A

AQA

Surname _____

Forename(s) _____

Centre Number_____

Candidate Number_____

Candidate Signature _____
I declare this is my own work.

Level 3 Certificate

MATHEMATICAL STUDIES

Paper 2B Critical Path and Risk Analysis

1350/2B

Wednesday 24 May 2023   Afternoon

Time allowed: 1 hour 30 minutes

At the top of the page, write your surname and forename(s), your centre number, your candidate number and add your signature.

[Turn over]

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.**

- **Answer ALL questions.**

- **You must answer the questions in the spaces provided. Do not write 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.**

DO NOT TURN OVER UNTIL TOLD TO DO SO

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]

_____

_____

_____

_____

_____

_____

_____

_____

4

[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

_____

_____

_____

_____

_____

_____

_____

[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 _____

_____

_____

_____

_____

[Turn over]

2 (f) **Ayesha wants to comment on how much money social media companies make from children in the UK**

She finds the following information for 2020

- **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**

Use this information, together with the data from the Preliminary Material, to estimate how much Instagram made from children aged 12–15 in the UK

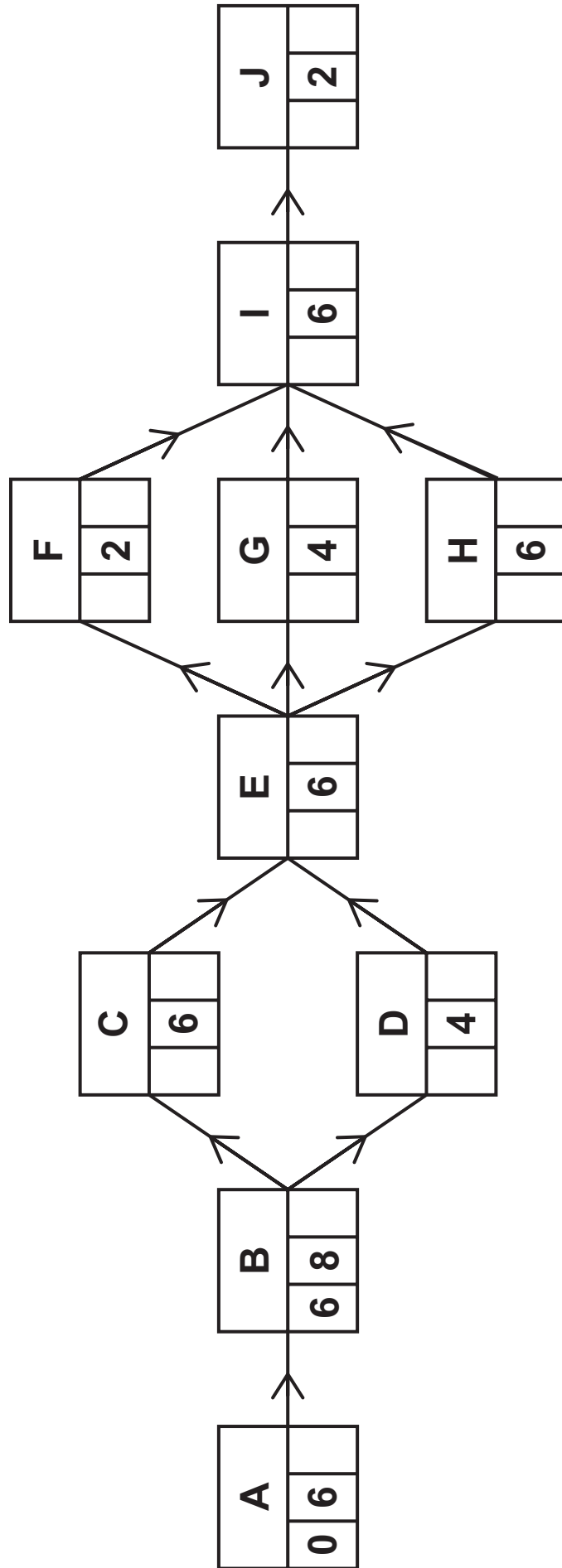**Give your answer to the NEAREST MILLION pounds. [5 marks]**

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Answer £ _____ million 16

[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 on page 16.**
[4 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

[Turn over]

A | 0 | 6

B | 6 8 | 6
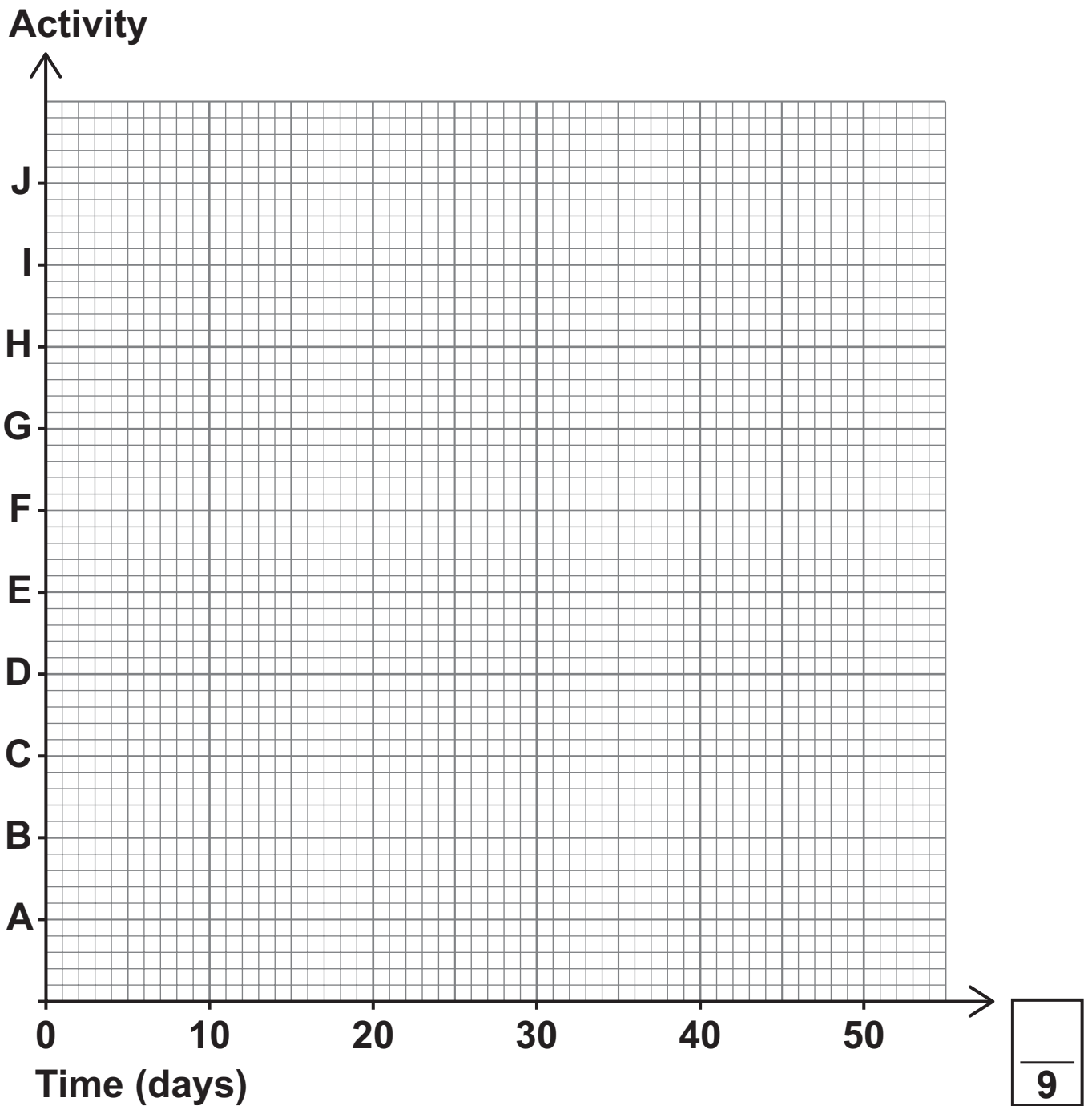
C | 6 |

D | 4 |

E | 6 |

F | 2 |

G | 4 |

H | 6 |

I | 6 |

J | 2 |

3 (b) State the critical path. [1 mark]

Answer _____

3 (c) Complete the Gantt chart for the house renovation. [4 marks]

Activity

Time (days)

9

[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 _____

[Turn over]

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]

_____

_____
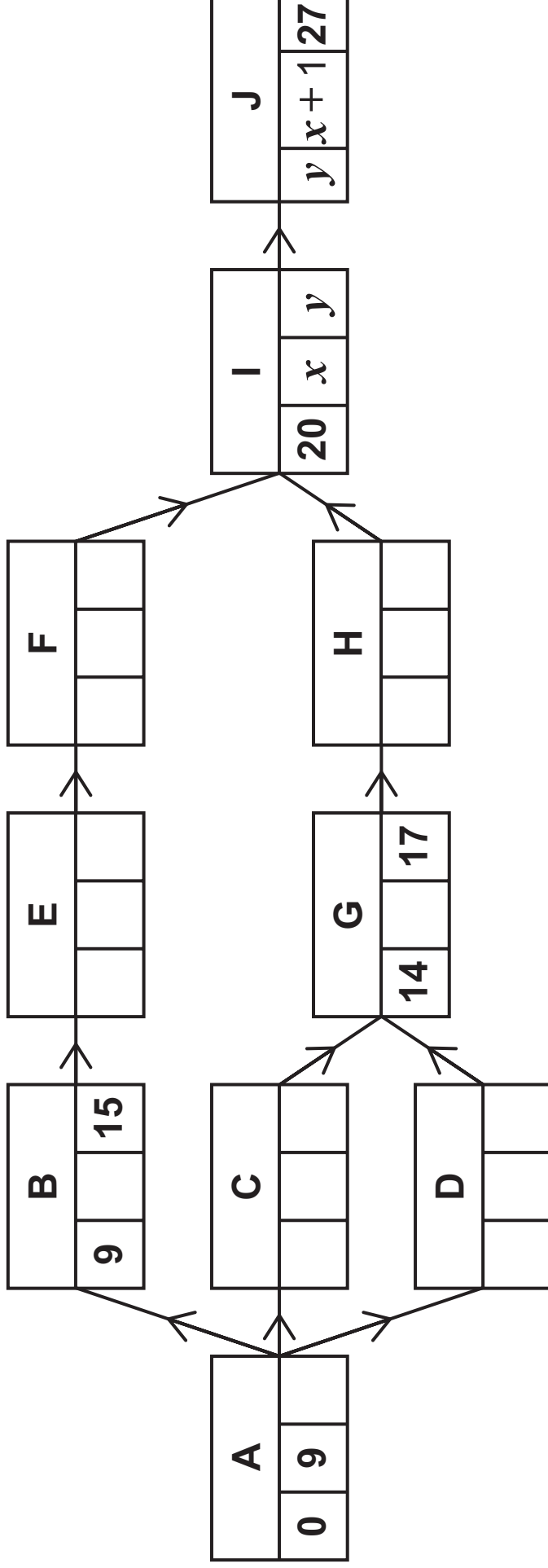
_____

_____

_____

_____

7

[Turn over]

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.

A	
0	9

B	
9	15

C		

D		

E		

F		

G		
14		17

H		

I		
20	x	y

J		
y	$x+1$	27

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

[Turn over]

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]

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.
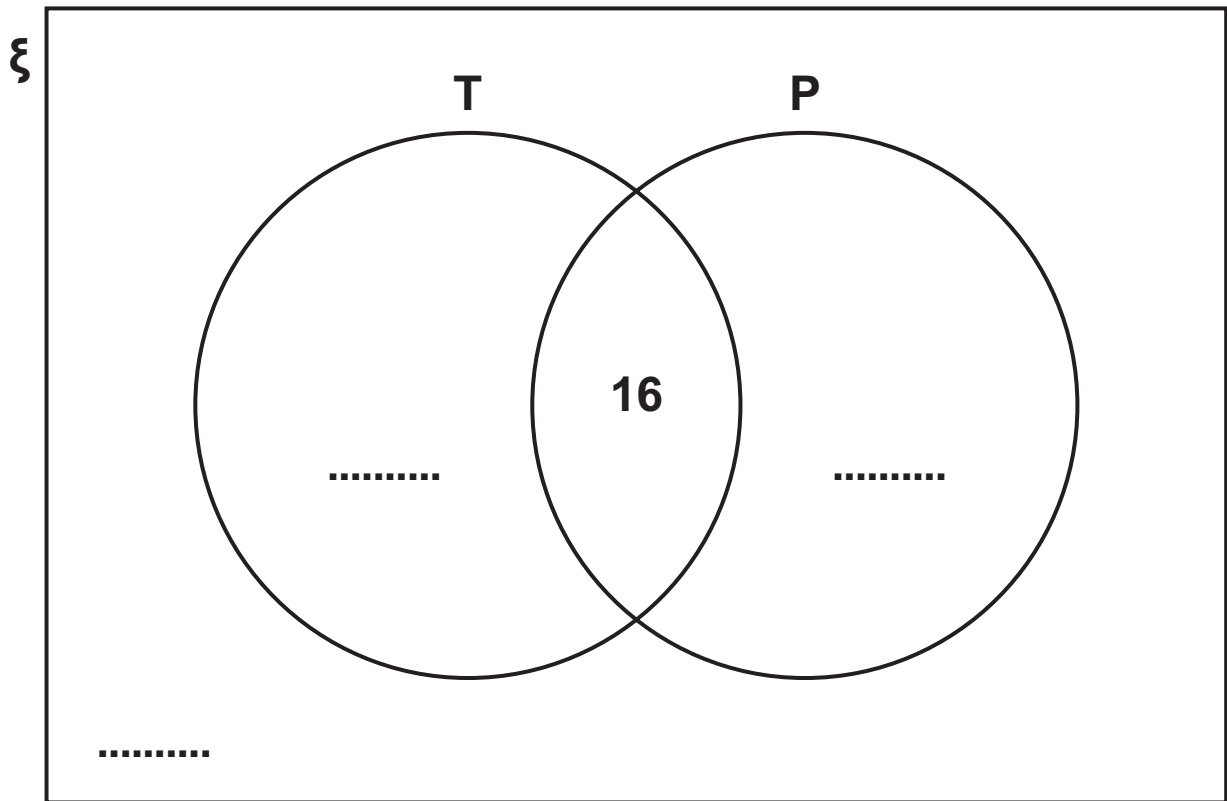
In the Venn diagram, on the opposite page,

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]

ξ

T   P

16

....

....

[Turn over]

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]

7   Clara manages a petrol station.

She plans to buy some disposable barbeques to sell on a bank holiday weekend.

Each pack of 50 barbeques will cost Clara £72

She will sell the barbeques

at £4 each during the weekend

at £1 each after the weekend.

The table shows how many barbeques Clara expects to sell DURING THE WEEKEND, depending on the weather.

WEATHER	NUMBER OF BARBEQUES
Hot	65
Not hot	15

The forecast shows a 70% chance of the weather being hot that weekend.

7 (a) **Advise Clara on whether she should order 50 or 100 barbeques.**

Base your advice on the expected sales.
[10 marks]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

[Turn over]

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

[Turn over]

7 (b)   Give ONE reason Clara may NOT follow your advice. [1 mark]

_____

_____

_____

_____

_____

_____

_____

_____

11

END OF QUESTIONS

Additional page, if required.
Write the question numbers in the left-hand margin.

Additional page, if required.
Write the question numbers in the left-hand margin.

Additional page, if required.
Write the question numbers in the left-hand margin.

BLANK PAGE

For Examiner's Use	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
TOTAL	

G/LM/Jun23/1350/2B/E4

38

236A1350/2B