A bead, A, of mass $0.1\,\text{kg}$ is threaded on a long straight rigid wire which is inclined at $\sin^{-1}\left(\frac{7}{25}\right)$ to the horizontal. A is released from rest and moves down the wire. The coefficient of friction between A and the wire is μ. When A has travelled $0.45\,\text{m}$ down the wire, its speed is $0.6\,\text{m}\,\text{s}^{-1}$.

(a) Show that $\mu = 0.25$. [6]

Another bead, B, of mass 0.5 kg is also threaded on the wire. At the point where A has travelled 0.45 m down the wire, it hits B which is instantaneously at rest on the wire. A is brought to instantaneous rest in the collision. The coefficient of friction between B and the wire is 0.275.

(b) Find the time from when the collision occurs until A collides with B again. [6]

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