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I declare this is my own work.

# Level 3 Certificate MATHEMATICAL STUDIES

## Paper 2B Critical Path and Risk Analysis

Thursday 23 May 2024

Morning

Time allowed: 1 hour 30 minutes

### Materials

For this paper you must have:

- a clean copy of the Preliminary Material and the Formulae Sheet (enclosed)
- a scientific calculator or a graphics calculator
- 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 spaces provided. Do not write outside the box around each page or on blank pages.
- If you need extra space for your answer(s), use the lined pages at the end of this book. Write the question number against your answer(s).
- Show all necessary working; otherwise, marks for method may be lost.
- Do all rough work in this book. Cross through any work 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 or graph paper, which must be tagged securely to this answer booklet.

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
<b>TOTAL</b>	



J U N 2 4 1 3 5 0 2 B 0 1

G/LM/Jun24/G4001/E7

**1350/2B**

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

**1** Use **Economics of music streaming** from the Preliminary Material.

**1 (a)** Use the information in **Graph 2** to estimate the number of premium Google (including YouTube Music) subscriptions there were in the UK in January 2020

Which is the best estimate?

Tick (✓) **one** box.

**[1 mark]**

Nine million

Nine hundred thousand

Ninety thousand

Nine thousand

**1 (b)** Suggest two improvements that could be made to the **graphs** on pages 2 and 3 of the Preliminary Material.

**[2 marks]**

Improvement 1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Improvement 2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_



**1 (c)** Readers of the extract commented that it was difficult to follow **Diagram 1**

Give **one** reason why they might have said this.

[1 mark]

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**1 (d)** In a sports club,

20 players are daily active users of BBC Sounds

27 players are weekly active users of BBC Sounds.

Compare

the proportion of listeners at the sports club who are daily active users  
with

the proportion of all consumers who are daily active users.

Use the information in **Graph 1** to justify your comparison.

[2 marks]

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**Question 1 continues on the next page**

**Turn over ►**



1 (e) Two music websites commented on the report.

Streaming services kept more money than was given to recording artists and songwriters/composers combined.

*The Recorder*

For every 4 Amazon Music Prime subscriptions, there were about 7 Spotify subscriptions.

*Waxing Lyrical*

Using the Preliminary Material, comment on the validity of each website's claim.

You **must** show your working.

**[4 marks]**

The Recorder

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Waxing Lyrical

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1 (f) Another music website made this claim.

Only 13% of consumers do **not** use a streaming service daily.

*The Daily Fret*

Is the website's claim correct?

Use **Graph 1** to justify your answer.

[1 mark]

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11

Turn over for the next question

Turn over ►



**2** Use **Economics of music streaming** from the Preliminary Material.

Molly is researching how the income from Spotify was shared out in 2020

In 2020, the price of a Spotify premium subscription was £9.99 per month in the UK

**2 (a)** Molly disagreed with the report, saying,

“As VAT is 20%, the Government should receive almost £2 for each monthly subscription, not £1.67”

Is Molly correct?

Show working to justify your answer.

**[3 marks]**

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- 2 (b)** Molly used the following method to estimate the total amount of Spotify's UK subscription revenue that should have been received by **recording artists** in 2020

Yearly subscription cost was  $£9.99 \times 12 = £119.88$

There were  $226\,000\,000 \times 0.44 = 99\,440\,000$  subscribers in the UK

Total UK subscription revenue was  $99\,440\,000 \times £119.88 = £11\,920\,867\,200$

Recording artists received  $£11\,920\,867\,200 \times 0.0165 = £196\,694\,308.80$

So, around £200 million.

Identify **two** mistakes in Molly's calculation.

You do **not** need to carry out any calculations.

**[2 marks]**

Mistake 1

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Mistake 2

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5

**Turn over for the next question**

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- 4 A survey asked 250 households if they own a laptop and if they have access to full fibre broadband.

The table shows the results.

		Full fibre broadband	
		Yes	No
Laptop	Yes	64	82
	No	42	62

- 4 (a) One household included in the survey owns a laptop.

Work out the probability the household does **not** have access to full fibre broadband.

[1 mark]

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Answer \_\_\_\_\_



**4 (b)** In the UK, 12.4 million households have access to full fibre broadband.

Use the information in the table to estimate the number of households in the UK that own a laptop.

**[3 marks]**

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Answer \_\_\_\_\_

**4 (c)** Give **one** reason why your answer to **question 4 (b)** might **not** be a good estimate.

**[1 mark]**

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5

**Turn over for the next question**

**Turn over ►**



- 5** Pavlova is a dessert made with meringue, fruit and cream.  
Meringue is made with a baked mixture of egg whites and sugar.  
The table lists the activities needed to make a pavlova.

Task	Activity	Immediate predecessor(s)	Duration (minutes)
A	Whisk meringue mixture	–	5
B	Prepare baking tray	–	3
C	Heat oven	–	10
D	Put meringue mixture on baking tray	A, B	1
E	Bake meringue	C, D	60
F	Cool meringue	E	60
G	Clean bowl and whisk	D	2
H	Cut up fruit	–	3
I	Make sauce	H	5
J	Whisk cream	G	7
K	Assemble pavlova	F, I, J	2

- 5 (a)** Complete the activity network on the opposite page.  
Include the earliest start time and latest finish time for each activity.

**[7 marks]**

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A	
5	

B	
3	

C	
10	

H	
3	

Question 5 continues on the next page

Turn over ►



**5 (b)** State the critical path.

**[1 mark]**

Answer \_\_\_\_\_

**5 (c)** Anna plans to make a pavlova and serve it at 1:30 pm

**5 (c) (i)** Work out the task she must start first and the latest time she can start it.

**[3 marks]**

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Anna must start task \_\_\_\_\_ by no later than \_\_\_\_\_

**5 (c) (ii)** Anna says,

“I **cannot** do tasks A and B at the same time, so I will do task A and then task B.”

Will Anna need to start making the pavlova earlier than planned?

Give a reason to justify your answer.

**[1 mark]**

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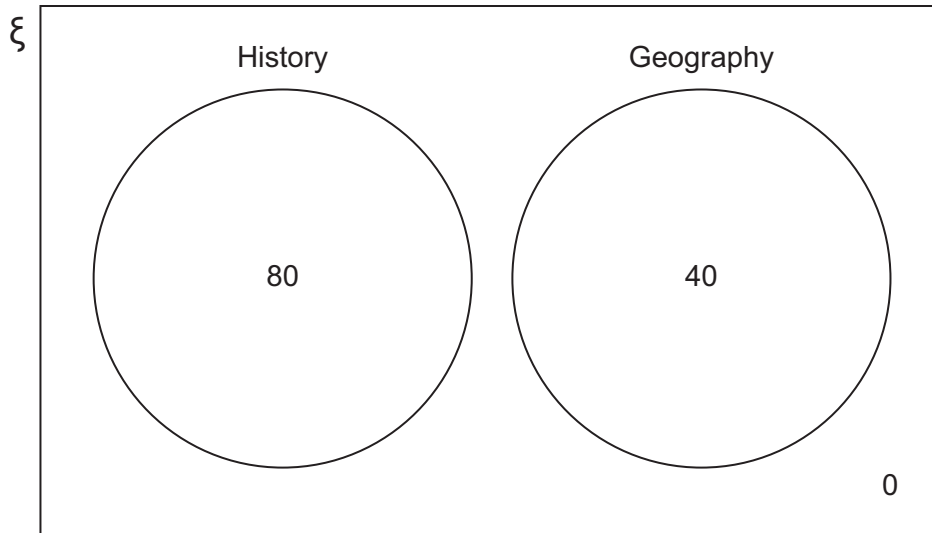
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12
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- 6** In a town there are two secondary schools, Audley Academy and Banford School.  
At Audley Academy  
there are 120 students in Year 10  
all students study either history or geography.

The Venn diagram shows the number of students in Year 10 that study each subject at Audley Academy.



- 6 (a)** Two students in Year 10 at Audley Academy are chosen at random.

Work out the probability that one studies history and one studies geography.

**[2 marks]**

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Answer \_\_\_\_\_

**Question 6 continues on the next page**

**Turn over ►**



**6 (b)** At Banford School

there are 180 students in Year 10

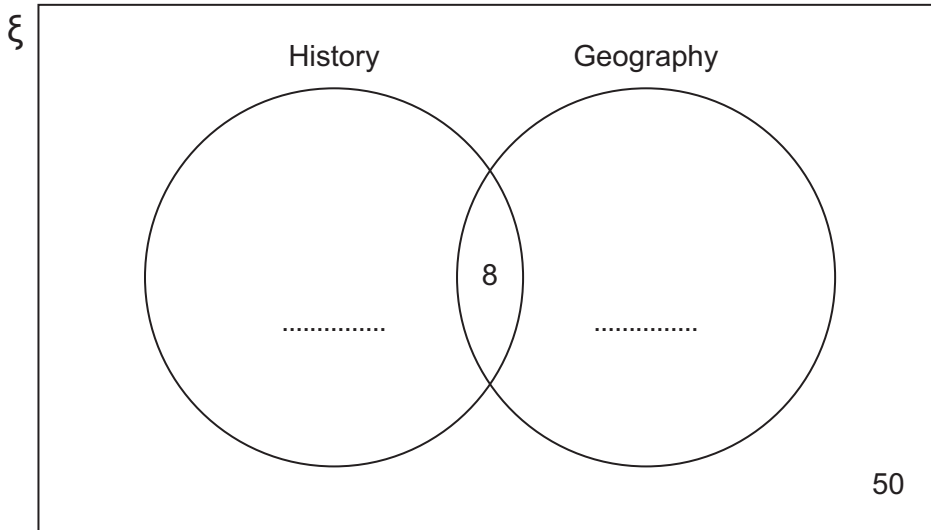
8 students in Year 10 study both history and geography

50 students in Year 10 study neither history nor geography

twice as many students study history as geography.

Complete the Venn diagram.

**[3 marks]**



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**6 (c)** One student in Year 10 is chosen at random from **each school**.

Work out the probability that they both study geography.

**[3 marks]**

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Answer \_\_\_\_\_

8

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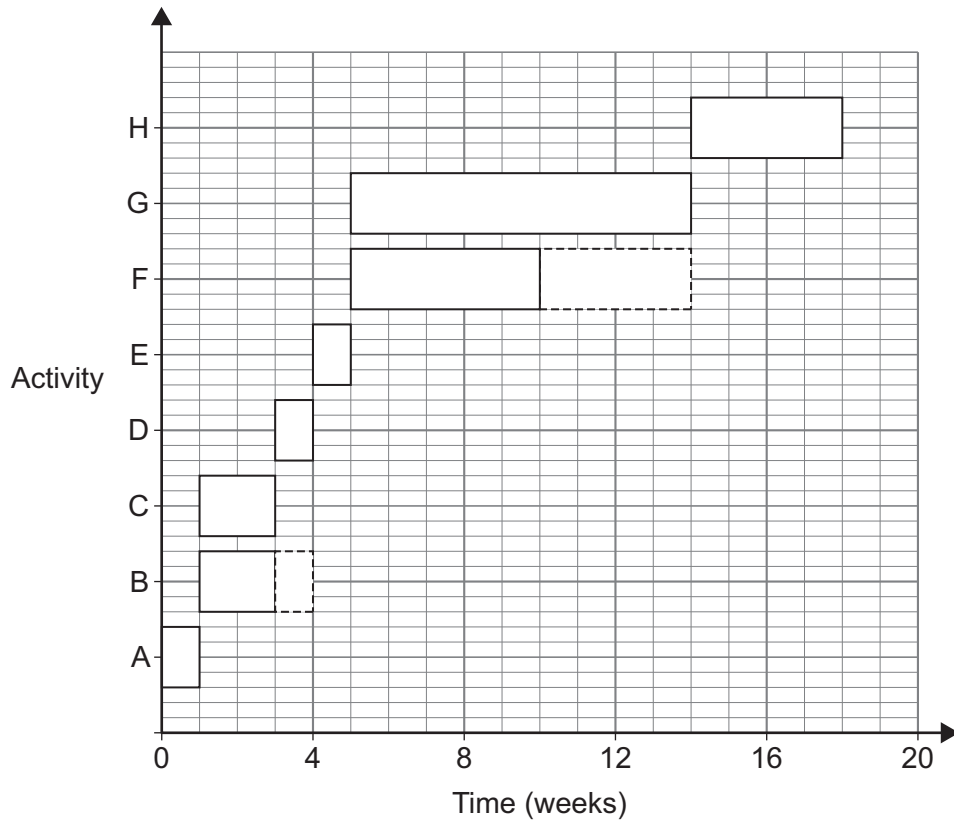
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7

Aled is managing a project to create a new mobile app.

This Gantt chart shows the eight activities that make up the project.



**7 (a)** The planned start date of the project is 1 September.

Aled says,

“If all activities are on time, the project will be completed by the end of December.”

Is Aled correct?

You **must** show your working.

**[2 marks]**

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**7 (b)** After the project was completed, Aled compared how long each activity took compared to the Gantt chart.

Activity F took twice as long as planned.

All other activities took the planned time.

Work out how many weeks the whole project took to complete.

**[2 marks]**

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Answer \_\_\_\_\_ weeks

4

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**8 (c)** Give one reason why Pete may **not** follow your advice.

**[1 mark]**

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**8 (d)** Pete decides he will **not** drive his van at weekends.

What would happen to the total expected cost of getting the silver level of cover?

Circle your answer.

**[1 mark]**

Increase

Decrease

Stay the same

Not enough information

11

**END OF QUESTIONS**



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2 8



2 4 6 A 1 3 5 0 / 2 B

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