# Section 2: Arithmetic sequence and series

## Solutions to Exercise level 1

1. (i) 2
   (ii) 5
   (iii) -4

2. (i) The common difference is 2, and the difference between the first and last terms is 18, so 2 has been added 9 times.
   So there are 10 terms.

   (ii) The common difference is 5, and the difference between the first and last terms is 195, so 5 has been added 39 times.
   So there are 40 terms.

   (iii) The common difference is -4, and the difference between the first and last terms is -40, so -4 has been added 10 times.
   So there are 11 terms.

3. (i) $S_n = \frac{1}{2}n[\text{first term} + \text{last term}]$
   $= \frac{1}{2} \times 10[1 + 19]$
   $= 5 \times 20$
   $= 100$

   (ii) $S_n = \frac{1}{2}n[\text{first term} + \text{last term}]$
   $= \frac{1}{2} \times 40[5 + 200]$
   $= 20 \times 205$
   $= 4100$

   (iii) $S_n = \frac{1}{2}n[\text{first term} + \text{last term}]$
   $= \frac{1}{2} \times 11[50 + 10]$
   $= \frac{1}{2} \times 11 \times 60$
   $= 11 \times 30$
   $= 330$

4. First term is -12, common difference is 7.
   $15^{\text{th}}$ term $= -12 + 14 \times 7 = -12 + 98 = 86$

# Edexcel A level Maths Sequences 2 Exercise solutions

5. The first 50 odd numbers form an arithmetic series, with $a = 1$, $d = 2$, $n = 50$

$$S_n = \tfrac{1}{2}n[2a + (n-1)d]$$
$$= \tfrac{1}{2} \times 50[2 \times 1 + 49 \times 2]$$
$$= 25[2 + 98]$$
$$= 25 \times 100$$
$$= 2500$$

6. (i) $a = 2$, $d = 4$

$8^{th}$ term $= a + 7d$
$= 2 + 7 \times 4$
$= 2 + 28$
$= 30$

(ii) $S_n = \tfrac{1}{2}n[2a + (n-1)d]$

$S_{10} = \tfrac{1}{2} \times 10[2 \times 2 + 9 \times 4]$
$= 5[4 + 36]$
$= 5 \times 40$
$= 200$

(iii) Last term $= 278$

$2 + 4(n-1) = 278$
$4(n-1) = 276$
$n - 1 = 69$
$n = 70$
There are 70 terms in the sequence.

7. (i) $a = 30$

$15^{th}$ term $= -12 \Rightarrow 30 + 14d = -12$
$\Rightarrow 14d = -42$
$\Rightarrow d = -3$

(ii) $S_n = \tfrac{1}{2}n[\text{first term} + \text{last term}]$

$= \tfrac{1}{2} \times 15[30 + -12]$
$= \tfrac{1}{2} \times 15 \times 18$
$= 15 \times 9$
$= 135$

# Edexcel A level Maths Sequences 2 Exercise solutions

8. $a = 2, d = 3$

Last term $= 92 \Rightarrow 2 + 3(n-1) = 92$

$\Rightarrow 3(n-1) = 90$

$\Rightarrow n - 1 = 30$

$\Rightarrow n = 31$

$S_n = \frac{1}{2}n[\text{first term} + \text{last term}]$

$= \frac{1}{2} \times 31[2 + 92]$

$= \frac{1}{2} \times 31 \times 94$

$= 31 \times 47$

$= 1457$

9. (i) $u_3 = u_1 + 2d \Rightarrow d = 7$

(ii) $s_{15} = \frac{15}{2}[2(12) + (15-1)(7)] = 915$

10. $d = -6$, so $123 - 6(n-1) = -57$

$\Rightarrow 6(n-1) = 180$

$\Rightarrow n = 31$

so $s_{31} = \frac{31}{2}[2(123) + (31-1)(-6)]$

$= 1023$

[Or: $s_{31} = \frac{31}{2}(123 - 57) = 1023$]