

## EXERCISE 8C

1. a,  $d = 3$

d,  $d = -2$

f,  $d = 9n$

h,  $d = x$

2. f.  $d = -6, U_1 = 73$

$$U_n = 73 - 6(n-1) = 73 - 6n + 6 = 79 - 6n$$

$$U_6 = 79 - 6 \cdot 6 = \underline{43}$$

g.  $d = 2, U_1 = x$

$$U_n = x + 2(n-1) = x + 2n - 2$$

$$U_6 = x + 2(5) = x + 10$$

h.  $d = x, U_1 = 1-x$

$$U_n = 1-x + x(n-1) = 1-x + xn - x$$

$$= 1 + xn - 2x$$

$$U_6 = 1 + 6x - 2x$$

$$= 1 + 4x$$

3a.  $U_1 = 4, d = 1, U_n = 17$

$$17 = 4 + (n-1)$$

$$n = \underline{14}$$

g.  $U_1 = \frac{1}{6}, d = \frac{1}{6}, U_n = \frac{8}{3}$

$$\frac{8}{3} = \frac{1}{6} + \frac{1}{6}(n-1)$$

$$16 = 1 + n - 1$$

$$n = \underline{16}$$

h.  $U_1 = 1-2x$

$$d = x$$

$$U_n = 1 + 25x$$

$$1 + 25x = 1 - 2x + x(n-1)$$

$$1 + 25x = 1 - 2x + nx - x$$

$$25x + 3x = nx$$

$$n = \underline{28}$$

4a.  $S = \frac{1}{2}(20)(4 + 19 \times 3)$   
 $= 10 \times 61 = \underline{610}$

g.  $S = \frac{1}{2}(40)(2a + 39 \cdot 4a)$   
 $= 20(2a + 156a)$   
 $= 20 \times 158a$   
 $= \underline{3160a}$

h.  $S = \frac{1}{2}(100)(-6p + 99(-3p))$   
 $= 50(-6p - 297p)$   
 $= 50(-303p)$   
 $= \underline{-15150p}$

5a.  $111 = 5 + 2(n-1)$

$$106 = 2n - 2$$

$$n = 54$$

$$S = \frac{1}{2}(54)(5 + 111)$$

$$= 27(116) = 3132$$

g.  $10\,000 = 10 + 10(n-1)$

$$n = 1000$$

$$S = \frac{1}{2}(1000)(10 + 10\,000)$$

$$= 500(10\,010)$$

$$= 5\,005\,000$$

h.  $-34.2 = 1.8 - 0.6(n-1)$

$$-34.2 = 1.8 + 0.6 - 0.6n$$

$$-34.2 - 2.4 = -0.6n$$

$$-36.6 = -0.6n$$

$$n = 61$$

$$S = \frac{1}{2}(61)(1.8 - 34.2)$$

$$= \frac{1}{2}(61)(-32.4) = \underline{-988.2}$$

$$\begin{aligned}
 6a \quad U_4 &= 15 \\
 U_9 &= 35 \\
 U_n &= a + (n-1)d \\
 15 &= a + 3d \\
 35 &= a + 8d \\
 20 &= 5d \\
 d &= \underline{4}, a = \underline{3}
 \end{aligned}$$

$$\begin{aligned}
 7a \quad S_n &= \frac{1}{2}n(2a + (n-1)d) \\
 820 &= \frac{1}{2}n(6 + (n-1)4) \\
 1640 &= n(6 + 4n - 4) \\
 1640 &= 2n + 4n^2 \\
 4n^2 + 2n - 1640 &= 0 \\
 2n^2 + n - 820 &= 0 \\
 (2n + 41)(n - 20) &= 0 \\
 n &= 20
 \end{aligned}$$

$$\begin{aligned}
 8 \quad &5, 8, 11, \\
 a \quad U_{20} &= 5 + 19 \cdot 3 = \underline{62} \\
 b \quad S_n &= \frac{n}{2}(10 + (n-1)3) > 1000 \\
 n(10 + 3n - 3) &> 2000 \\
 3n^2 + 7n - 2000 &> 0 \\
 3(n^2 + \frac{7}{3}n - \frac{2000}{3}) &> 0 \\
 (n + \frac{7}{6})^2 - (\frac{7}{6})^2 - \frac{2000}{3} &> 0 \\
 n + \frac{7}{6} &= \pm 25.8 \\
 \begin{array}{ccc} + & - & + \\ -27.0 & & 24.7 \end{array} \\
 n &> 24.7 \\
 n &= \underline{25}
 \end{aligned}$$

$$\begin{aligned}
 6g. \quad U_2 = 2x &= a + d \\
 U_{11} = -7x &= a + 10d \\
 \hline
 -9x &= 9d \\
 d &= \underline{-x} \\
 2x &= a - x \\
 a &= 2x + x = \underline{3x}
 \end{aligned}$$

$$\begin{aligned}
 7e \quad S_n &= \frac{1}{2}n(2 \cdot 2 + (n-1)0.2) = 1017.6 \\
 n(2 + 0.2n) &= 2035.2 \\
 0.2n^2 + 2n - 2035.2 &= 0 \\
 n^2 + 10n - 10176 &= 0 \\
 (n + 106)(n - 96) &= 0 \\
 n &= -106 \quad n = \underline{96}
 \end{aligned}$$

$$\begin{aligned}
 g \quad &30, 32, 34 \quad n = 24 \\
 a \quad U_{24} &= 30 + 2 \cdot 23 = \underline{76} \\
 b \quad S_{24} &= \frac{24}{2}(60 + 23 \cdot 2) = \underline{\$172}
 \end{aligned}$$

$$\begin{aligned}
 6h \quad U_3 = 2p + 7 &= a + 2d \\
 U_7 = 4p + 19 &= a + 6d \\
 \hline
 2p + 12 &= 4d \\
 d &= \frac{2p + 12}{4} = \\
 &= \underline{3 + \frac{p}{2}} \\
 2p + 7 &= a + 2(3 + \frac{p}{2}) \\
 2p + 7 &= a + 6 + p \\
 a &= \underline{p + 1}
 \end{aligned}$$

$$\begin{aligned}
 f \quad 2338 &= \frac{1}{2}n(2(-11) + (n-1)7) \\
 4676 &= n(-22 + 7n - 7) \\
 4676 &= -29n + 7n^2 \\
 7n^2 - 29n - 4676 &= 0 \\
 7(n^2 - \frac{29}{7}n - 668) &= 0 \\
 7[(n - \frac{29}{14})^2 - (\frac{29}{14})^2 - 668] &= 0 \\
 (n - \frac{29}{14}) &= \pm \frac{363}{14} \\
 n &= \frac{29}{14} \pm \frac{363}{14} \\
 n &= \underline{28}
 \end{aligned}$$

$$\begin{aligned}
 10. a \quad S_n &= \frac{100}{2}(2 + 99) = \underline{5050} \\
 b \quad S_n &= \frac{100}{2}(202 + 99) = 15050 \\
 c \quad U_1 &= n+1, \quad U_n = 2n \\
 n = 1 &: 2 \\
 n = 2 &: 3, 4 \\
 n = 3 &: 4, 5, 6
 \end{aligned}$$

$$\begin{aligned}
 S_n &= \frac{1}{2}n(n+1 + 2n) \\
 &= \frac{1}{2}n(3n+1)
 \end{aligned}$$

$$\begin{aligned}
 11 \quad 2000 &: 30\,000, 30\,800, \quad n = 16 \\
 U_{16} &= 30\,000 + 15 \cdot 800 = 42\,000 \\
 S_{16} &= \frac{16}{2}(30\,000 + 42\,000) = 576\,000 \\
 2016 \sim 2040 \quad 42\,000 \times 25 &= \underline{1\,050\,000} + \\
 &\underline{\$1\,626\,000}
 \end{aligned}$$