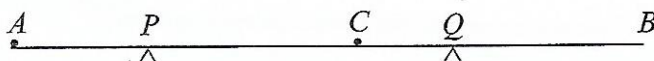**4.**

A   P   C   Q   B

The diagram shows a horizontal light rod AB resting on smooth supports at P and Q where $AP = 0.3$ m and $PQ = 0.9$ m. A particle of weight 12 N is placed at A and a second particle, of weight 27 N, is placed at the point C on the rod where $PC = 0.5$ m.

Given that the system is in equilibrium, find the reactions at P and Q. [4]

3. Bethan and Ieuan have to lift and carry a heavy awkwardly shaped parcel of mass 50 kg and decide to do this by putting the parcel on a uniform plank, of mass 10 kg and length 2·4 m, and carry the plank by its ends. Bethan is not as strong as Ieuan and they therefore place the parcel in such a position that the force exerted by Bethan is two thirds that exerted by Ieuan. Modelling the plank as a uniform rod and the parcel as a particle find

(a) the force exerted by Ieuan,

(b) the distance of the parcel from Ieuan. [4]

1.
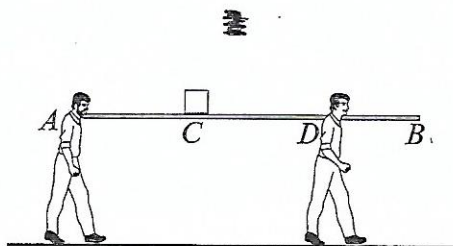
The diagram shows two men carrying a horizontal uniform plank AB, of weight 20 N and length 6 m, with a load of weight 60 N at a point C which is 2 m from A. One man supports the plank at A and the other man supports the plank at the point D so that each man bears the same load. Find the distance of D from A. [3]

6. A see-saw is modelled by a uniform rigid rod AB, of mass 45 kg and length 3 m, resting on a smooth support at the centre C of the rod. An adult of mass 64 kg sits at the end A and a child of mass 40 kg sits at the end B. When another child of mass M kg sits in a position 0·3 m from end B, the see-saw is in equilibrium.

(a) Find the value of M. [5]

(b) Find the magnitude of the reaction at C, stating your units. [2]

4. The diagram shows a uniform plank of wood held horizontally in equilibrium by two small cylinders A and B. The centres of A and B are 0·5 m apart. The plank is of length 6 m and mass 40 kg. The force exerted on the plank by each cylinder is vertical.