Daily Question – Mechanics - Day 6

Topic: Moments - Horizontal

Day 6 Question 1

A plank AB has length 6m and mass 30kg. The point C is on the plank with $CB = 2$m. The plank rests in equilibrium in a horizontal position on supports at A and C. Two people, each of mass 75kg, stand on the plank. One person stands at the point P of the plank, where $AP = x$ metres, and the other person stands at the point Q of the plank, where $AQ = 2x$ metres. The plank remains horizontal and in equilibrium with the magnitude of the reaction at C five times the magnitude of the reaction at A. The plank is modelled as a uniform rod and each person is modelled as a particle.

(a) Find the value of x.

(7)

(b) State two ways in which you have used the assumptions made in modelling the plank as a uniform rod.

(2)

Day 5 Question 2

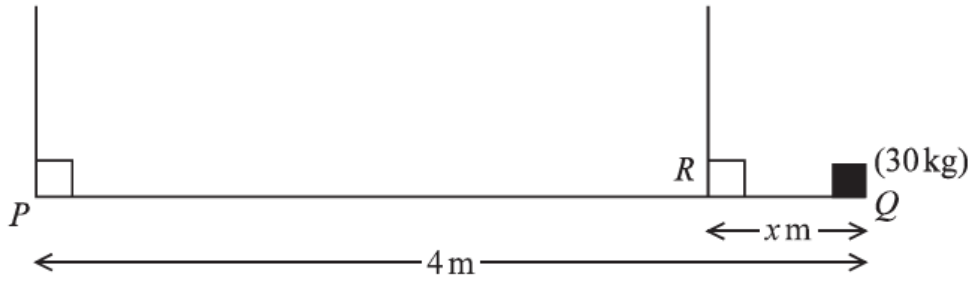

Figure 1

A girder PQ has length 4m and mass 60kg. A load of mass 30kg is placed on the girder at Q. The loaded girder is held in equilibrium in a horizontal position by two vertical ropes. The ropes are attached to the girder at the points P and R, where $RQ = x$ metres, as shown in Figure 1. The tension in the rope at R is four times the tension in the rope at P. The girder is modelled as a uniform rod, the ropes as light inextensible strings and the load as a particle.

Find

(i) the tension in the rope at P,

(ii) the value of x.

(7)