adamjee maths

A-LEVEL MATHS / EDEXCEL / FREE RESOURCES

# Moments

## Question paper

1 questions

Exam questions and marking instructions remain credited to their board.

# Contents

1 June 2019 - Paper 3 Mechanics - Q4

**4.**

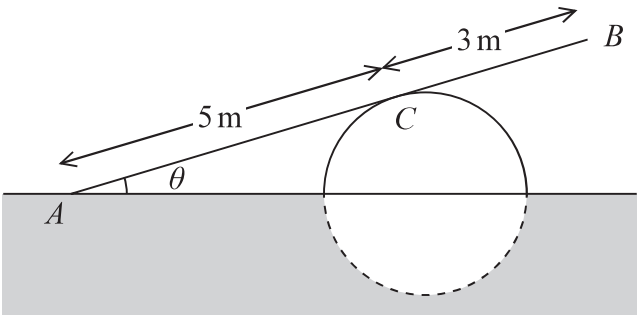



**Figure 2**

A ramp, $AB$, of length 8 m and mass 20 kg, rests in equilibrium with the end $A$ on rough horizontal ground.

The ramp rests on a smooth solid cylindrical drum which is partly under the ground. The drum is fixed with its axis at the same horizontal level as $A$.

The point of contact between the ramp and the drum is $C$, where $AC = 5$ m, as shown in Figure 2.

The ramp is resting in a vertical plane which is perpendicular to the axis of the drum, at an angle $\theta$ to the horizontal, where $\tan\theta = \frac{7}{24}$

The ramp is modelled as a uniform rod.

(a) Explain why the reaction from the drum on the ramp at point $C$ acts in a direction which is perpendicular to the ramp.

**(1)**

(b) Find the magnitude of the resultant force acting on the ramp at $A$.

**(9)**

The ramp is still in equilibrium in the position shown in Figure 2 but the ramp is not now modelled as being uniform.

Given that the centre of mass of the ramp is assumed to be closer to $A$ than to $B$,

(c) state how this would affect the magnitude of the normal reaction between the ramp and the drum at $C$.

**(1)**

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**(Total for Question 4 is 11 marks)**

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