1.

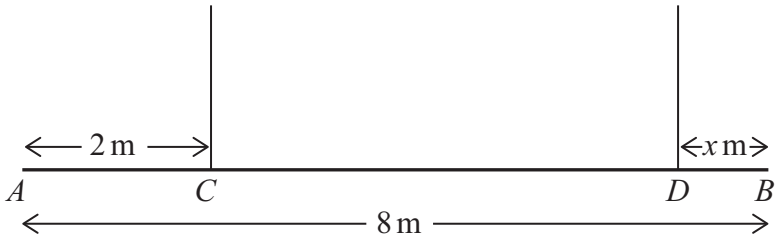

Figure 1

Figure 1 shows a sketch of a beam AB, with weight 240 N and length 8 m.

The beam is held in equilibrium in a horizontal position by two vertical ropes. The ropes are attached to the beam at the points C and D, where $AC = 2$ m and $DB = x$ metres.

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

The tension in the rope at D is 90 N.

(a) Show that $x = \frac{2}{3}$

(3)

The rope at C will break if its tension exceeds 183 N. The rope at D cannot break. A package of weight W newtons is now attached to the beam at A. The beam remains horizontal and in equilibrium.

The package is modelled as a particle.

It is given that the rope at C does not break.

(b) Find the greatest possible value of W.

(4)

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Question 1 continued

(Total for Question 1 is 7 marks)