

Level 3 Certificate

MATHEMATICAL STUDIES

Paper 2A

Name: _____

Class: _____

Date: _____

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a clean copy of the Preliminary material
- a scientific calculator or a graphics calculator
- a copy of the formulae sheet
- a ruler.

Instructions

- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Fill in your name, class and the date at the top of this page.
- Answer all the questions.
- Do all rough work on this paper. Cross through any work that you do not want to be marked.
- In all calculations, show clearly how you work out your answer.
- The final answer to questions should be given to an appropriate degree of accuracy.
- You may not refer to the copy of the Preliminary material that was available prior to this examination. A clean copy is enclosed for your use.

Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
Total	

Information

- The maximum mark for this paper is 60.
- The marks for each question are shown in brackets [].
- Use this as a guide as to how much time to spend on each question.

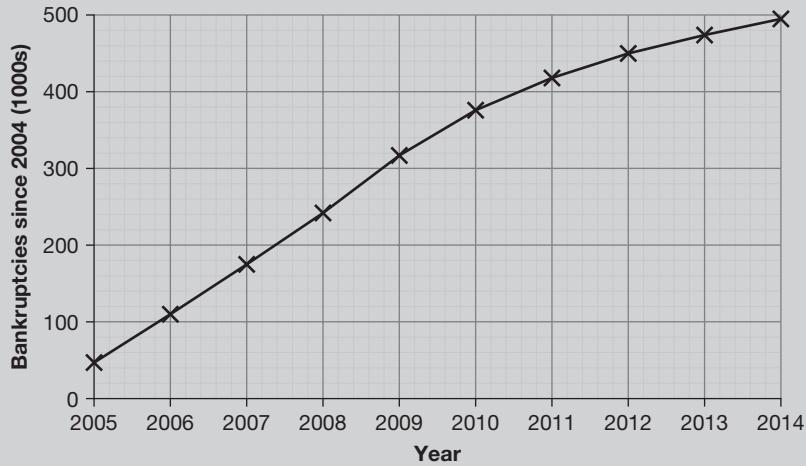
Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

1

UK bankruptcy rate continues to rise

This graph of cumulative bankruptcies since 2004 illustrates the total failure of this government's attempts to ease the hardships of thousands of working people.



a) In what way is this newspaper cutting misleading?

[2 marks]

b) Suggest a sentence that a government spokesperson might write about this graph. Your sentence must involve numerical data from the graph.

[2 marks]

3 Use **Different perspectives!** on the Preliminary Material.

a) What emotive language is used in the newspaper extract?

[1 mark]

b) In addition to the figures mentioned in the newspaper extract, the government will receive £6.2 billion in fees from RBS. Show how this leads to the figure given in the headline.

[2 marks]

c) What reasons does George Osborne give for the decision he has taken?

[2 marks]

d) Suppose that the price of RBS shares rises significantly after the government sells part of its stake. Write a brief, reasoned justification for which, if either, of George Osborne and the Daily Mirror were correct in their judgements.

[4 marks]

e) What is the current **total** valuation of RBS's shares according to Rothschilds?

[2 marks]

4 The lifetime, in kilometres, of a make of car tyre is normally distributed with mean 25 000 km and standard deviation 2000 km.

a) A particular garage fits 1000 of these tyres.

How many of these tyres can be expected to last longer than 28 000 km?

[6 marks]

b) What distribution will model the average lifetime of a random sample of four tyres?

[2 marks]

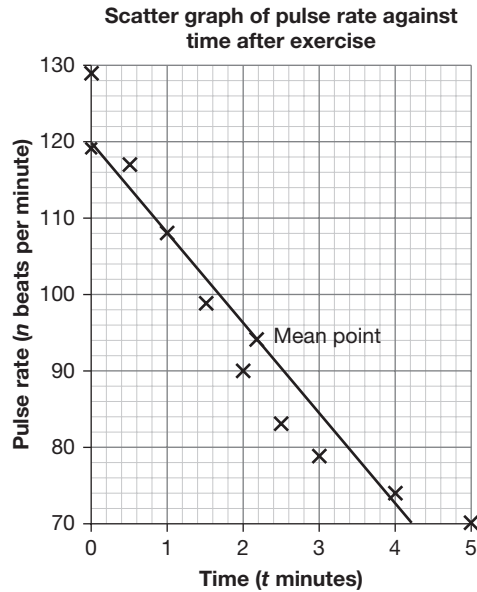
c) Will the average lifetime of the four tyres on a car have the same distribution as the answer to part (b)? Justify your answer.

[1 mark]

- 5 One measure of fitness is the time taken for your pulse rate to return to normal after exercise. The fitter you are, the quicker your pulse rate reduces.

The table and graph show Oliver's results after he exercises.

Time (t minutes)	Pulse rate (n beats per minute)
0	129
0.5	117
1.0	108
1.5	99
2.0	90
2.5	83
3.0	79
4.0	74
5.0	70



- a) Find and interpret the gradient of Oliver's line of best fit.

[3 marks]

- b) Sam uses results after he exercises to calculate a regression equation

$$n = 124 - 10.9t$$

Sam says that this means that he is fitter than Oliver. Is Sam correct? Explain your answer.

[2 marks]

- c) Chris says that linear regression is not a good model in this context. Do you agree? Explain your answer.

[1 mark]

6 The time taken for a milkman to deliver to the houses in one road is normally distributed with mean 15 minutes and standard deviation 2 minutes. He delivers milk every day other than Sundays. Estimate the number of days in a year that he takes

a) longer than 22 minutes

[3 marks]

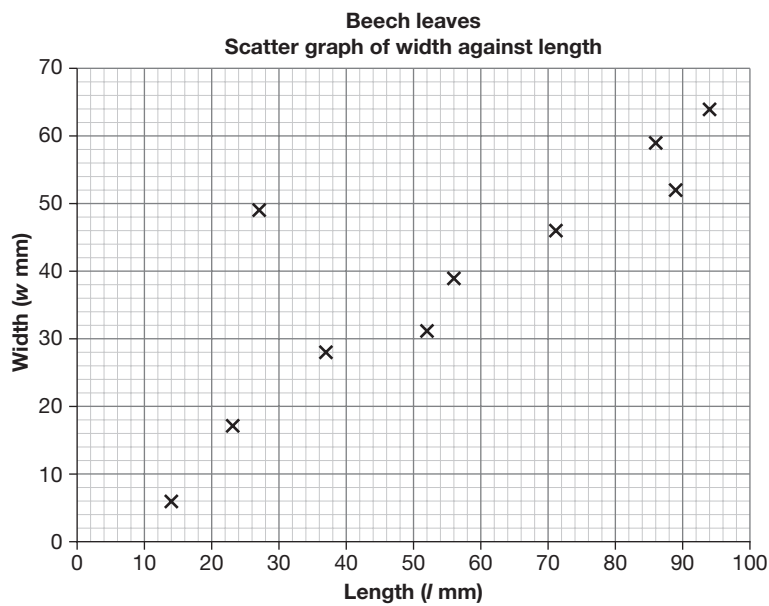
b) less than 12 minutes.

[4 marks]

7 Amelia has measured the length and width of a random sample of 10 beech leaves.

Length (l mm)	Width (w mm)
14	6
37	28
56	39
94	64
86	59
71	46
49	27
23	17
52	31
89	52

Amelia draws this scatter graph.



a) Identify and correct the error on Amelia's scatter graph.

[2 marks]

b) Calculate the equation of the regression line of w on l and plot the line on the scatter graph.

[5 marks]

c) Amelia says that a 10 centimetre long beech leaf would be about 6 centimetres wide. Does the data support this statement? You must show working to justify your answer.

[3 marks]
