IGCSE · Cambridge (CIE) · Maths

1 hour 16 questions

Calculator Questions

Sequences

Introduction to Sequences / nth Terms of Linear Sequences / Quadratic Sequences / Other Sequences

Easy (3 questions)	/7
Medium (4 questions)	/11
Hard (6 questions)	/26
Very Hard (3 questions)	/33
Total Marks	**/77**

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Easy Questions

1 Here is a sequence of numbers.

$$7,\ \ 5,\ \ 3,\ \ 1,\ \ -1, \ldots$$

Find the next term in this sequence.

(1 mark)

2 Write the next term in each of these sequences.

i) 1 1 2 3 5 8

[1]

ii) 2 4 8 16 32 64

[1]

(2 marks)

3 This expression can be used to generate a sequence of numbers.

$$n^2 - n + 11$$

i) Work out the first three terms of this sequence.

[2]

ii) Show that this expression does not only generate prime numbers.

[2]

(4 marks)

Medium Questions

1 Find the nth term of the sequence below.

$$\frac{1}{2}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}, \frac{1}{10}, \ldots$$

(1 mark)

2 The nth term of a sequence is $4n^2 + n + 3$.

i) Find the 2nd term.

[1]

ii) Find the value of n when the nth term is 498.

$n =$ ..... [3]

(4 marks)

3 Here is a sequence.

$$a, \quad 13, \quad 9, \quad 3, \quad -5, \quad -15, \quad b, \quad \ldots$$

Find the value of a and the value of b.

$a =$ .....
$b =$ .....

(2 marks)

4 (a) 9 12 17 24 33

Write down the next term in the sequence.

(1 mark)

(b) Find the n^{th} term of the sequence.

(3 marks)

Hard Questions

1 (a) Find the nth term of each sequence.

4 2 0 -2 -4 ...

(2 marks)

(b) 1 7 17 31 49 ...

(2 marks)

2 Complete the table for the 5th term and the nth term of each sequence.

1st term	2nd term	3rd term	4th term	5th term		nth term
9	5	1	-3			
4	9	16	25			
1	8	27	64			
8	16	32	64			

(11 marks)

3 0, 1, 1, 2, 3, 5, 8, 13, 21 , ...

This sequence is a Fibonacci sequence. After the first two terms, the rule to find the next term is "add the two previous terms". For example, 5 + 8 = 13.

Use this rule to complete each of the following Fibonacci sequences.

2 4 ....

1 11

..... −1 1

(3 marks)

4 Find the nth term of the sequence below.

$1, \quad 5, \quad 25, \quad 125, \quad 625, \quad ...$

(2 marks)

5 Find the nth term of each sequence.

i) $-1, \quad -3, \quad -5, \quad -7, \quad -9, \quad ...$

[2]

ii) $2, \quad 9, \quad 28, \quad 65, \quad 126, \quad ...$

[2]

(4 marks)

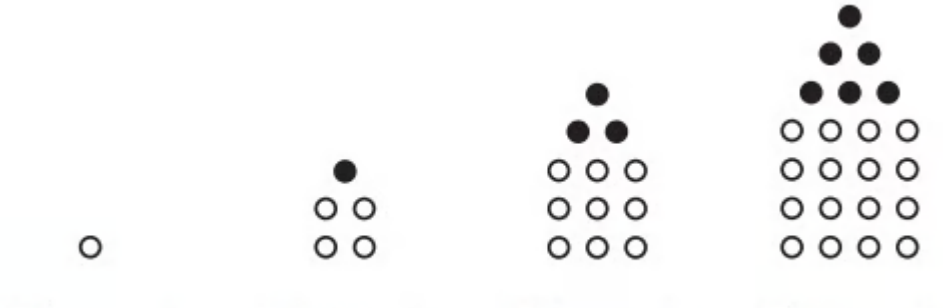
6 Find the nth term of the sequence below.

3, 6, 12, 24, ...

(2 marks)

Very Hard Questions

1 (a)



These are the first four diagrams of a sequence.
The diagrams are made from white dots and black dots.

Complete the table for Diagram 5 and Diagram 6.

Diagram	1	2	3	4	5	6
Number of white dots	1	4	9	16		
Number of black dots	0	1	3	6		
Total number of dots	1	5	12	22		

(2 marks)

(b) Write an expression, in terms of n, for the number of white dots in Diagram n.

(1 mark)

(c) The expression for the total number of dots in Diagram n is $\frac{1}{2}(3n^2 - n)$.

i) Find the total number of dots in Diagram 8.

[1]

ii) Find an expression for the number of black dots in Diagram n. Give your answer in its simplest form.

[2]

(3 marks)

(d) T is the total number of dots used to make **all** of the first n diagrams.

$$T = an^3 + bn^2$$

Find the value of a and the value of b. You must show all your working.

a = ...

b = ...

(5 marks)

2 The table shows the first four terms in sequences *A*, *B*, and *C*.

Sequence	1st term	2nd term	3rd term	4th term	5th term		nth term
A	4	9	14	19			
B	3	10	29	66			
C	1	4	16	64			

Complete the table.

(9 marks)

3 (a) The table shows the first five terms of sequences *A*, *B* and *C*.

Sequence	1st term	2nd term	3rd term	4th term	5th term	6th term
A	0	1	4	9	16	
B	4	5	6	7	8	
C	-4	-4	-2	2	8	

Complete the table.

(3 marks)

(b) Find an expression for the nth term of

i) sequence *A*,

[2]

ii) sequence *B*.

[1]

(3 marks)

(c) Find the value of n when the nth term of sequence A is 576.

$n =$ .....

(2 marks)

(d) i) Find an expression for the nth term of sequence C. Give your answer in its simplest form.

[3]

ii) Find the value of the 30th term of sequence C.

[2]

(5 marks)