



Cambridge International AS & A Level

CANDIDATE NAME



CENTRE NUMBER

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MATHEMATICS

9709/43

Paper 4 Mechanics

October/November 2025

1 hour 15 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)



INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- Where a numerical value for the acceleration due to gravity (g) is needed, use 10 ms^{-2} .

INFORMATION

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [].

This document has **16** pages. Any blank pages are indicated.



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- 2 The engine of a motorcycle can generate a maximum power of 105 kW. The mass of the motorcycle and its rider is 400 kg. The total resistance to the motion of the motorcycle and its rider is cv N, where v m s^{-1} is the motorcyclist's speed and c is a constant.

The motorcyclist travels along a straight horizontal road under maximum engine power. When the motorcyclist's speed is 35 m s^{-1} , his acceleration is 0.5 m s^{-2} .

- (a) Show that $c = 80$. [3]

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The motorcyclist now travels up a straight hill under maximum engine power. The hill makes an angle of $\sin^{-1}\left(\frac{3}{20}\right)$ with the horizontal.

- (b) Find the steady speed at which the motorcyclist travels up the hill. [3]

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3 A block of mass 4 kg is pulled along a rough horizontal road by a constant force of magnitude 25 N acting at an angle of 36° above the horizontal. The block moves in a straight line passing through two points A and B on the road, where $AB = 120$ m. The coefficient of friction between the block and the road is 0.4.

(a) Find the work done against friction in moving the block from A to B . [3]

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The speed of the block at A is 7 m s^{-1} .

(b) Use an energy method to find the speed of the block at B . [4]

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