

New
Specification



Rewarding Learning

ADVANCED SUBSIDIARY (AS)
General Certificate of Education

Centre Number

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Candidate Number

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Mathematics

Assessment Unit AS 2

assessing

Applied Mathematics



SMT21

[SMT21]

Assessment

TIME

1 hour 15 minutes.

Assessment Level of Control:

Tick the relevant box (✓)

Controlled Conditions	
Other	

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, on blank pages or tracing paper.

Complete in black ink only. Questions which require drawing or sketching should be completed using an HB pencil. **Do not write with a gel pen.**

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 $\ln z \equiv \log_e z$

12293



28SMT2101

[3]

[illegible]

[1]

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[Turn over



(ii) If $\mathbf{F}_2$ and $\mathbf{F}_3$ are unchanged, find the magnitude of the acceleration produced and the angle it makes with the vector $\mathbf{i}$.

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28SMT2105





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28SMT2107

- 3 **Fig. 1** below shows crates P and Q resting on two planes each inclined at 45° to the horizontal.

P and Q are connected using a light, inextensible string passing over a smooth, light fixed pulley.

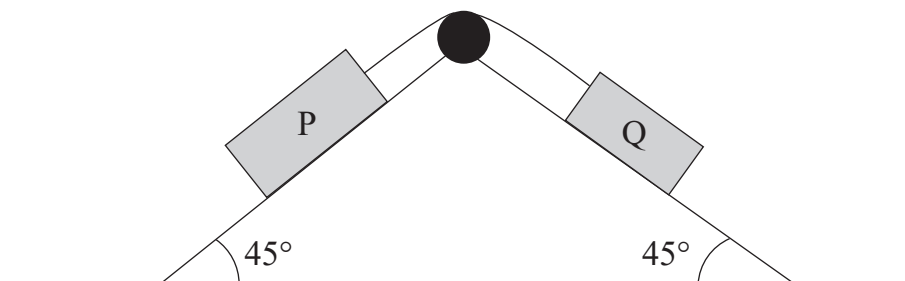


Fig. 1

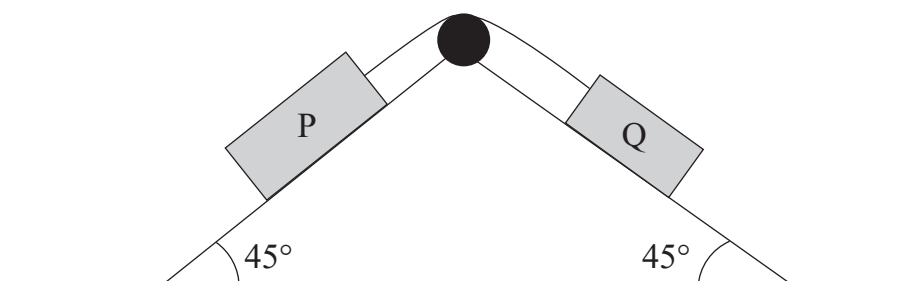
P has mass $3m$ kg and rests on a smooth plane.

Q has mass $2m$ kg and rests on a rough plane with coefficient of friction μ .

The system is released from rest and motion occurs.

- (i) Complete the diagram below to show all the external forces acting on P and Q.

[2]



[7]

[Turn over



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The acceleration is found to be 1.3 m s^{-2}

(iii) Find the value of μ .

[2]

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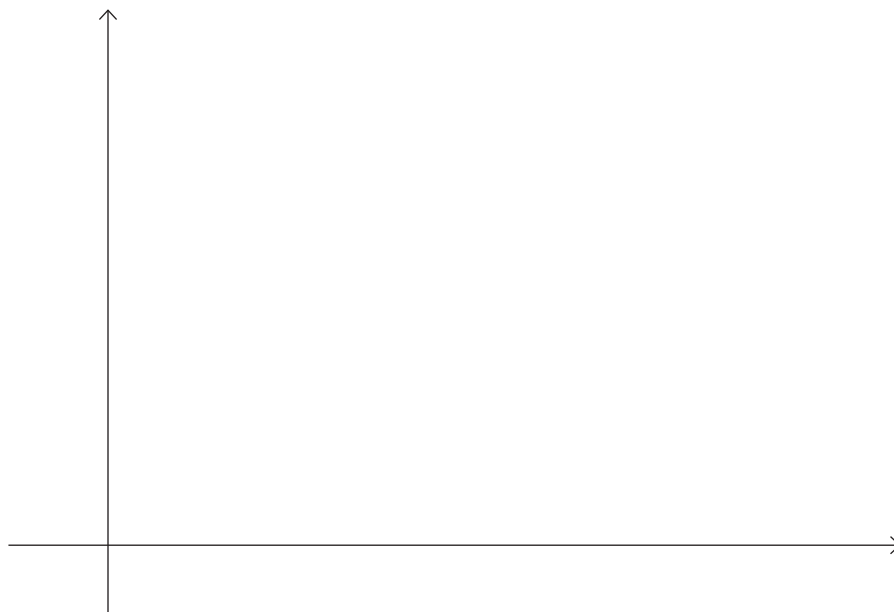
- 4 A car is travelling along a straight stretch of road at a constant speed of 30 m s^{-1} when it passes a stationary police motorcycle at time $t = 0$ seconds.

Two seconds later the police motorcycle gives chase accelerating from 0 m s^{-1} to 35 m s^{-1} with constant acceleration of 7 m s^{-2}

The police motorcycle maintains this speed of 35 m s^{-1} until it catches up with the car at time T .

By drawing a velocity–time graph find the value of T .

[8]



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[Turn over



28SMT2113

Statistics

- Some of the summary values he calculated are:

$$\Sigma y = 551.8$$

- [illegible]

- (ii) Comment on what the value obtained in (i) suggests to the farmer. [1]

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Based on his data, the farmer calculates an equation of the y on x regression line to be

$$y = 33.7 + 0.112x$$

- (iii) Give an interpretation, in context, of the value of the gradient of this regression line. [2]

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[Turn over]



[2]

[Turn over



[2]

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[1]

[illegible]

[2]

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28SMT2121

[illegible]

(i) Find the probability that exactly two of the components in the batch are faulty. [3]

[illegible]

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28SMT2123

(ii) Find the probability that fewer than two components in the batch are faulty. [3]



The probability that no components are faulty in batches of this size is 0.2957 to 4 decimal places.

[6]

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

Total Marks	
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Examiner Number

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