

1.3 Sequences & Series

Question Paper

Course	DP IB Maths	
Section	1. Number & Algebra	
Topic	1.3 Sequences & Series	
Difficulty	Medium	

Time allowed: 120

Score: /94

Percentage: /100

Question la

The second term, u_2 , of a geometric sequence is 44 and the third term, u_3 , is 55.	
(a) Find the common ratio, r , of the sequence.	
	[2 marks]
Question 1b	
(b) Find the first term of the sequence, u_1 .	
	[2 marks]
Question 1c	
(c) Find S_5 , the sum of the first 5 terms of the sequence.	
	[2 marks]
Question 2a	
The sum of the first 16 terms of an arithmetic sequence is 920.	

(a) Find the common difference, d, of the sequence if the first term is 27.5.

→ SaveMyExams	
Head to <u>savemy exams.co.uk</u> for more awe some resources	[3 marks]
Question 2b	
(b) Find the first term of the sequence if the common difference, d , is 11.	
	[3 marks]
Question 3a	
The sum of the first 5 terms of a geometric sequence is 461.12.	
(a) Find the common ratio, r , of the sequence if the first term is 200, given that $r>$	0.
	[3 marks]

Question 2b

Question 3a

Question 3b

(b) Find the first term of the sequence if the common ratio, r, is -2. Give your answer correct to 2 decimal places.

[3 marks]

Question 4a

The table below shows information about the terms of four different sequences a_n , b_n , c_n and d_n .

	n = 1	n = 2	n = 3	n = 4
a_n		12	30	
b_n		12	30	
c_n	80			10
d_n	80			10

(a) Calculate a_1 , a_4 and the common difference, d, given that a_n is an arithmetic sequence.

[2 marks]

Question 4b

(b) Calculate b_1 , b_4 and the common ratio, r, given that b_n is a geometric sequence.

[2 marks]

Question 4c

(c) Calculate c_2 , c_3 and the common difference, d, given that c_n is an arithmetic sequence.

[2 marks]

Question 4d

(d) Calculate d_2 , d_3 and the common ratio, r, given that d_n is a geometric sequence.

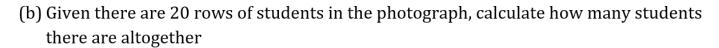
[2 marks]

Question 5a

Students are arranged for a graduation photograph in rows which follows an arithmetic sequence. There are 20 students in the fourth row and 44 in the 10th row.

- (a) (i) Find the common difference, d, of the arithmetic sequence.
 - (ii) Find the first term of the arithmetic sequence.

Question 5b



[3 marks]

Question 6a

Marie is an athlete returning to running after an injury and wants to manage the number of kilometres she runs per week. She decides to run 4 km the first week and increase this by 1.5 km each week.

(a) Find the distance Marie ran in the 10th week.

[2 marks]

Question 6b

(b) Find the week in which Marie runs 26.5 km.



[3 marks]

Question 6c

Marie's coach says she can start preparing for her next race once she has run a total of 220 km.

(c) Find the week in which Marie will complete this.

[3 marks]

Question 7a

The eighth term, u_8 , of an arithmetic sequence is 18 and the common difference, d, is 2.

- (a) (i) Find the first term of the arithmetic sequence.
 - (ii) Find the value of u_{17} .

Question 7b

The first and 17th terms of the arithmetic sequence are the third and fifth terms respectively of a geometric sequence.

- (b) (i) Find the possible values for the common ratio, r, of the geometric sequence.
 - (ii) Find the first term of the geometric sequence.

[4 marks]

Question 8a

In a geometric sequence, $u_3 = 160$ and the common ratio, r, is $\frac{1}{4}$.

- (a) (i) Find the first term, u_1 .
 - (ii) Find u_6 .

Question 8b

(b) Find the value of the infinite sum of the sequence.

[2 marks]

Question 8c

The first and third terms of the geometric sequence are the seventh and ninth terms respectively of an arithmetic sequence.

- (c) (i) Find the common difference, d, of the arithmetic sequence.
 - (ii) Find the first term of the arithmetic sequence.

Question 9a

A sequence can be defined by $a_n = 32 - 7n$, for $n \in \mathbb{Z}^+$.

(a) Write an expression for $a_1 + a_2 + a_3 + \cdots + a_{12}$ using sigma notation and find the value of the sum.

[3 marks]

Question 9b

(b) Write an expression for $a_4+a_5+a_6+\cdots+a_{15}$ using sigma notation and find the value of the sum.

Question 10a

A sequence can be defined by $g_n = 4 \times 3^{n-1}$, for $n \in \mathbb{Z}^+$.

(a) Write an expression for $g_1+g_2+g_3+\cdots+g_{10}$ using sigma notation and find the value of the sum.

[3 marks]

Question 10b

(b) Write an expression for $g_8+g_9+g_{10}+\cdots+g_{18}$ using sigma notation and find the value of the sum.

Question 11a

The kiwi is a flightless bird and is a national treasure in New Zealand. At the start of 2021 there were approximately 68 000 kiwi left, with the population decreasing by 2% every year.

(a) Find the expected population size of kiwis in 2030 assuming the rate of decrease in kiwi population remains the same.

[3 marks]

Question 11b

(b) Find the year in which the population of kiwis falls below 50 000 assuming the rate of decrease in kiwi population remains the same.

Head to <u>savemy exams.co.uk</u> for more awe some resources

Question 12a

Aaron is working on his cycling in preparation for a triathlon event in 10 months. He cycles a total of 240 km in the first month and plans to increase this by 12.5% each month.

(a) Find the distance Aaron cycles in the fifth month of preparation.

[3 marks]

Question 12b

(b) Calculate the total distance Aaron cycles until the triathlon.

Question 13a

A geometric sequence has $u_1 = 0.5$ and r = 3.

- (a) Find
 - (i) u_4
 - (ii) S_5 .

[2 marks]

Question 13b

An arithmetic sequence has the same u_4 and S_5 as the geometric sequence above.

(b) Find u_1 and d for the arithmetic sequence.



 $Head to \underline{savemy exams.co.uk} for more awas ome resources$

Question 14

The sum of the first two terms of a geometric sequence is 15.3 and the sum of the infinite geometric sequence is 30. Find the positive value of the common ratio, r.

[6 marks]