1.2 Arithmetic sequences and series

Checklist

What you should know

By the end of this subtopic you should be able to:

- recognise sequence notation such as $u_1,\ u_2,\ u_{n-1},\ u_n,\ u_{n+1}$
- know that $u_{n-1},\ u_n, u_{n+1}$ are three consecutive terms in a sequence
- write a recursive rule for a sequence and use the recursive rule to generate the first few terms of a sequence
- show that a sequence is arithmetic by proving that $d = u_n - u_{n-1}$ is constant for all terms of a sequence
- write a recursive rule for an arithmetic sequence by using $u_n = u_{n-1} + d$
- write an nth term or deductive rule for an arithmetic sequence by using $u_n = u_1 + (n-1)\,d$
- find the sum of an arithmetic sequence by using

$$S_n = \frac{n}{2}\left(2u_1 + (n-1)\,d\right) \text{ or } S_n = \frac{n}{2}\left(u_1 + u_n\right)$$

- identify real-world situations which follow a perfectly arithmetic progression
- apply $u_n = u_1 + (n-1)\,d$, $S_n = \frac{n}{2}\left(2u_1 + (n-1)\,d\right)$, and $S_n = \frac{n}{2}\left(u_1 + u_n\right)$ to solve real-world application questions with perfectly arithmetic progressions
- identify real-world situations which are not perfectly arithmetic but are similar enough to be modelled using arithmetic sequences
- use the mean value for d in application questions involving sequences that are not perfectly arithmetic to create a model for u_n and to approximate its values for specific values of n
- interpret sigma notation to write out and evaluate a given sum
- write an equivalent form of a sum in sigma notation.