2.7 Sequences

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

5 17 29 41 53

(a) Work out the next term of the sequence.

.....

(1)

The 40th term of the sequence is 473

(b) Work out the 39th term of the sequence.

.....

(1)

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

3 7 11 15

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

.....

(1)

(b) Write down the 10th term of the sequence.

.....

(1)

Ali says that 102 is a term of the sequence.

Ali is wrong.

(c) Explain why.

.....

.....

(1)

6 Here is a sequence of patterns made from dots.

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

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

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5
Number of dots	4	8	12		

(1)

(c) Work out the number of dots in Pattern number 13

.....

(2)

(d) Find an expression, in terms of n, for the number of dots in Pattern number n.

.....

(1)

There are fewer than 90 dots in Pattern number k.

(e) What is the largest possible value of k?

.....

(2)

11 A sequence is formed by adding 1 to each square number.
Here are the first five terms of the sequence.

2 5 10 17 26

(a) Find the 10th term of the sequence.

.....

(1)

1025 is a term of this sequence.

(b) Which term?

.....

(2)

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

6 10 14 18

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

.....

(2)

(b) Write down an expression, in terms of n, for the $(n + 1)$th term of this sequence.

.....

(1)

3 Here is a sequence of patterns made from identical pentagons.

Pattern number 1 | Pattern number 2 | Pattern number 3

(a) (i) Work out the number of pentagons in Pattern number 4

(ii) Explain how you worked out your answer.

(2)

A different sequence of patterns is made from identical hexagons.
The rule below can be used to find the number of hexagons in each pattern of this sequence.

Multiply the Pattern number by 5 and subtract 1

(b) Work out the number of hexagons in Pattern number 7

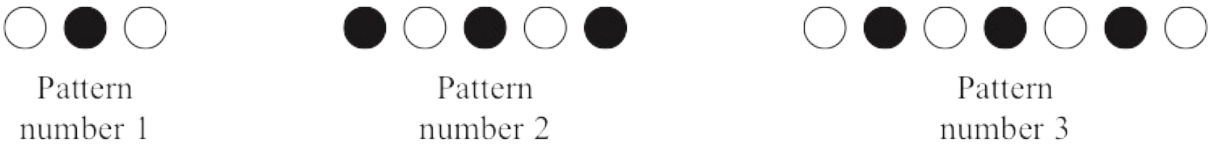
(1)

A pattern in this sequence has exactly 59 hexagons.

(c) Work out its Pattern number.

(2)

9 Here is a sequence of patterns made from white counters and black counters.



Pattern number 1 | Pattern number 2 | Pattern number 3

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

(1)

(b) Find the **total** number of counters in Pattern number 6

(1)

(c) Work out the number of **black** counters in Pattern number 14

(1)

(d) Work out the **total** number of counters in Pattern number 50

(2)

17 Here are the first five terms of a number sequence S.

10 16 22 28 34

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

(2)

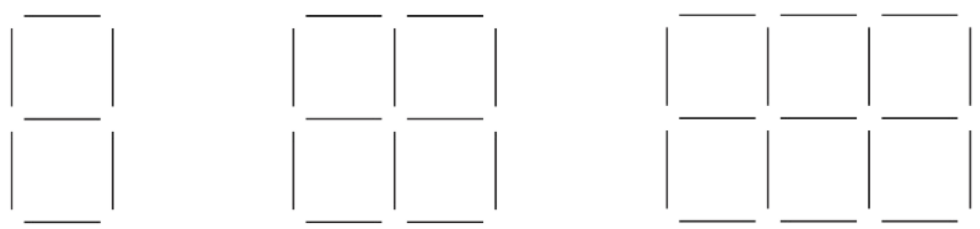
The nth term of a sequence T is given by $n^2 - 3$

There are numbers that are terms in both the sequence S and the sequence T.

(b) Find one of these numbers.

(2)

6 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 to make Pattern number 7?

.....

(2)

(c) Work out the Pattern number of the pattern made from exactly 62 sticks.

(2)

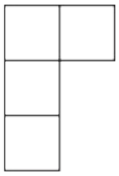
Pedro says,

"There will be a pattern in the sequence with exactly 123 sticks."

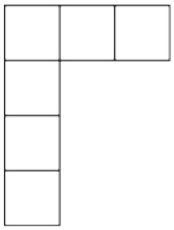
(d) Is Pedro correct?
You must give a reason for your answer.

(1)

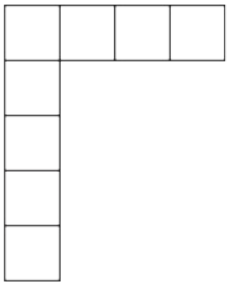
4 Here is a sequence of patterns made from square tiles.



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 tiles	4	6	8		

(1)

(c) Work out the number of tiles in Pattern number 30

.....

(2)

Liz says that in Pattern number n, the number of tiles is $2n$.

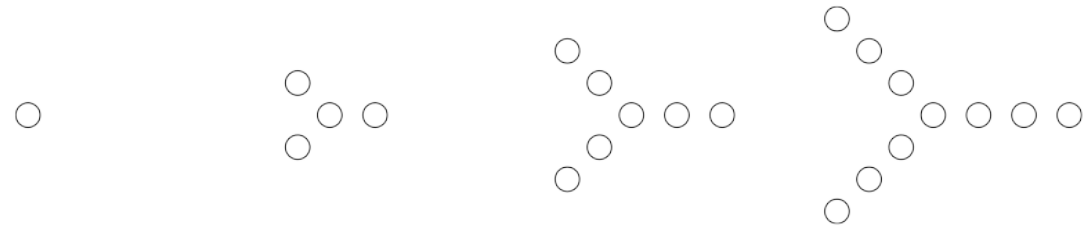
(d) Is Liz correct?
You must give a reason for your answer.

.....

.....

(1)

9 Here is a sequence of patterns made from circles.



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

(a) In the space below, draw Pattern number 5

(1)

(b) Complete the table.

Pattern number	1	2	3	4	5	6
Number of circles	1	4	7	10		

(1)

(c) Work out the number of circles in Pattern number 8

.....

(1)

C is the number of circles in Pattern number P

(d) Write down a formula for C in terms of P

.....

(2)

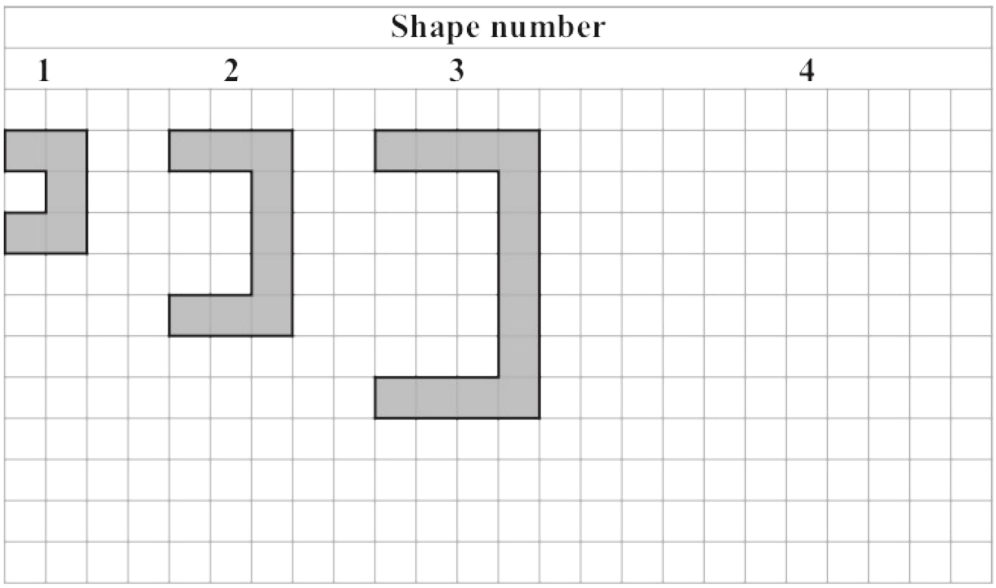
A different sequence of patterns is made from triangles.
The rule to find the number of triangles in each pattern is

multiply the Pattern number by 5 and subtract 4

(e) Is there a pattern in this sequence that is made from exactly 136 triangles?
You must give a reason for your answer.

(1)

5 A sequence of shapes is made by shading squares on a square grid.



(a) On the grid, draw Shape number 4

(1)

(b) Complete the table.

Shape number	1	2	3	4	5
Number of shaded squares	5	9	13		

(1)

(c) Find the number of shaded squares in Shape number 8

.....

(1)

(d) Explain why no shape in the sequence is made by shading exactly 50 squares.

.....

.....

(1)

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

4 8 12 16

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

.....

(1)

(b) Explain how you found your answer to part (a).

.....

.....

(1)

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

.....

(1)

11 Here is a sequence of patterns made from 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	3	6	9		

(1)

(c) Work out the number of counters in Pattern number 10

(1)

Sven has exactly 70 counters.

(d) Can Sven make Pattern number 25 using his 70 counters?

Tick the appropriate box below.

Yes ☐ No ☐

Give a reason for your answer.

(1)

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

7 12 17 22

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

.....

(1)

(ii) Explain how you worked out your answer.

.....

.....

(1)

(b) Is 256 a number in the sequence?

Tick one of the boxes below and give a reason for your answer.

Yes ☐ No ☐

Give a reason for your answer.

.....

.....

.....

(1)

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

1 5 9 13 17

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

(2)

The nth term of another arithmetic sequence is $3n + 5$

(b) Find an expression, in terms of m, for the $(2m)$th term of this sequence.

(1)

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

7 13 19 25 31

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

.....

(1)

(ii) Explain how you found your answer to part (a)(i)

.....

(1)

The 30th term of the sequence is 181

(b) Work out the 28th term of the sequence.

.....

(1)

Brian says that 96 is a number in the sequence.
Brian is wrong.

(c) Explain why.

.....

.....

(1)

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

1 7 13 19 25

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

.....

(1)

(ii) Explain how you worked out your answer.

.....

.....

(1)

(b) Explain why 188 cannot be a number in the sequence.

.....

.....

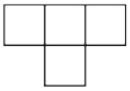
.....

(1)

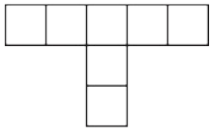
3 A sequence of patterns is made from squares.

Pattern number 1

Pattern number 2



Pattern number 3



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

Pattern number 4

(1)

(b) Complete the table.

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

(1)

(c) Work out the number of squares in Pattern number 8

.....

(1)

Angus says

"there are 42 squares in Pattern number 15"

Angus is incorrect.

(d) Explain why.

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.....

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(1)

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

4 10 16 22 28

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

.....

(1)

(ii) Explain how you worked out your answer.

.....

.....

(1)

(b) Work out the 13th term of the sequence.

.....

(1)

(c) Explain why 467 cannot be a number in the sequence.

.....

.....

(1)

4 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) Complete the table.

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

(1)

(c) Work out the number of sticks in Pattern number 10

.....

(1)

Connor says that in Pattern number 25 there are 102 sticks.

(d) Explain why Connor is wrong.

.....

.....

(1)

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

38 31 24 17

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

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(Total for Question 19 is 2 marks)