



Surname _____

Other Names _____

Centre Number _____

Candidate Number _____

Candidate Signature _____

Level 3 Certificate MATHEMATICAL STUDIES

Paper 2B Critical path and risk analysis

1350/2B

Wednesday 22 May 2019 Morning

Time allowed: 1 hour 30 minutes

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.

At the top of the page, write your surname and other names, your centre number, your candidate number and add your signature.

[Turn over]



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.
- 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 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 Helen is researching the amount of fat in 25-gram packets of ready salted and prawn cocktail crisps for three brands, A, B and C.

The table shows the amount of fat for each of the six packets.

	Ready salted (g)	Prawn cocktail (g)
A	10.4	9.5
B	9.6	10.8
C	10.3	10.6



1 (a) Draw lines below to match each box on the left to the correct box on the right. [3 marks]

0.15 g

Mean fat content of the six packets

0.20 g

Median fat content of the six packets

1.30 g

Difference in the mean fat content between the ready salted packets and the prawn cocktail packets

10.20 g

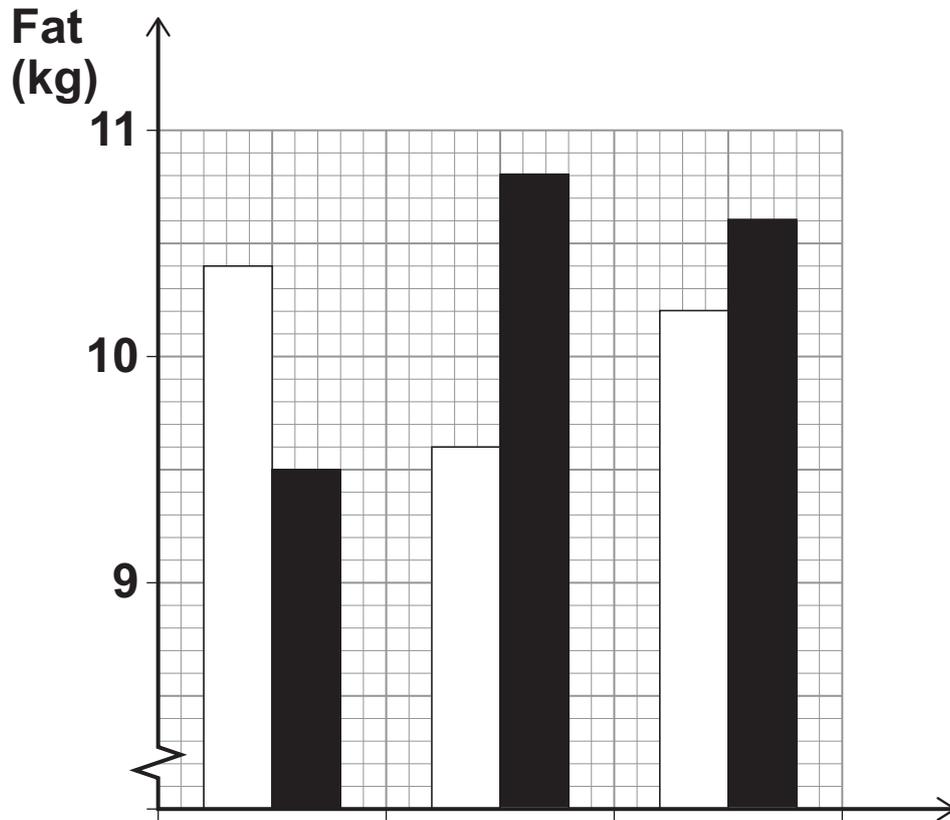
10.30 g

10.35 g

[Turn over]



- 1 (b) Helen produces a bar chart to show the information for the six packets.



KEY

Ready salted Prawn cocktail



Identify TWO errors in the bar chart. [2 marks]

Error 1

Error 2

[Turn over]



2 Use PISA from the Preliminary Material.

2 (a) Suggest THREE improvements that could be made to the article in the Preliminary Material, including the graphs. [3 marks]

Improvement 1

Improvement 2

[Turn over]



Improvement 3

2 (b) A research assistant is comparing the UK average science score with the overall OECD average science score.

She wants to find out how many per cent higher the UK average is than the overall average.

Here is her calculation.

$$509 - 493 = 16$$

$$16 \div 509 = 0.0314$$

So 0.0314% higher



Critically analyse her calculation, making corrections where necessary. [3 marks]

[Turn over]



2 (c) The following comments were made on social media after the 2015 results were published.

**‘For PISA maths in 2015, the range of average scores of the four UK nations is above 10’
Simon**

**‘If Scotland’s percentage decline in reading score from 2012 to 2015 is repeated in the next PISA test, the score will drop below 485’
Rukshana**

2 (c) (i) Is Simon correct?
Show working to support your answer.
[2 marks]



**2 (c) (ii) Is Rukshana correct?
Show working to support your answer.
[3 marks]**

11

[Turn over]



- 3 A survey asked adults whether they suffered from asthma and whether they suffered from migraine.

The table shows the results.

		ASTHMA	
		Yes	No
MIGRAINE	Yes	13	52
	No	28	398

- 3 (a) Work out the probability that an adult in the survey who suffers from asthma does NOT suffer from migraine. [1 mark]



Answer _____

3 (b) In the UK, 5.4 million people suffer from asthma.

Use the information in the table to estimate the number of people in the UK who suffer from migraine. [3 marks]

[Turn over]



Answer _____

3(c) Give ONE reason why your answer to QUESTION 3(b) might NOT be a good estimate.
[1 mark]

5

[Turn over]



4 A toy company has a contract to supply a new kind of toy for a supermarket.

The toy company will design and make the toys.

The packaging will be made by another company, based overseas.

When completed, the packaging will be delivered to the toy company by ship.

The toy company will then pack the finished toys and deliver them to the supermarket.

The table below lists the activities needed to deliver the toy to the supermarket.

The duration of each activity and its immediate predecessors are shown.

Task	Activity	Immediate predecessor(s)	Duration (days)
A	Design toy	–	8
B	Test toy	A	7
C	Finalise toy design	B	5
D	Make toy	C	18
E	Write instructions for use	C	2
F	Print instructions	E	2
G	Design packaging	A	2
H	Make packaging	G	4
I	Deliver packaging	H	23
J	Package toy	D, F, I	3
K	Deliver toy to supermarket	J	2



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A	

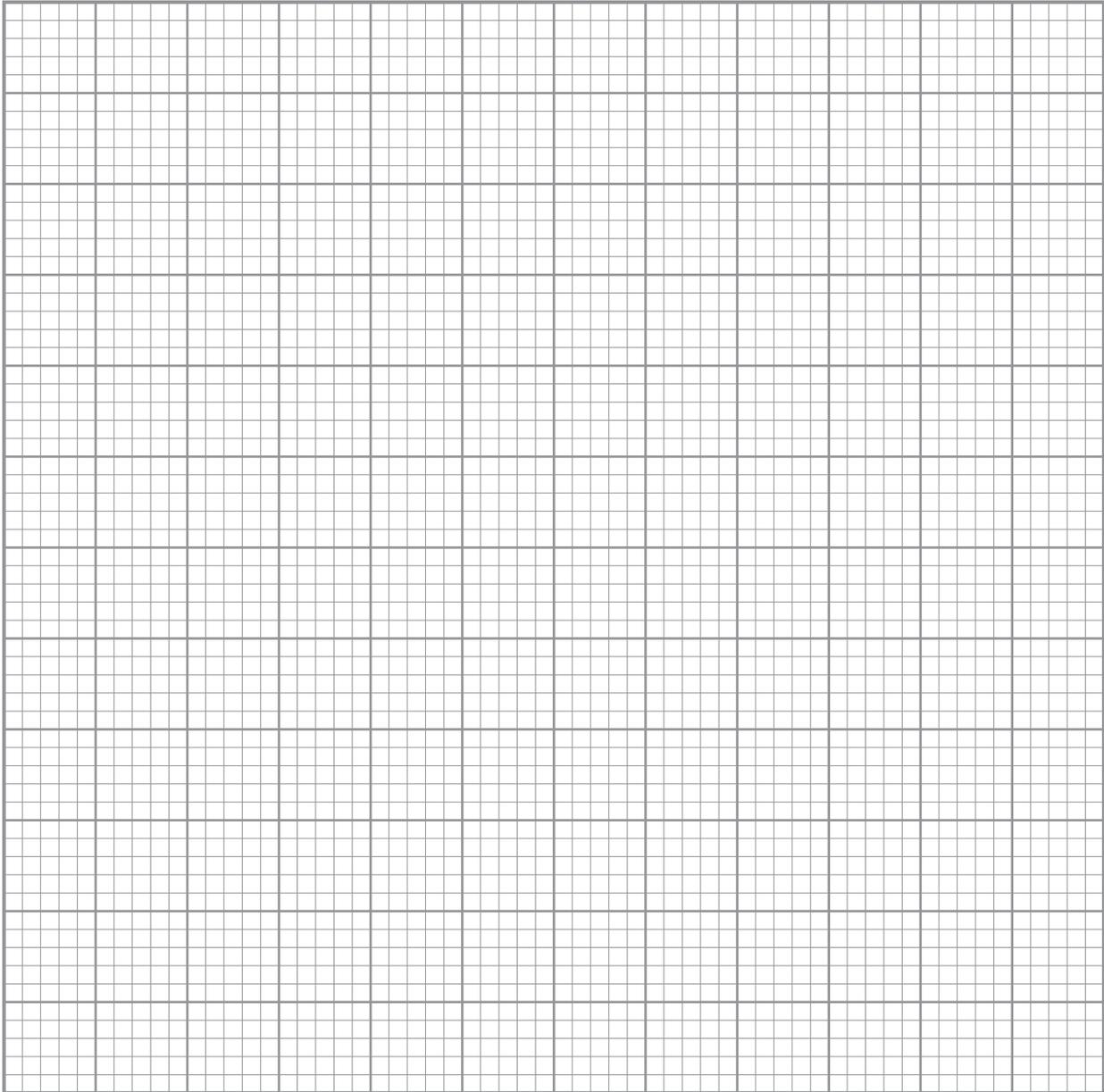
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F	Print instructions	E	2
G	Design packaging	A	2
H	Make packaging	G	4
I	Deliver packaging	H	23
J	Package toy	D, F, I	3
K	Deliver toy to supermarket	J	2

4 (b) Draw a Gantt chart (cascade diagram) for the project. [4 marks]





[Turn over]



4 (c) The toy company has been warned that bad weather may cause the delivery of the packaging to take longer than the expected 23 days.

4 (c) (i) What is the float, in days, for activity I (Deliver packaging)?
Circle your answer. [1 mark]

1

14

15

23

4 (c) (ii) The company delivering the packaging estimates the probability of delay as follows.

Delay (days)	Probability
0	0.08
1	0.21
2	0.35
3	0.30
4 or more	0.06

Estimate the probability that the delivery of the toys to the supermarket will be delayed.
[2 marks]

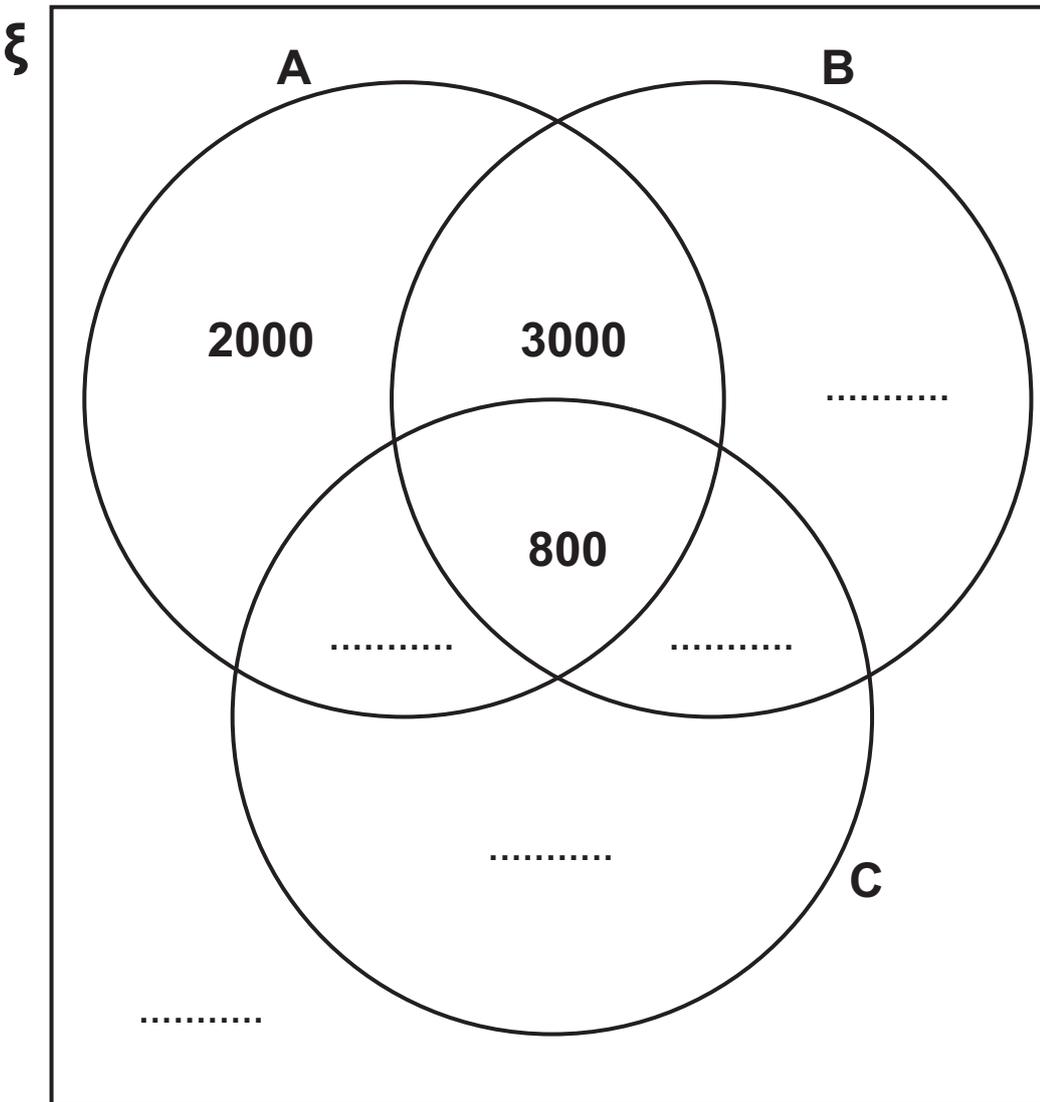


5 20 000 students enrolled at a university in 2017
Of these 20 000 students,

- 6800 students were aged 25 or over
- 10 800 students were female, and the rest were male
- 4400 were non-UK students, with 2000 of these being female.

5(a) Complete the Venn diagram. [4 marks]

Key: A aged 25 or over
B female
C non-UK



5 (b) Use the Venn diagram to state how many male students from the UK aged under 25 enrolled at the university in 2017 [1 mark]

Answer _____

5 (c) A female student is chosen at random from the 20 000 students.

Work out the probability that she is aged under 25

Give your answer as a fraction in its lowest terms. [2 marks]

Answer _____

[Turn over]



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5 (d) Two students are chosen at random from the 20 000 students.

Work out the probability that one is a non-UK student and the other is from the UK.
Give your answer to two decimal places.
[2 marks]

Answer _____

9

[Turn over]



6 A film unit is making a wildlife documentary series.

Humpback whales sometimes appear at the location where the unit is filming.

The producer wants to film these whales, but is concerned about the costs, and there are only two more weeks before the deadline for the end of filming.

You are working on the project as an assistant producer.

You have been given the following estimated probability and costs.

- **The probability that the whales will appear in any one week is 0.4**
- **The cost of staying at the location is £50 000 per week**
- **The cost of filming the whales if they appear is £30 000**
- **If the unit films the whales, the income from the film will increase by £200 000**

The producer is considering these three options:

OPTION A

Stop filming and leave immediately.

OPTION B

Stay at the location for one more week. If the whales appear in this week, film the whales.

If not, stop filming and leave.



6 (b) Give ONE reason why the producer might decide NOT to follow your advice. [1 mark]

12

END OF QUESTIONS



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For Examiner's Use	
Question	Mark
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TOTAL	

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