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|---------------------|--|------------------|--|
| Surname             |  | Other Names      |  |
| Centre Number       |  | Candidate Number |  |
| Candidate Signature |  |                  |  |

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General Certificate of Secondary Education  
March 2003



**MATHEMATICS (MODULAR) (SPECIFICATION B) 33001/HA  
MODULE 1 HIGHER TIER SECTION A**

**H**

Monday 3 March 2003 9.00 am to 9.25 am

|   |   |
|---|---|
| <p><b>In addition to this paper you will require:</b></p> <ul style="list-style-type: none"> <li>● a calculator</li> <li>● mathematical instruments</li> <li>● a treasury tag.</li> </ul> |  |
|---|---|

| For Examiner's Use  |      |           |      |
|---------------------|------|-----------|------|
| Section A           |      | Section B |      |
| Number              | Mark | Number    | Mark |
| 1                   |      | 5         |      |
| 2                   |      | 6         |      |
| 3                   |      | 7         |      |
| 4                   |      | 8         |      |
| Total Section A     |      |           |      |
| Total Section B     |      |           |      |
| TOTAL               |      |           |      |
| Examiner's Initials |      |           |      |

Time allowed for Section A: 25 minutes

**Instructions**

- Use blue or black ink or ball-point pen. Diagrams should be drawn in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this booklet.
- This paper is divided into **two** sections: Section A and Section B.
- After the 25 minutes allowed for Section A, you must put your calculator on the floor under your seat. You will then be given Section B.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination, make sure that you hand in **both** Section A and Section B securely tagged together with Section A on top.

**Information**

- The maximum mark for Section A is 20.
- Mark allocations are shown in brackets.
- Additional answer paper will be issued on request and must be tagged securely to this answer booklet.
- You are expected to use a calculator where appropriate.

**Advice**

- In all calculations, show clearly how you work out your answer.

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

- 1 The table shows the amounts of Jenny's gas bills from September 2001 to December 2002.

| Date               | September<br>2001 | December<br>2001 | March<br>2002 | June<br>2002 | September<br>2002 | December<br>2002 |
|--------------------|-------------------|------------------|---------------|--------------|-------------------|------------------|
| Amount of bill (£) | 28.70             | 32.40            | 29.10         | 7.80         | 30.30             | 38.60            |

- (a) Explain why a **four-point** moving average is appropriate for these data.

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(1 mark)

- (b) Show that the first value of the four-point moving average is £24.50

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 .....

(2 marks)

- (c) Calculate the second value of the four-point moving average for these data.

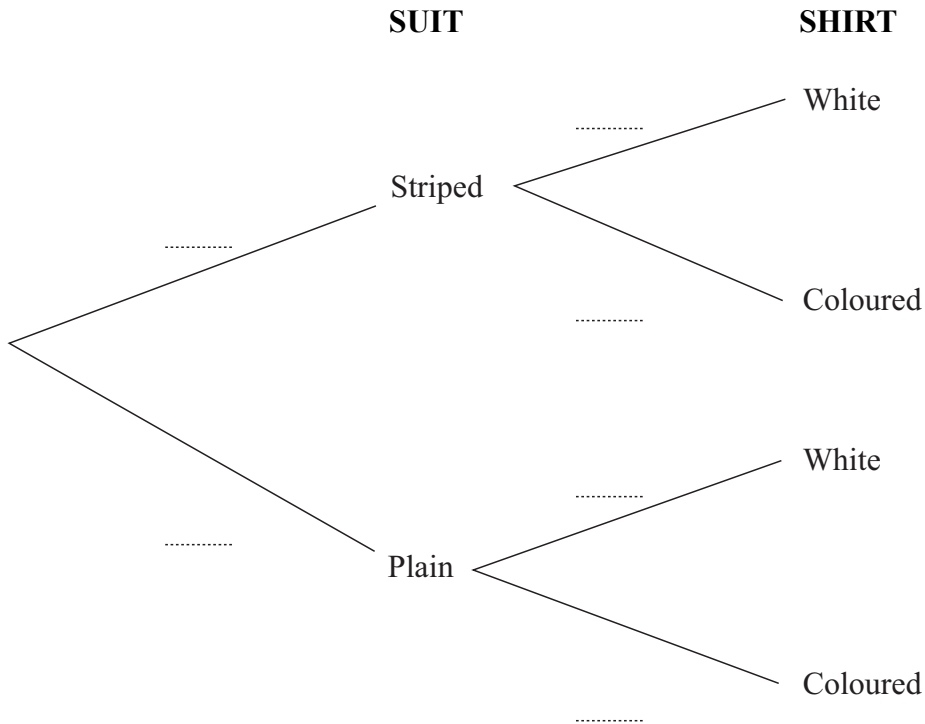
.....  
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Answer £ ..... (2 marks)

- 2 Greg has four suits, one is striped and the other three are plain.  
He also has ten shirts, four are white and the other six are coloured.

Greg chooses a suit at random and then chooses a shirt at random.

- (a) Fill in the probabilities on the branches of the tree diagram.



(3 marks)

- (b) Calculate the probability that Greg chooses a plain suit and a coloured shirt.

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.....

Answer ..... (2 marks)

3 Mr Singh wants to choose four pupils from a class list to attend a meeting. There are 10 boys and 18 girls in the class.

(a) Explain why a stratified sample may be better than a random sample in this situation.

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(1 mark)

(b) Calculate the number of boys and the number of girls who should be chosen for a stratified sample of four pupils.

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Boys ..... Girls ..... (2 marks)

(c) Explain how Mr Singh should choose the girls to send to the meeting.

.....  
.....  
.....  
.....  
.....

(2 marks)

5

- 4 Mick is a striker for his local football team.  
The probabilities of Mick scoring 0, 1, 2 or 3 goals in any game are shown in the table.

|                        |     |     |     |     |
|------------------------|-----|-----|-----|-----|
| <b>Number of goals</b> | 0   | 1   | 2   | 3   |
| <b>Probability</b>     | 0.4 | 0.3 | 0.2 | 0.1 |

Mick's performance in any game is independent of any other game.

- (a) Calculate the probability that Mick scores in each of three consecutive games.

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Answer ..... (2 marks)

- (b) Calculate the probability that Mick scores a total of 8 or more goals in three consecutive games.

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Answer ..... (3 marks)

**END OF SECTION A**

|                     |  |                  |  |
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General Certificate of Secondary Education  
March 2003



**MATHEMATICS (MODULAR) (SPECIFICATION B) 33001/HB  
MODULE 1 HIGHER TIER SECTION B**

**H**

Monday 3 March 2003 9.30 am to 9.55 am

**In addition to this paper you will require:**  
mathematical instruments.

You must **not** use a calculator.



Time allowed for Section B: 25 minutes

**Instructions**

- Use blue or black ink or ball-point pen. Diagrams should be drawn in pencil.
- Fill in the boxes at the top of this page.
- Answer **all** questions in the spaces provided.
- Do all rough work in this booklet.
- You may **not** use your calculator in Section B. Your calculator must remain on the floor under your seat.
- When you have answered Section B you may work again on Section A but you may **not** use your calculator. It must remain on the floor under your seat.
- At the end of the examination, make sure that you hand in **both** Section A and Section B securely tagged together with Section A on top.

**Information**

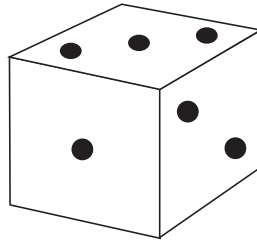
- The maximum mark for Section B is 20.
- Mark allocations are shown in brackets.
- Additional answer paper will be issued on request and must be tagged securely to this answer booklet.

**Advice**

- In all calculations, show clearly how you work out your answer.

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

- 5 A dice is suspected of bias.  
Here are the results of 20 throws.



3      4      2      3      1      5      6      2      4      3  
4      3      1      1      6      2      5      6      5      3

- (a) Use these results to calculate the relative frequency of each score.

.....  
.....  
.....

|                           |   |   |   |   |   |   |
|---------------------------|---|---|---|---|---|---|
| <b>Score</b>              | 1 | 2 | 3 | 4 | 5 | 6 |
| <b>Relative frequency</b> |   |   |   |   |   |   |

(2 marks)

- (b) Use the relative frequency to calculate how many times you would expect to score 3 in 60 throws of this dice.

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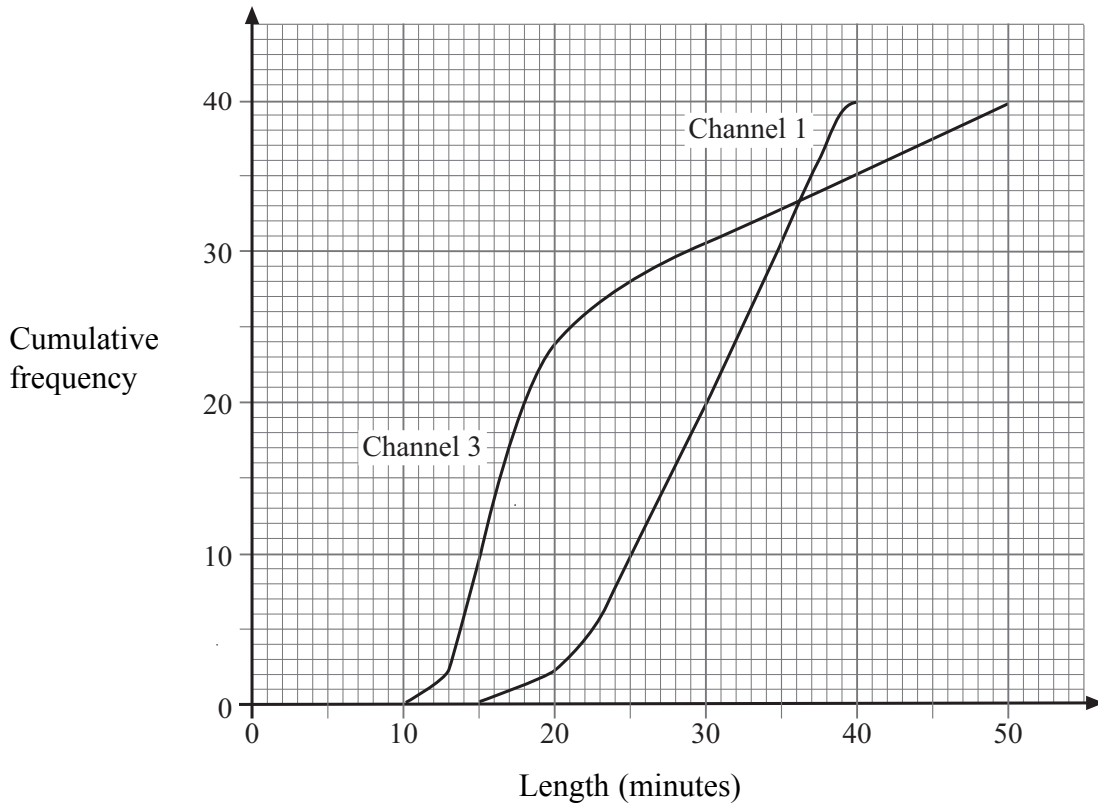
Answer..... (2 marks)

- (c) Compare your answer to part (b) with the number of times you would expect to score 3 in 60 throws of a **fair** dice.

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.....  
.....

(1 mark)

- 6 The cumulative frequency graphs represent the lengths of 40 programmes on Channel 1 and 40 programmes on Channel 3.



- (a) What is the difference between the median programme lengths for the two channels?

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Answer .....minutes (2 marks)

- (b) How many programmes in total were more than 25 minutes long?

.....

.....

Answer ..... (3 marks)

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Turn over ▶



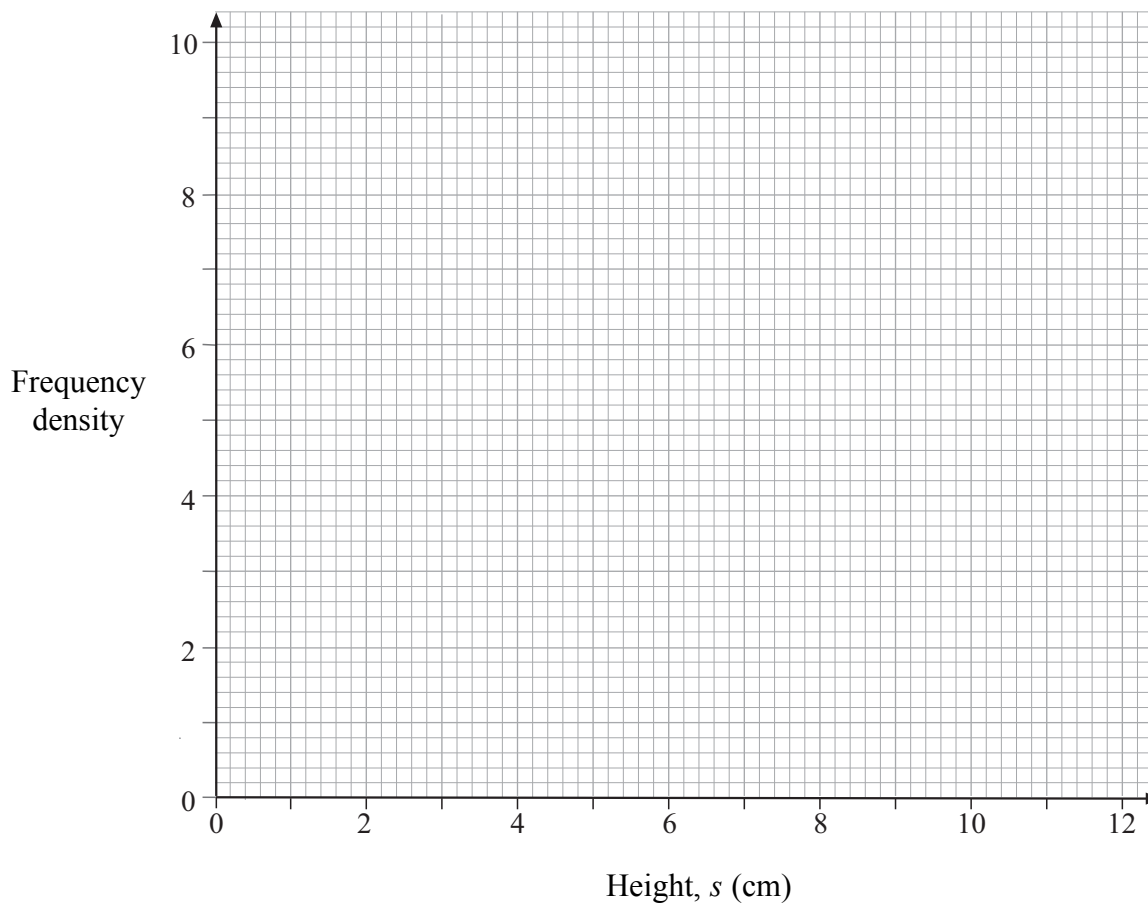
- 7 The height,  $s$ , of 50 sage seedlings is measured.  
The table summarises the results.

| Height, $s$ (cm) | Frequency |
|------------------|-----------|
| $1 \leq s < 3$   | 6         |
| $3 \leq s < 6$   | 15        |
| $6 \leq s < 10$  | 24        |
| $10 \leq s < 12$ | 5         |

- (a) (i) Draw a histogram to represent the heights of the sage seedlings.

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**Sage seedlings**



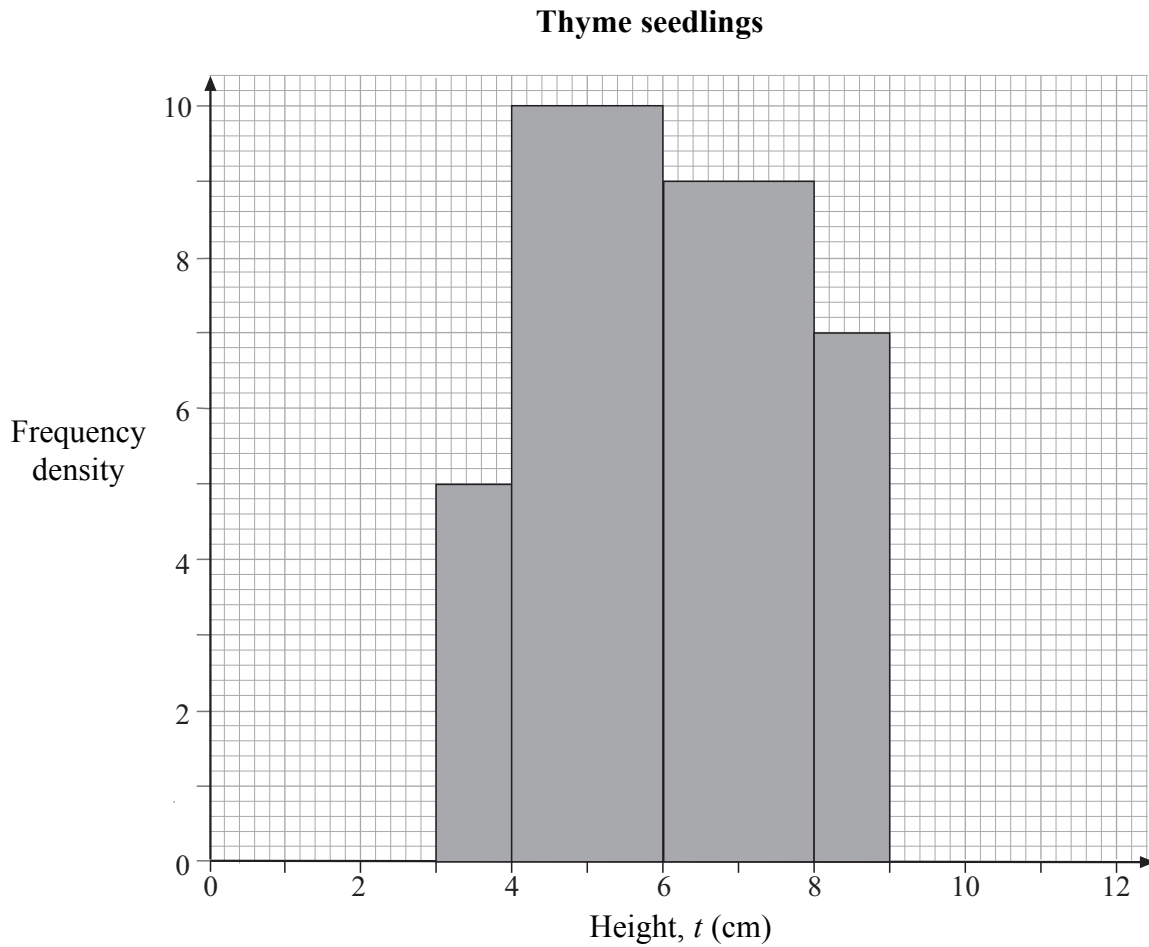
(3 marks)

- (ii) Calculate the **minimum** possible range for the heights of the sage seedlings.

.....

Answer ..... cm (1 mark)

- (b) The height,  $t$ , of 50 thyme seedlings is also measured.  
The results are shown in the histogram below.



Wendy says that the heights of the thyme seedlings are more consistent than the heights of the sage seedlings.

Is she correct?

Give a reason for your answer.

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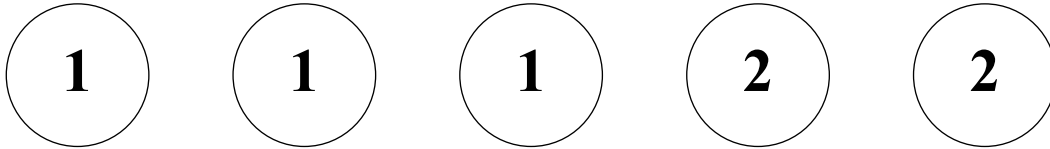
.....

(1 mark)

5

Turn over ►

- 8 Jill is playing a game with a set of five discs.  
Three of the discs are numbered 1 and the other two are numbered 2.



The discs are placed in a bag.  
Jill draws a disc from the bag and looks at its number.

If the first disc drawn is numbered 1, she takes one more disc from the bag.  
Her score is the total of the three discs left in the bag.

If the first disc drawn is numbered 2, she takes two more discs from the bag.  
Her score is the total of the two discs left in the bag.

- (a) Complete the table below.

| First disc drawn | Further disc(s) taken | Discs left in the bag | Score |
|------------------|-----------------------|-----------------------|-------|
|                  |                       |                       |       |
|                  |                       |                       |       |
|                  |                       |                       |       |
|                  |                       |                       |       |

(2 marks)

- (b) Calculate the probability that Jill gets a score of 3.

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Answer ..... (3 marks)

5

**END OF QUESTIONS**