

4.

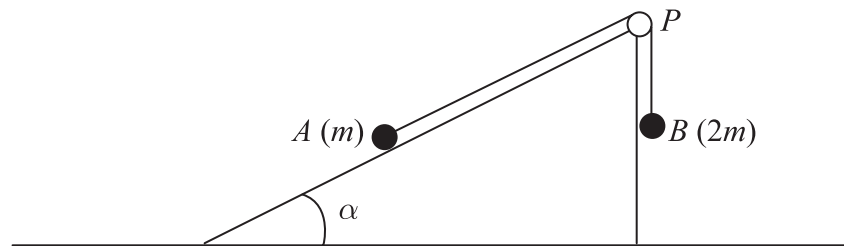


Figure 2

Two particles A and B , of mass m and $2m$ respectively, are attached to the ends of a light inextensible string. The particle A lies on a rough plane inclined at an angle α to the horizontal, where $\tan \alpha = \frac{3}{4}$. The string passes over a small light smooth pulley P fixed at the top of the plane. The particle B hangs freely below P , as shown in Figure 2. The particles are released from rest with the string taut and the section of the string from A to P parallel to a line of greatest slope of the plane. The coefficient of friction between A and the plane is $\frac{5}{8}$. When each particle has moved a distance h , B has not reached the ground and A has not reached P .

- (a) Find an expression for the potential energy lost by the system when each particle has moved a distance h . (2)

When each particle has moved a distance h , they are moving with speed v . Using the work-energy principle,

- (b) find an expression for v^2 , giving your answer in the form kgh , where k is a number. (5)



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