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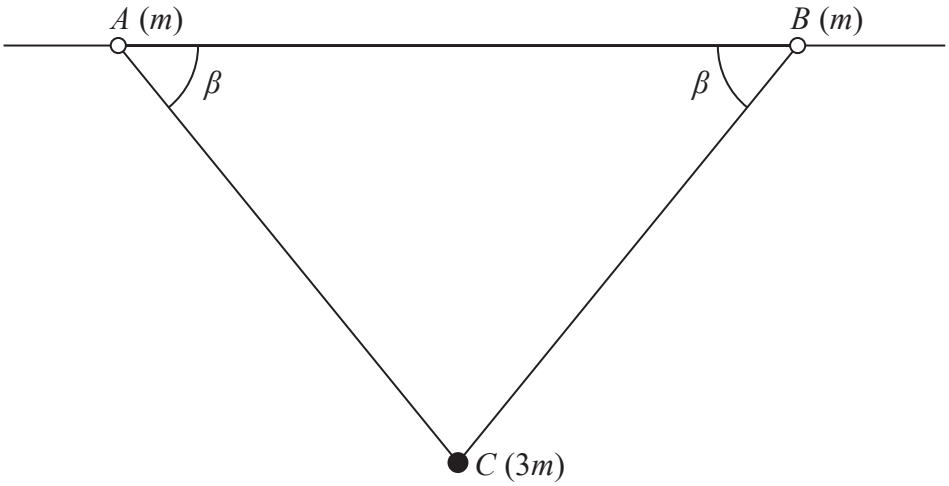

Figure 2

Two identical small rings, A and B, each of mass m, are threaded onto a rough horizontal wire. The rings are connected by a light inextensible string. A particle C of mass $3m$ is attached to the midpoint of the string. The particle C hangs in equilibrium below the wire with angle $BAC = \beta$, as shown in Figure 2.

The tension in each of the parts, AC and BC, of the string is T

(a) By considering particle C, find T in terms of m, g and β

(2)

(b) Find, in terms of m and g, the magnitude of the normal reaction between the wire and A.

(3)

The coefficient of friction between each ring and the wire is $\frac{4}{5}$

The two rings, A and B, are on the point of sliding along the wire towards each other.

(c) Find the value of $\tan\beta$

(5)

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