



A beam, AB , has length 4 m and mass 20 kg. The beam is suspended horizontally by two vertical ropes. One rope is attached to the beam at C , where $AC = 0.5$ m. The other rope is attached to the beam at D , where $DB = 0.7$ m (see diagram).

The beam is modelled as a non-uniform rod and the ropes as light inextensible strings.

It is given that the tension in the rope at C is three times the tension in the rope at D .

(a) Determine the distance of the centre of mass of the beam from A . **[5]**

A particle of mass m kg is now placed on the beam at a point where the magnitude of the moment of the particle's weight about C is $3.5mg$ N m. The beam remains horizontal and in equilibrium.

(b) Determine the largest possible value of m . **[2]**