

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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## Pearson Edexcel Level 3 GCE

Paper  
reference

**9MA0/32**

# Mathematics

Advanced

**PAPER 32: Mechanics**

**You must have:**

Mathematical Formulae and Statistical Tables (Green), calculator

Total Marks

**Candidates may use any calculator allowed by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.**

### Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Unless otherwise indicated, whenever a value of  $g$  is required, take  $g = 9.8 \text{ m s}^{-2}$  and give your answer to either 2 significant figures or 3 significant figures.

### Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- The total mark for this part of the examination is 50. There are 5 questions.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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4.

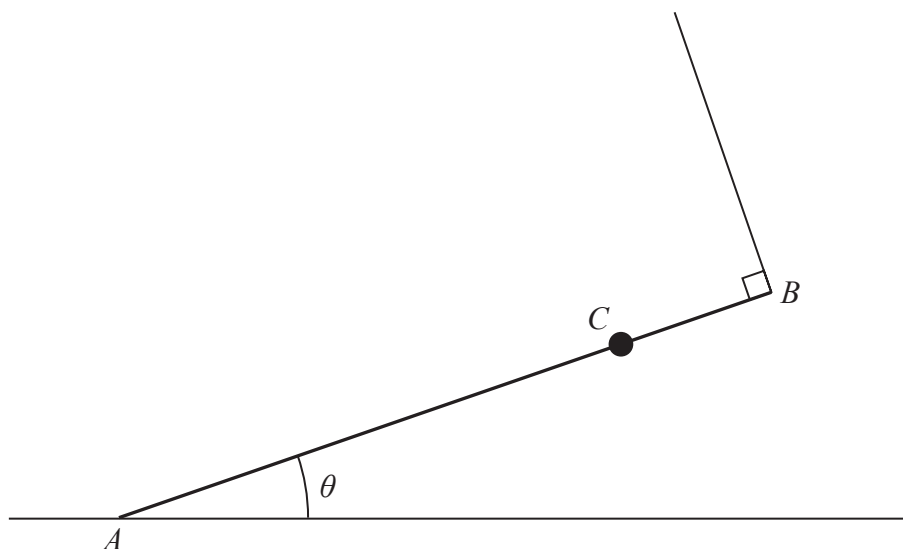


Figure 2

A uniform rod  $AB$  has mass  $M$  and length  $2a$

A particle of mass  $2M$  is attached to the rod at the point  $C$ , where  $AC = 1.5a$

The rod rests with its end  $A$  on rough horizontal ground.

The rod is held in equilibrium at an angle  $\theta$  to the ground by a light string that is attached to the end  $B$  of the rod.

The string is perpendicular to the rod, as shown in Figure 2.

- (a) Explain why the frictional force acting on the rod at  $A$  acts horizontally to the right on the diagram.

(1)

The tension in the string is  $T$

- (b) Show that  $T = 2Mg \cos \theta$

(3)

Given that  $\cos \theta = \frac{3}{5}$

- (c) show that the magnitude of the vertical force exerted by the ground on the rod at  $A$  is  $\frac{57Mg}{25}$

(3)

The coefficient of friction between the rod and the ground is  $\mu$

Given that the rod is in limiting equilibrium,

- (d) show that  $\mu = \frac{8}{19}$

(4)



















