

Unit 2 *Indices and Factors*

Text Answers

2.1 Squares, Cubes, Square Roots and Cube Roots

1. (a) 25 (b) 36 (c) 1 (d) 49 (e) 6 (f) 1 (g) 7 (h) 5
2. (a) 27 (b) 64 (c) 216 (d) 1000 (e) 3 (f) 10 (g) 6 (h) 4
3. (a) 100 (b) 4 (c) 16 (d) 49 (e) 64 (f) 81 (g) 1 (h) 343
(i) 512 (j) 0 (k) 0 (l) 8
4. (a) 10 (b) 2 (c) 9 (d) 8 (e) 4 (f) 3
5. (a) 144 (b) 121 (c) 3375 (d) 2197 (e) 169 (f) 225
(g) 400 (h) 1331 (i) 11 (j) 20 (k) 13 (l) 15
(m) 15 (n) 13 (o) 12 (p) 11
6. (a) 52 (b) 5 (c) 116 (d) 25 (e) 16 (f) 72 (g) 1001 (h) 100

2.2 Index Notation

1. (a) 4^5 (b) 3^3 (c) 6^7 (d) 7^4 (e) 18^3 (f) 19^2
(g) 4^6 (h) 7^5 (i) 10^6 (j) 100^5
2. (a) 81 (b) 625 (c) 2401 (d) 10 000 (e) 1 (f) 729
(g) 128 (h) 2 (i) 4096 (j) 4 (k) 1 (l) 25
3. (a) 2^{11} (b) 3^9 (c) 3^{13} (d) 4^5 (e) 5^4 (f) 5^5
(g) 4^2 (h) 5^3 (i) 3^2 (j) 7^4 (k) 17^2 (l) 9^4
(m) 4^5 (n) 4^{16} (o) 3^6 (p) $3^0 = 1$ (q) $3^1 = 3$
(r) 3^5 (s) 3^7 (t) 4^7 (u) 5^0
4. (a) 2^2 (b) 2^3 (c) 2^4 (d) 2^6 (e) 3^3 (f) 5^2
(g) 4^3 (h) 3^4 (i) 5^3
5. (a) 3^{13} (b) 2^8 (c) 4^{11} (d) 3^{10} (e) 2^9 (f) 2^{10}
(g) 3^5 (h) 3^7 (i) 3^5 (j) 8^{10} (k) 7^3 (l) 9^2
(m) 2^4 or 4^2 (n) 2^3 (o) 2^3
6. (a) 2^3 (b) 10^3 (c) 2^4 (d) 3^3 (e) 3^4 (f) 10^4
(g) 5^4 (h) 4^3 (i) 6^4 (j) 2^0 (k) 6^2 (l) 5^0

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7. (a) 2^6 (b) 3^4 (c) 6^6 (d) 5^6 (e) 2^8 (f) 4^6
 (g) 3^8 (h) 5^8 (i) 3^6
8. (a) 2^8 (b) 2^4 (c) 3^{10} (d) 5^3 (e) $(10^5)^3$ (f) $(7^5)^4$
9. (a) 3^6 (b) 2^{14} (c) 5^{12} (d) 7^3 (e) 7^4 (f) 2^7
 (g) $3^0 = 1$ (h) $4^1 = 4$ (i) $2^1 = 2$
10. (a) a^5 (b) a^{10} (c) x^9 (d) x^2 (e) y^3 (f) p^3
 (g) q^3 (h) x^8 (i) b^3 (j) b^6 (k) c^3 (l) x^5
 (m) y^2 (n) $x^0 = 1$ (o) x^8 (p) p^4 (q) x^3 (r) y^4
 (s) $x^0 = 1$ (t) $x^1 = x$ (u) x^{12} (v) x^8 (w) x^{15} (x) x^{54}
11. (a) $p = 3$ (b) $q = 0$
12. $2x^4$

2.3 Factors

1. (a) 1, 2, 7, 14 (b) 1, 3, 9, 27 (c) 1, 2, 3, 6 (d) 1, 3, 5, 15
 (e) 1, 2, 3, 6, 9, 18 (f) 1, 5, 25 (g) 1, 2, 4, 5, 8, 10, 20, 40
 (h) 1, 2, 4, 5, 10, 20, 25, 50, 100 (i) 1, 3, 5, 9, 15, 45
 (j) 1, 2, 5, 10, 25, 50 (k) 1, 2, 3, 4, 6, 9, 12, 18, 36 (l) 1, 2, 4, 7, 14,
2. (a) 1×10 , 2×5 , 5×2 , 10×1 (b) 1×8 , 2×4 , 4×2 , 8×1
 (c) 1×7 , 7×1 (d) 1×9 , 3×3 , 9×1
 (e) 1×16 , 2×8 , 4×4 , 8×2 , 16×1 (f) 1×22 , 2×11 , 11×2 , 22×1
 (g) 1×11 , 11×1 (h) 1×24 , 2×12 , 3×8 , 4×6 , 6×4 , 8×3 , 12×2 , 24×1
3. (a) 4 (b) 3 (c) 3 (d) 4 (e) 5 (f) 4 (g) 11 (h) 1
4. (a) 6, 10, 20, 8, 2, 24, 4 (b) 10, 20, 15, 55
5. (a) (i) 20, 22, 24, 26 (ii) 21, 24, 27 (iii) 20, 25
 (b) prime numbers
6. (a) (i) 16 (ii) 18 (b) (i) 25 (ii) 27

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2.4 Prime Factors

1. 2, 3, 5, 7, 13, 19, 23
2. 53, 59
3. (a) 2×5 (b) $2 \times 3 \times 7$ (c) $2^2 \times 17$ (d) $2^3 \times 3 \times 7$ (e) 2×5^3
(f) $2 \times 3^3 \times 5$ (g) $3 \times 11 \times 13$ (h) $3 \times 5^2 \times 11$ (i) $7 \times 11 \times 13$
4. (a) $32 = 2^5$ and $56 = 2^3 \times 7$ (b) $2^3 (= 8)$
5. (a) $2 \times 3 = 6$ (b) $2 \times 3 = 6$ (c) $3 \times 5 = 15$ (d) 2
(e) $2 \times 5 = 10$ (f) $5 \times 7 = 35$ (g) $2^3 \times 3 = 24$
(h) $2 \times 3 \times 13 = 78$ (i) $3 \times 7^2 = 147$
6. (a) $45 = 3^2 \times 5$, $99 = 3^2 \times 11$, $135 = 3^3 \times 5$
(b) (i) $3^2 = 9$ (ii) $3^2 = 9$ (iii) $3^2 \times 5 = 45$ (c) $3^2 = 9$
7. (a) 5 (b) $3^2 \times 5 = 45$ (c) $2^3 = 8$ (d) $2 \times 5 = 10$
(e) $2^3 \times 3 = 24$ (f) $2 \times 3 \times 5 = 30$ (g) $2^2 \times 3^3 = 108$
(h) $2^2 \times 11 = 44$ (i) $2^2 \times 3^2 \times 7 = 252$
8. (a) 105 (b) 60 (c) 196
(d) 285 (e) 420 (f) 5184
9. (a) 120 (b) 72 (c) 150
(d) 72 (e) 720 (f) 440

2.5 Further Index Notation

1. (a) $\frac{1}{16}$ (b) $\frac{1}{8}$ (c) $\frac{1}{6}$ (d) $\frac{1}{7}$ (e) 3 (f) 8
(g) 2 (h) 3 (i) 1 (j) $\frac{1}{25}$ (k) 8 (l) 32
(m) 2187 (n) 125 (o) $\frac{1}{2}$
2. (a) -4 (b) -1 (c) -3 (d) $\frac{1}{2}$ (e) $-\frac{1}{2}$ (f) 2
(g) 3 (h) -1 (i) $\frac{1}{3}$ (j) -1 (k) -2 (l) -2
(m) -3 (n) $\frac{1}{2}$ (o) -2 (p) $\frac{1}{3}$ (q) $\frac{2}{3}$ (r) $\frac{2}{5}$

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3. (a) 0.125 (b) 0.05 (c) 2 (d) 4 (e) $\frac{1}{225} = 0.004444\dots$
 (f) 0.000125 (g) 729 (h) 27 (i) $\frac{1}{2}$ (j) 1728
 (k) 62748517 (l) 1331
4. (a) $\frac{1}{a}$ (b) a^{10} (c) a^4 (d) $\frac{1}{a^6}$ (e) $\frac{1}{a^2}$ (f) $\frac{1}{a^6}$
 (g) a^8 (h) $a^{\frac{5}{2}}$ (i) $\frac{1}{a^{\frac{3}{2}}}$ (j) a^2 (k) $\frac{1}{a^3}$ (l) a^3
 (m) $\frac{a^2}{b^2}$ (n) $\frac{a^6}{b^{12}}$ (o) $a^{12}b^2$ (p) $\frac{b^4}{a^4}$ (q) $\frac{a^8}{b^{12}}$
 (r) $\frac{m^2}{n^6}$ (s) $\frac{a^3}{b^5}$ (t) $\frac{m^2}{a}$ (u) $\frac{c^3}{a^4b}$ (v) $\frac{x}{m^2}$
 (w) $\frac{z^{12}}{x^8y^4}$ (x) $\frac{b^{\frac{16}{3}}}{a^2}$
5. (a) $\frac{1}{9}$ (b) a^4 (c) $y = \frac{5}{2}$