

Level 3 Certificate

MATHEMATICAL STUDIES

Paper 2B

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.

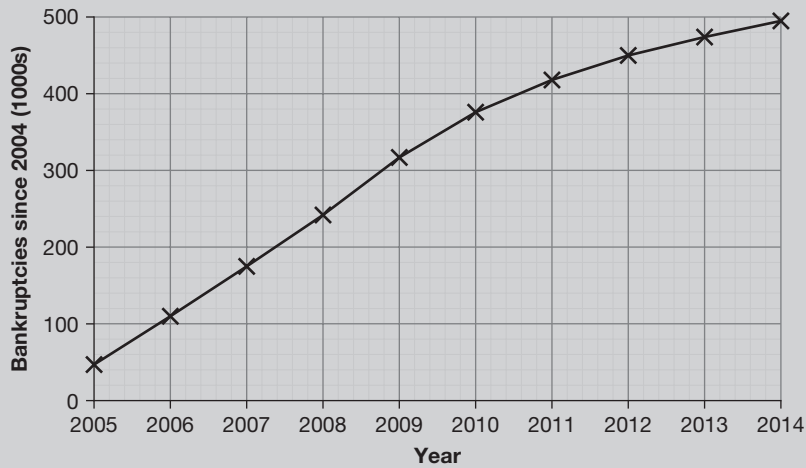
Advice

- 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]

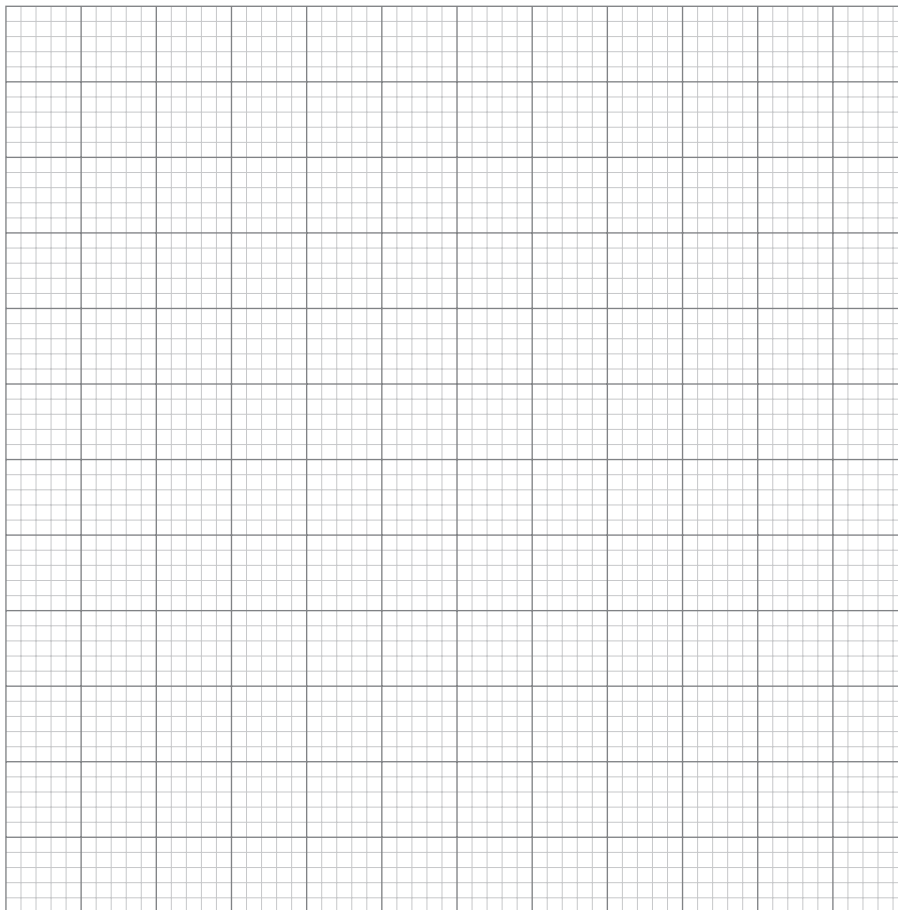
4 A small project requires the completion of six tasks. The table below shows:

- the minimum time required to complete each task
- the earliest start time for each task
- the latest finish time for each task.

Activity	Duration (hours)	Earliest start time	Latest finish time
A	2	0	2
B	3	0	3
C	1	0	4
D	2	2	4
E	2	2	6
F	2	4	6

- a) Draw a Gantt chart (cascade diagram) for the project.
Assume that each activity starts as early as possible.

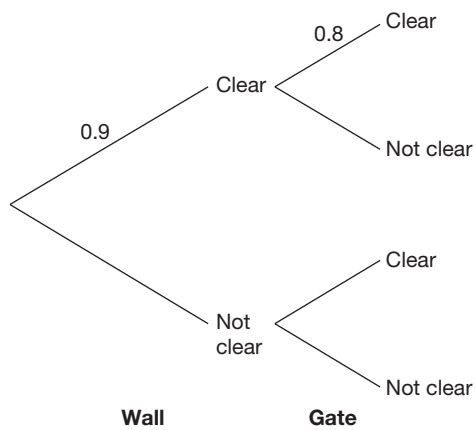
[3 marks]



- b) Assume that each task can be done by one person and that two people are available.
State when any non-critical activities should be started.

[2 marks]

- 5 A double combination of jumps in a show-jumping course consists of a wall and a gate. For each jump which is not successfully cleared a rider is given four faults. The probabilities of a particular horse successfully clearing each jump are as shown on the tree diagram.



- a) Making any necessary assumptions, calculate the expected number of faults for this horse. Show all your working.

[5 marks]

- b) What assumptions have you had to make about the probabilities? Do you consider these assumptions to be reasonable? Justify your answer.

[2 marks]

- 6 Outline planning permission has been granted to convert a barn into three new houses. The initial stage of the construction has been divided into a number of activities, as shown in the table below. The minimum duration needed to complete each activity is also shown.

Activity	Immediate predecessor	Duration (weeks)
A: Complete detailed survey	–	5
B: Obtain full planning permission	A	10
C: Purchase materials	B	3
D: Appoint subcontractors	B	4
E: Prepare site	C, D	2
F: Remedial work on walls	C, D	4
G: Build access roads	E	3
H: Re-roof barn	F, G	3
I: Excavate extra foundations	G	2
J: Lay drains	H, I	3

- a) Construct an activity network for the project. Determine the earliest start time and the latest finish time for each activity.

[6 marks]

- b) List the critical path and state its length.

[2 marks]

7 Flu vaccinations are freely available for people over the age of 65. Vaccinated people can still catch flu but are much less likely to require hospitalisation.

In a study at one surgery of 100 patients over 65, it was found that

- 73 had been vaccinated
 - 5 vaccinated patients caught flu
 - 4 non-vaccinated patients caught flu.
- a) Draw a Venn diagram to represent this information.

[3 marks]

b) A randomly selected patient is found to have caught flu.
What is the probability she had been vaccinated?

[2 marks]

c) A doctor encourages an over-65 patient to have a flu vaccination by saying,
'Your chance of catching flu will be roughly halved if you have the vaccination'.
Comment fully on whether or not this statement is justified.

[5 marks]

8 The initial cost of entering a design competition is £2000. The three companies accepted to take part in the final can expect a further cost of £5000 each. The prize for the single winning team is £30 000. You estimate that your design company has a probability of 0.2 of making the final and then that all the finalists would have an equal chance of winning the prize.

a) What is your expected gain or loss from entering the competition? You must fully justify your answer.

[6 marks]

b) Why might a company enter a competition even if a loss is expected?

[2 marks]

c) Why might a company not enter a competition even if a gain is expected?

[2 marks]
