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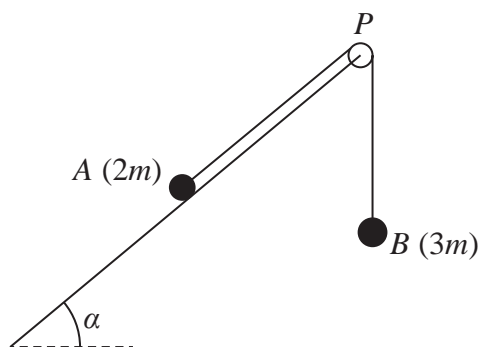


Figure 4

One end of a light inextensible string is attached to a particle  $A$  of mass  $2m$ . The other end of the string is attached to a particle  $B$  of mass  $3m$ . The string passes over a small, smooth, light pulley  $P$  which is fixed at the top of a rough inclined plane. The plane is inclined to the horizontal at an angle  $\alpha$ , where  $\tan \alpha = \frac{3}{4}$

Particle  $A$  is held at rest on the plane with the string taut and  $B$  hanging freely below  $P$ , as shown in Figure 4. The section of the string  $AP$  is parallel to a line of greatest slope of the plane.

The coefficient of friction between  $A$  and the plane is  $\frac{1}{2}$

Particle  $A$  is released and begins to move up the plane.

For the motion before  $A$  reaches the pulley,

- (a) (i) write down an equation of motion for  $A$ ,  
 (ii) write down an equation of motion for  $B$ , (4)
- (b) find, in terms of  $g$ , the acceleration of  $A$ , (5)
- (c) find the magnitude of the force exerted on the pulley by the string. (4)
- (d) State how you have used the information that  $P$  is a smooth pulley. (1)



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### Question 7 continued

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**Q7**

**(Total 14 marks)**

