



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education
2025

Centre Number

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Candidate Number

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Mathematics

Assessment Unit AS 2

assessing

Applied Mathematics



[SMT21]

SMT21

TUESDAY 27 MAY, AFTERNOON

TIME

1 hour 15 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer the questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. **Do not write with a gel pen.**

Questions which require drawing or sketching should be completed using an HB pencil.

Candidates must answer **all** questions from sections A and B.

Equal time should be spent on each section. Show clearly the full development of your answers.

Answers without working may not gain full credit.

Answers should be given to three significant figures unless otherwise stated.

You are permitted to use a graphic or scientific calculator in this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 70. The total available mark for each section of this paper is 35.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

Answers should include diagrams where appropriate and marks may be awarded for them.

Take $g = 9.8 \text{ m s}^{-2}$, unless specified otherwise.

A copy of the **Mathematical Formulae and Tables booklet** is provided.

Throughout the paper the logarithmic notation used is $\ln z$ where it is noted that $\ln z \equiv \log_e z$

15872



20SMT2101

Answer all questions.

SECTION A

Mechanics

1 At time $t = 0$ seconds a particle is at rest at the point A.

The particle has a constant acceleration of $(3\mathbf{i} + 4\mathbf{j}) \text{ m s}^{-2}$

(i) Find the velocity of the particle when $t = 5$ [3]

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(ii) Find the distance travelled by the particle from $t = 0$ to $t = 5$ [5]

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2 An athlete is training for a race.

During one of her training sessions, she runs along a horizontal path in a straight line.

Fig. 1 below shows the displacement (km) of the athlete at time t (hours) from her starting point O.

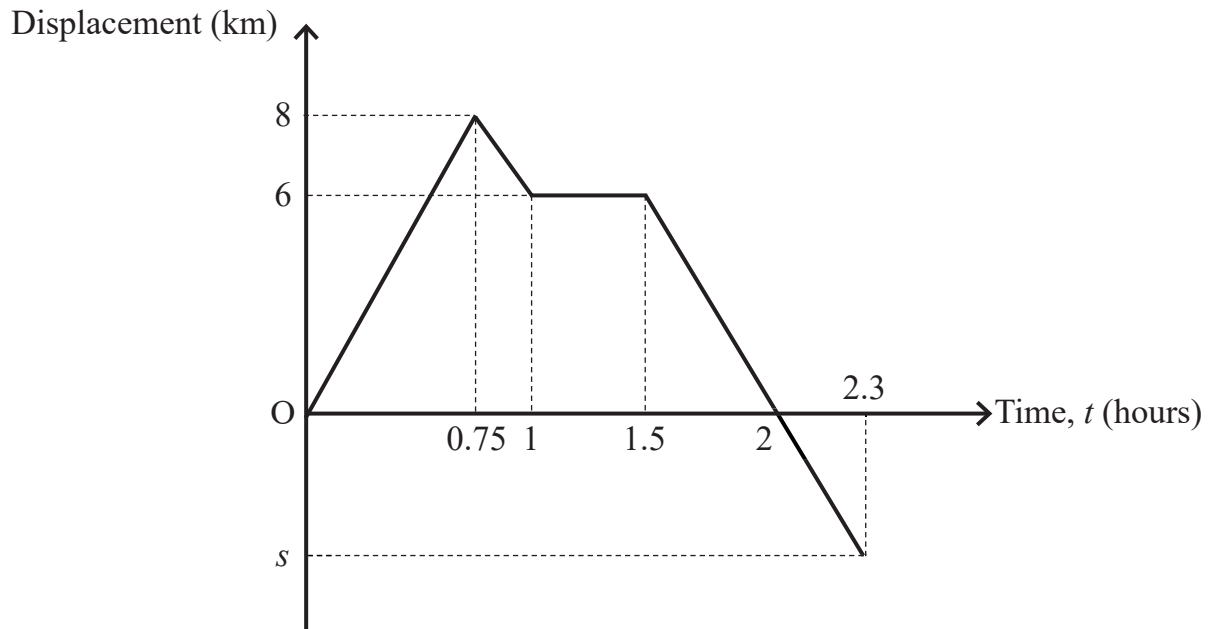


Fig. 1

(i) Find the velocity of the athlete from $t = 0.75$ to $t = 1$ [2]

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3 Fig. 2 below shows a lift of mass 1000 kg.

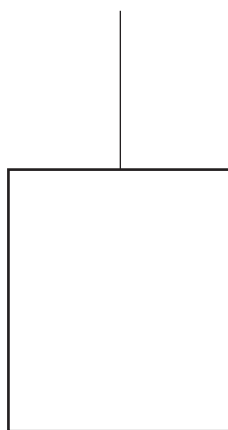


Fig. 2

A vertical cable attached to the top of the lift raises and lowers it.

(i) If the empty lift is travelling at constant speed, find the tension in the cable. [2]

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4 Fig. 3 below shows a box at rest on a rough plane inclined at 30° to the horizontal.

The coefficient of friction between the box and the plane is $\frac{2}{9}$

When a horizontal force of magnitude 24 N is applied to the box, it is on the point of slipping down the plane.

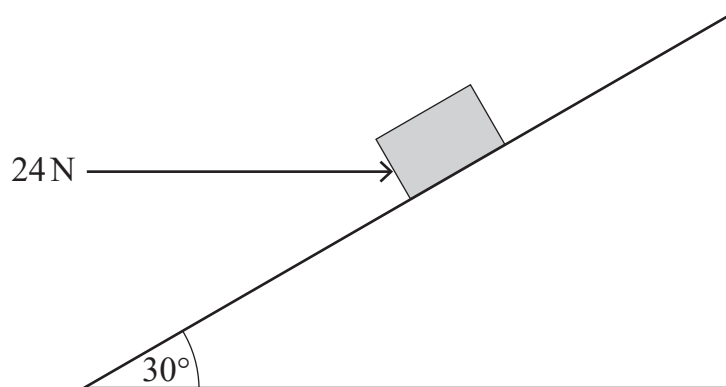


Fig. 3

(i) Complete the diagram above, showing all of the external forces acting on the box. [2]

(ii) Find the mass of the box. [9]

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Handwriting practice area with 20 horizontal dotted lines.



One Year 13 student is selected at random from this school.

(ii) Find the probability that this student:

(a) does not study Spanish or History; [2]

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(b) studies just one of the three subjects. [1]

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(iii) Show why studying Spanish and studying History are not independent of each other. [2]

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[Turn over



(ii) Give an interpretation of the result in part (i).

[1]

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In a different part of his research, for the same 20 cities, David obtains an equation for the line of regression of the average life expectancy, z years, on the air quality, x units.

The equation of his regression line is

$$z = 76.8 + 0.703x$$

(iii) Estimate the average life expectancy for the population of a city in which the air quality is 10.5 units.

[1]

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(iv) Explain what is represented by the gradient of this regression line.

[2]

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[Turn over



THIS IS THE END OF THE QUESTION PAPER

DO NOT WRITE ON THIS PAGE

For Examiner's use only	
Question Number	Marks
1	
2	
3	
4	
5	
6	
7	
8	
9	

Total Marks	
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Examiner Number

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