4. A rough plane is inclined to the horizontal at an angle α, where $\tan\alpha = \frac{3}{4}$

A particle P of mass m is held at rest at a point A on the plane.

The particle is then projected with speed u up a line of greatest slope of the plane and comes to instantaneous rest at the point B.

The coefficient of friction between the particle and the plane is $\frac{1}{7}$

(a) Show that the magnitude of the frictional force acting on the particle, as it moves from A to B, is $\frac{4mg}{35}$

(2)

Given that $u = \sqrt{10ag}$, use the work–energy principle

(b) to find AB in terms of a,

(4)

(c) to find, in terms of a and g, the speed of P when it returns to A.

(4)

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Question 4 continued

(Total for Question 4 is 10 marks)