

Unit 5 *Sequences and Series*

Text Answers

5.1 Geometrical Sequences

1. (a) $3 \times 2^{n-1}$ (b) $36 \times \left(\frac{1}{2}\right)^{n-1}$
 (c) $2 \times (-3)^{n-1}$ (e) $90 \times \left(-\frac{1}{3}\right)^{n-1}$
 (e) 10^n (f) $(-1)^{n-1}6$ (g) $\frac{1}{4} \times \left(\frac{1}{3}\right)^{n-1}$
2. (a) 315 (b) 118 096 (c) 0.6641
 (d) 83.33 (e) 18 620 (f) 16.01
3. (a) 11^{th} (b) 14^{th} (c) 10^{th}
4. (a) 9 (b) 1708
5. £9050

5.2 Never-Ending Sums

1. (a) $\frac{320}{3}$ (b) 135 (c) 200 (d) - (e) $\frac{1}{9}$
2. (a) 0.111111... (b) $\frac{37}{99}$
3. (a) $\frac{52}{99}$ (b) $\frac{358}{999}$ (c) $\frac{193}{990}$
4. (a) 42 (b) 0.125
5. 211.6 cm^3
6. (a) 16.964 s (b) 49.4 m

5.3 Arithmetic Sequences

1. (a) 105 (b) 252 (c) 78 (d) 2500
2. (a) $u_n = 3n - 2$, $S_n = \frac{n}{2}(3n - 1)$
 (b) $u_n = 3 + 9n$, $S_n = \frac{n}{2}(9n + 15)$
 (c) $u_n = 65 - 5n$, $S_n = \frac{n}{2}(125 - 5n)$
 (d) $u_n = \frac{3}{2}n - \frac{1}{2}$, $S_n = \frac{n}{2}\left(\frac{3}{2}n + \frac{1}{2}\right)$

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5.3

3. 1840 cm
4. (a) 536 (b) 45 (c) 1162
(d) 277.2 (e) 385 (f) 409.125
5. -8, 621
6. (a) 10 (b) 19
7. 5.5
8. £76 300
9. 19, 17, 15, ...

5.4 Sigma Notation

1. (a) $5^2 + 6^2 + 7^2 + \dots + 15^2$ (b) $1 + 3 + 5 + \dots + 19$
(c) $1 + 2 + 3 + \dots + n$ (d) $\frac{1}{3} + \frac{2}{4} + \frac{3}{5} + \dots + \frac{8}{10}$
(e) $4^2 + 5^2 + 6^2 + \dots + 98^2$
2. (a) $\sum_{r=1}^{25} \frac{1}{r}$ (b) $\sum_{r=0}^{40} (10 + r)$ (c) $\sum_{r=1}^n r^3$
(d) $\sum_{r=0}^{12} 3^r$ (e) $\sum_{r=1}^n (5r + 1)$ (f) $\sum_{r=0}^{16} 14 + 3r$
(g) $\sum_{r=0}^n 5 \times 10^r$ (h) $\sum_{r=1}^{20} \frac{r}{(r+1)(r+2)}$
3. (a) $\sum_{r=10}^{99} r$ (b) $\sum_{r=1}^{60} (2r - 1)$
(c) $\sum_{r=10}^{20} r^2$ (d) $\sum_{r=0}^{14} (7r + 1)$
4. (a) $\sum_{r=0}^{18} (19 - r)$ (b) $\sum_{r=1}^{40} \frac{1}{r}$ (c) $\sum_{r=0}^6 (r - 3)^2 6$

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5.5 Sigma Notation

1. (a) 55 (b) 1300 (c) 731
2. (a) $\sum_{r=1}^6 \frac{(-1)^{r+1}}{r}$ (b) $\sum_{r=1}^{12} (-1)^r r^2$ (c) $\sum_{r=0}^{50} 12(-0.2)^r$
3. (a) 84 (d) 32 (e) 44 (f) 36 (other parts cannot be calculated)
4. (a) $\sum_{r=1}^{20} r = 210$ (b) $\sum_{r=1}^{10} r^2 = 385$
 (c) $2 \sum_{r=1}^{15} r^2 = 2480$ (d) $2 \sum_{r=1}^{50} r = 2550$
 (e) $\sum_{r=1}^{13} (2r-1) = 169$ (f) $\sum_{r=1}^{10} r^3 = 3025$
5. 165
6. (a) 4515 (b) 13959 (c) 861
7. 6461