

- 9 A uniform rod  $AB$  has length 6 m and mass 4 kg. It is resting in equilibrium in a horizontal position on supports at points  $X$  and  $Y$  where  $AX = 2$  m and  $AY = 4.5$  m. A particle of mass  $M$  kg is placed at point  $C$  where  $AC = 5$  m. Given that the rod is on the point of tilting about  $Y$ , calculate the value of  $M$ .
- 10 A uniform rod  $AB$  of length 4 m and mass 2 kg is suspended in a horizontal position by two vertical strings attached at points  $P$  and  $Q$  where  $AP = 1$  m and  $AQ = 3$  m. When a particle of mass 3 kg is attached at point  $R$  of the rod, the rod is on the point of turning about  $P$ . Calculate the distance  $AR$ .
- 11 A non-uniform plank  $AB$  has length  $5d$  and mass  $8m$ . It is in equilibrium in a horizontal position resting on supports at the points  $P$  and  $Q$  where  $AP = 2d$  and  $AQ = 4d$ . A parcel of mass  $6m$  is placed on the plank at  $B$ . The plank is on the point of tilting about  $Q$ . By modelling the plank as a rod and the parcel as a particle, calculate the distance of the centre of mass of the plank from  $A$ . Explain briefly the significance of modelling the parcel as a particle.