

Sequences and series / SL [53 marks]

1. [Maximum mark: 6] EXN.1.SL.TZ0.4

The first three terms of an arithmetic sequence are u_1 , $5u_1 - 8$ and $3u_1 + 8$.

(a) Show that $u_1 = 4$. [2]

(b) Prove that the sum of the first n terms of this arithmetic sequence is a square number. [4]

2. [Maximum mark: 5] 22N.2.SL.TZ0.4

geometric sequence has a first term of 50 and a fourth term of 86.4.

The sum of the first n terms of the sequence is S_n .

Find the smallest value of n such that $S_n > 33\,500$. [5]

3. [Maximum mark: 5] 22M.1.SL.TZ2.2

The n^{th} term of an arithmetic sequence is given by $u_n = 15 - 3n$.

(a) State the value of the first term, u_1 . [1]

(b) Given that the n^{th} term of this sequence is -33 , find the value of n . [2]

(c) Find the common difference, d . [2]

4. [Maximum mark: 5]

21M.2.SL.TZ2.3

An arithmetic sequence has first term 60 and common difference -2 . 5.

(a) Given that the k th term of the sequence is zero, find the value of k . [2]

(b) Let S_n denote the sum of the first n terms of the sequence.

Find the maximum value of S_n . [3]

5. [Maximum mark: 6]

19N.1.SL.TZ0.S_1

In an arithmetic sequence, $u_2 = 5$ and $u_3 = 11$.

(a) Find the common difference. [2]

(b) Find the first term. [2]

(c) Find the sum of the first 20 terms. [2]

6. [Maximum mark: 7]

19N.2.SL.TZ0.S_5

The first two terms of a geometric sequence are $u_1 = 2.1$ and $u_2 = 2.226$.

(a) Find the value of r . [2]

(b) Find the value of u_{10} . [2]

(c) Find the least value of n such that $S_n > 5543$. [3]

7. [Maximum mark: 7]

18M.2.SL.TZ2.S_4

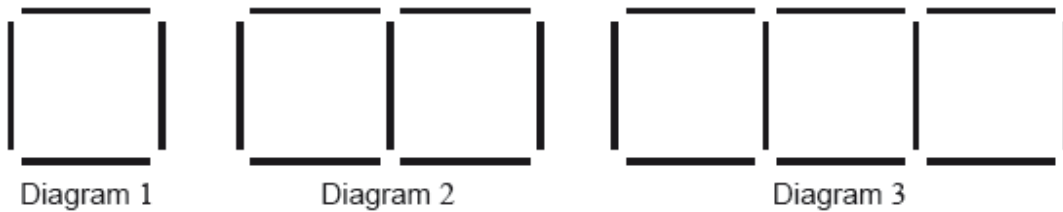
The first term of an infinite geometric sequence is 4. The sum of the infinite sequence is 200.

- (a) Find the common ratio. [2]
- (b) Find the sum of the first 8 terms. [2]
- (c) Find the least value of n for which $S_n > 163$. [3]

8. [Maximum mark: 6]

17M.1.SL.TZ2.T_5

Tomás is playing with sticks and he forms the first three diagrams of a pattern. These diagrams are shown below.



Tomás continues forming diagrams following this pattern.

Tomás forms a total of 24 diagrams.

- (a) Diagram n is formed with 52 sticks. Find the value of n . [3]
- (b) Find the total number of sticks used by Tomás for all 24 diagrams. [3]

9. [Maximum mark: 6]

16N.1.SL.TZ0.T_10

A hydraulic hammer drives a metal post vertically into the ground by striking the top of the post. The distance that the post is driven into the ground, by the n th strike of the hammer, is d_n .

The distances $d_1, d_2, d_3 \dots, d_n$ form a geometric sequence.

The distance that the post is driven into the ground by the first strike of the hammer, d_1 , is 64 cm.

The distance that the post is driven into the ground by the second strike of the hammer, d_2 , is 48 cm.

- (a) Find the value of the common ratio for this sequence. [2]
- (b) Find the distance that the post is driven into the ground by the eighth strike of the hammer. [2]
- (c) Find the **total depth** that the post has been driven into the ground after 10 strikes of the hammer. [2]