

Please write clearly in block capitals.

Centre number

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Candidate number

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Surname

Forename(s)

Candidate signature

I declare this is my own work.

Level 3 Certificate MATHEMATICAL STUDIES

Paper 2B Critical Path and Risk Analysis

Wednesday 24 May 2023

Afternoon

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	
TOTAL	



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

G/TI/Jun23/E4

1350/2B

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ANSWER IN THE SPACES PROVIDED**



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

- 1** The table shows information about the top four teams in the 2020 Olympic Games.

Rank	Team	Number of medals			Number of competitors
		Gold	Silver	Bronze	
1	United States	39	41	33	613
2	China	38	32	18	406
3	Japan	27	14	17	556
4	Great Britain	22	20	22	376

- 1 (a)** Work out the ratio of gold medals to bronze medals for the **United States**.
Circle your answer.

[1 mark]

11 : 13

13 : 11

24 : 11

13 : 24

- 1 (b)** A British newspaper made the following claim.

Great Britain won more medals per competitor than the United States.

Does the data support this claim?

Show working to support your answer.

[3 marks]

Turn over ►



2 Use **Online Nation** from the Preliminary Material.

2 (a) Suggest **two** improvements that could be made to the **graphs** in the Preliminary Material.

[2 marks]

Improvement 1 _____

Improvement 2 _____

2 (b) **Graph 1** in the Preliminary Material is based on the results of a survey.
35 children aged 7 said they use **messaging or social media**.

Estimate the number of children aged 7 that took part in the survey.

[3 marks]

Answer _____



2 (c) Mark works for a children's charity.

The charity is concerned by the amount of time that children spend online.

He calculates the percentage increase in time that children aged 15–16 spend online compared to children aged 7–8

Here is his calculation, which uses information from the last sentence in the Preliminary Material.

$$\frac{4.54 - 2.54}{2.54} = 0.787$$

$$0.787 \times 100 = 78.7$$

So, children aged 15–16 spend 78.7% longer online than those aged 7–8

Identify **one** mistake in Mark's calculation and work out the correct percentage increase.

[3 marks]

Mistake _____

Correct calculation and answer _____

Question 2 continues on the next page

Turn over ►



- 2 (d)** Ayesha, a radio journalist, produces a report based on the **Online Nation** extract in the Preliminary Material.

The report used **Graph 1** to make the claim,

“There are more 13-year-olds using messaging or social media than 12-year-olds.”

Give **one** reason why this might **not** be true.

[1 mark]

- 2 (e)** Ayesha commented that the **Online Nation** extract was difficult to follow in places.

Give **two** reasons why she might have said this.

You should **not** comment on the graphs.

[2 marks]

Reason 1 _____

Reason 2 _____



Ayesha wants to comment on how much money social media companies make from children in the UK

- There were approximately 3.2 million children aged 12–15 in the UK
- Instagram made \$24 billion from their 1.41 billion users around the world.
- The average exchange rate was £1 = \$1.28

[5 marks]

[illegible]

Answer £ _____ million

16

Turn over for the next question

Turn over ►



3 Daisy's house is being renovated.

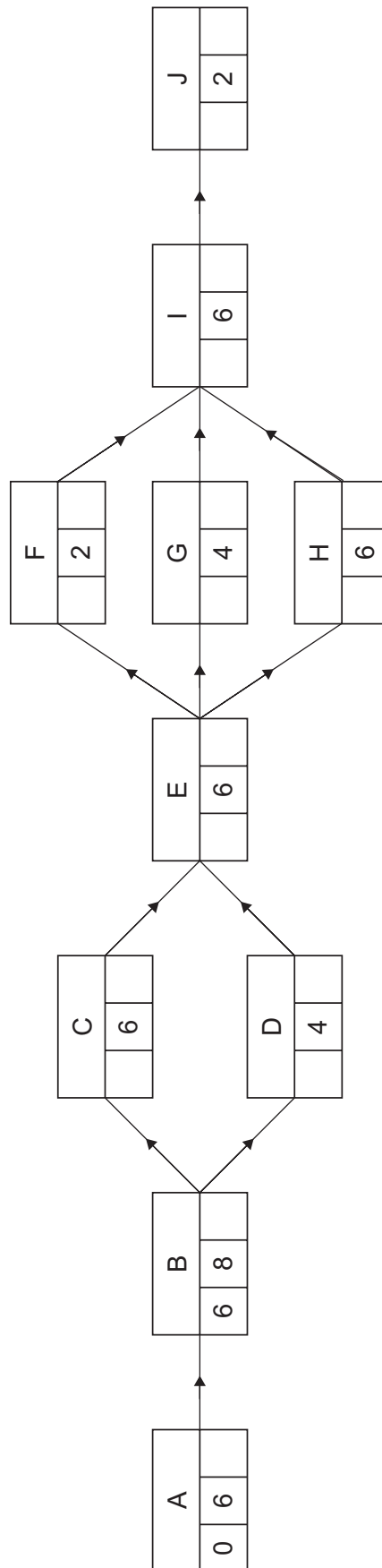
The table lists the activities needed for the renovation.

Task	Activity	Immediate predecessor(s)	Duration (days)
A	House preparation	–	6
B	Replacing floor joists and flooring	A	8
C	Replacing pipework	B	6
D	Rewiring	B	4
E	Plastering	C, D	6
F	Fitting electrical accessories	E	2
G	Fitting boiler, radiators, bath and sinks	E	4
H	Fitting doors and kitchen	E	6
I	Decorating	F, G, H	6
J	Completing final checks	I	2

3 (a) Complete the activity network.

[4 marks]





Turn over ►



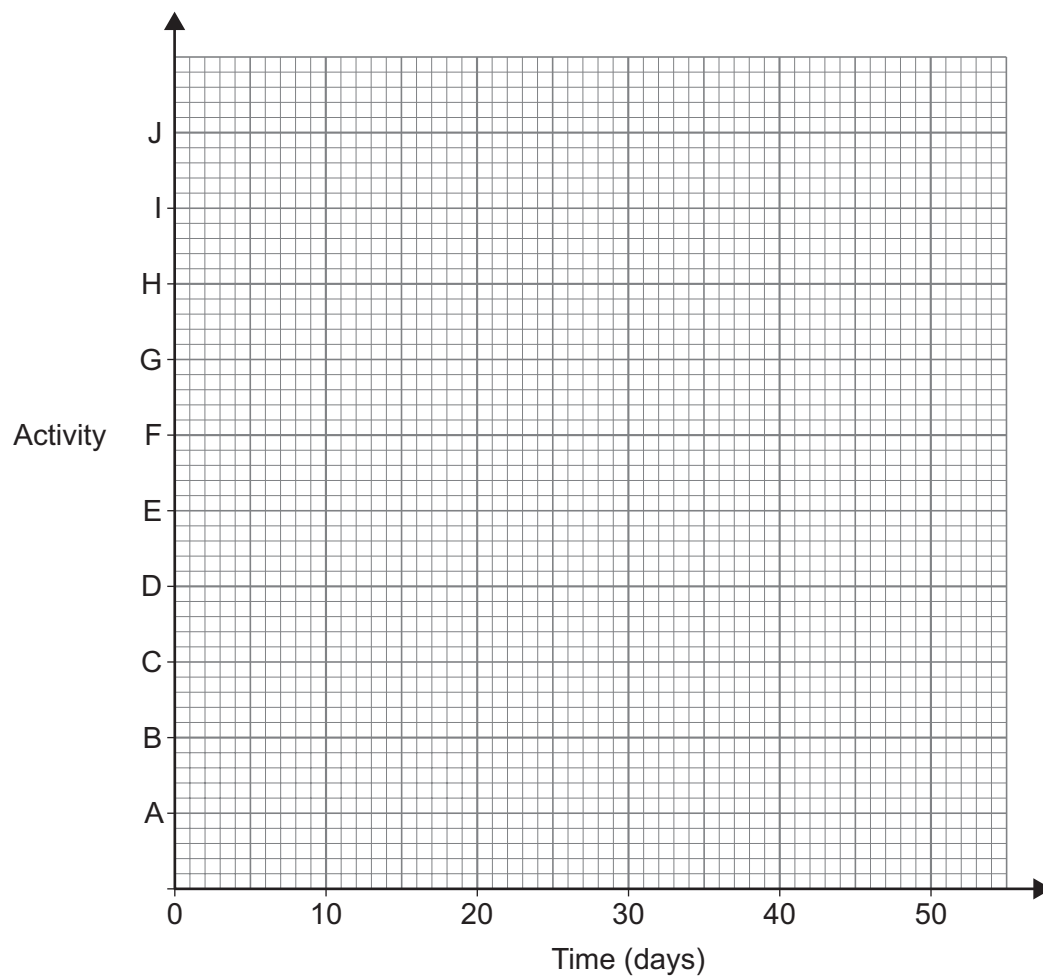
3 (b) State the critical path.

[1 mark]

Answer _____

3 (c) Complete the Gantt chart for the house renovation.

[4 marks]



Turn over for the next question

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Turn over ►



- 4** Pupils from one primary school and one secondary school in Rochdale were asked,
 “What is the main type of transport you use to travel to school?”
 The table shows the results.

Main type of transport	Primary school	Secondary school
Walk	191	328
Bicycle	4	85
Car	180	330
Bus	9	211
Other	6	36
Total	390	990

- 4 (a)** One **secondary** school pupil is chosen at random.

Write down the probability that the pupil travels to school by bicycle.

[1 mark]

Answer _____

- 4 (b)** One pupil is chosen at random from each school.

Work out the probability that **both** pupils travel to school by car.

[2 marks]

Answer _____



- 4 (c)** In Rochdale,
22 650 pupils attend primary school
13 721 pupils attend secondary school.

Using the information in the table, estimate how many pupils in Rochdale travel to school by bicycle.

[3 marks]

Answer _____

- 4 (d)** Give **one** reason why your answer to **Question 4(c)** might **not** be a good estimate.

[1 mark]

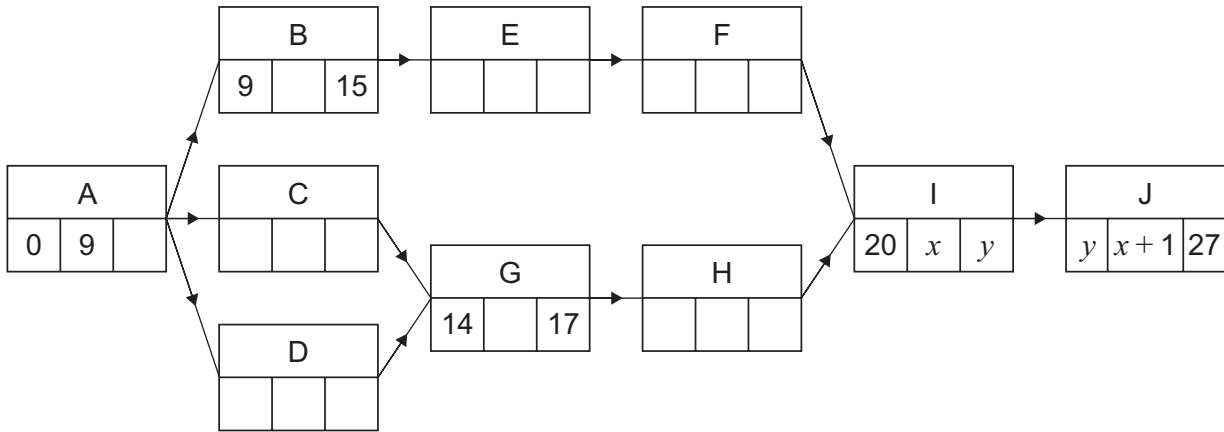
7

Turn over for the next question

Turn over ►



- 5** Noah is a wedding organiser.
A wedding he is organising is made up of ten activities.
He has started to draw this activity network.
Durations are shown in weeks.



- 5 (a)** ABEFIJ is the critical path for this activity network.

- 5 (a) (i)** Work out the duration of activity B.

[1 mark]

Answer _____ weeks

- 5 (a) (ii)** State **one** possible pair of durations for activities E and F.

[1 mark]

E _____ weeks F _____ weeks



- 5 (a) (iii)** Explain why, with the information given, it is **not** possible to work out the duration of activity G.

[1 mark]

- 5 (b)** Work out the values of x and y .

[3 marks]

$x =$ _____

$y =$ _____

6

Turn over for the next question

Turn over ►



- 6** At a school, 32 students in Year 13 passed both parts of their driving test.
- 16 passed both the theory test and the practical test at the first attempt.
 - 19 passed the theory test at the first attempt.
 - 21 passed the practical test at the first attempt.

In the Venn diagram,

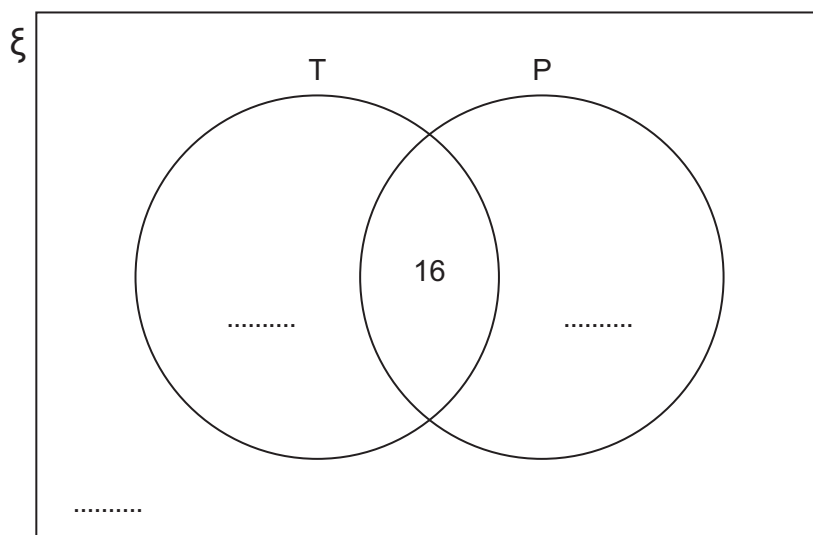
ξ represents the 32 students who passed their driving test

T represents the students who passed the theory test at the first attempt

P represents the students who passed the practical test at the first attempt.

- 6 (a)** Complete the Venn diagram.

[2 marks]



- 6 (b)** One student who passed their theory test at the first attempt is chosen at random.

Work out the probability that they also passed their practical test at the first attempt.

[2 marks]

Answer _____

- 6 (c)** Two students are chosen at random.

Work out the probability that **both** students passed their **theory** test at the first attempt.

[3 marks]

Answer _____

7

Turn over ►



Weather	Number of barbeques
Hot	65
Not hot	15

[10 marks]

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7 (b) Give **one** reason Clara may **not** follow your advice.

[1 mark]

11

END OF QUESTIONS



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2 4



2 3 6 A 1 3 5 0 / 2 B

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