

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

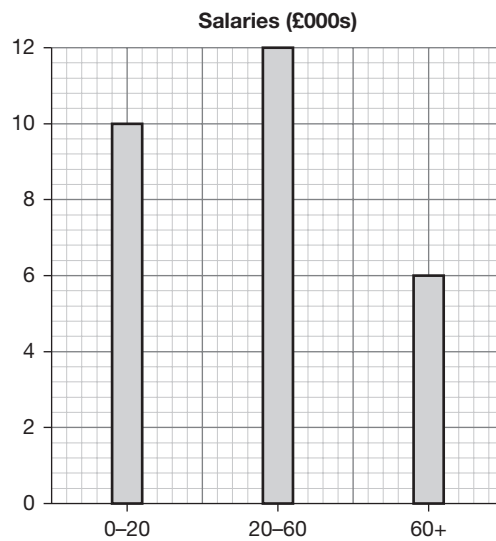
- The maximum mark for this paper is 60.
- The marks for each question are shown in brackets [].
- Use this as a guide as to how much time to spend on each question.

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.

Paper 2A

1 The results of a survey of salaries are illustrated by the graph shown below.

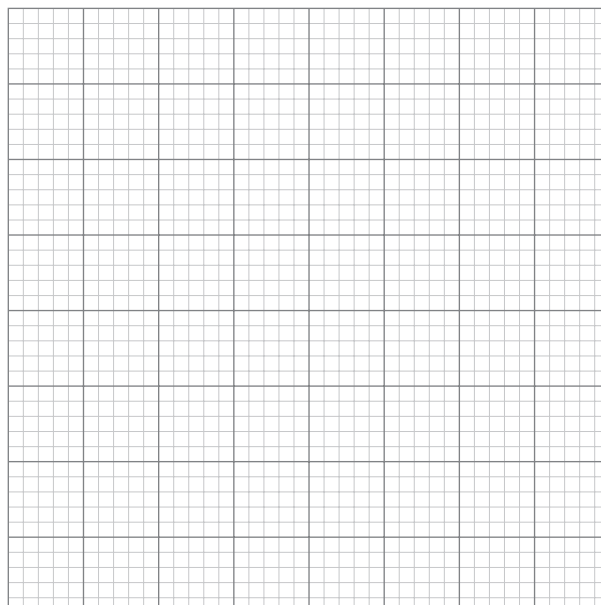


a) Criticise this graph.

[2 marks]

b) Making any necessary assumptions, which should be stated, draw a more suitable diagram to represent these data.

[4 marks]



- 2 Andy has borrowed £1000 which he must repay in two equal instalments, £600 at the end of the first year and a final payment of another £600 at the end of the second year. Andy makes the statement:

I will have to pay £200 interest over the two years of the loan. This is £100 per year and means that I am paying 10% interest per year.

- a) Which part of Andy's statement is correct?

[1 mark]

- b) Andy is not a mathematician. Using simple calculations, explain to him why the interest rate that he is paying is more than 10%.

[3 marks]

3 Use **Make schools pay!** in the Preliminary Material.

- a) The report *Crossing the Line* was discussed on a radio programme on 25th August 2015. Referring to the data used in the report, it was stated that

Further Education colleges take five times more English students and six times more maths students who don't make the grade than schools.

Comment fully on the numbers used in this statement.

[4 marks]

- b) Explain briefly why '*fining schools could be self-defeating*'.

[2 marks]

- c) Explain the observation that

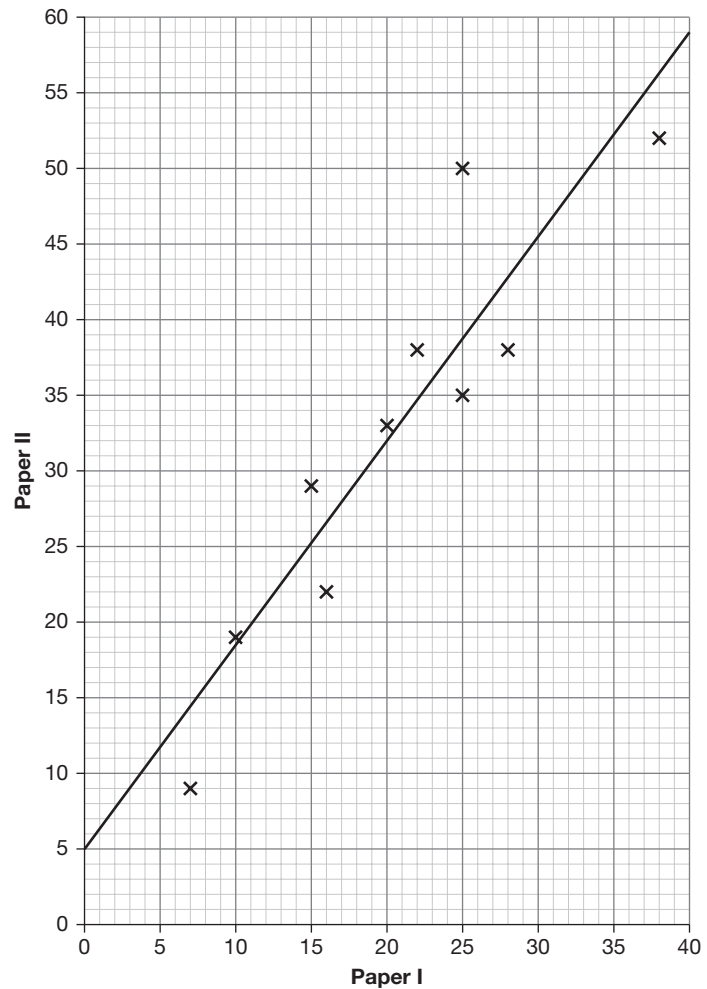
The work that is done in secondary schools in the five years leading up to GCSEs may greatly affect the result of an individual student or the result of all the students in that school but does not affect the overall GCSE results of the nation's students.

[4 marks]

- 5 An examination consists of two papers, I and II. The marks on these two papers are added together to give a candidate's overall percentage.

The table and graph show the results for 10 candidates. The graph also shows the line of best fit.

Candidate	Paper I	Paper II
A	7	9
B	10	19
C	16	22
D	15	29
E	20	33
F	25	35
G	22	38
H	28	38
I	25	50
J	38	52



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

[3 marks]

- b) Describe the correlation between the two sets of marks.
What does this indicate about the skills being tested by each paper?

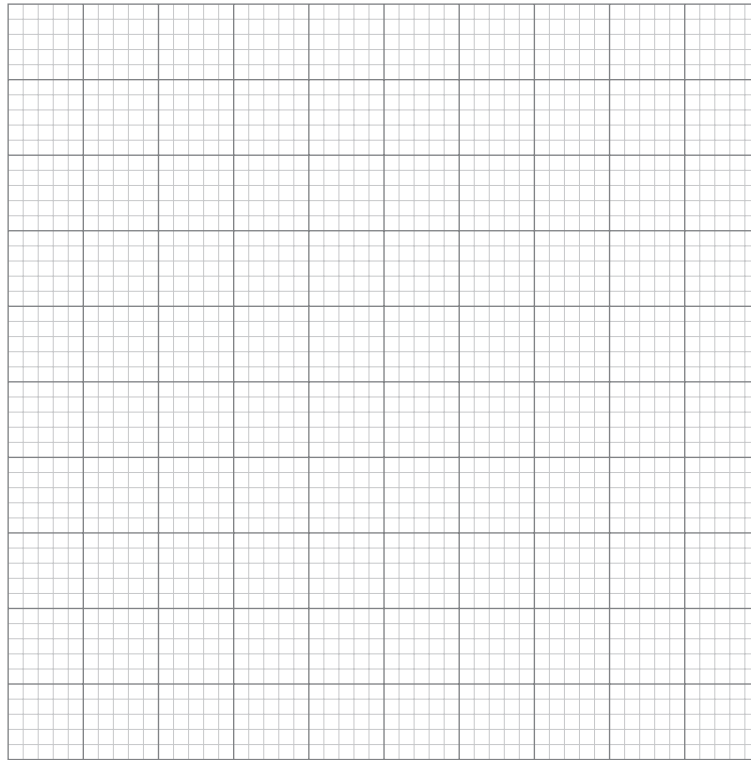
[2 marks]

c) One candidate has a medical certificate to show that his performance in Paper I had been affected by ill health. Which candidate is this likely to be? Justify your answer and suggest how the overall percentage mark for this candidate could be adjusted.

[3 marks]

6 Draw a histogram of the temperatures of a sample of healthy adults that would be consistent with the idea that body temperatures of healthy adults are normally distributed with mean 37°C and standard deviation 0.4°C . Justify your choice of histogram by commenting on **two** of its features.

[6 marks]



- 7 The International Monetary Fund ranks countries according to their Gross Domestic Product (GDP). In 2014, the top six countries were, in order, USA, China, Japan, Germany, UK and France. The table shows approximate GDP per person and health expenditure per person for these countries. The amounts are in US dollars (\$).

Country	GDP per person (\$)	Health expenditure per person (\$)
USA	55 000	9000
China	13 000	400
Japan	37 000	4000
Germany	46 000	5000
UK	40 000	3600
France	40 000	4900

- a) Plot a scatter graph of health expenditure per person (y) against GDP per person (x). Use the grid on the next page.

[2 marks]

- b) Calculate the equation of the regression line of y on x and draw this line on your scatter graph.

[5 marks]

- c) Italy has a GDP per person of \$36 000 and India has a GDP per person of \$6000. Use your regression line to estimate the expenditure on health in each of these two countries. Explain the likely accuracy of each answer.

[4 marks]

