

Surname	Centre Number	Candidate Number
First name(s)		2



GCE AS/A LEVEL

2300U20-1



S25-2300U20-1

FRIDAY, 23 MAY 2025 – AFTERNOON

MATHEMATICS – AS unit 2
APPLIED MATHEMATICS A

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 75.

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	6	
2	4	
3	11	
4	8	
5	11	
6	6	
7	6	
8	8	
9	4	
10	11	
Total	75	



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

Section A: Statistics

1. Financial transactions on a network occur at an average rate of one every 10 minutes. Transactions occur singly, randomly and independently.

- (a) Stating an appropriate model, calculate the probability that there will be exactly 5 transactions in a randomly selected one-hour period. [3]

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During a busy period, the average rate of transactions is 10 per hour. The cost per transaction is \$30.

- (b) For this busy period, calculate the probability that the total cost of the transactions will be at least \$360 in a randomly selected hour. [3]

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|------------|-----|-----|-----|-----|
| x | 2 | 3 | 4 | 5 |
| $P(X = x)$ | 0.1 | 0.4 | 0.3 | 0.2 |

[4]



- (c) Now suppose that Martin's new question is such that the true probability that the question is answered correctly is 0.2. Calculate the probability of a Type II error in a random sample of size 63. Interpret your answer in context. [5]

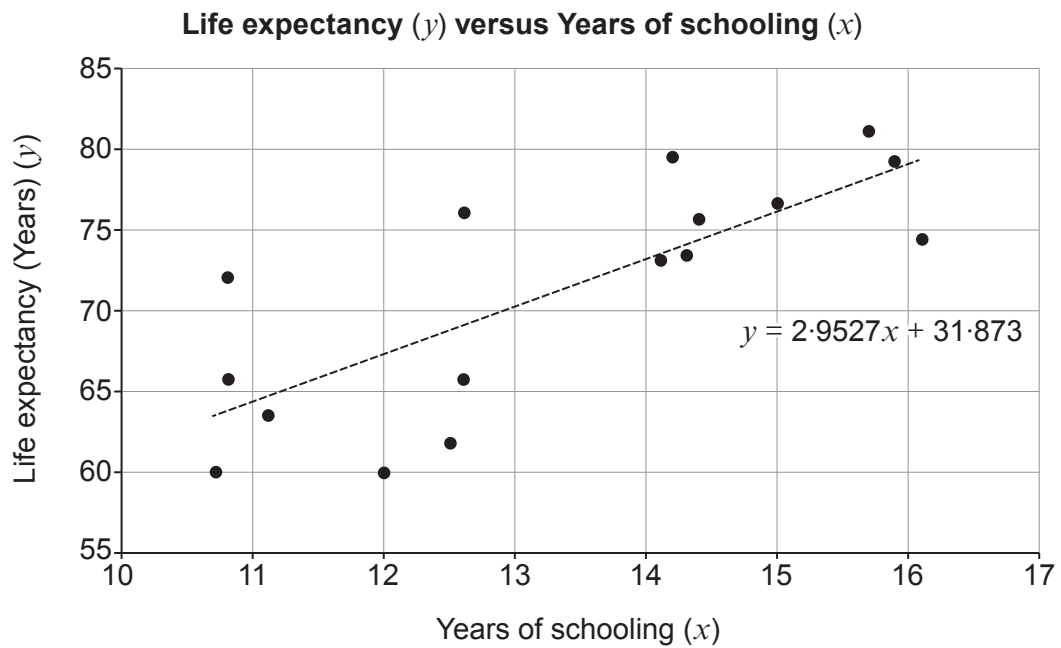


- (b) Given that $P(C') = 0.6$ and that the events C and D are independent, calculate p , q and r .

[6]



The graph below shows the life expectancy and years of schooling for 16 randomly selected countries.



(b) Interpret the gradient of the regression line in context.

[1]

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(c) Comment on the causal nature or otherwise of the correlation.

[1]

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TURN OVER FOR QUESTIONS 5(d)–5(f)



- (d) (i) Calculate an estimate of the life expectancy for a country that has 14.6 years of schooling. [1]
- (ii) Comment on the reliability of your answer. [1]

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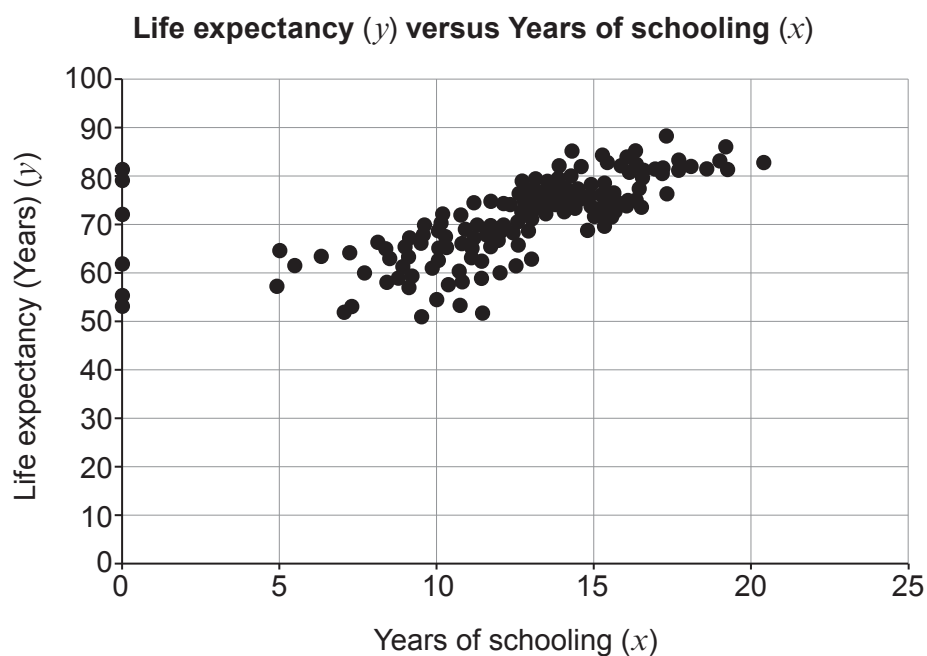
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The entire data set was used to produce the following scatter diagram.



- [1]

- $$\sum y = 13105.9 \quad \sum y^2 = 950615.47 \quad n = 183$$

- [3]

- [1]



- (b) The force $\mathbf{G} + \mathbf{H}$ acts on the particle. Determine the acceleration vector of the particle. [3]

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7. (a) Using the equations $v = u + at$ and $s = \frac{1}{2}(u + v)t$, show that

$$s = ut + \frac{1}{2}at^2. \quad [2]$$

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- (b) Object *C* separates from *B* and falls away. Without carrying out any further calculations, write down the acceleration of *A* after the separation. [1]



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9. A small toy car, which may be modelled as a particle, is moving along a straight horizontal track as shown below. Two points *A* and *B* are positioned along the track.



The velocity of the car, $v \text{ cm s}^{-1}$, at time t seconds, is given by

$$v = 50t - 2t^3 \quad \text{for} \quad 0 \leq t \leq 5.$$

When $t = 1$, the car passes the point A.

- (a) Find an expression for the displacement of the car from A at time t s. [3]



- (b) When $t = 4$, the car passes the point B . Determine the length of the track between A and B . [1]

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(c) Calculate the distance travelled by the lift during the entire 15 s journey.

[2]

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END OF PAPER



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