# OCR
Oxford Cambridge and RSA

Accredited

## A Level Further Mathematics B (MEI)
## Y433 Modelling with Algorithms
Printed Answer Booklet

Version 2

# Date – Morning/Afternoon
Time allowed: 1 hour 15 minutes

**You must have:**
- Question Paper Y433 (inserted)
- Formulae Further Mathematics B (MEI)

**You may use:**
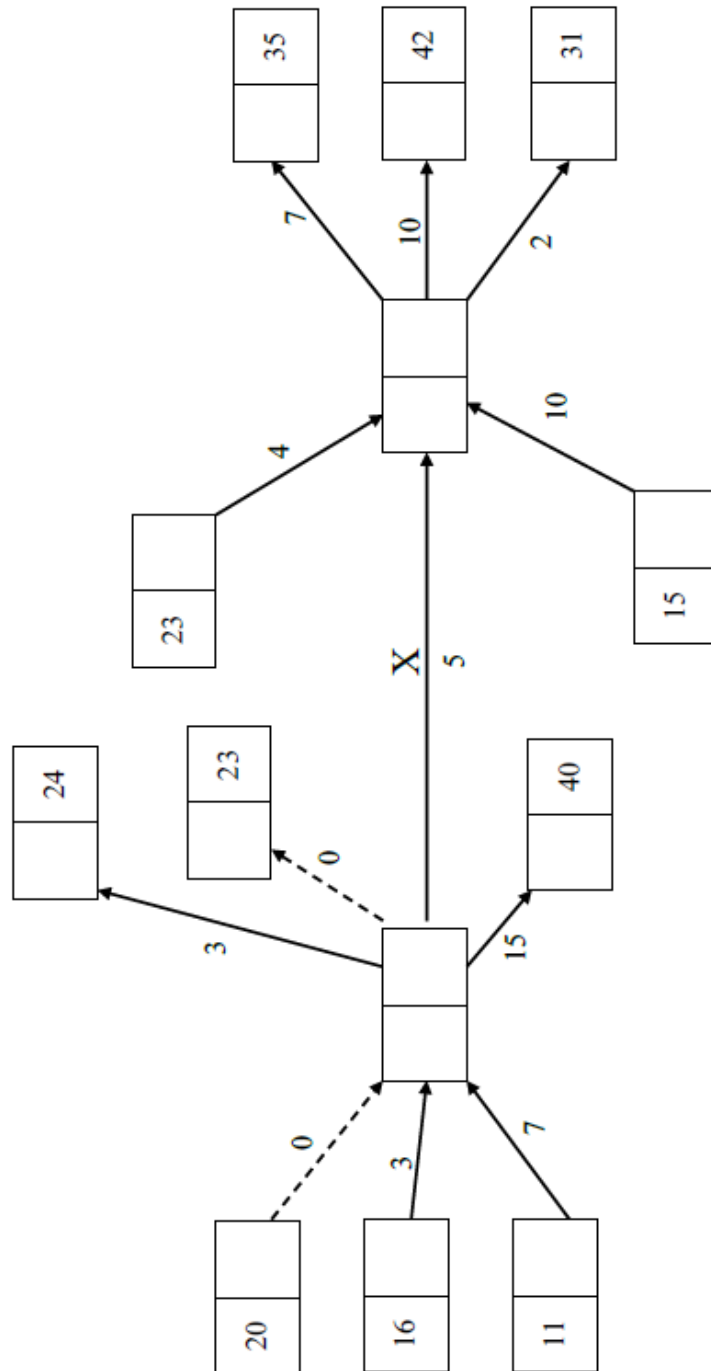- a scientific or graphical calculator

| First name | |
|---|---|
| Last name | |

| Centre number | | Candidate number | |
|---|---|---|---|

## INSTRUCTIONS
- The Question Paper will be found inside the Printed Answer Booklet.
- Use black ink. HB pencil may be used for graphs and diagrams only.
- Complete the boxes provided on the Printed Answer Booklet with your name, centre number and candidate number.
- Answer **all** the questions.
- **Write your answer to each question in the space provided in the Printed Answer Booklet.** Additional paper may be used if necessary but you must clearly show your candidate number, centre number and question number(s).
- Do **not** write in the bar codes.
- You are permitted to use a scientific or graphical calculator in this paper.
- Final answers should be given to a degree of accuracy appropriate to the context.

## INFORMATION
- You are advised that an answer may receive **no marks** unless you show sufficient detail of the working to indicate that a correct method is used. You should communicate your method with correct reasoning.
- The Printed Answer Booklet consists of **16** pages. The Question Paper consists of **12** pages.

**1 (i)**

**1 (ii)**

**1 (iii)**

**1 (iv)**

**2**

35

42

31

7

10

2

23

4

10

15

**X**
5

24

23

0

40

3

15

20

16

11

0

3

7

**A spare copy of the diagram for question 2 can be found on page 14**

**3 (i)**

B

A

5

2

4

3

D

2

1

C

F

7

7

3

1

8

E
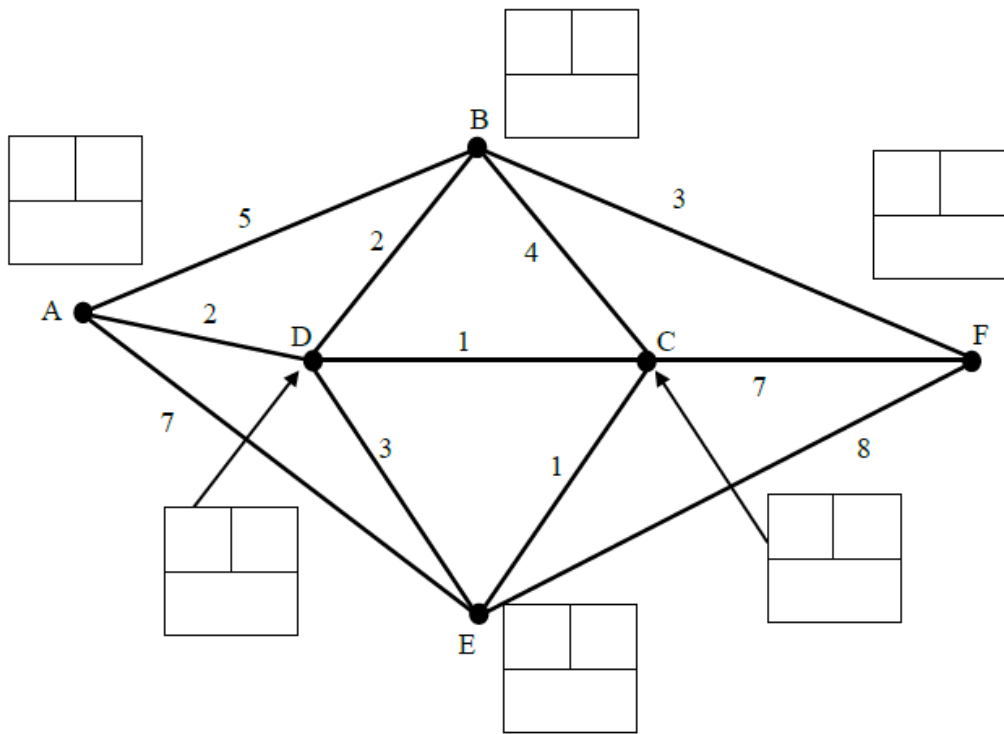
|   | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| A | - | 4 | 3 | 2 | 4 |   |
| B | 4 | - | 3 | 2 | 4 |   |
| C | 3 | 3 | - | 1 | 1 |   |
| D | 2 | 2 | 1 | - | 2 |   |
| E | 4 | 4 | 1 | 2 | - |   |
| F |   |   |   |   |   | - |

**A spare copy of the diagram and table for question 3 (i) can be found on page 15**

| | |
|---|---|
| **3 (ii)** | |
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| | |
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| **3 (iii)** | |
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**DO NOT WRITE IN THIS SPACE**

**4 (i)**

**4 (ii)**

**4 (iii)**

**5 (i)**

|   | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| A |   |   | 8 | 4 |   |   |   |   |   |   |
| B |   |   |   |   | 10 |   |   |   | 7 |   |
| C | 8 |   |   | 6 |   |   | 12 |   |   |   |
| D | 4 |   | 6 |   |   |   |   | 6 |   | 7 |
| E |   | 10 |   |   |   | 8 |   |   | 9 |   |
| F |   |   |   |   | 8 |   |   |   | 8 |   |
| G |   |   | 12 |   |   |   |   | 6 |   | 9 |
| H |   |   |   | 6 |   |   | 6 |   |   | 7 |
| I |   | 7 |   |   | 9 | 8 |   |   |   |   |
| J |   |   |   | 7 |   |   | 9 | 7 |   |   |

**A spare copy of the table for question 5 (i) can be found on page 16**

**5 (ii)**

**5 (iii)**
**(A)**

**5 (iii)**
**(B)**

**5 (iv)**
(*A*)

**5 (iv)**
(*B*)

**5 (iv)**
(*C*)

**5 (v)**

| | |
|---|---|
| **5 (vi)** | |

| | |
|---|---|
| **6 (i)** | |

**6 (ii)**
*(A)* **[You may not need to use all of these tableaux]**

| $P$ | $x$ | $y$ | $z$ | $s_1$ | $s_2$ | $s_3$ | $s_4$ | RHS |
|---|---|---|---|---|---|---|---|---|
| 1 | 0 | 1.75 | −0.5 | 0 | 0 | 0 | 1.25 | 37.5 |
| 0 | 0 | 3.5 | 2 | 1 | 0 | 0 | −0.5 | 5 |
| 0 | 0 | 2 | 1 | 0 | 1 | 0 | 0 | 10 |
| 0 | 0 | 2.5 | 1 | 0 | 0 | 1 | −0.5 | 55 |
| 0 | 1 | 0.75 | 0.5 | 0 | 0 | 0 | 0.25 | 7.5 |

| $P$ | $x$ | $y$ | $z$ | $s_1$ | $s_2$ | $s_3$ | $s_4$ | RHS |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |
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| $P$ | $x$ | $y$ | $z$ | $s_1$ | $s_2$ | $s_3$ | $s_4$ | RHS |
|---|---|---|---|---|---|---|---|---|
|  |  |  |  |  |  |  |  |  |
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**6 (ii)**
**(*B*)**

**6 (iii)**
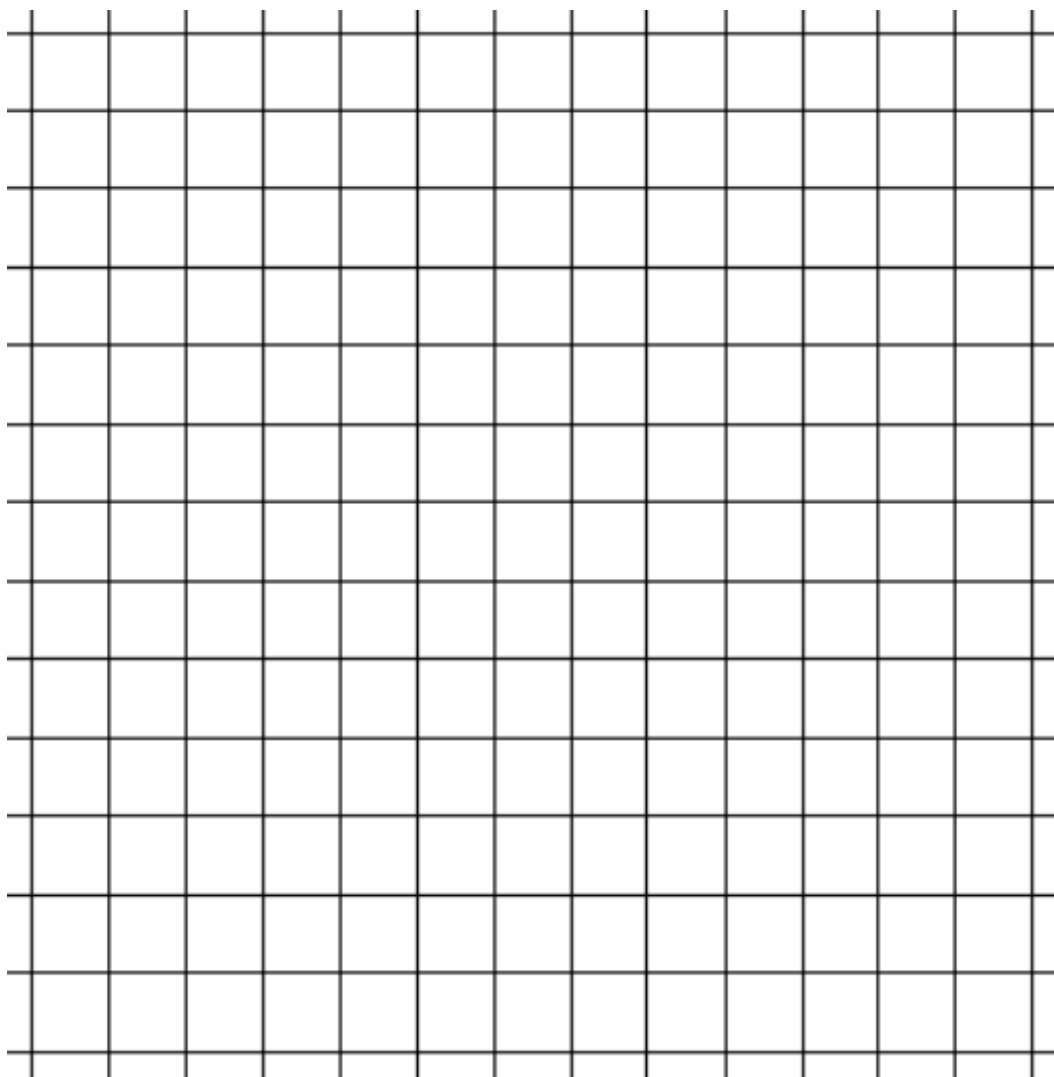
**7 (i)**

**7 (ii)**
**(*A*)**

**7 (ii)**
**(*B*)**

**7 (ii)**
**(*C*)**

**7 (iii)**
**(*A*)**

Online LP Solver
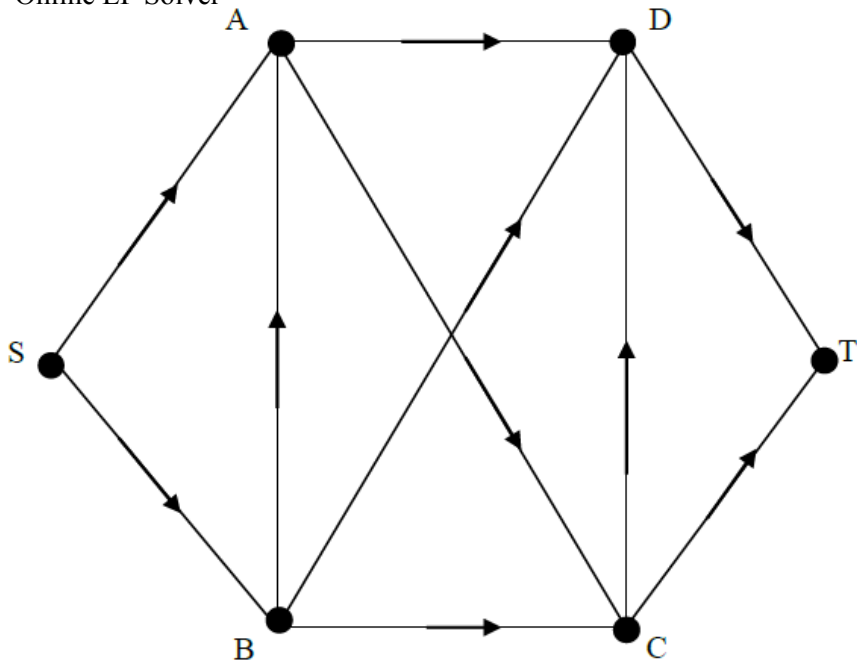


**(answer space continues on next page)**

**7 (iii)**
**(*A*)** **(continued)**

Spreadsheet LP Solver
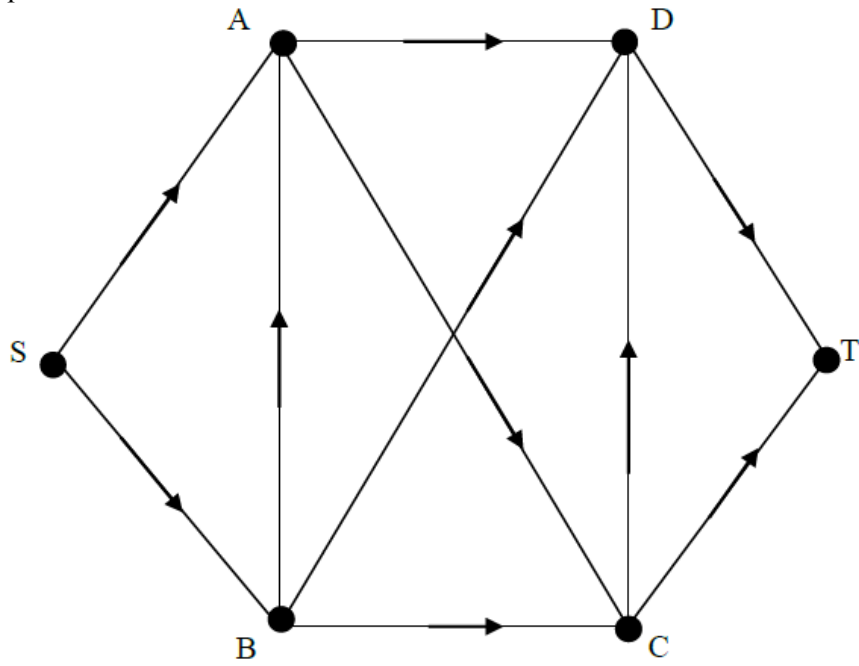


**7 (iii)**
**(*B*)**

**7 (iv)**

**7 (v)**

Spare copy of diagram for question 2
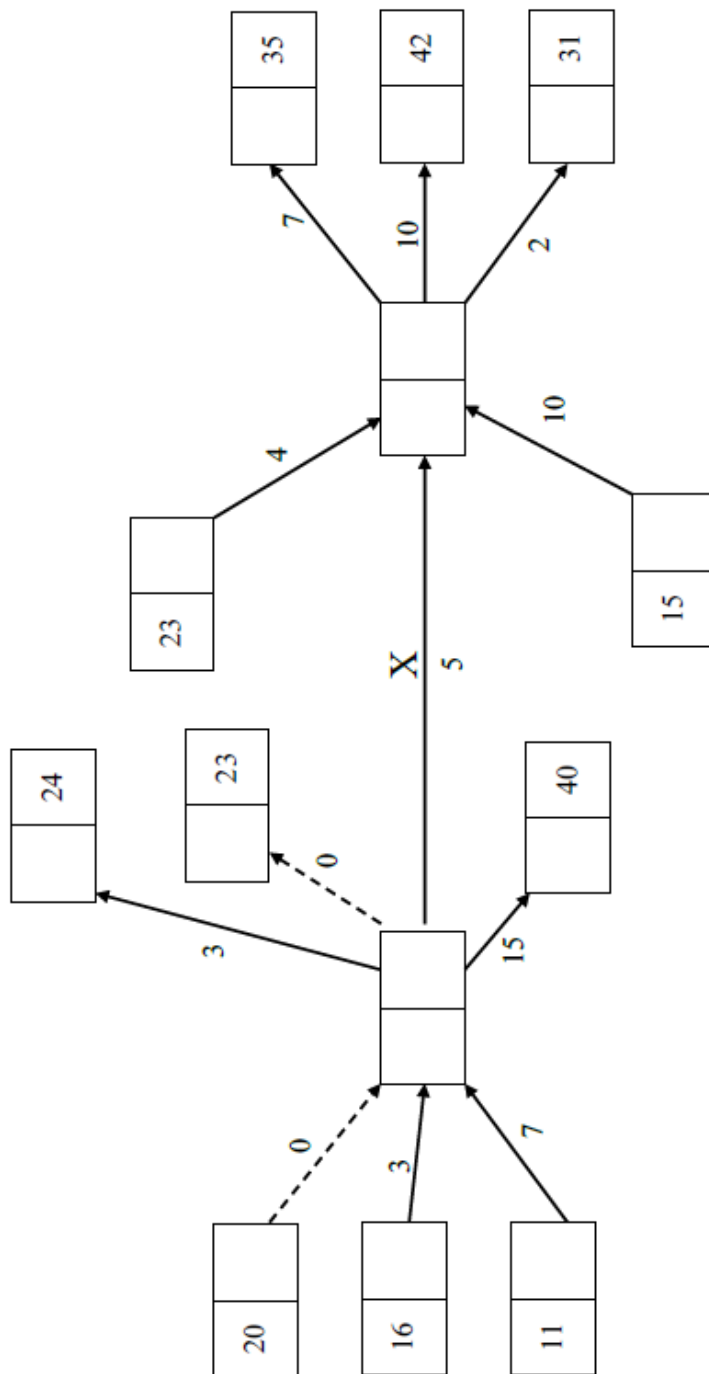
**Spare copy of diagram and table for question 3 (i)**
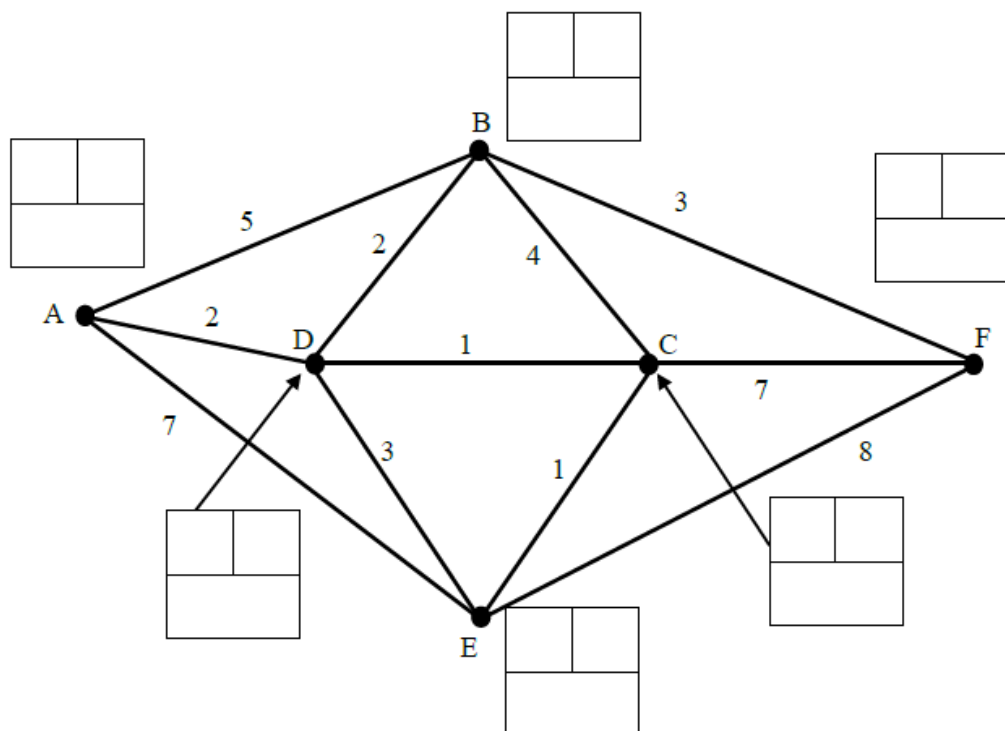


|   | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| A | - | 4 | 3 | 2 | 4 |   |
| B | 4 | - | 3 | 2 | 4 |   |
| C | 3 | 3 | - | 1 | 1 |   |
| D | 2 | 2 | 1 | - | 2 |   |
| E | 4 | 4 | 1 | 2 | - |   |
| F |   |   |   |   |   | - |

**Spare copy of table for question 5 (i)**

|   | A | B | C | D | E | F | G | H | I | J |
|---|---|---|---|---|---|---|---|---|---|---|
| A |   |   | 8 | 4 |   |   |   |   |   |   |
| B |   |   |   |   | 10 |   |   |   | 7 |   |
| C | 8 |   |   | 6 |   |   | 12 |   |   |   |
| D | 4 |   | 6 |   |   |   |   | 6 |   | 7 |
| E |   | 10 |   |   |   | 8 |   |   | 9 |   |
| F |   |   |   |   | 8 |   |   |   | 8 |   |
| G |   |   | 12 |   |   |   |   | 6 |   | 9 |
| H |   |   |   | 6 |   |   | 6 |   |   | 7 |
| I |   | 7 |   |   | 9 | 8 |   |   |   |   |
| J |   |   |   | 7 |   |   |   | 9 | 7 |   |

**DO NOT WRITE IN THIS SPACE**