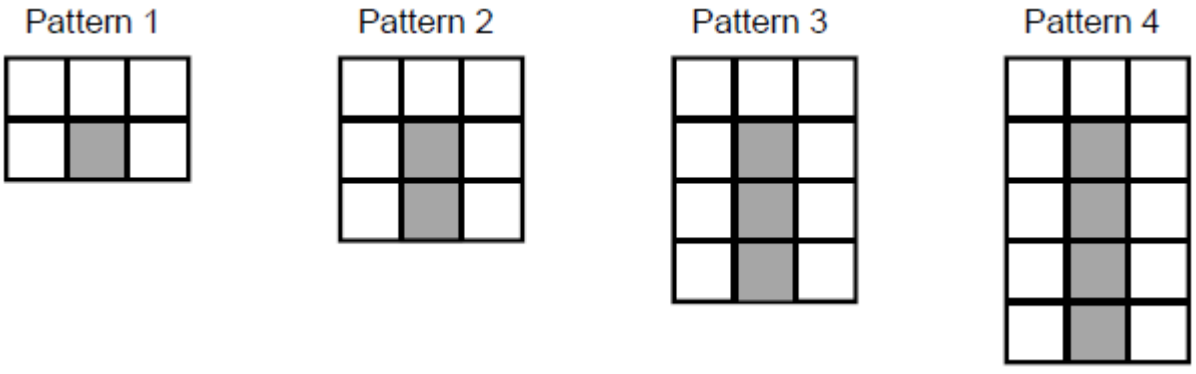
Q1.

A sequence of patterns uses grey squares and white squares.

Here are the first four patterns.



(a) Work out the **total** number of squares in Pattern 100

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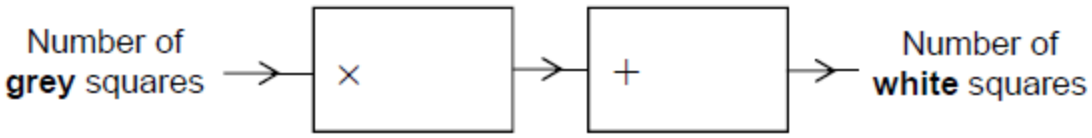
Answer .....

(3)

(b) Complete this number machine for the sequence of patterns.



(1)
(Total 4 marks)

Q2.

(a) Here is a linear sequence.

21 23 25 27 ....

Circle the expression for the *n*th term of the sequence.

$23 - 2n$ $19n + 2$ $21 - 2n$ $2n + 19$

(1)

(b) A different sequence starts

a $2a - 3$ ....

The term-to-term rule for this sequence is

multiply by 2 and subtract 3

The fourth term of this sequence is 35

Work out the value of a.

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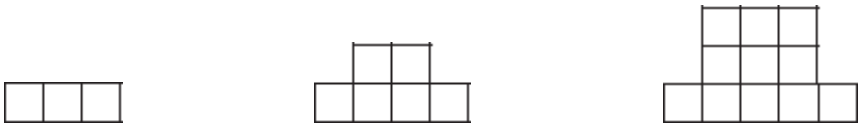
Answer .....

(3)
(Total 4 marks)

Q3.

Here is a sequence of patterns made with squares.



Pattern 1 Pattern 2 Pattern 3

The rule for working out the number of squares in each pattern is

Square the pattern number and then add 2

(a) How many squares are in pattern 7?

.....

.....

Answer .....

(1)

(b) Which pattern has 123 squares?

.....

.....

Answer .....

(2)
(Total 3 marks)

Q4. Here are the first three lines of a number pattern.

Line 1 $2 \times 2 - 2 \times 1^2 = 2$

Line 2 $4 \times 3 - 2 \times 2^2 = 4$

Line 3 $6 \times 4 - 2 \times 3^2 = 6$

(a) Write down Line 4 of the pattern.

Line 4 ..... = ...

(2)

(b) Which line of the pattern is this?

Line ..... $38 \times 20 - 2 \times 19^2 = 38$

(1)

(c) Line n $2n(n + 1) - 2n^2 = 2n$

Show how $2n(n + 1) - 2n^2$ simplifies to $2n$

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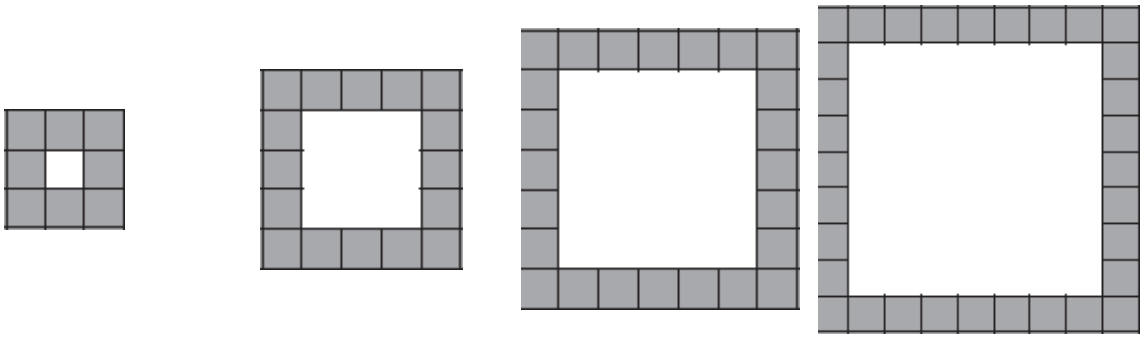
(1)
(Total 4 marks)

Q5. Here is a sequence of patterns.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

(a) Complete the table.

	Pattern 1	Pattern 2	Pattern 3	Pattern 4
Number of shaded squares	8			

(2)

(b) How many shaded squares are in Pattern 7?

Answer .....

(1)
(Total 3 marks)

Q6.

(a) Here is a sequence.

5 8 11 14 17 .....

Write down the next number in the sequence.

Write down the rule for continuing the sequence.

.....

Next number .....

Rule .....

(2)

(b) Here is a different sequence.

Work out the *n*th term of the sequence.

7 13 19 25 31

.....

.....

Answer .....

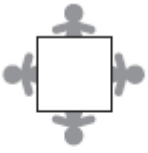
(2)
(Total 4 marks)

Q7.

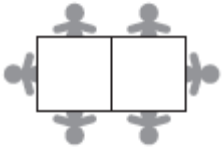
Square tables are put in rows.

One person can sit at each available edge of a table.
People can **not** sit at an edge where two tables join.

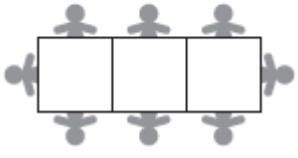
Examples



A single table
4 people



A row of 2 tables
6 people



A row of 3 tables
8 people

(a) How many people can sit at a row of 7 tables?

Answer .....

(2)

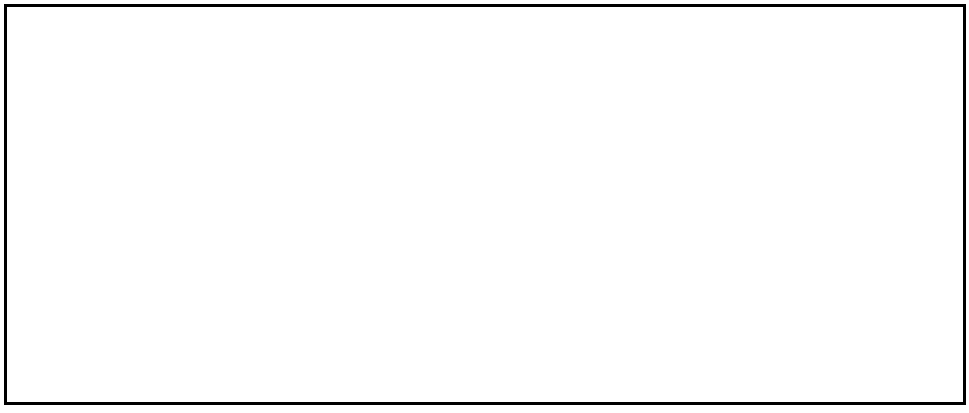
(b) 12 tables are put in a room.

There must be

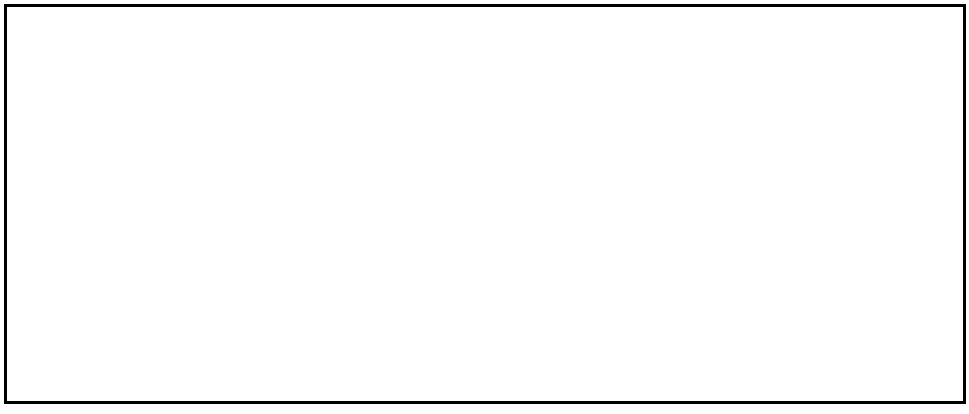
only one row of 4 tables
no single tables.

Show how the 12 tables can be arranged so that **exactly** 30 people can sit at the tables.

Practise on this diagram of the room.



Put your final answer on this diagram of the room.



(3)
(Total 5 marks)

Q8.A sequence begins 1 6 16

The rule for the sequence is

Double the previous term and add 4

Work out the next **two** terms in the sequence.

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.....

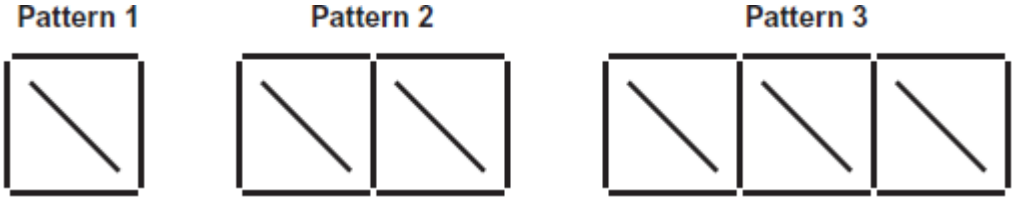
.....

.....

Answer ..... and .....

(Total 2 marks)

Q9. This sequence of patterns is made using sticks.



(a) Complete the table for Pattern 4 and Pattern 5

Pattern	1	2	3	4	5
Number of sticks	5	9	13		

(1)

(b) Work out the *n*th term of the sequence 5 9 13 ....

.....

.....

Answer .....

(2)

(c) Which pattern is made using 53 sticks?

.....

.....

.....

Answer .....

(2)
(Total 5 marks)

Q10. Here is a number sequence.

31 26 21 16 11 ...

(a) What is the next term in the sequence?

Answer .....

(1)

(b) Write down the rule for continuing the sequence.

Answer .....

(1)

(c) What is the first **negative** term in the sequence?

Answer .....

(1)

(d) Here are the first five terms of another number sequence.

2 4 8 16 32 ...

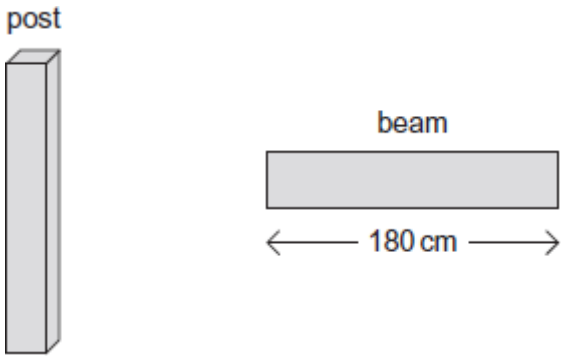
Tick whether each of the following is true or false.

All the numbers in this sequence are even	True	☐	False	☐
To continue the sequence you add 2	True	☐	False	☐
48 is a number in this sequence	True	☐	False	☐

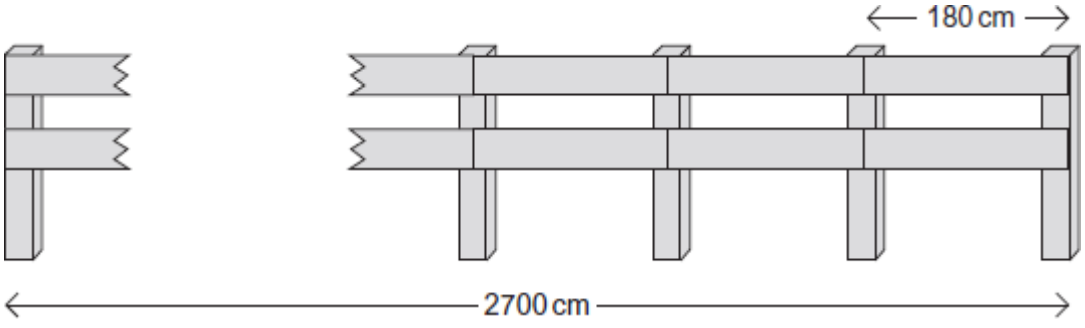
(3)
(Total 6 marks)

Q11. A farmer is building a fence using posts and beams.

Not drawn accurately



The total length of the fence is 2700 cm



(a) How many **beams** and **posts** are in the fence?

.....

.....

.....

.....

.....

.....

Beams .....

Posts .....

(3)

(b) 40 beams and 21 posts are used in another fence.

Use this formula to work out the cost of this fence in £

Cost (£) = $5B + 9P$

B is the number of beams.
P is the number of posts.

.....

.....

Answer £ .....

(2)
(Total 5 marks)

Q12.(a) The rule for continuing a sequence is

Double the previous term and add 5

A sequence starts 5 15 35 .....

Work out the next term in this sequence.

Answer .....

(1)

(b) A different sequence follows the same rule.

Double the previous term and add 5

The **third** term of this sequence is 27.

Work out the **first** term.

Answer .....

(3)
(Total 4 marks)

Q13. The diagram shows patterns made with sticks.

Pattern 1 Pattern 2 Pattern 3

(a) How many sticks are in Pattern 3?

Answer .....

(1)

(b) Draw Pattern 4.

(1)

(c) How many sticks are in Pattern 6?

.....

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Answer .....

(2)
(Total 4 marks)