

Mathematics Book One - Chapter Two Assessment

Student examination paper

Modules 6-10 | 20 questions | 30 marks | 60 minutes



Name: _____ Class: _____ Date: _____

Examination instructions

- Answer every question and show complete working for written responses.
- Do not view the marking guide until the examination is complete.
- For induction, state the base case, induction hypothesis and induction step clearly.

Curriculum and mark balance

6	Arithmetic sequences	4	6
7	Geometric sequences	4	6
8	Summation	4	6
9	Advanced sequences	4	6
10	Recurrence and induction	4	6

Section A: Objective questions - 15 marks

Choose the correct answer, then complete the true-or-false items.

1. An arithmetic sequence has first term 7 and common difference 5. Find a_{12} . [1 marks]

- A) 57
B) 60
C) 62
D) 67

2. An arithmetic sequence has first term 4 and common difference 3. Find the sum of its first 10 terms. [1 marks]

- A) 155
B) 165
C) 175
D) 185

3. For the geometric sequence 162, 54, 18, 6, ... what is the common ratio? [1 marks]

- A) 3
B) $\frac{1}{3}$
C) -3
D) -108

4. A geometric sequence has first term 3 and common ratio 2. Find the sum of its first 6 terms. [1 marks]

- A) 96
B) 126
C) 189
D) 192

5. Which expanded expression equals Σ from $k=2$ to 5 of $(2k-1)$? [1 marks]

- A) $1+3+5+7$
B) $3+5+7+9$
C) $3+5+7$
D) $2+4+6+8$

6. Evaluate Σ from $k=1$ to 8 of $\frac{1}{k(k+1)}$. [1 marks]

- A) $\frac{1}{9}$
B) $\frac{7}{8}$
C) $\frac{8}{9}$
D) $\frac{9}{8}$

7. If $u_n = 2n^2 - 3n$, what is $u_{(n+1)} - u_n$? [1 marks]

- A) $2n-3$
B) $4n-1$
C) $4n+1$
D) $2n^2-1$

8. If group sizes are 1,2,3,..., in which group and local position is term 23? [1 marks]

- A) Group 6, position 2
B) Group 7, position 2
C) Group 7, position 3
D) Group 8, position 1

9. If $u_1=2$ and $u_{(n+1)}=3u_n-1$, find u_4 . [1 marks]

- A) 14
B) 29
C) 41
D) 53

10. To prove $1+3+5+\dots+(2n-1)=n^2$ by induction from $n=1$, which is the correct base case? [1 marks]

A) $1=1^2$

B) $1+3=2^2$

C) $2n-1=n^2$

D) Assume the result at $n=1$

11. True or false: if the difference between each term and its predecessor is constant, the sequence is arithmetic. [1 marks]

☐ True ☐ False

12. True or false: if the common ratio is negative, every term of the sequence is negative. [1 marks]

☐ True ☐ False

13. True or false: $\sum$ from $k=1$ to n of the constant c equals c . [1 marks]

☐ True ☐ False

14. True or false: knowing only the difference sequence uniquely determines the original sequence. [1 marks]

☐ True ☐ False

15. True or false: checking the first 100 cases of a statement is an induction proof for all natural numbers. [1 marks]

☐ True ☐ False

Section B: Written solutions - 15 marks

Show a complete, justified method. Each question is worth 3 marks.

16. Find the sum of the multiples of 6 from 24 to 120 inclusive. Show how you counted the terms. [3 marks]

17. A geometric sequence has first term 64 and ratio $1/2$. Find a_7 and S_7 , and explain the effect of $|r| < 1$. [3 marks]

18. Evaluate Σ from $k=1$ to 5 of $k \times 2^{(k-1)}$, displaying the terms before adding. [3 marks]

19. For 3,8,15,24,... construct a quadratic general term, then use it to find a_6 . [3 marks]

20. Prove by induction that the sum of the first n odd numbers is n^2 for every $n \geq 1$. [3 marks]

Mark summary and follow-up

27-30	Mastery	Begin Chapter Three with an extension challenge.
23-26	Secure	Review and retry two missed questions.
18-22	Developing	Redo the weakest module sheets before retesting.
0-17	Needs support	Return to instruction and worked examples with a teacher.

Strongest module: _____

Module to revisit: _____

Retest date: _____