

Sequences

Difficulty: Hard

Question Paper 1

Level	IGCSE
Subject	Maths (0580/0980)
Exam Board	CIE
Topic	Algebra and graphs
Sub-Topic	Sequences
Paper	Paper 2
Difficulty	Hard
Booklet	Question Paper 1

Time allowed: 39 minutes

Score: /30

Percentage: /100

Grade Boundaries:

CIE IGCSE Maths (0580)

A*	A	B	C	D	E
>88%	76%	63%	51%	40%	30%

CIE IGCSE Maths (0980)

9	8	7	6	5	4	3
>94%	85%	77%	67%	57%	47%	35%

Question 1

Find the n th term of each sequence.

(a) 7, 13, 19, 25, 31, ... [2]

(b) 9, 16, 25, 36, 49, ... [2]

Question 2

Find the n th term of each of these sequences.

(a) 16, 19, 22, 25, 28, ... [2]

(b) 1, 3, 9, 27, 81, ... [2]

Question 3

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

(a) Write down an expression, in terms of a and b , for the 3rd term. [1]

(b) The 3rd term of this sequence is 21 and the 6th term is 96.

Find the value of a and the value of b .
You must show all your working. [4]

Question 4

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

$$U_1 = 1^3$$

$$U_2 = 1^3 + 2^3$$

$$U_3 = 1^3 + 2^3 + 3^3$$

The n th term is given by $U_n = \frac{1}{4}n^2(n+1)^2$.

Work out the value of U_{39} .

[2]

- (b) Here are the first three terms of another sequence.

$$V_1 = 2^3$$

$$V_2 = 2^3 + 4^3$$

$$V_3 = 2^3 + 4^3 + 6^3$$

[1]

By comparing this sequence with the sequence in **part (a)**, find a formula for the n th term, V_n .

Question 5

Find the n th term in each of the following sequences.

(a) $\frac{1}{3}, \frac{2}{4}, \frac{3}{5}, \frac{4}{6}, \frac{5}{7}, \dots$ [1]

(b) 0, 3, 8, 15, 24, [2]

Question 6

The first four terms of a sequence are

$$T_1 = 1^2 \quad T_2 = 1^2 + 2^2 \quad T_3 = 1^2 + 2^2 + 3^2 \quad T_4 = 1^2 + 2^2 + 3^2 + 4^2.$$

(a) The n th term is given by $T_n = \frac{1}{6} n(n+1)(2n+1)$.

Work out the value of T_{23} . [2]

(b) A new sequence is formed as follows.

$$U_1 = T_2 - T_1 \quad U_2 = T_3 - T_2 \quad U_3 = T_4 - T_3 \quad \dots$$

(i) Find the values of U_1 and U_2 . [2]

(ii) Write down a formula for the n th term, U_n . [1]

(c) The first four terms of another sequence are

$$V_1 = 2^2 \quad V_2 = 2^2 + 4^2 \quad V_3 = 2^2 + 4^2 + 6^2 \quad V_4 = 2^2 + 4^2 + 6^2 + 8^2.$$

By comparing this sequence with the one in part (a), find a formula for the n th term, V_n . [2]

Question 7



Pattern 1



Pattern 2



Pattern 3

The first three patterns in a sequence are shown above.

(a) Complete the table.

Pattern number	1	2	3	4
Number of dots	5			

[1]

(b) Find a formula for the number of dots, d , in the n th pattern.

[1]

(c) Find the number of dots in the 60th pattern.

[1]

(d) Find the number of the pattern that has 89 dots.

[1]