

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname _____

Forename(s) _____

Candidate signature _____

Level 3 Certificate

MATHEMATICAL STUDIES

Paper 2B Critical Path and Risk Analysis

Date

Morning

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:

- a clean copy of the Preliminary Material (enclosed)
- a scientific calculator or a graphics calculator
- a copy of the formulae sheet
- a ruler.

Instructions

- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the space provided. Do not write outside the box around each page or on blank pages.
- Show all necessary working; otherwise, marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- 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.

Information

- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You may ask for more answer paper and graph paper, which must be tagged securely to this answer booklet.
- The paper reference for this paper is 1350/2B.

Answer **all** questions in the spaces provided.

- 1** Gerry is a teaching assistant.
The four students he supports each completed a short test consisting of four questions.
Their marks in the short test are shown in the table.

Student	Question 1	Question 1	Question 3	Question 4	Total mark	Percentage (%)
Rachel	3	3	4	5	15	60
Shafi	3	3	4	9	19	76
Ash	2	1	2	5	10	40
Karen	3	2	4	5	14	56
Mode	3	3	4	5		

- 1 (a)** A teacher wants to find out the **maximum total mark** available in the short test.

Circle the **maximum total mark**.

[1 mark]

19

25

76

100

- 1 (b) Identify **one** formatting error in Gerry's table and suggest **three** improvements he could make to the table.

[4 marks]

Error _____

Improvement 1 _____

Improvement 2 _____

Improvement 3 _____

Question 1 continues on the next page

1 (c) Amy gave the same test to the five students she supports.

Their marks are shown in the table.

Student	Question 1	Question 2	Question 3	Question 4	Total mark	Percentage (%)
Ben	3	2	5	6	16	64
Cho	3	1	6	8	18	72
Liz	2	1	2	5	10	40
Nick	3	4	3	7	17	68
Paul	3	3	4	6	16	64

In a meeting, Amy presented her students' marks to her colleagues.

Two of her colleagues made the statements below.

'Most of the students that Amy supports did very well in Question 1.'

(Richard)

'The mean percentage for the five students that Amy supports is 60%.'

(Din)

Critically analyse these two statements.

Show working to justify your comments where necessary.

[4 marks]

Richard's statement

2 Use **Communications Market Report** in the Preliminary Material.

2 (a) A journalist suggested that the format and content of the report were not presented well.

Give **three** examples to support her suggestion.

[3 marks]

Example 1

Example 2

Example 3

2 (c) Three online bloggers made claims about the CMR as follows.

‘The number of superfast broadband connections had increased by a factor of three fifths in one year.’

(Rasheed)

‘Overall, BT lost over 20 000 landline customers in 2013.’

(Francoise)

‘Overall in 2014, the number of national radio stations declined.’

(Eugene)

Does the data support these claims? Justify your answers.

[5 marks]

Rasheed

Francoise

Eugene

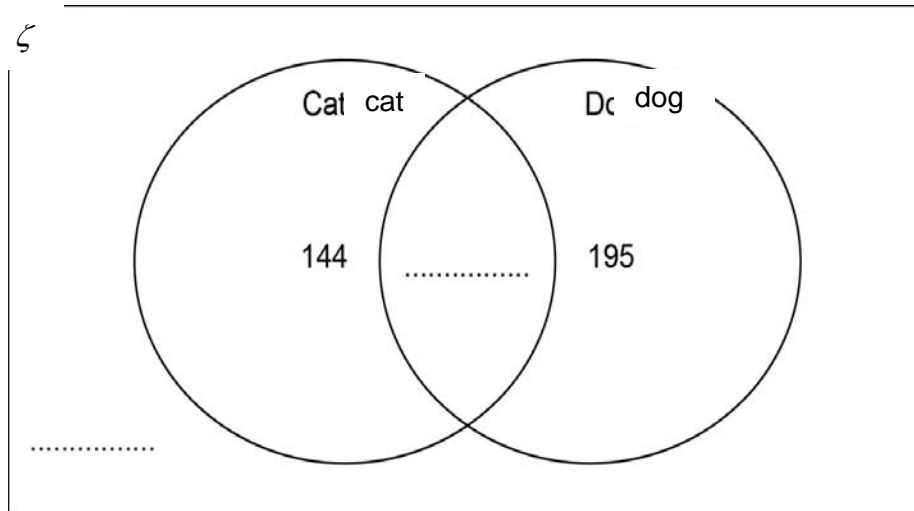
- 3** In a survey of 600 households, one of the questions asked if a household had a cat or a dog or both.

The Venn diagram below shows some of the results.

4% of households said they had both a cat and a dog.

- 3 (a)** Complete the Venn diagram with the **two** missing figures.

[4 marks]



- 3 (b)** Calculate the probability that a household in the survey that has a cat, also has a dog.

[2 marks]

Turn over for the next question

5 A company makes bird baths from stone blocks.

Once an order is received, the process of making and supplying a bird bath can be split into a number of activities, as shown.

Task	Activity	Immediate predecessor	Duration (days)
A	Receive and print out order	-	0.5
B	Upload order to company tracking system	A	1
C	Order stone blocks from supplier	A	1.5
D	Issue work order for employees	B, C	1
E	Create invoice and send to customer	B	1
F	Make bird bath	D	4.5
G	Process payment	E	0.5
H	Print receipt	G	0.5
I	Package bird bath and send to customer	F, H	1.5

5 (a) Construct an activity network for this project.

State the earliest start time and latest finish time for each activity.

[8 marks]

- 5 (b) Which of the tasks has half a day of float time?
Circle your answer.

B

E

G

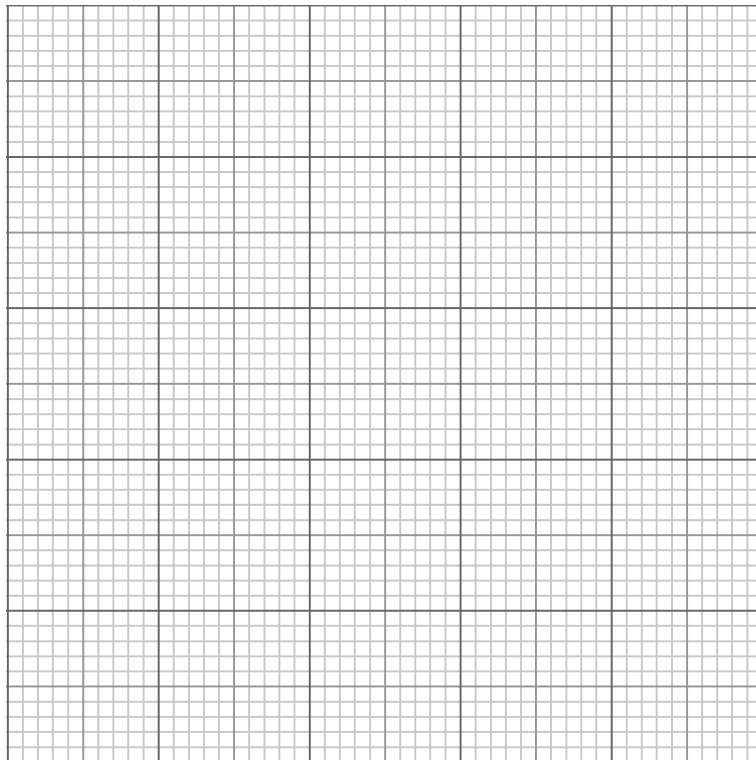
H

[1 mark]

- 5 (c) List the critical path.

[1 mark]

- 5 (d) Draw a Gantt chart for the process.

[4 marks]

- 6** A company has a £6 million contract to build a boat next year.
The contract has a 0.65 probability of delay.
The penalty for delay is 10% of the value of the contract.

Taking **either** of the following actions now would reduce the risk of delay.

- Reorganising the company at a cost of £120 000 would reduce the probability of delay to 0.3
- Upgrading the IT systems at a cost of £185 000 would reduce the probability of delay to 0.16

- 6 (a)** Calculate the expected penalty if no action is taken to reduce the risk of delay.

[3 marks]

There are no questions printed on this page

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