Chhetri Academy

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GCSE MATHS

Algebra

Edexcel 1MA1 | Subtopic collection Topic 22

Sequences and the nth term

Foundation tier

Past paper question booklet

66	2010-2025	Foundation
question groups	available papers	tier

Before you begin

1. Show working and use units where appropriate.
2. Use extra paper if you need more space.
3. Print at actual size (100%) for measurement questions.

Name _____ **Date** _____

Whole questions are retained for context; some parts cover other points. Legacy sources are labelled.

5 Here are some patterns made from sticks.



Pattern number 1 Pattern number 2 Pattern number 3

(a) Draw Pattern number 4 in the space below.

(1)

(b) How many sticks are needed for Pattern number 12?

.....

(2)

Sunil says that he will need 70 sticks for Pattern number 20

(c) Is Sunil correct?
You must give a reason for your answer.

.....

.....

.....

(2)

(Total for Question 5 is 5 marks)

7 Here are some patterns made from dots.



Pattern number 1



Pattern number 2



Pattern number 3

(a) Draw Pattern number 4 in the space below.

(1)

(b) How many dots are needed for Pattern number 15?

.....

(2)

(Total for Question 7 is 3 marks)

16 Here are the first four terms of an arithmetic sequence.

5 9 13 17

(a) What is the next term of this sequence?

.....

(1)

(b) Write down an expression, in terms of n, for the nth term of the sequence.

.....

(2)

(Total for Question 16 is 3 marks)

14 Here are the first four terms of a number sequence.

4 7 10 13

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

.....

(ii) Explain how you found your answer.

.....

(2)

(b) What is the 8th term in the sequence?

.....

(1)

Alexi says 34 is in the sequence.

(c) Is Alexi correct? .....

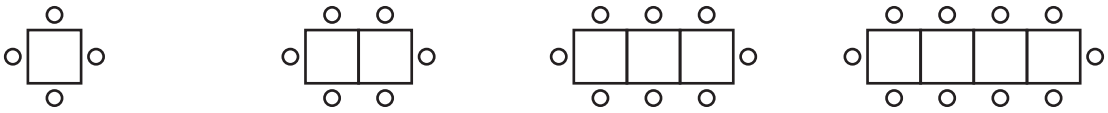
You must give a reason for your answer.

.....

(1)

(Total for Question 14 is 4 marks)

11 Here are the first four patterns in a sequence.
Each pattern is made from squares and circles.



Pattern number 1 Pattern number 2 Pattern number 3 Pattern number 4

(a) How many squares are there in the pattern with exactly 14 circles?

.....

(2)

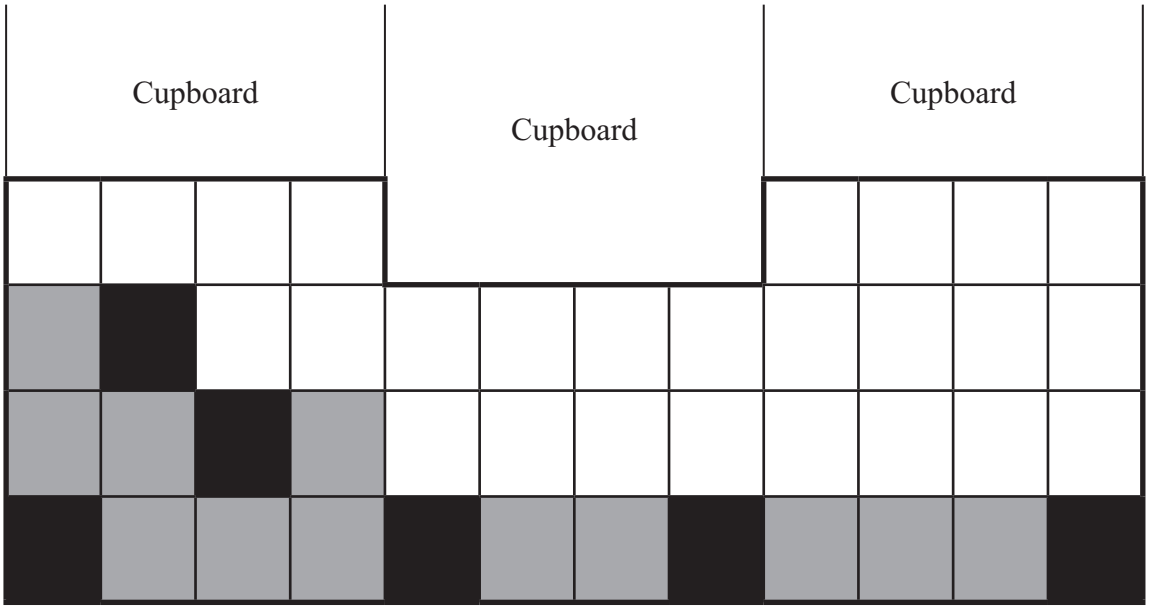
(b) How many circles are needed for Pattern number 50?

.....

(2)

(Total for Question 11 is 4 marks)

10 The diagram shows a partly tiled wall.



Alfie is tiling the wall with black and grey tiles.
He is going to use a total of 10 black tiles.

Alfie is going to make a symmetrical pattern with the tiles.

(a) (i) On the diagram, show where Alfie could put the 4 black tiles he has left.

(ii) Work out the total number of grey tiles that Alfie uses to tile the wall.

.....

(3)

Alfie has 4 boxes of grey tiles and 1 box of black tiles.
Each box of tiles costs £6.20

(b) Work out the total cost of the tiles.

£ .....

(2)

(Total for Question 10 is 5 marks)

14 Here are the first five terms of an arithmetic sequence.

2 7 12 17 22

(a) (i) Find the next term of this sequence.

.....

(ii) Explain how you found your answer.

.....

.....

(2)

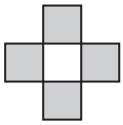
(b) Write down an expression, in terms of n, for the nth term of the sequence.

.....

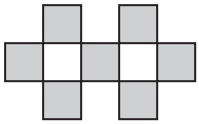
(2)

(Total for Question 14 is 4 marks)

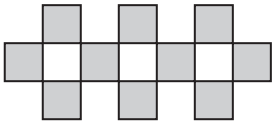
15 Here are some patterns made from grey tiles.



Pattern number 1



Pattern number 2



Pattern number 3

(a) Draw Pattern number 4 on the grid below.



(1)

(b) How many grey tiles are needed for Pattern number 10?

.....

(2)

Jenny says,

'I will need exactly 46 grey tiles for Pattern number 18'.

(c) Is Jenny right?
You must give a reason for your answer.

.....

.....

.....

(2)

(Total for Question 15 is 5 marks)

6 Here are the first four terms of a number sequence.

6 10 14 18

(a) Write down the next term in this sequence.

.....

(1)

(b) Find the 10th term in this sequence.

.....

(1)

(c) The number 101 is **not** a term in this sequence.
Explain why.

.....

.....

(1)

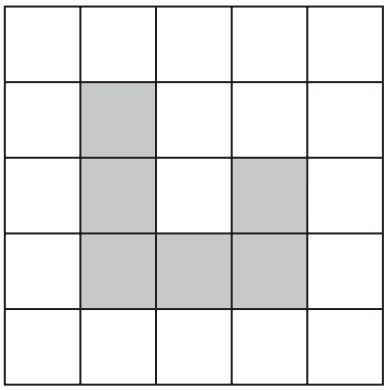
(d) Write an expression, in terms of n, for the nth term of this sequence.

.....

(2)

(Total for Question 6 is 5 marks)

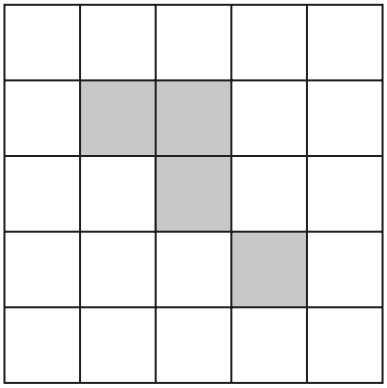
8 (a)



Shade **one** more square to make a pattern with 1 line of symmetry.

(1)

(b)



Shade **one** more square to make a pattern with rotational symmetry of order 2

(1)

(Total for Question 8 is 2 marks)

12 Here are the first four terms of a number sequence.

3 7 11 15

(a) (i) Write down the next term in the sequence.

.....

(ii) Explain how you got your answer.

.....

(2)

(b) Work out the difference between the 10th term and the 15th term in the sequence.

.....

(2)

(Total for Question 12 is 4 marks)

8 Here are the first 6 terms of a number sequence.

5 9 13 17 21 25

(a) Write down the next term of the sequence.

.....

(1)

(b) (i) Work out the eleventh term of the sequence.

.....

(ii) Explain how you found your answer.

.....

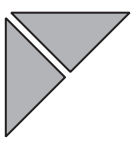
.....

.....

(2)

(Total for Question 8 is 3 marks)

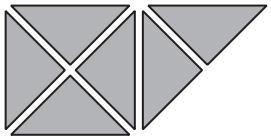
2 Here are some patterns made from triangles.



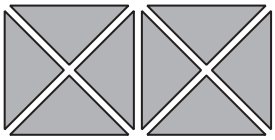
Pattern number 1



Pattern number 2



Pattern number 3



Pattern number 4

(a) Complete the table.

Pattern number	1	2	3	4	5
Number of triangles	2	4	6		

(1)

(b) How many triangles are needed for Pattern number 12?

.....

(1)

Luke says that Pattern number 40 has 82 triangles.

(c) Luke is wrong.
Explain why.

.....

.....

(1)

(Total for Question 2 is 3 marks)

14 Here are the first five terms of a number sequence.

2 7 12 17 22

(a) (i) Write down the next term in the sequence.

.....

(ii) Explain how you worked out your answer.

.....

.....

(2)

(b) 45 is **not** a term in this number sequence.
Explain why.

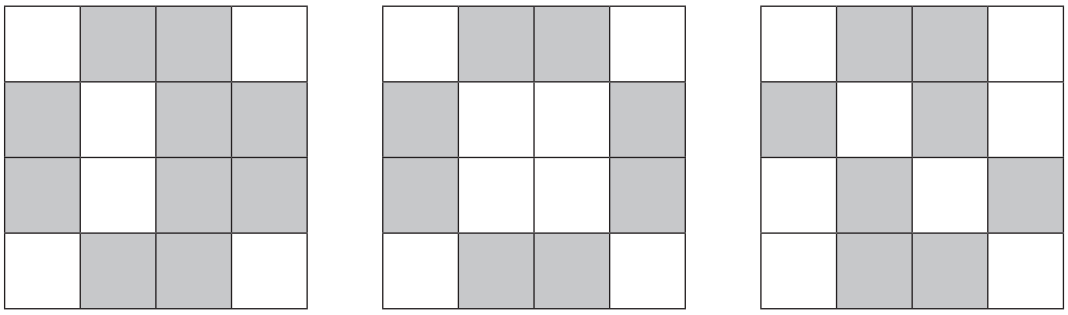
.....

.....

(1)

(Total for Question 14 is 3 marks)

21 The diagrams show patterns made from grey tiles and white tiles.



A B C

One of the patterns has exactly 1 line of symmetry.

(a) Write down the letter of this pattern.

.....

(1)

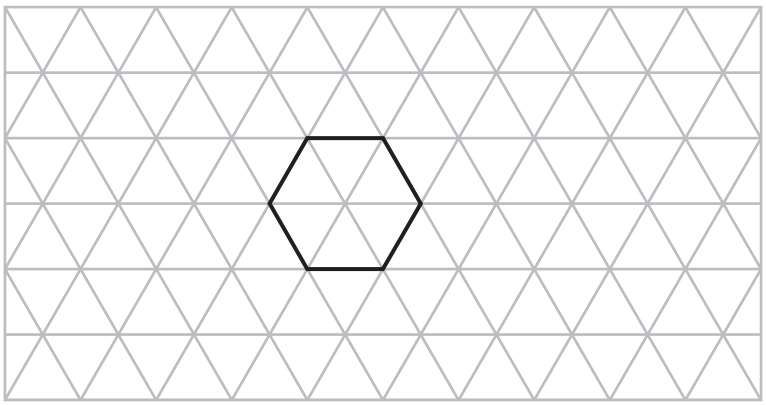
(b) Write down the order of rotational symmetry of pattern C.

.....

(1)

The diagram on the grid shows a tile in the shape of a hexagon.

(c) On the grid, show how the tile will tessellate.
You should draw at least 6 tiles.



(2)

(Total for Question 21 is 4 marks)

2 Complete this bill.

Jill's Wool Shop



Item	Number of items	Cost of one item	Total
Pattern	2	£2.85	£5.70
Button	16	£0.52	£.....
Balls of wool	.....	£4.65	£37.20
		Total cost	£.....

(Total for Question 2 is 3 marks)

6 Here are the first five terms of a number sequence.

40 37 34 31 28

(a) (i) Write down the next two terms of this number sequence.

....., ...

(ii) Explain how you got your answer.

.....

.....

(2)

Here are the first five terms of a different number sequence.

−12 −7 −2 3 8

(b) Find the 8th term of this sequence.

.....

(2)

(Total for Question 6 is 4 marks)

24 The diagram shows a pattern using four identical rhombuses.

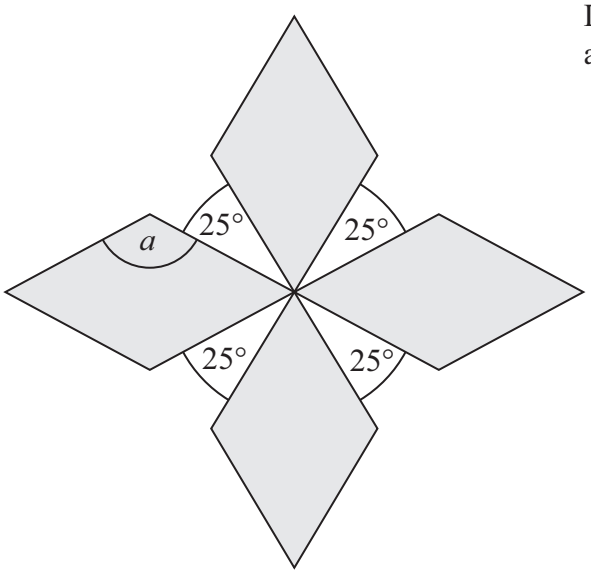


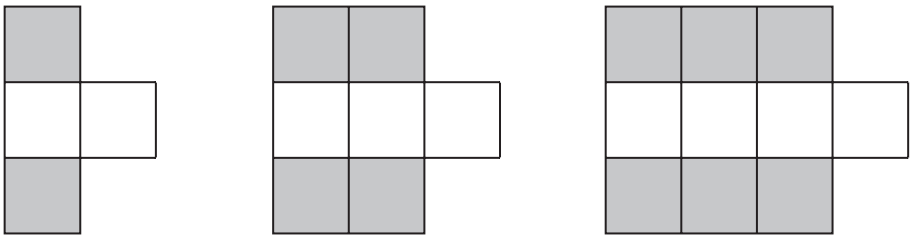
Diagram **NOT** accurately drawn

Work out the size of the angle marked a.
You must show your working.

.....°

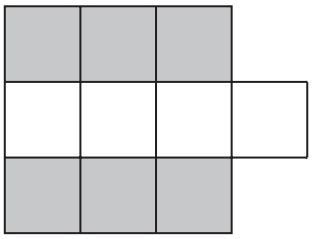
(Total for Question 24 is 4 marks)

10 Here are some patterns made from white centimetre squares and grey centimetre squares.



Pattern 1 Pattern 2 Pattern 3

(a) In the space below, complete Pattern 4



(1)

(b) Find the number of grey squares in Pattern 6

.....

(1)

A Pattern has 20 grey squares.

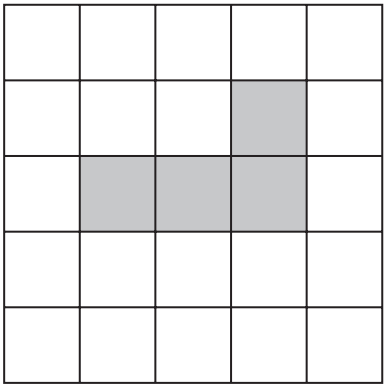
(c) Work out how many white squares there are in this Pattern.

.....

(2)

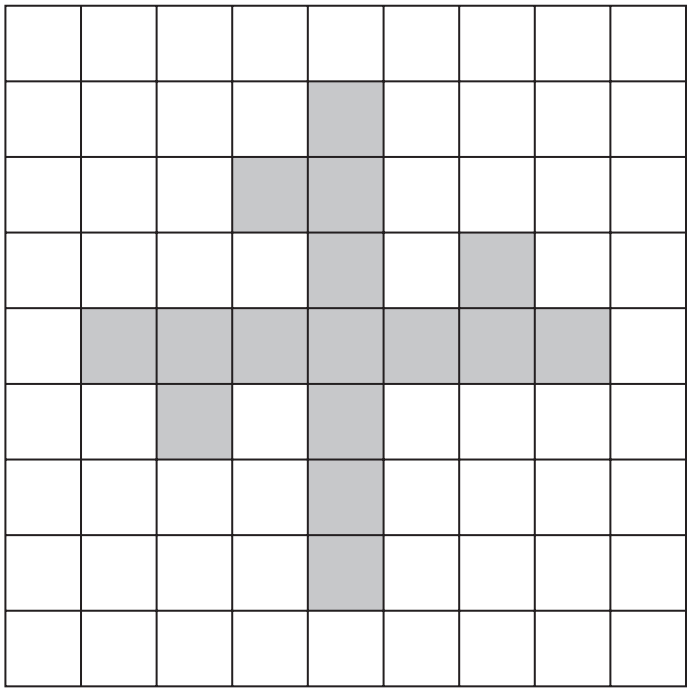
(Total for Question 10 is 4 marks)

12 (a) Shade **one** more square to make a pattern with exactly 1 line of symmetry.



(1)

(b) Shade **one** more square to make a pattern with rotational symmetry of order 4



(1)

(Total for Question 12 is 2 marks)

4 Here are the first four terms of a number sequence.

3 7 11 15

(a) Write down the next term of this sequence.

.....

(1)

The 50th term of this number sequence is 199

(b) Write down the 51st term of this sequence.

.....

(1)

The number 372 is **not** a term of this sequence.

(c) Explain why.

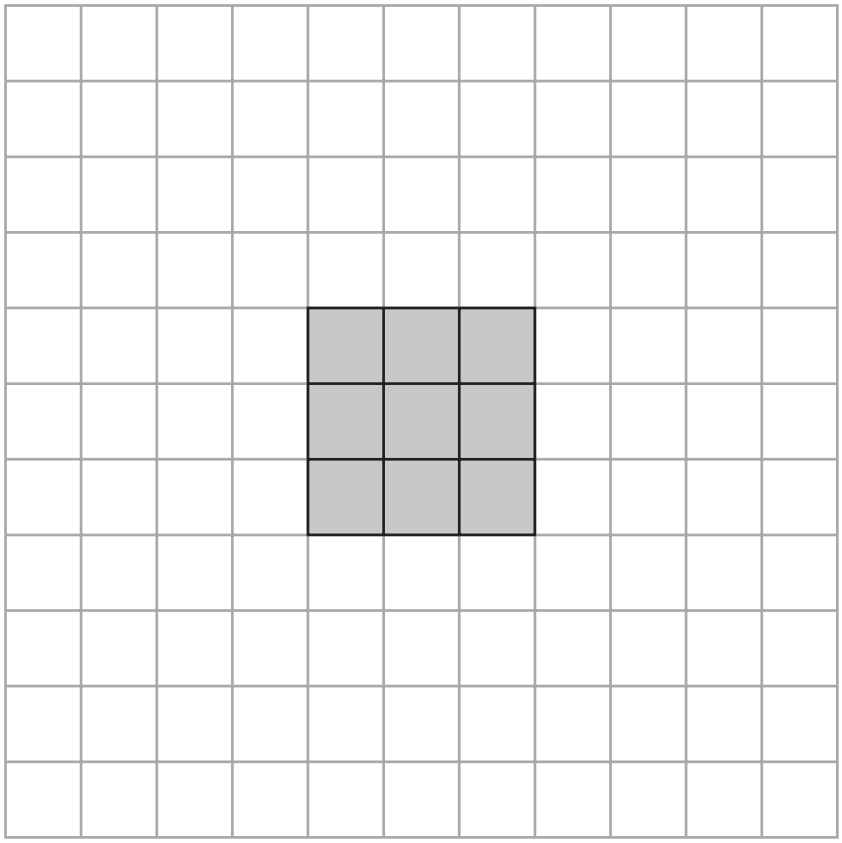
.....

.....

(1)

(Total for Question 4 is 3 marks)

8 A square of side 3 cm is made from nine squares of side 1 cm.



(a) How many **more** squares of side 1 cm are needed to make a square of side 6 cm?

.....

(2)

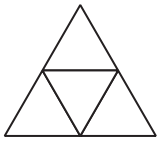
Here is a tile.



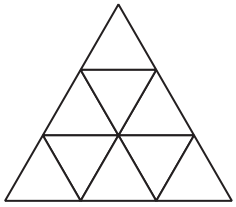
Here is a sequence of patterns made from these tiles.



Pattern number 1



Pattern number 2



Pattern number 3

(b) How many of these tiles are needed to make Pattern number 7?

.....

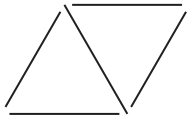
(2)

(Total for Question 8 is 4 marks)

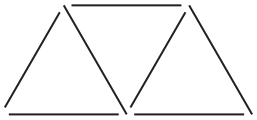
2 Here are some patterns made from sticks.



Pattern number 1



Pattern number 2



Pattern number 3

(a) In the space below, draw Pattern number 4

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of sticks	3	5	7		

(1)

(c) How many sticks make Pattern number 15?

.....

(1)

Maria wants to work out how many sticks make Pattern number 50

(d) Write down a method she can use.

.....

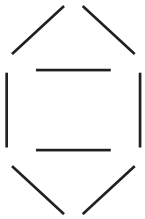
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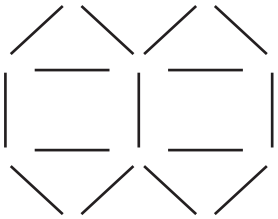
(1)

(Total for Question 2 is 4 marks)

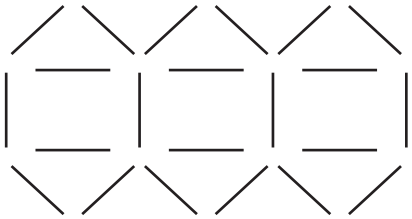
8 Here is a sequence of patterns made from sticks.



pattern number 1



pattern number 2



pattern number 3

(a) In the space below, draw pattern number 4

(1)

(b) How many sticks are needed for pattern number 10?

.....

(2)

(Total for Question 8 is 3 marks)

15 A pattern is made using four identical rectangular tiles.

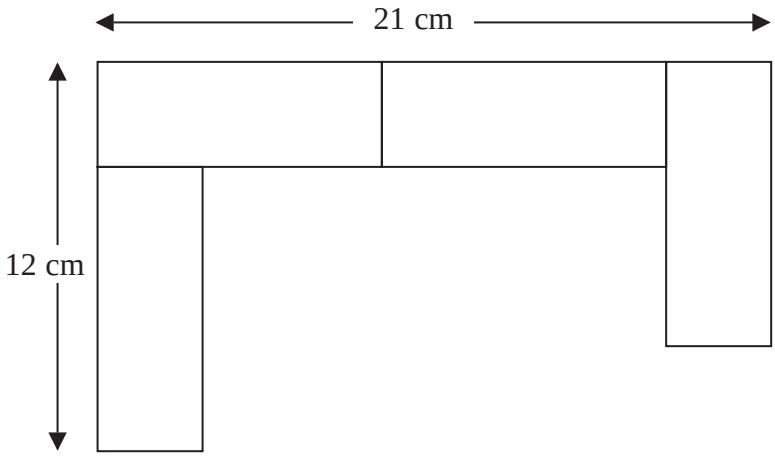


Diagram **NOT** accurately drawn

Find the total area of the pattern.

..... cm^2

(Total for Question 15 is 5 marks)

***16** Here are the first four terms in a number sequence.

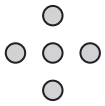
5 8 11 14

Kasey thinks that the number 34 is in this sequence.

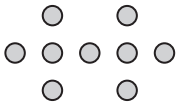
Is Kasey correct?
You must show how you get your answer.

(Total for Question 16 is 3 marks)

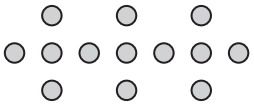
14 Here is a sequence of patterns made with counters.



pattern number 1



pattern number 2



pattern number 3

(a) In the space below, draw pattern number 4

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of counters	5	9	13		

(1)

(c) Find an expression, in terms of n, for the number of counters in pattern number n.

.....

(2)

Habeeb has 50 counters.
He wants to use as many of his counters as possible to make a pattern in the sequence.

(d) What is the number of the pattern he can make using the greatest number of his counters?

.....

(2)

(Total for Question 14 is 6 marks)

13 Here are the first four terms of a number sequence.

3 7 11 15

(a) (i) Write down the next term in the sequence.

.....

(ii) Explain how you got your answer.

.....

(2)

(b) Work out the 11th term in the sequence.

.....

(1)

(c) Is 79 a term in this sequence?
Explain how you got your answer.

.....

.....

(1)

(Total for Question 13 is 4 marks)

10 (i) Write down the next two terms in this number sequence.

100 95 90 85 ....

(ii) Explain how you got your answer.

.....

.....

(Total for Question 10 is 2 marks)

18 Here are the first four terms of an arithmetic sequence.

11 17 23 29

(a) Find, in terms of n, an expression for the nth term of this arithmetic sequence.

.....

(2)

(b) Is 121 a term of this arithmetic sequence?
You must explain your answer.

.....

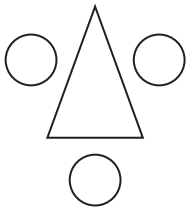
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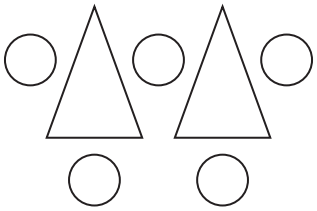
(2)

(Total for Question 18 is 4 marks)

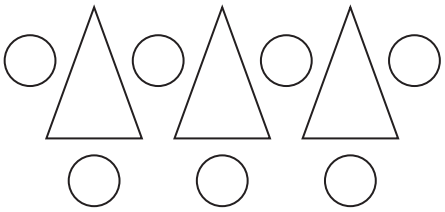
7 Here is a sequence of patterns made from triangles and circles.



pattern number 1

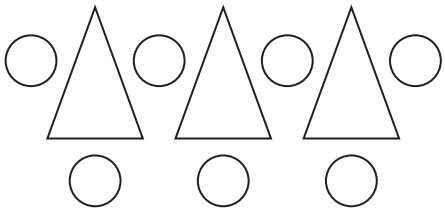


pattern number 2



pattern number 3

(a) Complete the diagram below to show pattern number 4



(1)

(b) Find the number of circles in pattern number 7

.....

(2)

Jane says pattern number 17 has 36 circles.

Jane is wrong.

(c) Explain why.

.....

.....

(1)

(Total for Question 7 is 4 marks)

13 n is a positive whole number.

(a) What type of positive whole number is $2n - 1$?

.....

(1)

(b) Write down an expression for the nth multiple of 5

.....

(1)

Alan has 4 boxes of cakes.
There is the same number of cakes in each box.
Alan has a total of t cakes.

(c) Write down an expression, in terms of t, for the number of cakes in each box.

.....

(1)

(Total for Question 13 is 3 marks)

***19** The nth term of sequence A is $3n - 2$
The nth term of sequence B is $10 - 2n$

Sally says there is only one number that is in both sequence A and sequence B.

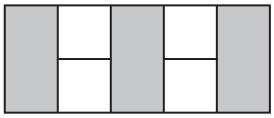
Is Sally right?
You must explain your answer.

(Total for Question 19 is 2 marks)

11 Here is a sequence of patterns made with white squares and grey rectangles.



pattern number 1



pattern number 2



pattern number 3

(a) In the space below, draw pattern number 4

(1)

(b) How many grey rectangles are there in pattern number 8?

.....

(1)

Sue says,

"There is a pattern in the sequence with exactly 50 white squares."

(c) Is Sue right?
You must give a reason for your answer.

.....

.....

(1)

A pattern in the sequence has exactly 20 grey rectangles.

(d) How many white squares does the pattern have?

.....

(1)

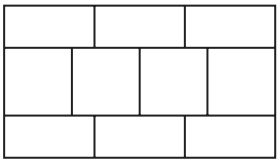
(Total for Question 11 is 4 marks)

19 James has some square paving stones and some rectangular paving stones.



Diagram **NOT** accurately drawn

He uses four square paving stones and six rectangular paving stones to make this pattern in the shape of a rectangle.



Each rectangular paving stone is 60 cm by 30 cm.

(a) Work out the length of one side of a square paving stone.

..... cm

(2)

Sally is going to make a path with rectangular paving stones.
Each paving stone is 60 cm by 30 cm.

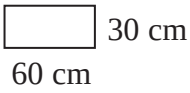
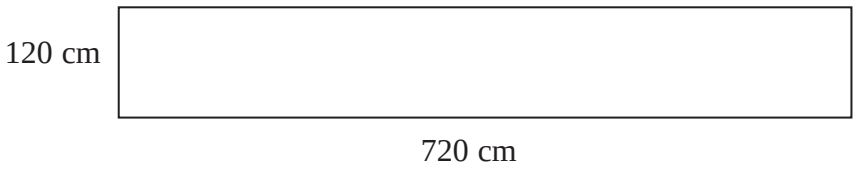


Diagram **NOT** accurately drawn

The path will be 720 cm long and 120 cm wide.



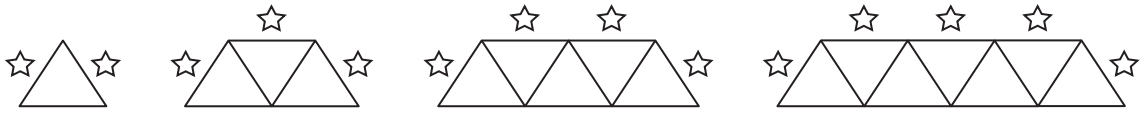
(b) Work out how many paving stones Sally needs to make the path.

.....

(3)

(Total for Question 19 is 5 marks)

8 Here is a sequence of patterns made from triangles and stars.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

(a) How many stars are needed for Pattern 5?

.....

(1)

(b) How many triangles are needed for Pattern 6?

.....

(1)

A pattern in the sequence is made from exactly 10 stars.

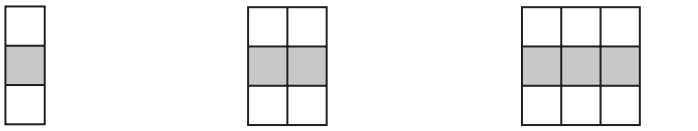
(c) How many triangles are needed for this pattern?

.....

(2)

(Total for Question 8 is 4 marks)

5 Here is a sequence of patterns made with grey squares and with white squares.



pattern number 1 pattern number 2 pattern number 3

(a) In the space below, draw pattern number 4

(1)

A pattern in the sequence has 10 grey squares.

(b) How many white squares does the pattern have?

.....

(1)

A pattern in the sequence has a total of 45 squares.

(c) (i) How many grey squares does the pattern have?

.....

(ii) Explain how you found your answer.

.....

.....

(2)

(Total for Question 5 is 4 marks)

2 Here are the first four terms of a number sequence.

3 7 11 15

(a) Write down the next number in this sequence.

.....

(1)

(b) Find the 8th term of this sequence.

.....

(1)

(c) The number 80 is **not** a term of this sequence.
Explain why.

.....

.....

.....

(1)

(Total for Question 2 is 3 marks)

Question 39

5 Here are the first three patterns in a sequence.
Each pattern is made from lines and circles.



pattern number 1

pattern number 2

pattern number 3

(a) In the space below, complete pattern number 4



pattern
number 4

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of lines	4	7	10		

(1)

(c) Find the number of **lines** in pattern number 12

.....

(1)

(d) Find the number of **circles** in pattern number 20

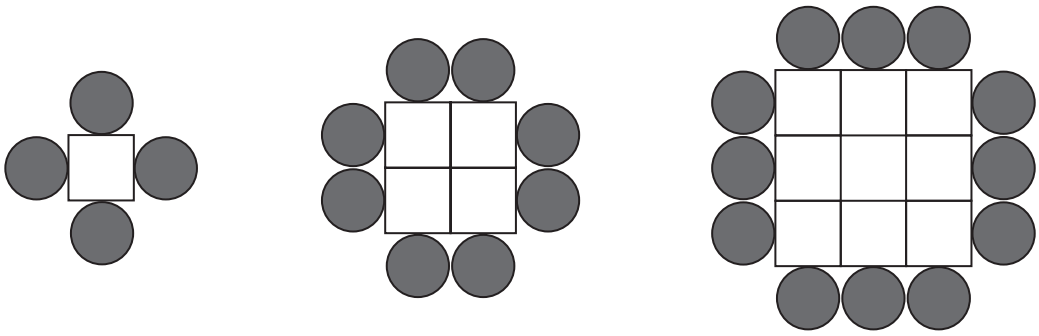
.....

(1)

(Total for Question 5 is 4 marks)

11 A sequence of patterns is made from circular tiles ● and square tiles □

Here are the first three patterns in the sequence.



pattern number 1 pattern number 2 pattern number 3

(a) How many square tiles are needed to make pattern number 6?

.....

(2)

(b) How many circular tiles are needed to make pattern number 20?

.....

(2)

Derek says,

"When the pattern number is odd, an odd number of square tiles is needed to make the pattern."

(c) Is Derek right?
You must give reasons for your answer.

.....

.....

(2)

(Total for Question 11 is 6 marks)

25 Here are the first six terms of an arithmetic sequence.

3 8 13 18 23 28

(a) Find an expression, in terms of n, for the nth term of this sequence.

.....

(2)

The nth term of a different sequence is $3n^2$
Nathan says that the 4th term of this sequence is 144

(b) Is Nathan right?
Show how you get your answer.

(1)

(Total for Question 25 is 3 marks)

Question 42

5 Here are the first four terms of a number sequence.

2 5 11 23

The rule to continue this sequence is

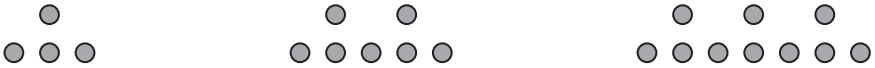
multiply the previous term by 2 and then add 1

Work out the 5th term of this sequence.

.....

(Total for Question 5 is 1 mark)

18 Here is a sequence of patterns made with counters.



pattern number 1 pattern number 2 pattern number 3

(a) Find an expression, in terms of n, for the number of counters in pattern number n.

.....

(2)

Bayo has 90 counters.

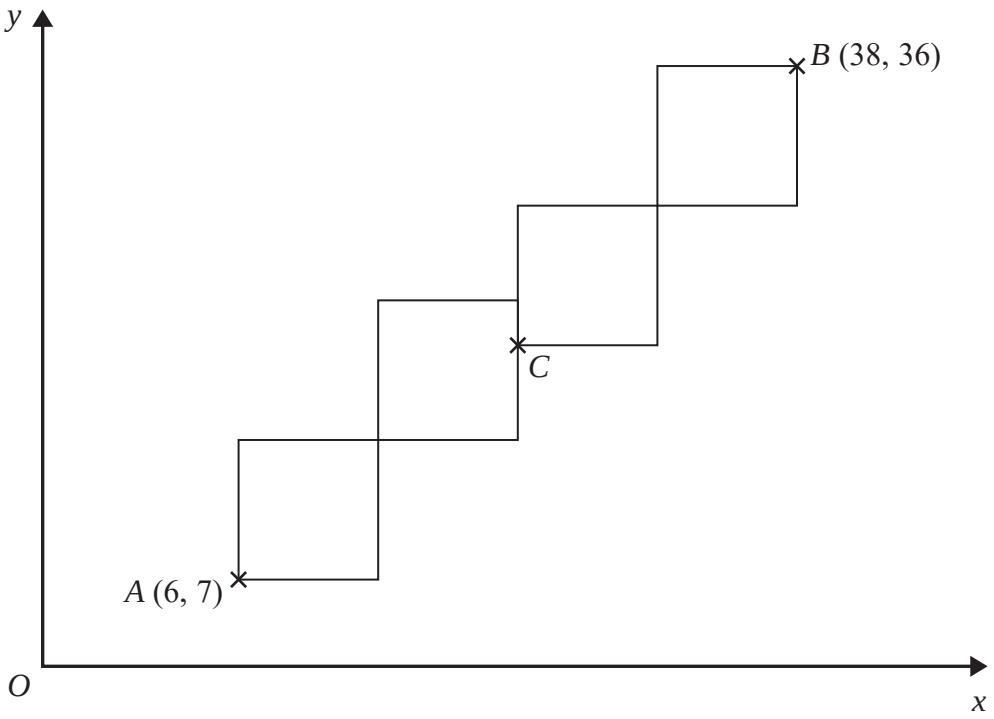
(b) Can Bayo make a pattern in this sequence using all 90 of his counters?
You must show how you get your answer.

(2)

(Total for Question 18 is 4 marks)

24 A pattern is made from four identical squares.

The sides of the squares are parallel to the axes.



Point A has coordinates (6, 7)
Point B has coordinates (38, 36)
Point C is marked on the diagram.

Work out the coordinates of C.

(..... , ...)

(Total for Question 24 is 5 marks)

4 Here are the first 4 terms of a sequence.

2 9 16 23

(a) (i) Write down the next term in the sequence.

.....

(1)

(ii) Explain how you got your answer.

.....

.....

(1)

(b) Work out the 10th term of the sequence.

.....

(1)

(Total for Question 4 is 3 marks)

9 (a) The nth term of a sequence is $3n + 4$

Explain why 21 is not a term of this sequence.

.....

.....

(2)

(b) Here are the first three terms of a different sequence.

1 2 4

Write down two numbers that could be the 4th term and the 5th term of this sequence.
Give the rule you have used to get your numbers.

.....

.....

.....

(2)

(Total for Question 9 is 4 marks)

Question 47

November 2018 | 1MA1/3F | Original Q26

26 Here are the first four terms of an arithmetic sequence.

5 11 17 23

Write down an expression, in terms of n, for the nth term of the sequence.

.....

(Total for Question 26 is 2 marks)

28 Here are the first five terms of a Fibonacci sequence.

3 3 6 9 15

(a) Write down the next two terms of the sequence.

..... , ...

(1)

The first three terms of a different Fibonacci sequence are

a a $2a$

(b) Find the 6th term of this sequence.

.....

(2)

(Total for Question 28 is 3 marks)

13 The first term of a sequence of numbers is 24
The term-to-term rule of this sequence is 'add 8'

Josie says,
"No number in this sequence is in the 5 times table."

(a) Give an example to show that Josie is wrong.

.....

(1)

(b) Is 85 a number in this sequence?
Give a reason for your answer.

.....

.....

(1)

(Total for Question 13 is 2 marks)

26 The nth term of a sequence is $2n^2 - 1$

The nth term of a different sequence is $40 - n^2$

Show that there is only one number that is in both of these sequences.

(Total for Question 26 is 3 marks)

Question 51

November 2019 | 1MA1/3F | Original Q8

8 Here are the first five terms of a sequence.

1 3 6 10 15

Write down the next two terms of the sequence.

..... , ...

(Total for Question 8 is 2 marks)

Question 52

20 The first five terms of an arithmetic sequence are

1 4 7 10 13

Write down an expression, in terms of n, for the nth term of this sequence.

.....

(Total for Question 20 is 2 marks)

12 Here are the first five terms of a number sequence.

45 40 35 30 25

(a) (i) Write down the next two terms of this sequence.

..... , ...

(1)

A term of this sequence is −5

(ii) Which term?

.....

(1)

The *n*th term of a different sequence is given by the expression $4n + 3$

(b) Find the 9th term of this sequence.

.....

(1)

(Total for Question 12 is 3 marks)

13 A number sequence starts 1 2 4

Emma says that the next term is 7

(a) Explain why Emma may be correct.

.....

.....

.....

(1)

Here are the first four terms of the sequence of triangle numbers.

1 3 6 10

(b) Find the 8th term of this sequence.

.....

(2)

(Total for Question 13 is 3 marks)

25 The first four terms of a Fibonacci sequence are

$$a \qquad 2a \qquad 3a \qquad 5a$$

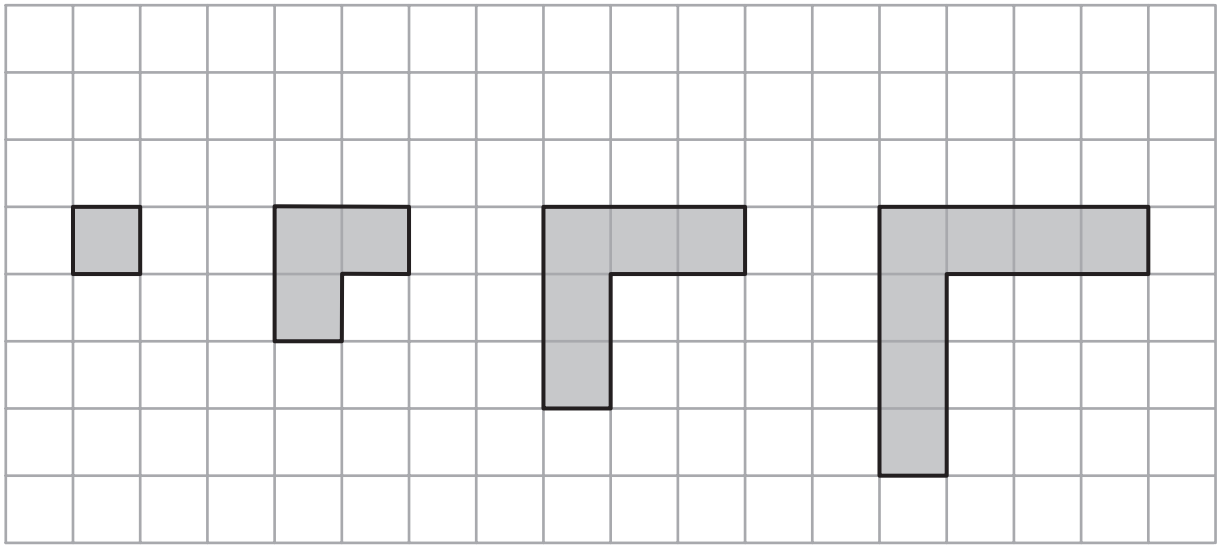
The sum of the first five terms of this sequence is 228

Work out the value of a.

.....

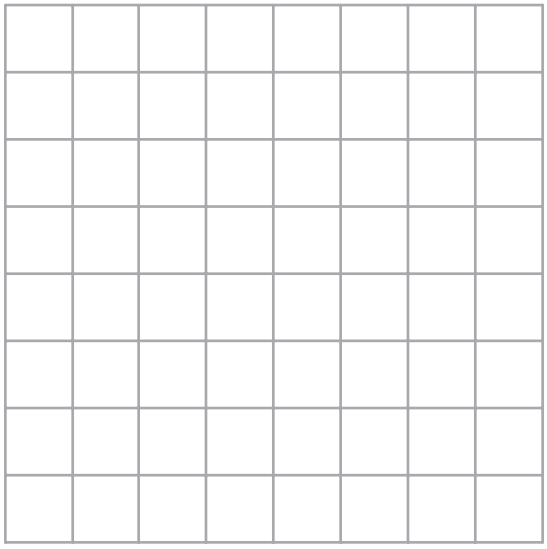
(Total for Question 25 is 3 marks)

9 Here is a sequence of patterns made from grey square tiles.



Pattern number 1 | Pattern number 2 | Pattern number 3 | Pattern number 4

(a) On the grid below, draw Pattern number 5



(1)

(b) Complete the table.

Pattern number	1	2	3	4	5	6
Number of squares	1	3	5	7		

(1)

(Total for Question 9 is 2 marks)

8 Here are the first five terms of a number sequence.

3 8 13 18 23

(a) Write down the next two terms of this sequence.

....

(1)

Jim says that 50 is a term in this sequence.
Jim is wrong.

(b) Explain why.

.....

.....

.....

(1)

(Total for Question 8 is 2 marks)

20 Here are the first five terms of an arithmetic sequence.

7 13 19 25 31

(a) Find an expression, in terms of n, for the nth term of this sequence.

.....

(2)

The nth term of a different sequence is $8 - 6n$

(b) Is -58 a term of this sequence?
You must show how you get your answer.

(2)

(Total for Question 20 is 4 marks)

10 Here are the first three terms of a sequence.

20 16 13

(i) Write down two numbers that could be the 4th and 5th terms of this sequence.

..... , ...

(1)

(ii) Write down the rule you used to get your numbers.

.....

.....

.....

(1)

(Total for Question 10 is 2 marks)

Question 60

June 2023 | 1MA1/1F | Original Q19

19 Here are the first five terms of an arithmetic sequence.

–5 3 11 19 27

Find an expression, in terms of n, for the nth term of this sequence.

.....

(Total for Question 19 is 2 marks)

Question 61

9 Here are the first five terms of a sequence.

3 8 13 18 23

(a) Write down the next term of this sequence.

.....

(1)

(b) Write down the ratio of the second term to the fourth term.
Give your ratio in its simplest form.

.....

(2)

(Total for Question 9 is 3 marks)

8 Here are the first four terms of a number sequence.

97 91 85 79

(a) Explain how to work out the next number of the sequence.

.....

(1)

(b) Work out the difference between the 5th term and the 7th term of the sequence.

.....

(2)

(c) Explain why 52 is **not** a number in this sequence.

.....

.....

(1)

(Total for Question 8 is 4 marks)

Question 63

June 2024 | 1MA1/1F | Original Q20

20 Here are the first four terms of an arithmetic sequence.

1 5 9 13

Find an expression, in terms of n, for the nth term of this sequence.

.....

(Total for Question 20 is 2 marks)

2 Here are the first four even numbers.

2 4 6 8

Find the 10th even number.

.....

(Total for Question 2 is 1 mark)

29 The first three terms of a Fibonacci sequence are

$a \qquad 3a \qquad 4a$

The 5th term of this sequence is 286

Work out the value of a.

$a =$ .....

(Total for Question 29 is 3 marks)

12 The nth term of a sequence is $4n - 1$

(a) Work out the 3rd term of the sequence.

.....

(1)

Here are the first four terms of a different sequence.

9 15 21 27

(b) Is 63 a number in this sequence?
You must give a reason for your answer.

.....

.....

.....

(2)

(Total for Question 12 is 3 marks)