

Surname	Centre Number	Candidate Number
First name(s)		2



GCE A LEVEL

1300U40-1



S25-1300U40-1

THURSDAY, 12 JUNE 2025 – AFTERNOON

**MATHEMATICS – A2 unit 4
APPLIED MATHEMATICS B**

1 hour 45 minutes

ADDITIONAL MATERIALS

In addition to this examination paper, you will need:

- a Formula Booklet;
- a calculator;
- statistical tables (RND/WJEC Publications).

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Take g as 9.8 ms^{-2} .

Write your answers in the spaces provided in this booklet. If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The maximum mark for this paper is 80.

The number of marks is given in brackets at the end of each question or part-question.

Sufficient working must be shown to demonstrate the **mathematical** method employed.

Answers without working may not gain full credit.

Unless the degree of accuracy is stated in the question, answers should be rounded appropriately.

You are reminded of the necessity for good English and orderly presentation in your answers.

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1	4	
2	12	
3	8	
4	16	
5	7	
6	9	
7	8	
8	7	
9	9	
Total	80	

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(b) The second test has 10 questions, each with 4 choices from which to select the answer. The probability that Selina knows the answer to a question is p , independently of any other question. If she knows the answer, she will select it. Otherwise, she will select one of the four choices at random, with equal probability for each.

i) Calculate the smallest value of p that will give a probability of at least 0.7 of Selina getting the correct answer to a randomly selected question. [4]

ii) At least 8 out of the 10 questions must be answered correctly to pass the test. Assuming that the probability of Selina getting the correct answer to a randomly selected question is 0.7, calculate the probability that she will pass the test. [3]

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3. A city councilor is investigating the decline in the number of bus drivers in the city. During her research, she finds an article claiming that delivery companies are actively recruiting bus drivers to work for them.

She collects data on the number of bus drivers and the number of delivery drivers from 8 randomly selected cities of a similar size to her city. She calculates the correlation coefficient in order to carry out a hypothesis test

(a) Explain why a one-tailed test could be appropriate. [1]

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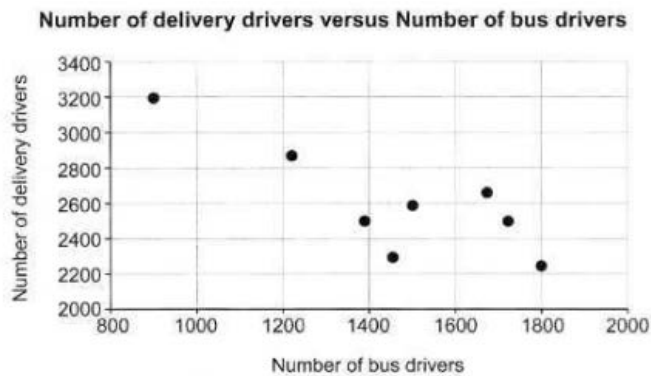
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The product moment correlation coefficient for the data is -0.8206 .

(b) Carry out a one-tailed significance test at the 5% significance level. [5]

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4. Collectible football cards come in packs. The masses, in grams of the packs are normally distributed with the mean 28.3 and standard deviation 0.3.

(a) Calculate the probability that a selected pack will have a mass less than 28g.

[2]

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(b) Packs have a mass more than 28.8g are classed as 'heavy'. Andrei buys a randomly selected 'heavy' pack of cards.

Calculate the probability that this pack has a mass more than 29.1g.

[6]

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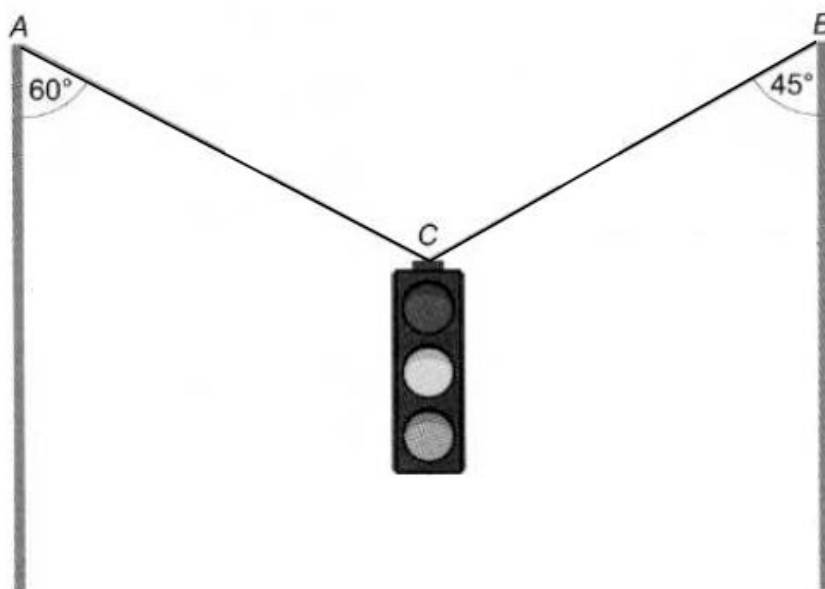
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Section B: Differential Equations and Mechanics

5. The diagram below shows a set of traffic lights suspended in equilibrium by means of two cables AC and BC , inclined at angles of 60° and 45° to the vertical respectively. The set of traffic lights has a mass of 25kg and may be modeled as a single particle attached at C .



- (a) Show that the tension AC is approximately 179N , and calculate the tension in BC . [6]

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(b) State a modeling assumption that you have made in your conclusion. [1]

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