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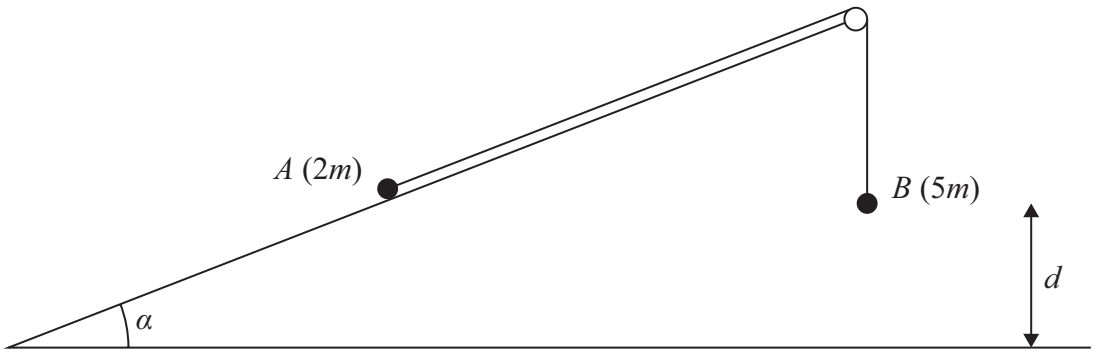


Figure 3

Figure 3 shows a rough plane inclined at an angle α to the horizontal, where $\tan\alpha = \frac{5}{12}$

The plane is fixed to horizontal ground.

A small smooth pulley is fixed at the top of the plane.

One end of a light inextensible string is attached to a particle A that is held at rest on the plane.

The string passes over the pulley and the other end of the string is attached to a particle B that hangs vertically below the pulley.

The string from A to the pulley lies along a line of greatest slope of the plane.

Particle A has mass $2m$ and particle B has mass $5m$.

The distance from B to the ground is d.

When the system is released from rest with the string taut, A begins to move up the plane and in the subsequent motion A never reaches the pulley.

The coefficient of friction between A and the plane is μ.

The work done against friction as A moves a distance d up the plane is $\frac{3mgd}{13}$

(a) Find the value of μ.

(4)

The speed of B as it hits the ground is V.

(b) **Use the work-energy principle** to find an expression for V^2 in terms of g and d.

(5)

(c) Find the speed of A when it has moved a **total** distance of $2d$ up the plane, giving your answer in terms of g and d.

(4)

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