

Sequences

Exam questions

Foundation and Higher tiers

Please write clearly in block capitals.

Name

Class

Teacher

Time allowed: 100 minutes

Materials

For this booklet you need a black pen, a pencil, a ruler, a rubber and a calculator for Section B.

Instructions

- Use black ink or black ballpoint pen. Draw diagrams in pencil.
- Fill in the boxes at the top of this page.
- Answer all questions in the spaces provided.
- **Section A** (questions 1 to 12): you must not use a calculator.
- **Section B** (questions 13 to 25): you may use a calculator.
- Do all rough work in this booklet. Cross through any work you do not want marked.

Information

- The marks for each question are shown in brackets.
- The maximum mark for this booklet is 87.

Advice

- Read each question carefully.
- In all calculations, show clearly how you work out your answer.

For teacher's use

Q	Mark	Q	Mark
1		14	
2		15	
3		16	
4		17	
5		18	
6		19	
7		20	
8		21	
9		22	
10		23	
11		24	
12		25	
13			
TOTAL			

Section A

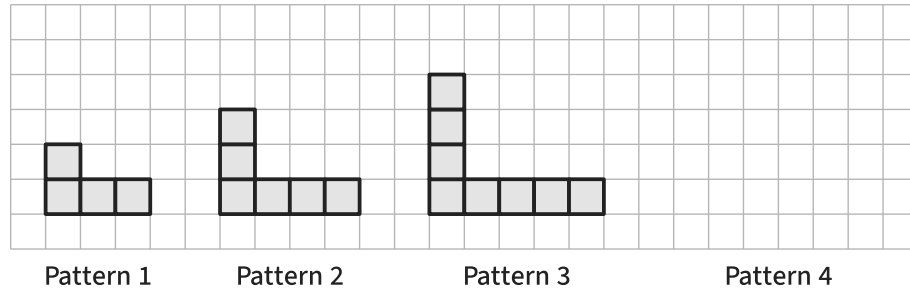


You must not use a calculator

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write
outside
the box

- 1** Here are the first three patterns in a sequence. Each pattern is made from squares.

- (a) In the space on the grid, draw Pattern 4



[1 mark]

- (b) Work out the number of squares in Pattern 10

Answer _____

[2 marks]

- 2** Here is a list of numbers.

15 16 18 25 27 28

- (a) From the list, write down the two square numbers.

Answer _____

[1 mark]

- (b) From the list, write down the cube number.

Answer _____

[1 mark]

- (c) From the list, write down the two triangular numbers.

Answer _____

[1 mark]

- 3** The rule for a sequence is
multiply by 2 and then subtract 3

- (a)** The first term is 5
Write down the next two terms.

Answer _____

[1 mark]

- (b)** A different sequence uses the same rule.
Its third term is 29
Work out its first term.

Answer _____

[2 marks]

- 4** Here are the first four terms of an arithmetic sequence.

7 11 15 19

- (a)** Write down the next term.

Answer _____

[1 mark]

- (b)** Work out an expression for the n th term of the sequence.

Answer _____

[2 marks]

- (c)** Explain why 102 is not a term in the sequence.

[1 mark]

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

62 57 52 47

(a) Work out an expression for the n th term of the sequence.

Answer _____

[2 marks]

(b) Work out the value of the first term in the sequence that is negative.

Answer _____

[2 marks]

6 The n th term of a sequence is $2n^2 + 1$

(a) Write down the first three terms of the sequence.

Answer _____

[1 mark]

(b) Mia says that 200 is a term in the sequence.
Is she correct?
You must show your working.

[2 marks]

- 7** In a sequence, each term after the second is found by adding the two terms before it.
The first term is 4
The fifth term is 41

Work out the second term.

Answer _____

[3 marks]

- 8** The n th term of sequence **A** is $3n + 5$
Here are the first four terms of sequence **B**.

48 46 44 42

For one value of n , the n th term of sequence **A** is equal to the n th term of sequence **B**.
Work out the value of this term.

Answer _____

[3 marks]

- 9** Here are the first four terms of a sequence.

$\frac{1}{3}$ $\frac{3}{7}$ $\frac{5}{11}$ $\frac{7}{15}$

Work out an expression for the n th term of the sequence.

Answer _____

[2 marks]

- 10** Here are the first five terms of a quadratic sequence.

4 9 18 31 48

Work out an expression for the n th term of the sequence.

Answer _____

[3 marks]

- 11** The first three terms of a geometric progression are

3 x 15

x is positive.

- (a) Work out the exact value of x .

Answer _____

[2 marks]

- (b) Work out the fifth term of the progression.

Answer _____

[2 marks]

12

The n th term of a sequence is $an^2 + bn$

The 2nd term is 2

The 5th term is 35

Work out the values of a and b .

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Answer _____

[4 marks]

Section B



You may use a calculator

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- 13** Here are the first four terms of a sequence.

3.8 5.15 6.5 7.85

- (a)** Write down the term-to-term rule.

Answer _____

[1 mark]

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

Answer _____

[2 marks]

- 14** Amara is training for a long swim.

In week 1 she swims 0.65 km.

Each week she swims 0.37 km more than the week before.

- (a)** How far does Amara swim in week 4?

Answer _____ km

[1 mark]

- (b)** In which week will Amara first swim more than 4 km?

Answer _____

[2 marks]

15

The table shows the start of three sequences, P, Q and R.
One is arithmetic, one is geometric and one is a Fibonacci type sequence.

	Start of the sequence	Kind	Next number
P	2.4, 3.6, 6, 9.6		
Q	2.4, 3.65, 4.9, 6.15		
R	2.4, 3.6, 5.4, 8.1		

- (a) Complete the table to show the kind of each sequence.

[2 marks]

- (b) Complete the table to show the next number in each sequence.

[2 marks]**16**

The n th term of the sequence of triangular numbers is $\frac{n(n+1)}{2}$

- (a) Work out the 12th triangular number.

Answer _____

[1 mark]

- (b) Two triangular numbers that are next to each other in the sequence add up to 121
Work out the two triangular numbers.

Answer _____

[2 marks]

- 17** The rule for a sequence is
multiply by 1.2 and then add 0.5

The first term is 6.2

- (a)** Work out the 4th term of the sequence.

Answer _____

[2 marks]

- (b)** Jade says,
“The 6th term of the sequence is more than 3 times the first term.”
Is Jade correct?
You must show your working.

[2 marks]

- 18** In a sequence, each term after the second is found by adding the two terms before it.
The first two terms are 0.75 and 1.2

Bronwen says,
“The 9th term of the sequence is more than 35”
Is Bronwen correct?
You must show your working.

[3 marks]

19 The n th term of a sequence is $7.4n - 3.85$

(a) Work out the 30th term of the sequence.

Answer _____

[1 mark]

(b) Dev says,
“The 24th term is double the 12th term.”
Is Dev correct?
You must show your working.

[2 marks]

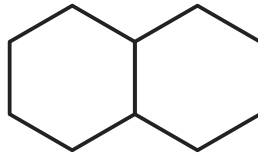
20

Here are the first three patterns in a sequence made from regular hexagons.
Each hexagon has sides of length 2.4 cm.

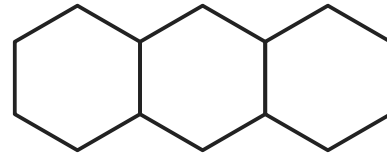
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Pattern 1



Pattern 2



Pattern 3

- (a) Work out the perimeter of Pattern 5

Answer _____ cm

[2 marks]

- (b) One pattern in the sequence has a perimeter of 91.2 cm.
Work out the number of this pattern.

Pattern number _____

[3 marks]

- 21** Here are the first four terms of a geometric progression.

64 48 36 27

- (a)** Work out the fifth term.

Answer _____

[2 marks]

- (b)** Which term is the first term less than 10?

Answer _____

[2 marks]

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

2.7 4.35 6 7.65

- (a)** Work out an expression for the n th term of the sequence.

Answer _____

[2 marks]

- (b)** Show that 50.55 is a term in the sequence.

[2 marks]

23

A sheet of paper is 0.085 mm thick.

Each time the paper is folded in half, its thickness doubles.

- (a) Work out the thickness of the paper after it has been folded in half 4 times.

Answer _____ mm

[1 mark]

- (b) What is the smallest number of times the paper must be folded in half for it to be more than 1 cm thick?

Answer _____

[2 marks]

24

One plastic chair is 82 cm tall.

When the chairs are stacked, each extra chair adds 6.4 cm to the height of the stack.

- (a) Work out the height of a stack of 7 chairs.

Answer _____ cm

[1 mark]

- (b) Write an expression for the height, in centimetres, of a stack of n chairs.

Answer _____

[2 marks]

- (c) A stack of chairs is stored under a shelf.

The shelf is 1.98 m above the floor.

Work out the greatest number of chairs the stack can have.

Answer _____

[2 marks]

25

Here are the first five terms of an arithmetic sequence.
Some of the terms are missing.

4.6 13.18

(a) Work out the three missing terms.

Answer _____

[2 marks]

(b) Work out the 50th term of the sequence.

Answer _____

[2 marks]

END OF QUESTIONS