Worksheet

Exercise 1

1. Determine the formula for the nth term of the following arithmetic sequences.

1.1 $-2; 5; 12; 19; \ldots$ **1.2** $3; 1; -1; -3; \ldots$

1.3 $7; 11; 15; 19; \ldots$ **1.4** $4; 0; -4; -8; \ldots$

2. Given the sequence $4; 10; 16; \ldots$

2.1 Write down the next 3 terms. **2.2** Determine the general formula T_n.

2.3 Calculate T_{14}. **2.4** Which term has a value of 70?

3. Given the sequence $18; 13; 8; \ldots$

3.1 Write down the next 3 terms. **3.2** Determine the general formula T_n.

3.3 Calculate T_{15}. **3.4** Which term has a value of -37?

4. Calculate the number of terms in the sequence $301; 297; 293, \ldots; -15$

5. The fourth term of an arithmetic sequence is 55 and the tenth term is 45. Calculate the value of T_{37}.

6. The first three terms of an arithmetic sequence are $2k + 7, 4k + 1; 5k - 1$. Calculate the value of k and write down the first three terms.

7. In an arithmetic sequence, the seventh term is 9 more than the fourth term. The sixth term is 5. Calculate:

7.1 the first term **7.2** the constant difference.

8. The nth term of an arithmetic sequence is x and the $(n + 1)$th term is y. Find the first term of the sequence in terms of x, y and n.

Sum of an arithmetic sequence

To find the sum of an arithmetic sequence, write it forwards and then backwards and add.

$S = a + (a + d) + (a + 2d) + \ldots (l - 2d) + (l - d) + l$ [where l is the last term]

$S = l + (l - d) + (l - 2d) + \ldots (a + 2d) + (a + d) + a$

$\therefore 2S = (a + l) + (a + l) + \ldots$ to n terms

$= n(a + l)$

$\therefore$ **$S = \frac{n}{2}(a + l)$ or $S = \frac{n}{2}(2a + (n - 1)d)$**

EXAMPLE

Find the sum of the terms in the series: $53 + 49 + 45 + \ldots + 9$.

Solution

In the example on page 12, we calculated n to be 12. There are 12 terms in the series.

Using the formula: $S = \frac{n}{2}(a + l)$

$S_{12} = \frac{12}{2}(53 + 9) = 372$

Using the formula: $S = \frac{n}{2}(2a + (n - 1)d)$

$S_{12} = \frac{12}{2}(2(53) + (12 - 1)(-4)) = 372$

Exercise 2

1. Calculate the sum of the arithmetic series: $4 + 7 + 10 + \ldots + 751$.

2. Find the sum of the first 11 terms of the series with $T_n = 5n - 3$.

3. The sum to n terms of an arithmetic series is $S_n = \frac{n}{2}(7n + 15)$.

3.1 How many terms must be added to give a sum of 425?

3.2 Determine the 10th term of the series.