



Cambridge International AS & A Level

CANDIDATE
NAME

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CENTRE
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FURTHER MATHEMATICS

9231/03

Paper 3 Further Mechanics

For examination from 2020

SPECIMEN PAPER

1 hour 30 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 **14** pages. Blank pages are indicated.

2 A light elastic string has natural length a and modulus of elasticity $24mg$. One end of the string is attached to a fixed point A . The other end of the string is attached to a particle of mass $2m$.

(a) Find, in terms of a , the extension of the string when the particle hangs freely in equilibrium below A . [2]

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(b) The particle is released from rest at A .

Find, in terms of a , the distance of the particle below A when it first comes to instantaneous rest. [6]

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It is now given that $k = 0.01$. The speed of P when x becomes large approaches $V \text{ m s}^{-1}$.

- (b) (i)** Find V correct to 2 decimal places. [1]

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- (ii)** Hence find how far P has fallen when its speed is $\frac{1}{2}V \text{ m s}^{-1}$. [2]

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