3.

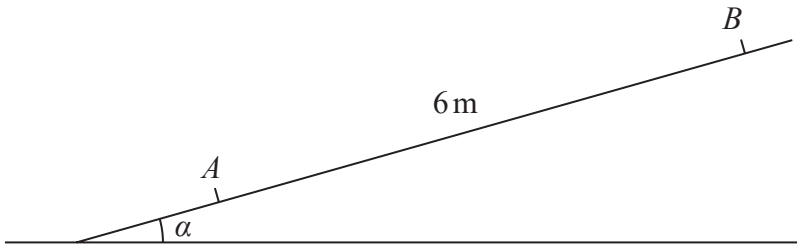


Figure 1

A rough ramp is fixed to horizontal ground.

The ramp is inclined to the horizontal at an angle α, where $\sin\alpha = \frac{3}{7}$

The line AB is a line of greatest slope of the ramp, with B above A and $AB = 6\,\text{m}$, as shown in Figure 1.

A block P of mass 2 kg is pushed, with constant speed, in a straight line up the slope from A to B. The force pushing P acts parallel to AB.

The coefficient of friction between P and the ramp is $\frac{1}{3}$

The block is modelled as a particle and air resistance is negligible.

(a) Use the model to find the **total** work done in pushing the block from A to B.

(5)

The block is now held at B and released from rest.

(b) Use the model and the work-energy principle to find the speed of the block at the instant it reaches A.

(4)

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Question 3 continued

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Question 3 continued

(Total for Question 3 is 9 marks)