4.

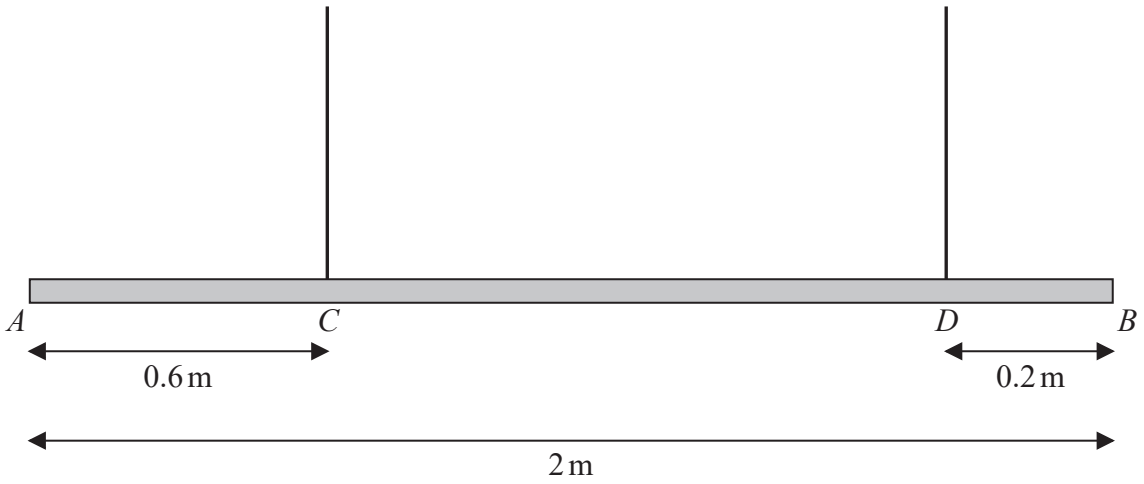

Figure 1

Figure 1 shows a beam AB, of mass m kg and length 2 m, suspended by two light vertical ropes.
The ropes are attached to the points C and D on the beam, where $AC = 0.6$ m and $DB = 0.2$ m
The beam is in equilibrium in a horizontal position.

A particle of mass pm kg is attached to the beam at A and the beam remains in equilibrium in a horizontal position.

The beam is modelled as a uniform rod.

(a) Given that the tension in the rope attached at C is four times the tension in the rope attached at D, use the model to find the exact value of p.

(7)

The particle of mass pm kg at A is removed and replaced by a particle of mass qm kg at A.
The beam remains in equilibrium in a horizontal position but is now on the point of tilting.

(b) Using the model, find the exact value of q

(4)

(c) State how you have used the modelling assumption that the beam is uniform.

(1)

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Question 4 continued

(Total for Question 4 is 12 marks)