

## Series and Sequences, Binomial Theorem Review Paper 1

1. Consider the infinite geometric sequence  $3, 3(0.9), 3(0.9)^2, 3(0.9)^3, \dots$ .

(a) Write down the 10<sup>th</sup> term of the sequence. Do not simplify your answer.

(1)

(b) Find the sum of the infinite sequence.

(4)

(Total 5 marks)

2. In an arithmetic sequence,  $u_1 = 2$  and  $u_3 = 8$ .

(a) Find  $d$ .

(2)

(b) Find  $u_{20}$ .

(2)

(c) Find  $S_{20}$ .

(2)

(Total 6 marks)

3. Let  $u_n = 3 - 2n$ .

(a) Write down the value of  $u_1, u_2$ , and  $u_3$ .

(3)

(b) Find  $\sum_{n=1}^{20} (3 - 2n)$ .

(3)

(Total 6 marks)

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4. Consider the infinite geometric sequence 25, 5, 1, 0.2, ... .

- (a) Find the common ratio.
- (b) Find
  - (i) the 10<sup>th</sup> term;
  - (ii) an expression for the  $n^{\text{th}}$  term.
- (c) Find the sum of the infinite sequence.

**(Total 6 marks)**

5. (a) Write down the first three terms of the sequence  $u_n = 3n$ , for  $n \geq 1$ .

**(1)**

(b) Find

(i)  $\sum_{n=1}^{20} 3n$ ;

(ii)  $\sum_{n=21}^{100} 3n$ .

**(5)**

**(Total 6 marks)**

6. Consider the infinite geometric series  $405 + 270 + 180 + \dots$

- (a) For this series, find the common ratio, giving your answer as a fraction in its simplest form.
- (b) Find the fifteenth term of this series.
- (c) Find the **exact** value of the sum of the infinite series.

**(Total 6 marks)**

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7. The first term of an infinite geometric sequence is 18, while the third term is 8. There are two possible sequences. Find the sum of each sequence.

*Working:*

*Answers:*

.....  
.....

**(Total 6 marks)**

8. Gwendolyn added the multiples of 3, from 3 to 3750 and found that

$$3 + 6 + 9 + \dots + 3750 = s.$$

Calculate  $s$ .

*Working:*

*Answer:*

.....

**(Total 6 marks)**

## Series and Sequences, Binomial Theorem Review Paper 1

9. Arturo goes swimming every week. He swims 200 metres in the first week. Each week he swims 30 metres more than the previous week. He continues for one year (52 weeks).
- (a) How far does Arturo swim in the final week?
- (b) How far does he swim altogether?

*Working:*

*Answers:*

(a) .....

(b) .....

**(Total 6 marks)**

10. In an arithmetic sequence, the first term is  $-2$ , the fourth term is 16, and the  $n^{\text{th}}$  term is 11 998.
- (a) Find the common difference  $d$ .
- (b) Find the value of  $n$ .

*Working:*

*Answers:*

(a) .....

(b) .....

**(Total 6 marks)**

## Series and Sequences, Binomial Theorem Review Paper 1

11. Find the sum of the infinite geometric series

$$\frac{2}{3} - \frac{4}{9} + \frac{8}{27} - \frac{16}{81} + \dots$$

*Working:*

*Answer:*

.....

**(Total 4 marks)**

12. An arithmetic series has five terms. The first term is 2 and the last term is 32. Find the sum of the series.

*Working:*

*Answer:*

.....

**(Total 4 marks)**