About Maths 7

Answers

Chapter 1: Whole Numbers

Getting Started

2 a, b, e, g

Exercise 1.01

1 (a) even (b) (i) 5, 5 (ii) 12, 12 (iii) 17, 17. No, order is not important. (c) (i) 17 (ii) 16 (d) yes (e) adding the same numbers
2 (a) even (b) odd (c) even (d) even (e) even (f) even (g) odd (h) odd (i) even (j) odd **3** (a) odd (b) odd (c) odd (d) even (e) even (f) even
4 (a) 6 (b) 18 (c) 7 (d) 42 **6** (a) 12, 12 (b) 18, 18 (c) 132, 132. Order is not important for multiplication. **7** (a) 4^2 (b) 7^2 (c) 9^2 (d) 11^2
8 (a) 8 (b) 10 (c) 12 (d) 2 **9** (a) 0 (b) 0 (c) 0 (d) 0 **10** (a) even (b) odd (c) even (d) odd (e) odd (f) odd (g) even (h) even **11** Yes, it is the same.
12 (a) even (b) odd (c) even (d) odd (e) odd (f) odd (g) even (h) even (i) odd (j) odd (k) even if integer is odd, odd if integer is even (l) odd if integer is even, even if integer is odd (m) odd (n) odd if integer is even, even if the integer is odd **13** Check answers with your teacher.
14 (a) 12, 8, 16, 10, 18 (b) 21, 6, 24, 15 27 (c) 42, 12, 36, 48, 18 (d) 21, 35, 42, 56, 28 (e) 56, 16, 72, 48, 24 **15** (a) 2, 10, 7, 11, 3
(b) 2, 12, 9, 7, 10 (c) 2, 12, 11, 7, 6 (d) 9, 12, 11, 3, 8 (e) 2, 8, 7, 6, 9 **16** (a) 48 (b) 72 (c) 36 (d) 48 (e) 60 (f) 85 (g) 120 (h) 112 (i) 108
(j) 162 (k) 60 (l) 240 (m) 242 (n) 495 (o) 407 **17** (a) 8, 6, 6, 11, 8 (b) 5, 8, 8, 5, 7 (c) 4, 9, 4, 5, 5 (d) 3, 6, 9, 7, 7 **18** (a) $45 \div 9 = 5$, $45 \div 5 = 9$
(b) $18 \div 6 = 3$, $18 \div 3 = 6$ (c) $20 \div 5 = 4$, $20 \div 4 = 5$ (d) $35 \div 5 = 7$, $35 \div 7 = 5$ (e) $72 \div 9 = 8$, $72 \div 8 = 9$ (f)$14 \div 2 = 7$, $14 \div 7 = 2$
19 (a) 2, 4, 8 (b) 2, 3, 4, 6, 12 (c) 2, 3, 6, 9, 18 (d) 2, 3, 4, 6, 8, 12, 24 (e) 2, 3, 4, 6, 9, 12, 18, 36 (f) 2, 3, 4, 6, 8, 12, 16, 24, 48
(g) 2, 3, 4, 5, 6, 10, 12, 15, 30, 60 (h) 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72 (i) 2, 4, 7, 14, 28 (j) 2, 3, 4, 5, 6, 8, 10, 12, 15, 20, 24, 30, 40, 60, 120
20 (a) 6, 6 (b) 21, 21 (c) 20, 20

Exercise 1.02

1 (a)

4	9	8
11	7	3
6	5	10

(b)

2	7	6
9	5	1
4	3	8

(c)

20	15	22
21	19	17
16	23	18

(d)

4	3	8
9	5	1
2	7	6

2

2	14	7	11
15	3	10	6
9	5	16	4
8	12	1	13

Exercise 1.03

1 (a) 29 (b) 29 (c) 98 (d) 177 (e) 101 (f) 131 (g) 397 (h) 1307 (i) 963 (j) 1010 (k) 11 922 (l) 12 886 (m) 12 221 (n) 9061 **2** (a) 50 (b) 104
(c) 1442 (d) 9944 **3** (a) 1139 (b) 1442 (c) 11 775 (d) 14 392 **4** (a) 19 (b) 9 (c) 49 (d) 19 (e) 19 (f) 246 (g) 125 (h) 159 (i) 193 (j) 387 (k) 1599
(l) 2094 (m) 2066 (n) 1725 **5** (a) 33 (b) 9 (c) 39 (d) 337 **6** (a) 222 (b) 375 (c) 867 (d) 272 (e) 608 (f) 1482 (g) 2831 (h) 4409 **7** (a) 42 (b) 36
(c) 52 (d) 374 (e) 540 (f) 450 (g) 360 (h) 1950 (i) 792 (j) 5056 (k) 11 259 (l) 29 736 (m) 15 215 (n) 59 784 (o) 8280 (p) 23 140 (q) 37 797
(r) 55 480 (s) 47 601 (t) 435 204 **8** (a) 4 (b) 6 (c) 4 (d) 8 (e) $6\frac{1}{4}$ (f) $3\frac{3}{5}$ (g) $7\frac{3}{8}$ (h) $8\frac{1}{3}$ (i) $8\frac{1}{8}$ **9** (a) 4 (b) 16 (c) 32 (d) 42 (e) $25\frac{2}{25}$
(f) $24\frac{23}{24}$ (g) $91\frac{15}{64}$ (h) $22\frac{1}{22}$ (i) 12 **10** (a) 3 (b) 7 (c) 24 (d) 10 (e) 34.5 (f) 17 (g) 23 (h) 16 (i) 18 (j) 27 (k) 39 (l) 18 (m) 25 (n) 15 (o) 15 (p)
21 (q) 41 (r) 65 (s) 27 (t) 57 **11** \$210 **12** 8 **13** 16 **14** 150 **15** (a) 50 (b) 150 (c) 27 300 (d) 8200 (e) 6400 (f) 1000 (g) 1 000 000
(h) 1 000 000 (i) 177 000 (j) 100 000 (k) 100 000 (l) 990 000 **16** (a) 1 + 2 + 5, 1 + 3 + 4 etc. (b) 9 – 1= 8, 12 – 4 = 8 etc.
(c) $2 \times 4 = 8$, 1×8 etc. (d) $\sqrt{64} = 8$, $2^3 = 8$, etc.

Exercise 1.04

1 (a) 7 (b) 17 (c) 5 (d) 9 (e) 21 (f) 52 (g) 19 (h) 68 – 36 (i) 95 + 86 (j) 75 – 43 (k) 35 (l) 154 (m) 896 (n) 527 + 258 = 785 (o) 487 (p) 646
(q) 259 + 348 = 607 (r) 564 – 195 = 369 (s) 463 + 445 = 908 (t) 825 – 346 = 479 (u) 218 + 565 = 783 **2** (a) 7, 8 (b) 8, 12 (c) 11, 12 (d) 4, 10
(e) 10, 22 **3** (a) 8×9 (b) 87×9 (c) 78×96 (d) 875×96 **4** 41×49 **5** (a) 94×86 (b) 862×94 **6** (a) 5, 7, 12 (b) 3, 4, 8 (c) 12, 14, 9
(d) 13, 11, 1 **7** (a) 12 (b) 15 **8** (a) 444 (b) 2112 (c) 1221 (d) 2772 (e) 2882

Exercise 1.05

1 255 **2** 270 **3** 150 **4** 30 300 **5** 300 **6** 72 500 **7** 25 **8** 100 km **9** 25 km **10** 25 **11** 30 000 **12** 118 **13** 18 **14** 113 – 72 **15** 177 km **16** 250 mL
17 9 teams, 2 reserves **18** 45 g **19** \$8570 **20** 19 14 **21** 123 **22** 90 boys **23** (a) (i) 91 (ii) 90 (b) 3 **24** 34 m **25** 1700 cm **26** (a) 65 kg
(b) 5 persons of average mass (c) 3 adults, 1 child, 2 adults, 2 children, 1 adult, 4 children

Exercise 1.06

1 (a) 六百, DC, ☆☆☆☆☆☆ (b) 四十, XL, ∩∩∩∩ (c) 四百, CD, ☆☆☆☆ (d) 九百, CM, ☆☆☆☆☆☆☆☆☆ (e) 二百五十一, CCLI, ☆☆∩∩∩∩∩ı (f) 三千, MMM, 𓆐𓆐𓆐 (g) 二千六百, MMDC, 𓆐𓆐☆☆☆☆☆ (h) 二千四百一十五, MMCDXV, 𓆐𓆐☆☆☆☆∩ıııı

2 (a) IX (b) XI (c) LVII (d) LXXIII (e) XXXVIII (f) MCMXC (g) CXIV (h) MDCXX (i) XXIII (j) DXXXII (k) XCV (l) MMIV (m) CXLI (n) CDLXIV (o) MDCCLXXXVIII (p) MCMLXX **3** (a) 7 (b) 13 (c) 149 (d) 238 (e) 641 (f) 522 (g) 70 (h) 1800 (i) 2610 (j) 84 (k) 136 (l) 677 (m) 2002 (n) 1505 (o) 6200 (p) 112 500 (q) 12 000 (r) 1 501 000 **4** (a) XX (b) CC (c) MM (d) $\overline{X}\ \overline{X}$ (e) $\overline{M}\ \overline{M}$ (f) $\overline{X}\ \overline{L}\ \overline{V}$ D (g) $\overline{C}$ DCCCL (h) $\overline{L}\ \overline{X}$ CDLII (i) $\overline{D}\ \overline{C}\ \overline{X}\ \overline{X}$ (j) $\overline{M}\ \overline{C}\ \overline{D}$ (k) $\overline{L}\ \overline{X}\ \overline{X}\ \overline{X}\ \overline{V}$ (l) $\overline{C}\ \overline{L}\ \overline{X}\ \overline{V}$ MM (m) $\overline{C}\ \overline{C}\ \overline{L}\ \overline{X}\ \overline{X}$ (n) $\overline{D}\ \overline{X}$ (o) $\overline{M}\ \overline{M}\ \overline{M}\ \overline{C}\ \overline{C}\ \overline{C}$ CCLXIV

Exercise 1.07

1 (a) 2341 (b) 24 365 (c) 30 545 (d) 154 000 (e) $383 (f) $204 (g) 675 (h) 1329 (i) 30 683 (j) 20 108 (k) 6078 (l) 54 030 **2** (a) 87 (b) 360 (c) 821 (d) 990 (e) 999 (f) 5427 (g) 5505 (h) 38 009 (i) 100 800 (j) 11 900 002 (k) 20 040 303 **3** (a) thirty-two (b) one hundred and sixty-seven (c) six hundred and one (d) three thousand two hundred (e) five thousand eight hundred and six (f) forty thousand and seventy-six (g) one hundred and twenty thousand two hundred and eleven (h) eight million two hundred and three thousand and fifty-six **4** (a) hundred, ten, units (b) thousand, ten, units (c) ten, hundred, thousand (d) thousand, unit, ten (e) thousand, hundred, ten (f) ten, hundred (g) unit, ten, ten thousand (h) unit, thousand, ten thousand (i) ten, thousand, million (j) ten, million, ten thousand **5** (a) 217 (b) 609 (c) 1783 (d) 3412 (e) 4058 (f) 6039 (g) 580 000 (h) 3 020 303 (i) 7 106 025 **6** (a) A number is what we think; a numeral is what we write. **7** (a) 731 (b) 950 (c) 8321 (d) 6532 (e) 8740 (f) 98 542 **8** (a) 101, 110,111, 1111 (b) 202, 221, 222, 2002 (c) 3877, 3900, 4595, 5954 (d) 83, 89, 345, 450 (e) 10 111, 11 001, 11 101, 11 110 (f) 11 212, 11 222, 12 112, 12 121

Exercise 1.08

1 (a) (5 × $10) + (2 × $1) (b) (1 × $10) + (4 × $1) (c) (1 × $100) + (0 × $10) +(2 × $1) (d) (6 × $100) + (3 × $10) + (8 × $1) (e) (7 × $1000) + (0 × $100) + (4 × $10) + (6 × $1) (f) (5 × $1000) + (3 × $100) + (8 × $10) + (6 × $1) (g) (2 × $10 000) + (5 × $1000) + (5 × $100) + (0 × $10) +(7 × $1) (h) (9 × $10 000) + (2 × $1000) + (0 × $100) +(3 × $10) + (5 × $1) **2** (a) $39 (b) $80 (c) $766 (d) $405 (e) $120 (f) $3975 **3** (a) 24 (b) 875 (c) 935 (d) 806 (e) 6789 (f) 3002 (g) 54 768 (h) 61 500 (i) 8 036 702 **4** (a) 35 (b) 99 (c) 462 (d) 3751 (e) 706 (f) 5054 (g) 20 530 (h) 92 800 (i) 1 003 500 (j) 3 094 071 **5** (a) (5 × 10) + (9 × 1) (b) (1 × 100) + (2 × 10) + (0 × 1) (c) (3 × 100) + (8 × 10) + (2 × 1) (d) (8 × 100) + (5 × 10) + (0 × 1) (e) (1 × 1000) + (1 × 100) + (2 × 10) + (5 × 1) (f) (5 × 1000) + (0 × 100) + (6 × 100) + (7 × 1) (g) (9 × 1000) + (4 × 100) + (0 × 10) + (3 × 1) (h) (5 × 10 000) + (3 × 1000) + (8 × 100) + (7 × 10) + (5 × 1) (i) (4 × 10 000) + (3 × 1000) + (0 × 100) + (0 × 10) + (1 × 1) (j) (1 × 1 000 000) + (7 × 10 000) + (8 × 1000) + (2 × 100) + (3 × 10) + (4 × 1) (k) (4 × 100 000) + (5 × 10 000) + (0 × 1000) + (4 × 100) + (0 × 10) + (1 × 1) (l) (6 × 100 000) + (3 × 10 000) + (5 × 1000) + (0 × 100) + (7 × 10) + (2 × 1) **6** 3078 , 8730 **7** (a) units (b) tens (c) tens (d) hundreds (e) units (f) thousands (g) ten thousand (h) hundred thousand (i) thousand **8** (a) 45 (b) 495 (c) 45 (d) 495 (e) 4995 (f) 499 995 (g) 495 000 (h) 4 999 500 **9** (a) subtract 50 (b) add 2000 (c) subtract 600 **10** (a) 400 (b) 40 (c) 400 (d) 4000 **11** (a) 250 (b) 1000 (c) 10 000 (d) 1000 (e) 10 000 (f) 1 000 000 **12** 200 **13** (a) 9876 (b) 9999

Exercise 1.09

1 (a) 20 (b) 30 (c) 30 **2** (a) 600 (b) 700 (c) 700 **3** (a) 4000 (b) 5000 (c) 5000 **4** (a) 20 (b) 80 (c) 110 **5** (a) 300 (b) 700 (c) 3500 **6** (a) 270 (b) 500 (c) 6000 (d) 540 (e) 500 (f) 300 (g) 6720 (h) 6700 (i) 7000 (j) 12 710 (k) 12 700 (l) 13 000 **7** (a) 500 (b) $4000 (c) $350 000 (d) 500 (e) 110 000 (f) 40 (g) 40 kg (h) 390 000 km (i) 400 pages **8** (a) 6 000 000 (b) 5 900 000 (c) 5 860 000 (d) 5 863 000

Exercise 1.10

1 (a) 10 (b) 12 (c) 15 (d) 8 (e) 8 (f) 12 (g) 40 (h) 15 (i) 16 (j) 8 (k) 77 (l) 12 **2** (a) 15 (b) 0 (c) 35 (d) 1000 (e) 32 (f) 3 (g) 6 (h) 24 (i) 23 (j) 36 (k) 44 (l) 32 (m) 8 **3** (a) 39 (b) 19 (c) 2 (d) 19 (e) 22 (f) 13 (g) 8 (h) 32 (i) 1 (j) 2 (k) 1 (l) 5 (m) 2 (n) 4 (o) 1 **4** (a) (3 + 2) × 6 (b) 3 + 2 × 6 (c) (26 – 12) ÷ 7 (d) 4 × (12 ÷ 3) × 12 (e) 8 × (7 – 4) × 4 **5** (a) 88 (b) 5 (c) 9 (d) 14 (e) 26 **6** (a) F (b) T (c) T (d) F (e) T **7** (a) (36 ÷ 3) + (9 × 10) + 4 = 106 (b) 36 ÷ (3 + 9) × 10 + 4 = 34 **8** (a) 20 (b) 20 (c) 100 (d) 40 (e) 2 (f) 50 (g) 1000 (h) 100 **9** (a) 72 (b) 30 (c) 60 (d) 700 (e) 630 (f) 60 (g) 1100 (h) 1200 (i) 450 (j) 6000 (k) 1120 (l) 24 **10** (a) 693 (b) 485 (c) 404 (d) 1140 (e) 1155 (f) 2448 (g) 3216 (h) 22 066 (i) 1176 (j) 6080 (k) 1782 (l) 10 989

Exercise 1.11

1 (a) 27 (b) 54 (c) 125 (d) 7 (e) 74 (f) 52 (g) 22 (h) 10 (i) 70 (j) 6 (k) 4 (l) 16 , 25 , 36 (m) 64 ,125 , 216 (n) 54 (o) 163 (p) 90 **2** (a) 4 + 20 (b) 13 – 7 (c) 6 × 10 (d) 32 ÷ 8 (e) 15 >14 (f) 6 < 7 (g) $\sqrt{121}$ (h) 6^2 (i) 98 ≈ 100 (j) $\pi \approx 3.14$ (k) 0.07 < 0.7 (l) $\therefore\ 2^3 = 8$ (m) 6 × 8 >12 ÷ 4 (n) $\Delta \geq 12$ (o) $\Delta \leq 26$ **3** (a) T (b) T (c) F (d) F (e) T (f) T (g) T (h) T (i) F (j) F (k) T (l) F (m) F (n) T (o) F (p) F **4** (a) 121, 144, 169, 196, 225, 256, 289, 324, 361, 400 (b) 13, 15, 17, 19 **5** (a) 125, 216, 343, 512, 729, 1000, 1331 (b) 5, 7, 9, 11

Exercise 1.12

1 (a) 100 (b) 1000 (c) 100 000 (d) 1 000 000 (e) 10 000 000 (f) 100 000 000 (g) 1 000 000 000 (h) 1 000 000 000 000 **2** (a) 473 500, 473 000, 470 000, 500 000 (b) 304 500, 305 000, 300 000, 300 000 (c) 651 400, 651 000, 650 000, 700 000 (d) 947 400, 947 000, 950 000, 900 000 **3** 100 000 000 000, 10^{11} **4** $2 400 000 000 **5** (a) 107 500 (b) 107 000 (c) 110 000 **6** (a) NSW 80 200 000, Vic 27 800 000, Qld 172 700 000, SA 98 400 000, WA 252 600 000, Tas 6 800 000, NT 134 600 000, ACT 200 000 (b) WA, Qld, NT, SA, NSW, Vic, Tas, ACT (c) 773 230 000 ha (d) (i) 4 (ii) 3 (iii) 2 (iv) 3 **7** 10 000 000 000 = 100 billion **8** 10 million reams **9** (a) 170 000 000 km (b) 300 000 km/s (c) 19 730 000 **10** 42 000 000 000 000 km **11** million **12** 1 **13** (a) 10^4 (b) 10 000 × 10 000 or 100 000 000 (c) one hundred million (d) number contains 8 zeros, Greek word for 8 is octo (e) ten quadrillion (f) 10^{24} or one septillion (g) Write 1 followed by 800 million zeros.

Exercise 1.13

1 60 **2** (a) CDE (b) ACD (c) BCF (d) DEF **3** (a) 10 000 (b) 999 900 (c) 989 900 **4** 451, 549 **5** (a) 89 (b) 988 **6** 8 **7** 71 cm **8** 570 days **9** (a) (i) 24 (ii) 5040 (b) (i) 7 (ii) 5 (iii) 1806 **10** (c) **11** B **12** 16 000 km **13** 18 **14** 22, 44, 66, 88 **15** 506 **16** 10

Diagnostic Test

1 (a) yes (b) yes (c) yes (d) no (e) 1, 4, 9, 16, 25, 36 **2** (a) 110 ÷ 2 (b) 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 **3** (a) 80 (b) 363 (c) 270 (d) 120 **4** (a) 7 (b) 39 (c) 35 + 46 **5** 11, 13 **6** (a) 186 (b) (i) 108 (ii) 980 (c) (i) 12 (ii) 15 (iii) 20 **7** (a) 273 (b) 17 (c) 36 (d) 988 **8** (a) (i) 160 (ii) 1724 (b) (i) XXVII (ii) XCIV (iii) MCCLXXV **9** (a) 909 (b) 763 (c) 505, 551, 555, 5005 (d) 1111, 1101, 1100, 1011, 1001 **10** (a) $654 (b) 78 906 (c) (i) (7 × 1000) + (2 × 100) + (4 × 10) + (5 × 1) (ii) (6 × 1000) + (0 × 100) + (6 × 10) + (6 × 1) (d) (i) units (ii) hundreds (iii) thousands (e) 5 994 **11** (a) 200 (b) 4000 (c) 80 000 (d) 12 000 000 **12** (a) 2 (b) 56 (c) 5 (d) 1 (e) F **13** (a) T (b) T (c) F (d) F (e) F (f) T **14** (a) 1, 8, 27, 64, 125 (b) (i) 3 (ii) 5 **15** (a) 100 000 000 (b) (i) billion (ii) trillion **16** (a) 34 (b) 93 **17** 240, 260 **18** 93

Chapter 2: Problem Solving and Sets

Exercise 2.01

1 8 **2** (a) $27.50 (b) $110 **3** 3 **4** 15 **5** (a) black (b) white (c) yellow **6** 10 **7** $96 **8** 180 km **9** 10 h **10** $12.10 **11** 56.6 kg **12** 100 cm **13** 12.19 pm **14** (a) **15** $2.40 **16** (a) 3rd step (b) 12th step **17** 90 mL **18** 30 min **19** 8 days **20** 5 **21** 15 **22** Year 9 **23** 11 s **24** 35 **25** 10.30 am

Exercise 2.02

1 9 min **2** 14 seals **3** 10 chickens, 8 cows **4** 2 bicycles, 5 tricycles **5** 10 ants, 8 spiders **6** 6, 12 **7** 5 posts **8** 30 m **9** 2 cuts **10** 14 pins **11** $26 **12** 43, 50 **13** 8, 9 **14** 12 **15** 7 **16** (a) 80 posts (b) 60 posts **17** A = 6 B = 6 C = 9 D = 3 **18** 73 mistakes **19** 23 rungs **22** 60 people

Exercise 2.03

1 (a) 3 (b) 6 (c) 15 (d) 66 for (n) people, sum = 1 + 2 + 3 + ….. + (n – 1) **2** 12 games **3** 8 people **4** (a) 3 games (b) 5 games **5** 10 **6** 55 s **7** (a) 2 tables (b) 4 tables (c) 6 tables **8 (a)** 6 **(b)** 9 **9 (a)** 6 **(b)** 27 **10** (a) 4 (b) 6 **11** (a) 4 + 3 + 2 + 1 = 10 (b) 6 + 5 + 4 + 3 + 2 +1 = 21 **12** (a) 5 (b) 14 (c) 30 (d) (i) 25 + 16 + 9 + 4 +1 = 55 (ii) 55 + 36 + 49 + 64 = 204 **13** (a) 6 (b) 20 (c) 70 **14** 15 **15** 45 games **16** 16 regions **17** 8 **18** (a) 100 (b) 75 (c) 0 (d) –1 **19** (a) 55 (b) 210 (c) 2500 (d) 2550 **20** 81 **21** 31 students **22** 3 **23** (a) 1 (b) 6 (c) 12 (d) 8

	Number of painted sides				
Length of sides of cube	**0**	**1**	**2**	**3**	**Total number of cubes**
2	0	0	0	8	8
3	1	6	12	8	27
4	8	24	24	8	64
5	27	54	36	8	125
6	64	96	48	8	216

24 For a 15-sided polygon there are 90 diagonals.

Exercise 2.04

1 4 **2** 6 **3** 4 **4** Peter, Rob, Nicole **5** (a) 6 (b) 24 **6** (a) 6 (b) 4 **7** 6 **8** 12 **9** 12 **10** 6 **11** 120 **12** 15 **13** 20 **14** 6 **15** (a) Fill the 5L jug and then pour into the 3L jug which leaves 2L in the 5L jug. (b) Continue on from (a); empty the 3L jug and pour the 2 litres from the 5L into the 3L jug; fill the 5L jug and pour 1 litre into the 3L jug, which leaves 4 litres in the 5L jug. **16** Gupta **17** King of spades, Queen of spades, Queen of hearts **18** silo Y

19

No. of discs	3	4	5	6	7	8
No. of moves	7	15	31	63	127	255

20 8 **21** (a) 18 (b) 66 **22**(a) 6 (b) 8

Exercise 2.05

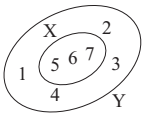
1 2 km **2** 2.5 km **3** 12 s **4** 20 **5** (a)12 (b) 6 **6** 109 pages **7** 3, 6, 10, 15 lamps

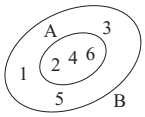
8 (a) $\begin{bmatrix}0\\4\end{bmatrix}\begin{bmatrix}3\\4\end{bmatrix} \to \begin{bmatrix}4\\0\end{bmatrix}\begin{bmatrix}3\\4\end{bmatrix}$ 4 min $\to \begin{bmatrix}1\\3\end{bmatrix}\begin{bmatrix}0\\7\end{bmatrix}$ 3 min $\to \begin{bmatrix}1\\3\end{bmatrix}\begin{bmatrix}0\\7\end{bmatrix} \to \begin{bmatrix}0\\4\end{bmatrix}\begin{bmatrix}6\\1\end{bmatrix}$ 1 min (b) $\begin{bmatrix}0\\4\end{bmatrix}\begin{bmatrix}3\\4\end{bmatrix} \to \begin{bmatrix}4\\0\end{bmatrix}\begin{bmatrix}3\\4\end{bmatrix}$ 4 min $\to \begin{bmatrix}1\\3\end{bmatrix}\begin{bmatrix}0\\7\end{bmatrix}$ 3 min $\to \begin{bmatrix}3\\1\end{bmatrix}\begin{bmatrix}7\\0\end{bmatrix} \to \begin{bmatrix}0\\4\end{bmatrix}\begin{bmatrix}4\\3\end{bmatrix}$

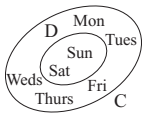
9 6 h **10** 60 sweets **11** 18 **12** $\frac{16}{64}, \frac{49}{98}, \frac{19}{95}$ are the 3 possibilities **13** 300 m **14** 8 **15** John, Joanna **16** 1440 days

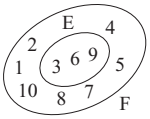
Exercise 2.06

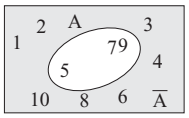
1 (a) ε (b) ∉ (c) ⊂ (d) ⊄ (e) ε (f) ⊂ (g) ε (h) ⊂ (i) ⊂ (j) ε **2** (a) T (b) T (c) T (d) F (e) T (f) F (g) F (h) T (i) F (j) F (k) T (l) T (m) T (n) T (o) T (p) T (q) F (r) T

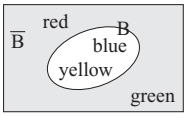
3 (a) 

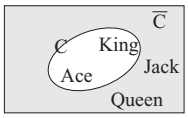
(b) 

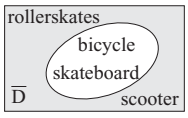
(c) 

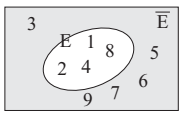
(d) 

4 (a) 

(b) 

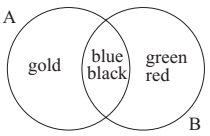
(c) 

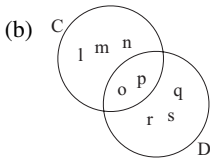
(d) 

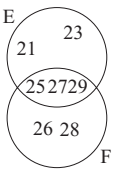
(e) 

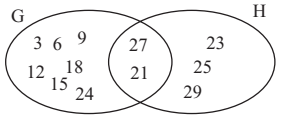
Exercise 2.07

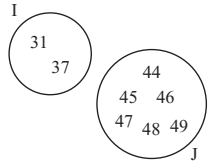
1 (a) {cat, bird} (b) {i} (c) {Jane} (d) {12, 24} (e) {17, 19} (f) {June, July}

2 (a) 

(b) 

(c) 

(d) 

(e) 

3 (a) {4, 7, 8, 9, 11} (b) {1, 2, 3, 4, 5, 7} (c) {4, 5, 6, 10, 14, 15} (d) { 4, 7} (f) {4} (g) {1, 2, 3, 4, 5, 6, 7, 8, 9, 11} (h) {1, 2, 3, 4, 5, 6, 7, 10, 14, 15} (i) {1, 2, 3, 5, 10, 12, 13, 14, 15} (j) {1, 2, 3, 7, 8, 9, 11, 12, 13} (k) {1, 2, 3, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15} (l) {10, 12, 13, 14, 15} (m) (1, 2, 3, 4, 5, 6, 7, 8, 9, 11} (n) (4, 5, 6} (o) {12, 13} (p) {4, 7, 10, 14, 15} (q) {1, 2, 3, 8, 9, 11, 12, 13} (r) {1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15} **4** (a) {1, 2, 6, 9, 10, 11, 15} (b) {1, 2, 3, 4, 5} (c) {1, 5, 6, 7, 8} (d) {1, 2} (e) {1, 5} (f) {1, 2, 5, 6, 7, 8, 9, 10, 11, 15} (g) {1, 2, 3, 4, 5, 6, 7, 8} (h) (1} (i) {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 15} (j) {1, 5, 6} (k) {1, 2, 5, 6, 7, 8} (l) {1, 2, 5} (m) {2 to 15} (n) {12, 13, 14} (o) {2, 3, 4, 7, 8, 9, 10, 11, 12, 13, 14, 15} **5** (a) 29 (b) 14 (c) 13 **6** (a) 73 (b) 38 (c) 15 (d) 58 (e) 14 (f) 23 (g) 110 (h) 72 **7** (a) 48 (b) 52 (c) 37 (d) 7 (e) 8 (f) 35 (g) 3 (h) 84 (i) 40 (j) 50 (k) 15 **8** (a) 44 (b) 23 (c) 12 (d) 2 (e) 4 (f) 8 (g) 5 (h) 24 (i) 21 (j) 2 (k) 17 (l) 10 (m) 5 (n) 7 (o) 27 **9** (a) 22 (b) 37 (c) 9 **10** (a) 95 (b) 61 (c) 50 (d) 16 (e) 45 (f)111 **11** (a) 27 (b) 38 (c) 15 (d) 80 (e) 37

Diagnostic Test

1 4 **2** 21 **3** 350 km **4** 5 **5** 7, 8 **6** 5 cows **7** 6 **8** 6 **9** 14 **10** 250 m **11** 15 **12** 13 **13** 4 **14** 820 **15** 6 **16** Step 1 $\begin{bmatrix}0\\3\end{bmatrix}\begin{bmatrix}1\\3\end{bmatrix}$

Step 2 $\begin{bmatrix}3\\0\end{bmatrix}\begin{bmatrix}1\\3\end{bmatrix} \to \begin{bmatrix}2\\1\end{bmatrix}\begin{bmatrix}0\\4\end{bmatrix}$

Step 3 $\begin{bmatrix}1\\2\end{bmatrix}\begin{bmatrix}4\\0\end{bmatrix} \to \begin{bmatrix}6\\3\end{bmatrix}\begin{bmatrix}3\\1\end{bmatrix}$

Chapter 3: Angles and Construction

Getting Started

1 A **2** B **3** D **4** C **5** A **6** B **7** A **8** B **9** A **10** A

Exercise 3.01

1 (e) ∠CBA = '##' **2** ∠Y, ∠ZYX **3** ∠SPG **4** ∠XYZ **5** (a) ∠AQB, ∠BQC (b) ∠SRT, ∠PRT (c) ∠XWV, ∠XWY (d) ∠EFD, ∠GDF (e) ∠KJL, ∠HLJ (f) ∠MVR, ∠RQV **6** Because it is ambiguous. It could refer to more than one angle. **7** ∠ABC, ∠ABE, ∠ACB, ∠ACD, ∠ADC, ∠AFE, ∠AFB, ∠BAD, ∠BAC, ∠BCD, ∠BED, ∠BFC, ∠CAD, ∠CBE **8** ∠ADF or ∠ABD or ∠AED **9** Join BD, AE and DF **10** ∠AOB, ∠COB **11** The two angles share a common vertex and a common arm **12** (a) ∠ABD (b) ∠CBZ (c) ∠CBD **13** ∠QRT **14** ∠QRS **15** ∠ADE and ∠BDC, No **16** (a) Yes (b) No (c) Yes **17** (a) 6 (b) 8 (c) 10 **18** (a) True (b)True **19** ∠EDH, ∠FDG and ∠EDF, ∠HDG **20** 10 **21** 20 **22** The number of lines multiplied by one less than itself.

Exercise 3.02

1 (a) 61° (b) 37° **2** (a) acute (b) acute **3** (a) 116° (b) 144° **4** (a) obtuse (b) obtuse **6** (a) 330° (b) 242° **7** (a) reflex (b) reflex **8** (a) obtuse (b) reflex (c) acute (d) acute (e) obtuse (f) reflex (g) acute (h) acute (i) obtuse (j) reflex **9** 20° **11** (a) acute 34° (b) acute 22° (c) acute 81° (d) obtuse 122° (e) obtuse 98° (f) obtuse 170° (g) right 90° (h) reflex 190° (i) reflex 339° **12** 20°

Exercise 3.03

1 (a) 140° (b) 60° (c) 88° (d) 90° (e) 20° (f) 30° (g)95° (h) 40° (i) 90° **2** (a) 143° (b) 53° (c) 99° (d) 32° **3** (a) 59° (b) 13° (c) 78° (d) 22° **4** (a) 21° (b) 105° (c) 38° (d) 20°, 20°, 60° (e) 130° (f) 95° **5** (a) 115° (b) 125° (c) 80° **6** (a) # = 105°, * = 75°, • = 105° (b) # = 45°, * = 135°, • = 45° (c) # = 150°, * = 30°, • = 150° (d) # = 60° (e) * = 60° (f) • = 37° (g) # = 55°, • = 50° (h) # = 28°, • = 62° (i) # = 68°, * = 68°, • = 22° **7** (a) 57°, 123° (b) 113°, 67° (c) 56°, 124° **8** (a) 135° (b) 45° (c) 225° (d) 270° (e) 270° (f) 225° (g) 315° **9** many different answers, e.g. (a) N, W (b) N, NW (c) N, SW (d) N, S (e) N, SE **10** WNW **11** (a) 97° (b) 55° (c) 118° (d) 107° (e) 100° (f) 90° **12** (a) 720° (b) 900° (c) 1080° (d) 1260° (e) 1440°

13

Number of sides	Sum = number of sides × 180 – 360
5	5 x 180 – 360 = 540
6	6 X 180 – 360 = 720
7	7 x 180 – 360 = 900
8	8 x 180 – 360 = 1080
9	9 x 180 – 360 = 1260
10	10 x 180 – 360 = 1440

14 179 460° **15** (a) 13 (b) 19 (c) 25 **16** (a) 112° (b) 133° (c) 82° (d) 115° **17** (a) 79°, 79°, 61°, 119° (b) 36°, 72°, 36°, 108° (c) 80°, 40°, 60° **Who am I?** Sir Isaac Newton

Exercise 3.04

1 (a) 65°, 50° (b) 58°, 58° (c) 61°, 61° (d) 49°, 82° (e) 44°, 92° (f) 45°, 90° **2** (a) 60°, 60°, 60° (b) 90°, 90°, 150°, 60°, 150° (c) 90°, 90°, 30°, 300°, 30° **3** (a) 70°, 70°, 40° (b) 72°, 72°, 108° (c) 60°, 60°, 60° (d) 72°, 54°, 54°, pentagon 108° (e) 60°, 60°, 60°, hexagon 120° (f) 90°, 45°, 45°, octagon 135° **4** (a) 35° (b) 44° (c) 52.5° (d) 65° (e) 120° (f) 30°

Exercise 3.05

2 The perpendicular bisectors of the sides of a triangle are concurrent (pass through the same point). **3** The perpendicular bisectors are again concurrent, this time outside the triangle. **5** The bisectors of the angles in a triangle are concurrent. **10** meet at the centre of the circle **11** circle **15** regular hexagon

Exercise 3.06

2 The sum of any two sides must exceed the third side. **4** no **5** yes **6** no

Exercise 3.07

3 (a), (b) and (d) **4** ∠BXP, ∠XPD and ∠AXP, ∠XPC **5** (a) ∠GHD (b) ∠QRL (c) ∠ZAW **6** (a) 140° (b) 70° (c) 115° **7**(a) ∠YXP, ∠ZVP (b) ∠AXY, ∠XWZ and ∠YXB, ∠ZWB **8** (a) ∠CHF (b) ∠LRP (c) ∠WAY **9** (a) 130° (b) 70° (c) 115° **10** ∠AXP, ∠XPD and ∠BXP, ∠XPC **11** (a) ∠STW (b) ∠QRL (c) ∠GHD **12** (a) 106° (b) 68° (c) 101° **13** (a) 140° (b) 80° (c) 115° (d) 115°, 65°, 115° (e) 75°, 75°, 75° (f) 95°, 95°, 85° (g) 40°, 80°, 60° (h) 60°, 60°, 55° (i) 130°, 120° **14** (c) ∠ACB, ∠ABC (d) ∠ACB, ∠ABC (e) 180°, ∠ACB + ∠CAB + ∠ABC = 180° (f) True **15** (b) ∠CBA, ∠CAB (c) ∠CBA, ∠CAB (d) 180°, ∠ABC + ∠ACB + ∠CAB = 180° (e) True **16** (b) ∠ABC, ∠CAB (c) ∠ABC, ∠CAB (d) ∠ABC + ∠CAB, ∠ABC + ∠CAB (e) True. **17** (a) 45°, 135°, 45° (b) 95°, (c) 42° (d) 62°, 62° (e) 110°, 110°, (f) 100°, 100°, 80° **18** (a) parallel (b) intersecting (c) intersecting (d) skew (e) intersecting (f) skew (g) intersecting (h) intersecting (i) intersecting (j) parallel **19** about 250 000 stadia **Who am I?** Charles Babbage **Angle Puzzle** 4:43:38

Exercise 3.08

1 16° **2** 130° **3** 20° **4** 140° > 90° **5** no **6** 72 km **7** 66 and 58 **8** (a) 47 000 – 47 = 46 953 (b) 139 000 + 139 = 139 139 (c) 53 000 − 530 = 52 470 (d) 132 000 + 1320 = 133 320 **9** 2760 **10** 24 **11** 24 **12** 17 $2 and 13 $1 **13** 34° **14** 50° **15** 256 **16** (a) 120 (b) 120 (c) no choice on last digit **17** 64

Diagnostic Test

1 (a) ∠BAD (b) ∠EJH (c) ∠QMP **2** (a) ∠CBD (b) ∠ABE (c) ∠ABE or ∠CBD **3** (a) ∠PRS (b) ∠ZYT (c) ∠MPR **4** (a) 30° (b) 110° (c) 315° (d) 80° **5** (a) acute (b) obtuse (c) reflex (d) acute **6** (a) obtuse (b) acute (c) reflex **7** (a) 125° (b) 30° (c) 70° **8** (a) 131° (b) 57° (c) 15° **9** (a) 33° (b) 102° (c) 48° **10** (a) 36° (b) 136° (c) 153° **11** (a) 53° (b) 7° (c) 71° **12** (a) 42° (b) 115° (c) 218° **13** (a) 225° (b) 315° (c) 135° **14** (a) 900° (b) 1260° (c) 1440° **15** (a) 100° (b) 85° (c) 55° **16** (a) 100° (b) 60° (c) 105° **20** (a) 58° (b) 125° (c) 50°

Chapter 4: Decimals and Money

Getting Started

1 (a) 0.82 (b) 0.28 (c) 0.66 (d) 0.345 (e) 0.666 (f) 0.606 (g) 0.066 (h) 0.307 (i) 0.091 (j) 0.205 (k) 10.11 (l) 5.56 (m) 7.123 (n) 47.101 (o) 32.098 (p) 9.3 (q) 14.89 (r) 11.751 **2** (a) T (b) F (c) T (d) T (e) T (f) F (g) T (h) F (i) F (j) T

Exercise 4.01

1 (a) $1+\frac{2}{10}$ (b) $3+\frac{4}{10}+\frac{5}{100}$ (c) $8+\frac{9}{10}+\frac{6}{100}$ (d) $55+\frac{5}{10}+\frac{5}{100}$ (e) $55+\frac{0}{10}+\frac{5}{100}$ (f) $70+\frac{0}{10}+\frac{9}{100}$ (g) $70+\frac{1}{10}+\frac{9}{100}$ (h) $10+\frac{0}{10}+\frac{1}{100}$ (i) $20+\frac{9}{10}+\frac{0}{100}$ (j) $191+\frac{3}{10}+\frac{6}{100}+\frac{0}{1000}$ (k) $64+\frac{7}{10}+\frac{0}{100}+\frac{7}{1000}$ (l) $497+\frac{0}{10}+\frac{0}{100}+\frac{8}{1000}$ **2** (a) 0.8 (b) 0.34 (c) 0.06 (d) 0.350 (e) 0.16 (f) 0.071 **3** (a) 0.5, 0.6, 0.8 (b) 0.8, 1.3, 1.9 (c) 4.95, 6.8, 8.6 (d) 0.88, 8.08, 88.0 (e) 1.01, 1.10, 11.1 (f) 3.03, 3.30, 3.33 (g) 96.1, 97.1, 98.1 (h) 0.59, 0.6, 0.61 (i) 100.1, 101.1, 110.1 (j) 0.002, 0.02, 0.2 (k) 0.65, 0.69, 0.7 (l) 0.07, 0.7, 0.707 (m) 0.25, 0.3, 0.31 (n) 0.39, 0.4, 0.41 (o) 0.002, 0.202, 0.220 (p) 0.404, 0.440, 0.444 (q) 7.077, 7.707, 7.777 (r) 8.008, 8.080, 8.088 (s) 1.101, 1.110, 1.111 (t) 0.010, 0.011, 1.010 **4** (a) 1 (b) 2 (c) 3 (d) 3 (e) 5 (f) 1 (g) none (h) none (i) 5 (j) 3 (k) 2 (l) 4 **5** (a) 12.3 (b) 17.06 (c) 2.59 (d) 0.006 (e) 11.005 (f) 0.75 (g) 300.001 (h) 1.38 (i) 0.27 (j) 0.207 **6** D **7** (a) $\frac{5}{10},\frac{9}{100}$ (b) 5 units, $\frac{9}{10}$ (c) $\frac{5}{100},\frac{9}{1000}$ (d) $\frac{5}{100}$ (e) $\frac{9}{10},\frac{5}{100}$ (f) $\frac{9}{10},\frac{5}{1000}$ (g) 5 tens, $\frac{9}{100}$ (h) $\frac{9}{100},\frac{5}{1000}$ (i) 5 units, $\frac{9}{1000}$ (j) $\frac{5}{10},\frac{9}{1000}$ (k) $\frac{9}{10},\frac{5}{100}$ (l) 9 units, $\frac{5}{1000}$ **8** (a) 6.9 (b) 2.78 (c) 3.11 (d) 0.2345 (e) 0.7002 (f) 8.001 **9** (a) 3.16 (b) 9.28 (c) 0.5307 (d) 0.626 (e) 7.10 (f) 18.00 **10** (a) 0.35 (b) 0.294 (c) 0.601 (d) 0.085 (e) 1.25 (f) 5.025 (g) 15.03 (h) 11.709 (i) 2.046 (j) 2.49 (k) 51.091 (l) 0.3089 (m) 0.0605 (n) 3.66 (o) 8.942 **11** (a) T (b) F (c) T (d) T (e) T (f) F (g) F (h) T (i) T (j) F (k) T (l) T (m) T (n) T **12** (a) 1, (b) 0.3 and (c) 0.05 **13** (a) $\frac{6}{10}$ (b) $\frac{4}{10}$ km (c) 999.9 **14** (a) > (b) < (c) > (d) > (e) < (f) > (g) < (h) > (i) < (j) > (k) < (l) < **15** (a) $\frac{1}{10}$ (b) $\frac{6}{10}$ (c) $1\frac{9}{10}$ (d) $\frac{32}{100}$ (e) $\frac{67}{100}$ (f) $13\frac{1}{100}$ (g) $1\frac{235}{1000}$ (h) $\frac{406}{1000}$ (i) $8\frac{71}{1000}$ (j) $19\frac{80}{100}$ (k) $39\frac{11}{100}$ (l) $12\frac{9}{1000}$ (m) $1\frac{33}{100}$ (n) $1\frac{3}{100}$ (o) $1\frac{3}{1000}$ (p) $1\frac{333}{10000}$ 1 **16** Sarah, Doreen, Liam, Kieran **17** Wednesday, Tuesday **18** (a) 0.8, 1.0, 1.2 (b) 11.0 (c) 0.09, 0.10, 0.11 (d) 6.04, 6.06, 6.12, 6.18 (e) 0.07, 0.09, 0.12, 0.15

Exercise 4.02

1 (a) 40 (b) Neither, it is halfway. (c) 9 (d) 16.7 **2** 56.4 **3** (a) 8 (b) 7.7 (c) 7.66 **4** 1, 3, 4, 4 **5** 0.3, 0.4, 0.5, 0.5 **6** (a) D (b) D **7** (a) 7.9 (b) 29.56 (c) 0.004 (d) 5.1 (e) 0.33 (f) 5.20 (g) 6.422 (h) 6.001 (i) 11.1 (j) 0.25 (k) 4.0 (l) 4.01 (m) 7.900 (n) 6.67 (o) 4.40 (p) 20.0 **8** 35.8m^2 **9** 56.461 **10** 15.0, 15.1, 15.2 **11** after multiplication **12** 352.1 m/s **13** 3.50 km **14** 28.9

Exercise 4.03

1 (a) 45.46 (b) 9.95 (c) 83.41 (d) 5.97 (e) 101.32 (f) 107.33 (g) 44.01 (h) 121.68 (i) 17.53 (j) 1.73 (k) 130.33 (l) 1628.813 (m) 23.142 (n) 75.684 (o) 531.435 **2** (a) 12.11 (b) 4.24 (c) 16.89 (d) 115.89 (e) 5.5 (f) 8.8 (g) 26.35 (h) 0.68 (i) 0.18 (j) 29.35 (k) 40.79 (l) 25.55 (m) 4.83 (n) 8.03 (o) 51.294 (p) 0.314 **3** (a) \$12.73 (b) \$7.27 **4** (a) \$240.24 (b) \$209.76 **5** (a) \$349.95 (b) \$43.05 **6** (a) \$869.75 (b) \$140.60 (c) \$563 **7** \$806.10 **8** \$614.56 **9** 0.37 m

Exercise 4.04

1 (a) 0.5 (b) 5.6 (c) 6.6 (d) 1.0 (e) 10.8 (f) 0.12 (g) 0.3 (h) 24.42 (i) 0.115 (j) 36.412 (k) 14.4 (l) 1 (m) 483.3 (n) 2.9 (o) 42 (p) 578 **2** (a) 65 (b) 650 (c) 6500 (d) 94.7 (e) 20 (f) 3750 (g) 567 (h) 5070 (i) 11.3 (j) 180 (k) 820 (l) 12800 (m) 7.1 (n) 71 (o) 710 (p) 3300 (q) 1 (r) 1 (s) 1 (t) 4600 (u) 30 (v) 590 (w) 0.37 (x) 84000 **3** (a) 57.0 (b) 3.75 (c) 90.72 (d) 174.6 (e) 2.618 (f) 152.49 **4** (a) 1.868 (b) 93.4 (c) 0.035 (d) 850 (e) 2.31 (f) 0.1 (g) 8.64 (h) 101 (i) 375 (j) 810 (k) 14.109 (l) 96200 (m) 1.44 (n) 1.92 (o) 1170 (p) 0.0989 (q) 15.394 (r) 3900 (s) 5360 (t) 0.0121 (u) 0.1575 (v) 315 (w) 19700 (x) 3600 **5** (a) 0.09 (b) 0.25 (c) 0.49 (d) 1.44 (e) 0.0004 (f) 90.25 (g) 0.1369 (h) 23.04 (i) 0.5041 (j) 0.064 (k) 0.001 (l) 0.015625 **6** (a) 4.8 (b) 0.48 (c) 0.048 (d) 0.048 (e) 0.0048 (f) 0.0048 (g) 0.00048 (h) 0.000048 (i) 0.6 (j) 0.06 (k) 0.006 (l) 0.006 (m) 0.0006 (n) 0.00006 (o) 0.00006 (p) 0.00006 (q) 0.16 (r) 0.027 **7** \$38.85 **8** 231.5 kilojoules **9** \$39.28 **10** (a) 375.2 m^2 (b) 81.6 m **11** (a) 344.8 kw (b) \$62.06 **12** \$48.90

Exercise 4.05

1 (a) 0.3 (b) 3.3 (c) 0.081 (d) 1.05 (e) 1.24 (f) 9.1 (g) 9.1 (h) 33.2 (i) 0.403 **2** (a) 0.0404 (b) 0.0044 (c) 15.3 (d) 4.73 (e) 5.92 (f) 0.14 (g) 0.041 (h) 12.3 (i) 1.209 **3** (a) 4 (b) 6 (c) 0.8 (d) 10 (e) 0.1 (f) 10 (g) 1320 (h) 340 (i) 2710 (j) 117.5 (k) 30 (l) 20 (m) 40 (n) 400 (o) 400 (p) 0.79 (q) 79 (r) 7900 (s) 2 (t) 0.4 (u) 0.022 **4** (a) 8.5 (b) 6.4 (c) 3.52 (d) 8.31 (e) 9.56 (f) 5.4 (g) 6.23 (h) 3.87 (i) 6.02 **5** 20 **6** 9.2 min **7** \$1528.55 **8** 400 **9** (a) yes (b) no **10** 35 m **11** 13 **12** 6 toilet rolls **13** (a) \$22.25 (b) \$44 500

Exercise 4.06

1 472.8 km **2** 16.04 **3** 27.8 km **4** \$35 **5** 2.59 **6** \$1053 **7** (a) 9.5 (b) 11.6 **8** 321 **9** 0.48 cents **10** 109.8 m **11** 12 laps **12** 17.5 m **13** 0.45 m **14** 99 **15** 2695 **16** 80 **17** \$260 **18** \$2100 **19** 15 **20** 12.4 L **21** 6.3 m **22** \$5.50 **23** \$21.85 **24** \$1.20, \$8, \$1.45, \$2.85 **25** 8.2

Exercise 4.07

1 (a) 0.5 (b) 0.1 (c) 0.79 (d) 0.6 (e) 0.345 (f) 0.72 (g) 0.85 (h) 0.07 (i) 0.462 (j) 0.25 (k) 0.125 (l) 0.625 (m) 5.75 (n) 9.05 (o) 0.04 **2** (a) no (b) yes (c) no (d) no (e) yes (f) yes (g) yes (h) no (i) yes (j) yes **3** (a) $0.\overline{8}$ (b) $6.\overline{13}$ (c) $5.8\overline{4}$ (d) $0.\overline{417}$ (e) $77.6\overline{7}$ (f) $0.9\overline{83}$ (g) $0.\overline{1234}$ (h) $8.22\overline{31}$ (i) $6.\overline{6}$ (j) $9.\overline{7654}$ (k) $4.86\overline{52}$ (l) $1.\overline{001}$ **4** (a) 8.999… (b) 3.4545… (c) 3.4555… (d) 0.345345… (e) 0.03450345… (f) 13.3666… (g) 1.63636… (h) 1.6363636… (i) 0.918787…. (j) 5.4321111… **5** $8.\overline{3}$ **6** 14.1556 **7** yes **8** (a) 0.8 (b) 0.25 (c) $0.\overline{3}$ (d) $0.1\overline{6}$ (e) 0.85 (f) 0.42 (g) $0.\overline{2}$ (h) 0.875 (i) $0.\overline{285714}$ (j) $0.\overline{09}$ k 0.486 (l) 0.508 (m) $0.8\overline{3}$ (n) $0.41\overline{6}$ (o) $0.\overline{7}$

Exercise 4.08

1 D **2** C **3** E **4** D **5** E **6** D **7** E **8** D **9** C **10** B **11** 1.327 **12** \$9 **13** 0.95 m **14** (a) 1.1 (b) 1.065 **15** No e.g. $0.2 \times 0.3 = 0.06$ **16** 2.5 **17** 240 mL **18** 0.25^2, 0.25, $\sqrt{0.25}$, $\frac{1}{0.25}$, $\frac{1}{0.25^2}$ **19** 5.90 **20** (a) 89725 (b) 897.25 (c) 485 (d) 0.185 **21** (a) $0.\overline{142857}$, $0.\overline{285714}$, $0.\overline{428571}$, $0.\overline{571428}$, $0.\overline{714285}$, $0.\overline{857142}$ There is a pattern where the same six digits are being repeated.

Diagnostic Test

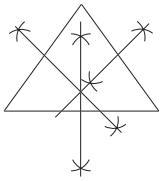
1 (a) 0.36 (b) 0.234 (c) 14.074 (d) 0.901 (e) 0.091 **2** (a) $8 \times 1 + 5 \times \frac{1}{10} + 1 \times \frac{1}{100}$ (b) $\frac{4}{10} + \frac{4}{100} + \frac{4}{1000}$ (c) $2 \times 10 + 1 \times 1 + 0 \times \frac{1}{10} + \frac{1}{100} + \frac{6}{1000}$ **3** (a) 0.27, 0.72, 2.7, 7.2 (b) 3.013, 3.031, 3.130, 3.310 **4** (a) < (b) > (c) > **5** (a) 0.95 (b) 63.10 (c) 8.100 **6** (a) 15.708 (b) 0.111 (c) 19.233 **7** (a) 5.39 (b) 0.083 (c) 29.95 **8** (a) 0.2 (b) 0.136 (c) 33 **9** (a) 8.3 (b) 83 (c) 830 **10** (a) 0.25 (b) 0.0016 (c) 0.027 **11** (a) 4.02 (b) 402 (c) 50.23 (d) 0.765 (e) 0.00765 (f) 0.0092 **12** (a) 340 (b) 7300 $\neq$ 7.3 No **13** (a) 0.55 (b) 1.15 m (c) 35 (d) \$5.24 **14** (a) 0.6 (b) 0.125 (c) $0.\overline{6}$ (d) 2.95 (e) $0.\overline{142857}$ (f) 0.44 (g) 0.768 (h) $0.\overline{2}$ **15** (a) $0.\overline{57}$ (b) $8.6\overline{2}$ (c) $6.0\overline{3456}$

Chapter 5: Revision Papers

Revision Paper 1

1 B **2** B **3** C **4** B **5** A **6** A **7** D **8** C **9** A **10** D **11** C **12** D **13** D **14** C **15** B **16** C **17** C **18** A **19** A **20** C **21** C **22** D **23** C **24** C **25** A **26** (a) acute (b) reflex (c) obtuse **27** $\angle$AOB, $\angle$BOC, $\angle$COD, $\angle$AOC, $\angle$BOD **28** 12 543 **29** \$1500 **30** 420 000 **31** \$6.82 **32** (a) 0.96 (b) 6.1 (c) 0.25 (d) 3.5 **33** (a) 8.6 (b) 86 (c) 860 **34** (a) 0.86 (b) 0.086 (c) 0.0086 **35** 7 **36** 20 **37** 8 **38** (a) $0.\overline{313}$ (b) $9.1\overline{4}$ (c) $8.0\overline{453}$

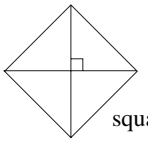
39



They are concurrent.

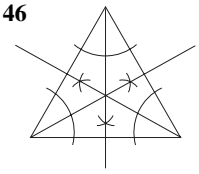
40 (a) 0.2 (b) 0.65 (c) 0.43 (d) $0.\overline{1}$ **41** (a) 60 (b) 45 (c) 40 (d) 130 (e) 145, 35 (f) 40 **42** (a) 130 (b) 110 (c) 60 (d) 130 (e) $a = 100$, $b = 80$, $x = 80$, $y = 80$ (f) 70 **43** sum angles – 180 **44** divide into 2 triangles, sum of angles = 360

45



square

46



bisectors pass through a common point

47 \$1 **48** a = 20kg **49** 24 min **50** 300 m

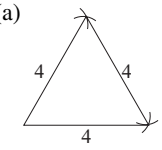
Revision Paper 2

1 D **2** B **3** D **4** D **5** A **6** B **7** B **8** C **9** A **10** A **11** D **12** C **13** A **14** B **15** B **16** A **17** C **18** C **19** D **20** A **21** A **22** D **23** B **24** B **25** D **26** $\angle$ABD, $\angle$CBE **27** (a) 40.705 (b) 3.12 **28** (a) 7.171, 7.177, 7.717, 7.771 (b) 5.660, 5.555, 5.055, 5.050 **29** (a) 20 million (b) 19 500 000 (c) 19 525 000 **30** (a) 275 (b) 27500 **31** (a) 0.309 (b) 0.00309 **32** 120 **33** (a) north (b) north **34** (a) 253 (b) 2800 (c) 15 (d) 8 **35** (a) 8.7 (b) 28.0 **36** 6 **37** \$224.45 **38** (a) 24 (b) 1 (c) 22 (d) 40 **39** (a) 0.7 (b) 0.15 (c) 0.742 (d) $0.1\overline{6}$ **40** (a) 52 (b) 44 (c) 64 (d) 75 **41** (a) 0.64 (b) 0.001 (c) 0.45 **2** (a) 9.49 am (b) 17 minutes **43** 14 ten cent coins **44** 16 emus **45** 12 **46** 20 min **47** 12 **48** 1275 **49** 36 **50** 8

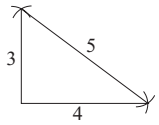
Revision Paper 3

1 B **2** B **3** C **4** B **5** C **6** A **7** C or D **8** B **9** D **10** D **11** A **12** C **13** C **14** D **15** B **16** A **17** B **18** C **19** C **20** D **21** B **22** D **23** A **24** B **25** A **26** (a) 0.65 (b) 0.306 (c) 0.081 **27** (a) T (b) F (c) T (d) F(e)T **28** (a) 0.26 m (b) 16 **29** (a) 0.09 (b) 3.37 (c) 0.04 (d) 39.93 **30** (a) \$17.21 (b) \$886.95 **31** (a) 64° (b) 75

32 (a)



(b)



33 (a) $\angle$XYZ, $\angle$SYZ (b) b **34** (a) 20 (b) 30 (c) 124 (d) 50 **35** (a) 100 (b) 26 **36** (a) 115 (b) 82 **37** (a) 56 (b) 72, 72, 108 **38** (a) 50 (b) 9900 **39** 6 **40** 60 **41** 1 **42** $\frac{3}{4}$ turn **43** 60 **44** 8 **45** 168 **46** 11 **47** 6 **48** 16mm **49** 6 **50** 120 days

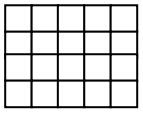
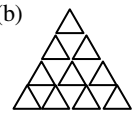
Chapter 6: Patterns and Algebra

Getting Started

1 B **2** C **3** B **4** C **5** C **6** A **7** B **8** D **9** C **10** D

Exercise 6.01

1 (a) 36, 42, 48 (b) 146, 161, 176 (c) 62, 69, 76 (d) 7.7, 7.8, 7.9 (e) 6.8, 7.9, 8.0 (f) 7.5, 9,10.5 (g) 692, 781, 870 (h) 8 100, 9 300, 10 500 (i) $9\frac{1}{2}$, 12, $14\frac{1}{2}$ (j) 4075, 4200, 4325 **2** (a) H, J, L (b) n, q, t (c) s, t, u (d) p, u, z (e) o, s, w (f) a, a, a (g) t, r, p (h) k, p, v **3** (a) 15, 12, 9 (b) 60, 55, 50 (c) 29, 23, 17 (d) 107, 92, 77 (e) 5, 3.75, 2.5 (f) 1.99, 1.97, 1.95 (g) 4.78, 4.55, 4.32 (h) 5190, 4680, 4170 **4** (a) 13 (b) 10 (c) 22 (d) 15 (e) 33 **5** (a) 18, 23, 29 (b) 70, 95, 125 (c) 42, 57, 75 (d) 35, 30, 24 (e) 67, 61, 56 (f) 240, 1440, 10 080 (g) 23, 17, 24 (h) 18, 29, 47 (i) 54, 162, 486

6 (a)  (b) 

7 320 **8** (a) 25 (b) 125 (c) 16 (d) 54 (e) 3 (f) 4 (g) .004 (h) .0016 **9** 22, 35 **10** (a) 1 (b) 2 (c) 6 **11** (a) 1 (b) 3 (c) 6 (d) triangular numbers (e) 10 **12** 28, 3 flavours, 3 choices, yes. **13** (c) 11 **14** (a) E, N, T (b) Christina (c) 1 (d) 7 red squares

Exercise 6.02

1 Number of sticks = 4 times number of squares. **2** Can't easily determine 100 squares. **3** Number of sticks = 4 times number of squares take away one less than the number of squares. 301 **4** (a) Number of sticks = 3 times number of squares add 1. (b) 301 (c) yes **5** All but the last joining sticks are shared. **6** Each new set of 3 completes the previous square except for the last one.

7

Number of houses	1	2	3	4	60
Calculation	6 × 1	6 × 2	6 × 3	6 × 4	6 × 60
Number of sticks	6	12	18	24	360

8 5, Number of sticks = 5 times number of houses plus 1. **9** (a) Number of sticks = 6 times number of houses subtract one less than the number of houses. (b) yes

10

Term	1	2	3	4	150
Double it	2	4	6	8	300
Subtract 1	2 – 1 = 1	4 – 1 = 3	6 – 1 = 5	8 – 1 =7	300 – 1 = 299
Odd number	1	3	5	7	299

11 (a) #1 = 3, 5, 7 #2 = 8, 15, 22 (b) #1 = Number of sticks is double the number of shapes plus 1. (b) #2 = Number of sticks is 7 times the number of shapes plus 1. (c) #1 = 101, #2 = 351 **13** (a) (i) 1 (ii) 1 less than the number of triangles (iii) 21 (b) (i) 1 (ii) 1 less than the number of octagons (iii) 71 **14** (a) 10 (b) 14, 18, 22 (c) Number of guests is 4 times the number of tables plus 2. (d) 50. **15** (c) Number of guests is 2 times the number of tables plus 4. (d) 34 **16** End to end. Add four extra guests per table as against only 2. **17** (a) Number of cans = number in the bottom row times the next consecutive integer divided by 2 (b) 20 × 21 ÷ 2 = 210 (c) too long **18** (a) (i) 5 faces (ii) 8 faces (iii) 11 faces (iv) 122 faces (b) Number of faces = 3 times number of lockers plus 2 **19** (a) Number of people = 3 times number of tables plus 2 (b) 2 times the number of tables plus 2 for the ends. (c) Subtract 2, then divide by 2 then multiply by 3 then add 2. (d) 62

Exercise 6.03

1

Term	1	2	3	n	1000
a	8	16	24	$8n$	8000
b	6	12	18	$6n$	6000
c	11	22	33	$11n$	11 000
d	10	20	30	$10n$	10 000
e	9	19	29	$10n - 1$	9999
f	5	10	15	$5n$	5000
g	6	11	16	$5n + 1$	5001
h	7	12	17	$5n + 2$	5002
i	1	4	9	$n \times n$	1 000 000
j	2	5	10	$n \times n + 1$	1 000 001

2 (b) $n - 1$ (c) 99 **3** (a) $3n$ (b) $3n + 1$ (c) $5n + 1$ (d) $5n$ *(e)* $5n + 3$ (f) $5n + 5$ (g) $3n + 3$ **4** (a) $2n + 5$, 105 (b) $3n + 17$, 167 (c) $4n - 3$, 197 (d) $10n - 5$, 495 (e) $7n + 92$, 442 (f) $4n - 1$, 199 (g) $3n + 0.5$, 150.5 (h) $0.5n + 12$, 37 (i) $0.1n + 3.9$, 8.9 (j) $1000n + 2000$, 52 000
5 (a) $52 - 2n$, 12 (b) $93 - 3n$, 33 (c) $84 - 4n$, 4 (d) $205 - 5n$, 105 (e) $88 - n$, 68 (f) $21 - 0.5n$, 11 (g) $26.7 - n$, 6.7 (h) $1010 - 10n$, 810
6 (a) $4n$ (b) $2n + 2$ (c) $5n$ (d) $3n + 2$ (e) $n + 2$ (f) $6n + 2$

7

Term	1	2	3	4	n	20
a	1	4	9	16	n^2	400
b	4	7	12	19	$n^2 + 3$	403
c	0	3	8	15	$n^2 - 1$	399
d	1	8	27	64	n^3	8000
e	0	7	26	63	$n^3 - 1$	7999
f	6	13	32	69	$n^3 + 5$	8005
g	3	6	11	18	$n^2 + 2$	402
h	101	104	109	116	$n^2 + 100$	500
i	30	37	56	93	$n^3 + 29$	8029
j	999	996	991	984	$1000 - n^2$	600
k	455	452	447	440	$456 - n^2$	56
l	2	8	18	32	$2n^2$	800
m	2	11	26	47	$3n^2 - 1$	1199

8

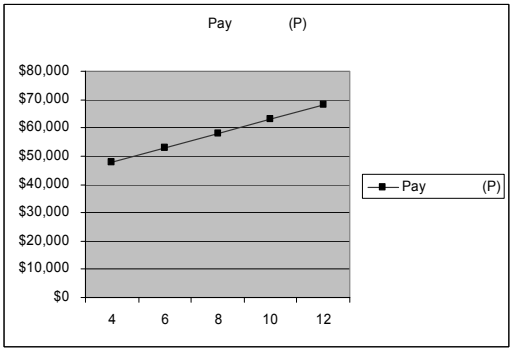
Term	1	2	3	4	n
a	17	19	21	23	$2n + 15$
b	19	17	15	13	$21 - 2n$
c	44	47	52	59	$n^2 + 43$
d	3	9	15	21	$6n - 3$
e	14	11	8	5	$17 - 3n$
f	0	7	26	63	$n^3 - 1$
g	2	6	12	20	$n^2 + n$
h	1	19	37	55	$18n - 17$

9 $6n - 3$ **10** $x - 1$ Who Am I? The degree.

Exercise 6.04

1 (a) $y = 2x + 1$ (b) $t = 4n + 19$ (c) $s = 2x - 1$ (d) $R = 22 - 2P$ (e) $b = 3a + 4$ (f) $q = 5p - 45$ (g) $f = 130 - 5d$ **2** (a) $x = 5n + 3$ (b) 43 **3** (a) $y = 9, 11, 13, 15$ (b) $s = 1, 4, 7, 10$ (c) $a = 14, 18, 22, 26$ (d) $p = 2, 7, 12, 17$ (e) $y = 13, 11, 9, 7$ (f) $y = 24, 21, 16, 9$ **4** (a) decreasing (b) subtract (c) decreases by 2 (d) B (e) 15 (f) $y = 15 - 2x$ **5** (a) $t = \frac{v}{20} + 2$ (b) 7 sec

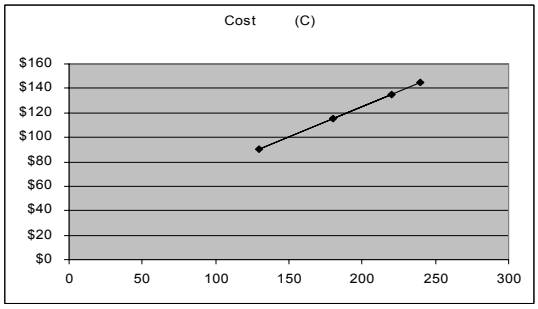
6



(b) \$68 000 (c) goes up \$5000 every 2 years (d) $P = \frac{S}{2} \times 5\,000 + 38\,000$

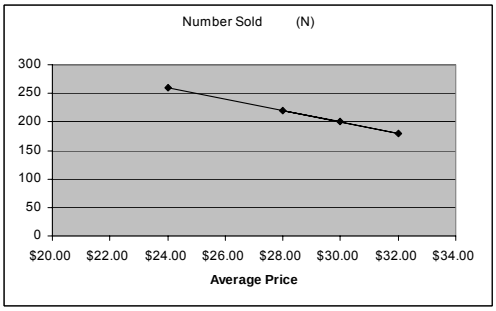
(e) formula. More accurate. (f) \$75 500 (g) 25 yrs **7** (a) $y = 2x - 1$ (b) $t = 6n - 30$ (c) $g = 103 - 4t$ (d) $y = 110 - 3x$ (e) $m = 110 - 5n$ (f) $t = 40 - 2n$ (g) $h = 90 - 6g$ (h) $f = 2x + 10$

8



(b) \$130 (c) $C = \frac{1}{2}G + 25$ (d) \$255, bulk discounts or commercial rate.

9 (a)



(b) $n = 500 - 10P$ (c) 300 (d) \$50

10

N	1	2	3	4	n
B	1	3	6	10	$\frac{n}{2} \times (n+1)$
S	6	12	20	30	$(n+1) \times (n+2)$

(a) 210 (b) 600 (c) rack # 9, 110 segments (d) 190 bottles **11** (a) 12 (b) 20 (c) 12, 20, 28 (d) $4 + 8n$ (e) 100 (f) 46 (g) 5 times the number of rows times the number of columns plus 3 times the sum of the number of rows and columns plus 1. (h) $5 \times 12 \times 10 + 3 \times (12 + 10) + 1 = 667$ **Who am I?** the decimal point

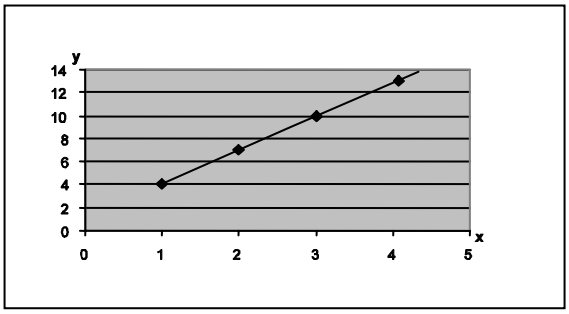
Exercise 6.05

1 240° **2** 36°, 72°, 72° and 45°, 45°, 90° **3** 132°, 132°, 48° **4** The last angle must be 180, which does not form a vertex. **5** 6 **6** 273 **7** 6, 8 **8** (a) $4 \times 104 = 416$ (b) $108\,000 + 216 = 108\,216$ (c) 78 400 (d) 8300 **9** 9 hours **10** 1 way **11** 4.17 metres **12** \$15 or \$30 **13** 42 **14** 9 years **15** C **16** 18 **17** \$16

Diagnostic Test

1 (a) 31, 36, 41 (b) 7.4, 7.6, 7.8 (c) 8.5, 10, 11.5 **2** (a) i, k, m (b) n, o, p (c) w, v, u **3** (a) 20, 16, 12 (b) 70, 65, 60 (c) 6.82, 6.80, 6.78 **4** (a) 9 (b) 21 (c) 18 **5** (a) 26 (b) 124 (c) 3 **6** (a) Multiply 50 by 2. (b) Multiply 50 by 2 and subtract one. (c) Multiply 50 by 3 and subtract 2. **7** (a) Multiply the number of triangles by 3 and add 3. (b) Add 2 to the number of triangles. (c) Multiply the number in the top row by 3 and add 1. **8** (a) Multiply the number of cabinets by 3 and add 1. (b) 16 (c) 7 **9** (a) $5n + 3$ (b) $65 - n$ (c) $100 - 3n$ **10** (a) $4n + 1$ (b) $4n$ (c) $5n - 1$ **11** (a) n^2 (b) $n^2 + 1$ (c) n^3 **12** (a) $y = 4x + 3$ (b) $b = 84 - 2a$ (c) $n = 8m - 1$ **13** (a) $c = 2p - 2$ (b) 14 (c) $p \times 2 = 2p - 2 = 2p - 2$ (d) 11 **14** (a) $y = 11, 12, 13$ (b) $b = 19, 21, 23$ (c) $n = 24, 22, 20$

15 13



Chapter 7: Properties of 2-D Figures

Getting Started

1 3, sides can't join **2** B **3** C **4** B **5** C **6** B **7** B **8** A **9** B **10** D **11** C

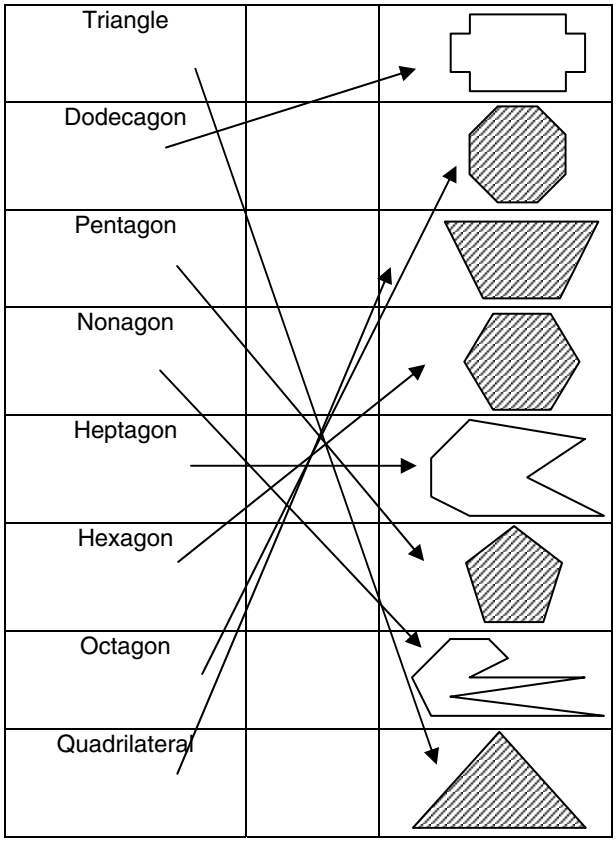
Exercise 7.01

1

Plane shape	Number of sides	Internal angles
Triangle	3	3
Quadrilateral	4	4
Pentagon	5	5
Hexagon	6	6
Octagon	8	8
Decagon	10	10

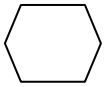
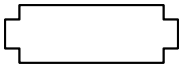
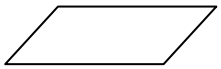
2 do = 2 and dec = 10 **3** triangle + hexagon or quadrilateral + pentagon

4



5 The shaded figures are convex. **6** octagon, hexagon, pentagon, triangle

7

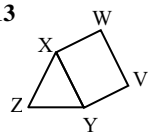
Shape	Regular	Irregular	Non-Convex	Convex
	√			√
		√	√	
		√		√
		√	√	

8 no **10** square **11** (a) quadrilateral, (b) hexagon, (c) octagon. Triple rhombus **13** square, circle, rectangle **14** STOP. Shape and colour. **16** angles not equal **17** 5

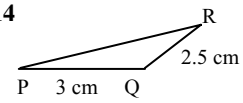
Exercise 7.02

1 (a) isosceles (b) equilateral (c) scalene (d) scalene (e) isosceles (f) scalene **2** (a) isosceles (b) equilateral (c) scalene **3** (a) equilateral (b) scalene (c) isosceles **4** (a) yes (b) yes (c) yes (d) yes (e) yes **5** (a) no (b) no (c) no (d) no (e) no **6** (a) no (b) no (c) no (d) yes (e) no **7** Since the triangle is not isosceles, the perpendicular bisector of the base will not pass through the opposite vertex. **8** (a) right-angled (b) acute (c) obtuse **9** (a) isosceles, acute (b) isosceles, obtuse (c) scalene, obtuse (d) scalene, right-angled (e) equilateral (f) scalene, acute **10** 7, ABD (isos.), BCD (isos.), BFD (isos.), BCE, DCE, BFE, DFE **11** (a) 10 cm (b) 18 cm, 24 cm (c) 16 cm each **12** (a) obtuse triangles (b) isosceles, right-angled triangles (c) isosceles triangle, rectangle.

13



14

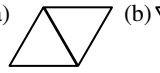


15 (a) ACB, isosceles (b) CDE, right-angled isosceles (c) QPR, obtuse-angled scalene **16** 4 **17** 20 **18** (a) largest side (b) smallest side **19** (a) DAC: acute isosceles, SVR: obtuse isosceles, PVQ: obtuse isosceles, QVR: obtuse isosceles, PVS: obtuse isosceles DEA: obtuse, ABC: obtuse (b) SPQ, PTV, VTQ, PQR, QRS, RWV, VWS, RSP (c) ABE **Who am I?** obtuse isosceles triangle.

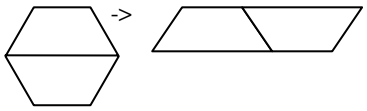
Exercise 7.03

1 (a) AB//DC, trapezium (b) QR//TS, QT//RS, SR = TQ, ST = RQ, ∠QTS = ∠QRS, ∠RST = ∠RQT, parallelogram (c) MN//PO, ON//PM, MP = PO = ON = NM, MO ⊥ PN , ∠PMN = ∠PON, ∠MPO = ∠MNO, rhombus (d) JK = KL = LM = MJ, JK//ML, KL//JM, JL = KM, MK ⊥ JL, square **2** (a) parallel (b) unequal (c) equal (d) angles (e) equal and perpendicular **3** (a) quadrilaterals (b) parallelograms (c) trapeziums (d) parallelograms (e) rectangles and kites **4** parallelogram **5** 10 **6** 12 including rhombuses **7** (a) trapeziums (b) rhombuses (c) equilateral triangles)

8 (a) (b) (c)



9 (a)



Exercise 7.04

1 (a) 0 (b) 1 (c) 3 **2** no **3** B **4** [1] parallelogram, 0 [2] kite, 1 [3] rhombus, 2 [4] rectangle, 2 [5] square, 4 [6] isosceles trapezium, 1
5

Name of quadrilateral	Number of axes of symmetry
Trapezium	0
Parallelogram	0
Isosceles trapezium	1
Kite	1
Rectangle	2
Rhombus	2
Square	4

6 parallelogram, **7** square
8

Name of quadrilateral	Order of rotational symmetry
Trapezium	1
Parallelogram	2
Isosceles trapezium	1
Kite	1
Rectangle	2
Rhombus	2
Square	4

9 rhombus, square equal sides **10** 72° **11** 60° **12** (a) 5 (b) 5 (c) 6 (d) 6 (e) same reflection and rotational symmetry **13** no. Has no axis of symmetry. **14** rectangle, half an octagon **15** A would not fold onto C ; A must fold onto C. **Who am I?** Maurits Escher

Exercise 7.05

1 quadrilateral, trapezium, parallelogram, rectangle/rhombus, square

2

Properties	Must be…	Could be…
4 equal sides	Rhombus	Square
1 pair of parallel sides	Trapezium	•
2 pair(s) of equal sides	Parallelogram	Square, rectangle
2 pairs of opposite angles equal	Parallelogram	Rhombus, square, rectangle
Diagonals are equal	Rectangle	Square
Diagonals are perpendicular	Rhombus	Square
Diagonals are perpendicular and equal	Square	•
Diagonals bisect each other	Parallelogram	Rhombus, rectangle, square

3 (b) **4** (b) **5** (a) **6** (d) **7** (d) **8** (a) **9** (b) **10** (c) **11** (d) **13** 2 **14** (a) false (b) false (c) false

Exercise 7.06

1 (a) #1, #2, #3, #5 and #7: right-angled isosceles triangles; (b) #4: square; (c) #6: parallelogram **2** no **3** yes **4** B **5** yes **6** yes **7** C
8 trapezium **13** 12 **14**  Squares share lowest number of edges.

Exercise 7.07

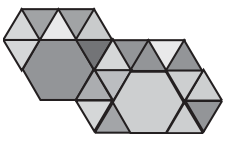
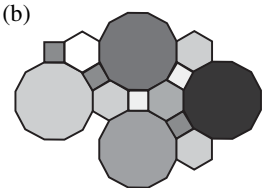
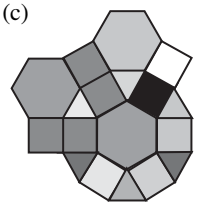
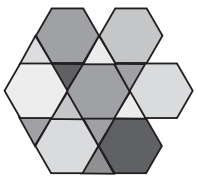
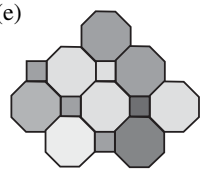
1

Regular shape	Number of sides	Number of angles	Angle sum of shape (°)	Size of each angle (sum ÷ sides) (°)	360° ÷ angle
Triangle	3	3	180	60	6
Square	4	4	360	90	4
Pentagon	5	5	540	108	3.46
Hexagon	6	6	720	120	3
Heptagon	7	7	900	128.6	2.80
Octagon	8	8	1080	135	2.67
Nonagon	9	9	1260	140	2.57
Decagon	10	10	1440	144	2.5
Dodecagon	12	12	1800	150	2.4
Any other?	Not possible			180	2

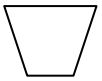
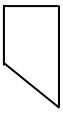
(a) 6 (b) 4 (c) No multiples add up to 360°. (d) 3 (e) 2, angle would have to be 180° (f) equilateral triangle, square, regular hexagon

3

Triangles	Squares	Hexagons	Dodecagons	Sum of angles
Number of 60°	Number of 90°	Number of 120°	Number of 150°	At one point (°)
1	–	–	2	360
–	1	1	1	360
2	1	–	1	360
–	–	3	–	360
2	–	2	–	360
1	2	1	–	360
4	–	1	–	360
–	4	–	–	360
3	2	–	–	360
6	–	–	–	360

4 (a)  (b)  (c)  (d)  (e) 

Exercise 7.08

1 34° **2** 180 kph **3** 2 equal sides  **4**  no, yes

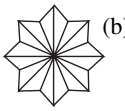
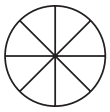
5

Name	Number of sides	Number of diagonals
Triangle	3	0
Quadrilateral	4	2
Pentagon	5	5
Hexagon	6	9
Heptagon	7	14
Octagon	8	20
Nonagon	9	27
Decagon	10	35
Dodecagon	12	44

6 Number of diagonals = number of sides × 3 less than the number of sides ÷ 2. For 100 sides, number of diagonals = 100 × 97 ÷ 2 = 485.
7 (a) 37 × 100 = 3700 (b) 119 × 100 = 11 900 (c) 117 × 10 = 170 (d) 97 × 10 = 970 **8** 360 metres **9** 5 hours **10** 10 hoses
11 5(1 × 5,1 × 10, 2 × 20,1 × 50) **12**  **13** 6 **14** 12 **15** (a) 0 gets off = 1 + 3 + 3 = 7 (b) 1 gets off = 4 ×(1 + 3 + 3 + 1) = 32
(c) 2 get off = 6 ×(1 + 3 + 3 + 1) = 48 (d) 3 get off = 4 ×(1 + 3 + 3 + 1) = 32 (e) 4 get off = 1 + 3 + 3 + 1 = 8 (f) 127

Diagnotic Test

1 (a) isosceles trapezium (b) rhombus (c) regular hexagon **2** (a) regular, convex (b) irregular, convex (c) irregular, non-convex **3** (a) scalene (b) right-angled isosceles (c) equilateral **4** (a) false (b) false (c) true **5** (a) true (b) false (c) true

6 (a)  (b)  (c) 

7 (a) square (b) kite or isosceles trapezium (c) equilateral triangle **8** (a) one (b) two (c) regular hexagon **9** (a) kite (b) square (c) rectangle
10 (a) parallelogram (b) kite (c) square **11** (a) pentominoes (b) tetrominoes (c) polyominoes **12** (A) 5, 540°, 108° (B) 6, 720°, 120°
(C) 8, 1080°, 135° **13** (a) B (b) B (c) (i) tiling, (ii) tessellation (iii) repeated pattern

Chapter 8: Number Theory

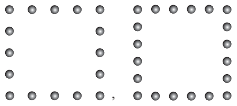
Getting Started

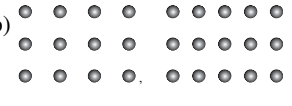
1 10, 12, 14 **2** 15, 17, 19 **3** 20, 24, 28 **4** 50, 60, 70 **5** −8, −9, −10 **6** 1, −1, 1 **7** 8, 4, 0 **8** 18, 21, 24 **9** $\frac{1}{16}, \frac{1}{32}, \frac{1}{64}$ **10** $\frac{1}{9}, \frac{1}{27}, \frac{1}{81}$ **11** 16, 32, 64
12 64, 125, 216 **13** 15, 21, 28 **14** 47, 95, 191 **15** 8, 13, 21 **16** 11, 16, 22

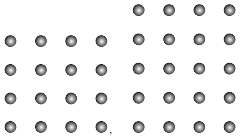
Exercise 8.01

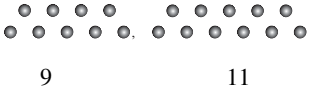
1 21 **2** 60 **3** 23 **4** 42 **5** 99 **6** 12 **7** 21, 23, 25, 27, 29 **8** 82, 84, 86, 88 **9** (a) even (b) even (c) even (d) odd (e) even (f) even (g) odd (h) even
(i) odd (j) even (k) odd **10** squares 25, 81, 64, 49, 121, 36; cubes 27, 125, 8; triangular and even 6, 10, 28, 36 **11** (a) 4^2 (b) 5^2 (c) 6^2 (d) 10^2
12 (a) 35, 51 (b) 45, 66 **13** (a) 1000, 10 000, 100 000 (b) 81, 100, 121 (c) 23, 25, 27 (d) 10, 12, 14 (e) 32, 64, 128 (f) 21, 28, 36

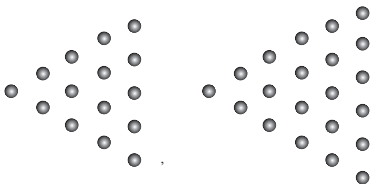
14 (a) 4 balls (b) 10, 15, 21 **15**  10, yes, triangular

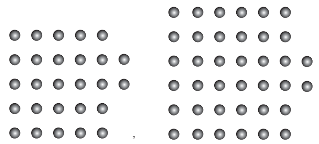
16 (a) 
16 20

(b) 
12 15

(c) 
16 25

(d) 
9 11

(e) 
15 **21**

(f) 
27 **38**

17 (a) 16, 41

18 (a)

Layer	1	2	3	4	5	6
Number in layer	1	4	9	16	25	36
Number in pile	1	5	14	30	55	91

(b)

Layer	1	2	3	4	5	6
Number in layer	1	3	6	10	15	21
Number in pile	1	4	10	20	35	56

19 100

20 (a)

1 6 15 20 15 6 1 64
1 7 21 35 35 21 7 1 128
1 8 28 56 70 56 28 8 1 256

(b) Each new row begins with 1. We add the first numbers of the above row to find the second term; the next two terms for the third row and so on. The last term is also 1. (c) (i) sum of row 6 is 64 (ii) 512 (d) (i) 6 (ii) 6 (e) (i) 3 (ii) 10 (f) (i) triangular numbers (ii) 45 (g) (i) sum of first 2 numbers in a row equals the row plus 1 (ii) triangular numbers (h) triangular numbers (i) 0, 1, 3, 7 … (j) sum of the numbers along each row is a power of 2 i.e.(2^{n-1}) **21** (a) Row 5 is 1, 4, 6, 4, 1; Row 6 is 1, 5, 10, 10, 5, 1. (b) 2, 4, 8, 16 (c) 64 (d) nth row is 2^{n-1} (e) Pascal's Triangle

Getting Started

1 (a) 24, (b) 24, (c) 24, (d) 24 **2** 1, 2, 3, 4, 6, 8, 12, 24 **3** (a) 7 (b) 2 (c) 56 (d) 8 (e) 14 (f) 4

Exercise 8.02

1 (a) yes (b) no (c) yes (d) yes (e) no (f) no (g) yes (h) no (i) yes (j) yes (k) no (l) yes **2** (a) 2, 3, 6 (b) 2, 4, 8 (c) 2, 3, 4, 6, 12 (d) 2, 3, 6, 9, 18 (e) 2, 13, 26 (f) 3, 9, 27 (g) 3, 5, 9, 15, 45 (h) 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 (i) 2, 8, 16, 32, 64 (j) 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72 (k) 11, 121 (l) 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 72, 144 **3** Yes, every whole number is divisible by 1 and itself. **4** 3, 6, 9, 12, 15, 18 **5** 10, 20, 30, 40, 50 **6** 9, 18, 27, 36 **7** 15, 30, 45, 60 **8** 20, 40, 60, 80, 100 **9** 66, 72, 78 **10** 120, 132, 144, 156 **11** 30, 60, 90 **12** 90, 99, 108, 117 **13** (a) 12 (b) 12 (c) 3 (d) 48 **14** (a) 7 (b) 12 (c) 25 (d) 7 (e) 13 (f) 15 (g) 16 (h) 13 (i) 14 **15** (a) 21 (b) 24 (c) 36 (d) 60 **16** (a) 12 (b) 28 (c) 36 (d) 24 (e) 72 (f) 60 (g) 60 (h) 30 (i) 60

Exercise 8.03

1 (a) 2, 3, 7, 11, 13, 17, 19 (b) 2 (c) 42, 44, 45, 46, 48, 49 (d) 83, 87, 89, 97 (e) 51, 52, 54, 55, 56, 57, 58 **2** (a) 2^3 (b) 2.3^2 (c) $2^2.7$ (d) 2.3.5. (e) 2^5 (f) $2^4.3^2$ (g) $2^3.3^3$ (h) $2^6.3^2$ (i) $2^3.17$ (j) $2^4.3^3$ (k) $2^2.3^3.7$ (l) $5^2.7^2$ **3** (a) 25 (b) 22 (c) 15 (d) 14 (e) 16 (f) 4 (g) 5 (h) 7 (i) 14 (j) 15 (k) 42 (l) 28 **4** (a) $2^2.3^2$ (b) $2^4.3$ (c) $2^2.13$ (d) 2^6 (e) $2^3.3^2$ (f) 2.37 (g) 3^4 (h) $2^2.3^3$ (i) 2^7 (j) $2^2.3.11$ (k) $5^2.7$ (l) $5^2.13$ **5** 14 = 7 + 7, 16 = 5 + 11, 18 = 7 + 11, 20 = 7 + 13, 22 = 11 + 11, 24 = 11 + 13 **6** $137 = 11^2 + 4^2$; $149 = 10^2 + 7^2$ **7** (a) 43, 47, 53 (b) 19, 23, 29 **8** 41, 43; 59, 61, 71, 73; 101, 103; 107, 109; 137, 139 **9** Type in the words 'prime number' in your search engine. **10** 28 = 1 + 2 + 4 + 7 + 14; 496 = 1 + 2 + 4 + 8 + 16 + 62 + 124 + 248 **11** e.g. 18 < 9 + 6 + 3 + 2 + 1, 42 < 21+14 + 7 + 6 + 4 + 3 + 2 + 1 **12** e.g. 14 > 7 + 2 + 1, 22 > 11 + 2 + 1 **13** 3, 5, 17, 257

Exercise 8.04

1 (a) 72 (b) 12 (c) 12 (d) 15 (e) 35 (f) 175 (g) 10 (h) 35 **2** (a) 40 (b) 60 (c) 30 (d) 275 (e) 108 (f) 48 (g) 105 (h) 72 (i) 126 (j) 225 (k) 231 (l) 3800 **3** (a) 15 (b) 12 (c) 25 (d) 20 (e) 4 (f) 18 (g) 35 (h) 45 (i) 4 (j) 12 (k) 96 (l) 32 **4** (a) 360 (b) 432 (c) 420 (d) 2160 (e) 105 000 (f) 2520

Exercise 8.05

1 346, 340, 986, 404, 1200 **2** 636, 117, 315, 723, 8220 **3** 336, 116, 17 008, 45 664 **4** 636, 8220 **5** 340, 565, 400, 1735, 555 **6** 469, 175, 581, 658 **7** 24 808, 3064, 10 032, 44 416 **8** 4842, 936, 1125, 2763 **9** 121, 297, 4411, 1441, 39 094, 8118 **10** (a) T (b) T (c) T (d) T (e) F (f) T (g) T (h) T (i) T (j) T (k) T (l) T **11** 3, 5^2,11 **12** 2×473; 22×43; 11×86 **13** (a) add two zeros and divide by 4 (b) ends in 00 (c) add two zeros and divide by 2 (d) does it end in 000? **14** (a) divisible by both 4 and 3 (b) 3,5 (c) even and divisible by 9 (d) ends in a zero and second last digit is even. **15** (a) 2, 4, 8 (b) 2, 3, 4, 6, 8, 12, 24 (c) 2, 5, 7, 10, 14, 35, 70 (d) 2, 3, 6, 11, 22, 33, 66 (e) 2, 41, 82 (f) 3, 5, 15, 23, 69, 115, 345 (g) 5, 103, 515 (h) 3, 13, 19, 39, 57, 247, 741 **16** (a) 12 (b) 3 (c) 24 (d) 6 (e) 18 (f) 3 (g) 6 (h) 4 **17** no answer **18** 79 463 **19** 381 654 729

Exercise 8.06

1 (a) 3 (b) 7 (c) 15 (d) 2 (e) 4 (f) 6 (g) 13 (h) 10 (i) 9 (j) 12 (k) 31 (l) 21 (m) 19 (n) 26 (o) 55 **2** (a) 111_2 (b) 1111_2 (c) $10\,110_2$ (d) $11\,001_2$ (e) $100\,010_2$ (f) $110\,011_2$ (g)$111\,100_2$ (h) $1\,000\,001_2$ (i) $1\,001\,000_2$ (j) $1\,010\,010_2$ (k) $1\,010\,100_2$ (l) $1\,011\,000_2$ (m) $1\,011\,011_2$ (n) $1\,011\,110_2$ (o) $1\,101\,000_2$ **3** (a) 4 (b) 8 (c) 1 (d) 22 (e) 16 (f) 12 (g) 4 (h) 26 (i) 21 (j) 42 (k) 80 (l) 65 (m) 61 (n) 35 (o) 68 **4** (a) 12_3 (b) 121_3 (c) 200_3 (d) 212_3 (e) 1010_3 (f) 1022_3 (g) 1112_3 (h) 1110_3 (i) 2100_3 (j) $10\,011_3$ **5** (a) 1100_2 (b) 100_2 (c) $11\,010_2$ (d) $11\,011_2$ (e) 21_3 (f) 1022_3 (g) 121_4 (h) 123_4 (i) 432_5 **6** (a) 185 (b) 127 (c) 14 586 (d) 21 907

7 (a)

+	0	1	2	3
0	0	1	2	3
1	1	2	3	0
2	2	3	0	1
3	3	0	1	2

×	0	1	2	3
0	0	0	0	0
1	0	1	2	3
2	0	2	0	2
3	0	3	2	1

(b)

+	0	1	2	3	4
0	0	1	2	3	4
1	1	2	3	4	0
2	2	3	4	0	1
3	3	4	0	1	2
4	4	0	1	2	3

×	0	1	2	3	4
0	0	0	0	0	0
1	0	1	2	3	4
2	0	2	4	1	3
3	0	3	1	4	2
4	0	4	3	2	1

(c) Any number times by zero is zero; 1 is the identity element. **8** (a) since 8 + 4 + 2 = 14 (b) (i) 6 = 4 + 2 (ii) 8 + 4 + 1 (iii) 8 + 4 + 2 + 1 (iv) 40 = 32 + 8 (v) 64 + 8 + 4 + 2 + 1 (vi) 64 + 32 + 8 + 4 + 1 (c) $23\times(16+1)$ (d) (i) 253 (ii) 391 (iii) 667 (e) (i) 378 (ii) 567 (iii) 972 (f) Doubling refers to the power of 2. (g) The numbers 1 to 31 can be written as a sum of numbers using different combinations of 1, 2, 4, 8, 16 and 32.

Exercise 8.07

1 (a) 323 (b) 1155 (c) 2009 (d) 468 (e) 713 (f) 5472 **2** (a) 361 (b) 576 (c) 1369 (d) 1681 (e) 5625 (f) 8649

Diagnostic Test

1 (a) 21, 23, 25 (b) 16, 25, 36 (c) –8, –6, –4 (d) 4, 2, 1 (e) 15, 21, 28 (f) 47, 95, 191 (g) 64, 125, 216 (h) 8, 13, 21 **2** (a) 38 (b) 69 **3** (a) odd (b) even **4** (a) 1,2, 3, 4, 6, 8, 12, 24 (b) 1,2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 **5** 32, 36 **6** (a) 27 (b) 12 **7** (a) 36 (b) 24 **8** $3^2.2^3$ **9** $2^4.3.5$ **10** (a) 35 (b) 28 (c) 9 (d) 12 **11** 17 + 11 ; 23 + 5 etc **12** 83, 89, 97 **13** 17,19 **14** (a) 75 (b) 12 **15** (a) 60 (b) 396 **16** (a) yes (b) yes (c) yes (d) yes (e) yes (f) yes (g) no (h) no (i) yes (j) yes

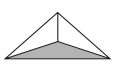
Chapter 9: Fractions and Percentages

Getting Started

1 A **2** B **3** A **4** C **5** D **6** A **7** B **8** C **9** D **10** B

Exercise 9.01

1 (a) $\frac{1}{2}$ (b) $\frac{3}{4}$ (c) $\frac{5}{6}$ (d) $\frac{2}{3}$ (e) $\frac{2}{5}$ (f) $\frac{3}{8}$ (g) $\frac{2}{3}$ (h) $\frac{1}{4}$ **2** (a) true (b) false (c) N = 8, D = 9 (d) $\frac{3}{5}$ etc (e) $\frac{5}{11}$ **3** (a)  $\frac{1}{8}$

(b)  $\frac{1}{4}$ (c)  $\frac{1}{6}$ (d)  $\frac{5}{6}$ (e)  $\frac{4}{5}$ (f)  $\frac{5}{8}$ (g)  $\frac{1}{3}$ (h)  $\frac{3}{4}$ **4** (a) $\frac{3}{7}$ (b) $\frac{2}{5}$ (c) $\frac{5}{12}$

(d) $\frac{7}{12}$ (e) $\frac{3}{10}$ (f) $\frac{13}{15}$ (g) $\frac{43}{60}$ (h) $\frac{2}{5}$ (i) $\frac{2}{11}$ (j) $\frac{5}{6}$ **5** (a) $\frac{5}{26}$ (b) $\frac{3}{7}$ (c) $\frac{29}{100}$ (d) $\frac{7}{15}$ (e) $\frac{8}{15}$ (f) $\frac{1}{4}$ (g) $\frac{2}{7}$ **6** (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{5}{6}$ (d) $\frac{1}{99}$

(e) $\frac{1}{2}$ (f) The one with the smaller denominator is bigger. **7** (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{8}$ (e) $\frac{1}{4},\frac{1}{2}$ **8** (a) $\frac{1}{2}=\frac{none}{3}=\frac{2}{4}=\frac{3}{6}=\frac{4}{8}=\frac{6}{12}=\frac{12}{24}$

(b) $\frac{1}{3}=\frac{none}{2}=\frac{none}{4}=\frac{2}{6}=\frac{none}{8}=\frac{4}{12}=\frac{8}{24}$ (c) $\frac{1}{4}=\frac{none}{2}=\frac{none}{3}=\frac{none}{6}=\frac{2}{8}=\frac{none}{10}=\frac{3}{12}$

(d) $\frac{3}{4}=\frac{none}{2}=\frac{none}{3}=\frac{none}{6}=\frac{6}{8}=\frac{9}{12}=\frac{18}{24}$ (e) $\frac{1}{6}=\frac{none}{2}=\frac{none}{3}=\frac{none}{4}=\frac{none}{8}=\frac{2}{12}=\frac{4}{24}$

(f) $\frac{5}{6}=\frac{none}{2}=\frac{none}{3}=\frac{none}{4}=\frac{none}{8}=\frac{10}{12}=\frac{20}{24}$ (g) $\frac{1}{8}=\frac{none}{2}=\frac{none}{3}=\frac{none}{4}=\frac{none}{6}=\frac{none}{12}=\frac{3}{24}$

(h) $\frac{3}{8}=\frac{none}{2}=\frac{none}{3}=\frac{none}{4}=\frac{none}{6}=\frac{none}{12}=\frac{9}{24}$ (i) $\frac{5}{8}=\frac{none}{2}=\frac{none}{3}=\frac{none}{4}=\frac{none}{6}=\frac{none}{12}=\frac{15}{24}$

(j) $\frac{7}{8}=\frac{none}{2}=\frac{none}{3}=\frac{none}{4}=\frac{none}{6}=\frac{none}{12}=\frac{21}{24}$ **9** (a) $\frac{3}{6},\frac{5}{10}$ (b) $\frac{6}{8},\frac{9}{12}$ (c) $\frac{4}{6},\frac{8}{12}$ (d) $\frac{6}{10},\frac{15}{25}$ (e) $\frac{2}{6},\frac{3}{9}$ (f) $\frac{2}{8},\frac{3}{12}$ (g) $\frac{8}{10},\frac{40}{50}$

(h) $\frac{10}{12},\frac{15}{18}$ (i) $\frac{4}{20},\frac{3}{15}$ (j) $\frac{4}{10},\frac{8}{20}$ **10** (a) $\frac{6}{12}$ (b) $\frac{9}{15}$ (c) $\frac{4}{16}$ (d) $\frac{32}{40}$ (e) $\frac{10}{15}$ (f) $\frac{6}{15}$ (g) $\frac{15}{20}$ (h) $\frac{15}{25}$ (i) $\frac{6}{16},\frac{9}{24}$ (j) $\frac{10}{12},\frac{50}{60}$ **11** (a) $\frac{5}{10}$

(b) $\frac{5}{20}$ (c) $\frac{12}{16}$ (d) $\frac{6}{9}$ (e) $\frac{20}{25}$ (f) $\frac{25}{40}$ (g) $\frac{14}{16}$ (h) $\frac{4}{36}$ (i) $\frac{15}{40}$ (j) $\frac{75}{100}$ **12** (a) $\frac{1}{2}$ (b) $\frac{1}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$ (e) $\frac{1}{2}$ (f) $\frac{3}{4}$ (g) $\frac{4}{5}$ (h) $\frac{2}{3}$ (i) $\frac{3}{4}$

(j) $\frac{4}{5}$ **13** (a) $\frac{3}{5}<\frac{5}{8}$ (b) $\frac{3}{5}>\frac{4}{7}$ (c) $\frac{3}{4}<\frac{4}{5}$ (d) $\frac{5}{6}<\frac{6}{7}$ (e) $\frac{2}{5}>\frac{1}{3}$ (f) $\frac{4}{7}>\frac{5}{9}$ **14** (a) $\frac{3}{5}$ (b) $\frac{3}{4}$ (c) $\frac{4}{5}$ (d) $\frac{6}{7}$ (e) $\frac{2}{3}$ (f) $\frac{1}{3}$ (g) $\frac{2}{3}$ (h) $\frac{9}{10}$

(i) $\frac{2}{3}$ (j) $\frac{3}{5}$ **15** (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$ (e) $\frac{2}{13}$ (f) $\frac{1}{5}$

Exercise 9.02

1 (a) improper (b) proper (c) improper (d) improper (e) improper (f) improper (g) integer (h) proper (i) integer (j) improper **2** (a) $\frac{3}{2}$ (b) $\frac{4}{3}$

(c) $\frac{8}{3}$ (d) $\frac{5}{4}$ (e) $\frac{4}{3}$ (f) $\frac{17}{4}$ (g) $\frac{3}{2}$ (h) $\frac{20}{9}$ (i) $\frac{9}{2}$ (j) $\frac{5}{3}$ **3** (a) $1\frac{1}{2}$ (b) $1\frac{1}{3}$ (c) $2\frac{2}{3}$ (d) $1\frac{1}{4}$ (e) $1\frac{1}{3}$ (f) $4\frac{1}{4}$ (g) $1\frac{1}{2}$ (h) $2\frac{2}{9}$ (i) $4\frac{1}{2}$ (j) $1\frac{2}{3}$

4 (a) $\frac{5}{2}$ (b) $\frac{13}{4}$ (c) $\frac{11}{4}$ (d) $\frac{21}{5}$ (e) $\frac{14}{5}$ (f) $\frac{17}{5}$ (g) $\frac{25}{4}$ (h) $\frac{111}{11}$ (i) $\frac{111}{10}$ (j) $\frac{13}{8}$ **5** (a) $2\frac{1}{2}$ (b) $2\frac{2}{5}$ (c) $3\frac{1}{2}$ (d) $3\frac{1}{3}$ (e) $6\frac{2}{3}$ (f) $1\frac{2}{3}$

(g) $14\frac{2}{7}$ (h) $1\frac{2}{3}$ **6** (a) wrong (b) right (c) wrong (d) right (e) wrong (f) right (g) wrong (h) right **7** proper fractions $\frac{2}{3},\frac{1}{8},\frac{2}{9}$

(b) improper fractions $\frac{5}{4},\frac{251}{3},\frac{11}{5},\frac{3}{2}$ (c) mixed numbers $3\frac{1}{2},5\frac{1}{4},1\frac{1}{6}$

Exercise 9.03

1 (a) $\frac{4}{7}$ (b) $\frac{4}{5}$ (c) $\frac{5}{7}$ (d) $\frac{8}{9}$ (e) $\frac{5}{11}$ (f) $\frac{1}{2}$ (g) **1** (h) $\frac{1}{2}$ (i) $\frac{1}{2}$ (j) $\frac{3}{4}$ (k) $1\frac{1}{3}$ (l) $1\frac{2}{5}$ (m) $1\frac{1}{2}$ (n) $1\frac{4}{9}$ (o) $1\frac{3}{5}$ **2** (a) $\frac{2}{7}$ (b) $\frac{1}{5}$ (c) $\frac{5}{7}$ (d) $\frac{1}{3}$

(e) $\frac{2}{11}$ (f) $\frac{1}{2}$ (g) $\frac{2}{5}$ (h) 0 (i) $\frac{1}{2}$ (j) $\frac{2}{3}$ **3** (a) $\frac{5}{6}$ (b) $\frac{7}{12}$ (c) $1\frac{1}{6}$ (d) $1\frac{3}{20}$ (e) $\frac{13}{20}$ (f) $\frac{7}{10}$ (g) $\frac{11}{30}$ (h) $1\frac{11}{20}$ (i) $\frac{23}{24}$ (j) $1\frac{13}{24}$ **4** (a) $\frac{1}{6}$ (b) $\frac{1}{12}$

(c) $\frac{1}{6}$ (d) $\frac{11}{20}$ (e) $\frac{7}{20}$ (f) $\frac{1}{10}$ (g) $\frac{1}{30}$ (h) $\frac{1}{20}$ (i) $\frac{11}{24}$ (j) $\frac{1}{24}$ **5** (a) $\frac{1}{12}$ (b) $\frac{5}{12}$ (c) $\frac{3}{20}$ (d) $\frac{31}{40}$ (e) $\frac{87}{100}$ **6** (a) $1\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{5}{8}$ (d) $\frac{9}{20}$

(e) $1\frac{1}{4}$ (f) $\frac{11}{20}$ (g) $\frac{1}{18}$ (h) $\frac{17}{24}$ (i) $\frac{11}{24}$ (j) $\frac{23}{30}$ **7** (a) $1\frac{1}{12}$ (b) $\frac{19}{30}$ (c) $\frac{31}{60}$ (d) $\frac{11}{20}$ (e) $\frac{19}{60}$ (f) $\frac{19}{30}$ (g) $\frac{1}{8}$ (h) **1** (i) $\frac{7}{8}$ (j) $\frac{13}{24}$

8 (a) $\frac{1}{4},\frac{3}{10},\frac{2}{5}$ (b) $\frac{3}{4},\frac{4}{5},\frac{5}{6}$ (c) $\frac{4}{9},\frac{1}{2},\frac{5}{8}$ (d) $\frac{4}{7},\frac{3}{5},\frac{5}{8}$ (e) $\frac{2}{5},\frac{3}{7},\frac{4}{9}$ **9** (a) $\frac{7}{10}$ (b) $\frac{15}{18}$ (c) $\frac{17}{24}$ (d) $\frac{31}{36}$ (e) $\frac{13}{18}$

Exercise 9.04

1 (a) $3\frac{3}{4}$ (b) $5\frac{19}{20}$ (c) $7\frac{11}{15}$ (d) $7\frac{3}{8}$ (e) $7\frac{5}{6}$ (f) $8\frac{5}{12}$ (g) $4\frac{9}{40}$ (h) $14\frac{1}{2}$ (i) $3\frac{1}{2}$ (j) $7\frac{7}{30}$ **2** (a) $5\frac{1}{2}$ km (b) $8\frac{11}{12}$ crates (c) $1\frac{37}{40}$ tanks

(d) $9\frac{11}{12}$ tonnes **3** (a) $1\frac{1}{4}$ (b) $1\frac{3}{20}$ (c) $2\frac{1}{15}$ (d) $4\frac{5}{8}$ (e) $1\frac{1}{2}$ (f) $2\frac{3}{4}$ (g) $1\frac{13}{20}$ (h) $2\frac{11}{15}$ (i) $1\frac{3}{8}$ (j) $1\frac{5}{18}$ **4** (a) $4\frac{1}{4}$ tonnes (b) $1\frac{1}{6}$ cups

(c) $2\frac{1}{12}$ cups **5** (a) $1\frac{5}{12}$ (b) $3\frac{31}{40}$ (c) $1\frac{29}{60}$ (d) $6\frac{5}{12}$ (e) $1\frac{29}{40}$ (f) $4\frac{1}{15}$ (g) $3\frac{19}{20}$ (h) $7\frac{7}{20}$ **Who am I?** Albert Einstein

Exercise 9.05

1 (a) \$12 (b) 16 hours (c) 48 seconds (d) 12 litres (e) 240 K (f) 10 (g) $4\frac{1}{2}$ hours (h) \$13.50 (i) 800 metres (j) $2\frac{1}{2}$ min **2** (a) $\frac{1}{2},\frac{1}{2},\frac{1}{4},\frac{1}{4}$ (b) $\frac{2}{3},\frac{1}{2},\frac{1}{3},\frac{1}{3}$ (c) $\frac{3}{4},\frac{1}{3},\frac{1}{4},\frac{1}{4},\frac{1}{2}$ (d) $\frac{5}{6},\frac{4}{5},\frac{2}{3},\frac{2}{3}$ **3** (a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$ **4** (a) $\frac{6}{35}$ (b) $\frac{8}{15}$ (c) $\frac{3}{8}$ (d) $\frac{5}{12}$ (e) $\frac{10}{21}$ (f) $\frac{6}{25}$ (g) $\frac{12}{35}$ (h) $\frac{15}{48}$ (i) $\frac{3}{40}$ (j) $\frac{5}{24}$ (k) $\frac{6}{35}$ (l) $\frac{63}{80}$ **5** (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{2}$ (e) $\frac{1}{4}$ (f) $\frac{1}{6}$ (g) $\frac{1}{6}$ (h) 1 (i) $\frac{1}{6}$ (j) $\frac{1}{14}$ (k) $\frac{1}{4}$ (l) $\frac{7}{90}$ **6** (a) $3\frac{1}{2}$ (b) $9\frac{1}{3}$ (c) $4\frac{1}{3}$ (d) $8\frac{11}{20}$ (e) 9 (f) 1 (g) $3\frac{1}{16}$ (h) $6\frac{1}{4}$ (i) 4 **7** (a) $1\frac{7}{8}$ cups (b) $6\frac{1}{3}$ km (c) $7\frac{1}{4}$ litres (d) $9\frac{5}{8}$ sq cm (e) $12\frac{1}{4}$ sq cm **8** (a) $\frac{4}{3}$ (b) $\frac{3}{2}$ (c) $\frac{5}{4}$ (d) $\frac{5}{3}$ (e) $\frac{5}{12}$ (f) $\frac{8}{29}$ (g) $\frac{4}{17}$ (h) 1 **9** (a) 4 (b) 6 (c) 4 (d) 6 (e) 10 **11** (a) $1\frac{1}{2}$ (b) $1\frac{1}{3}$ (c) $1\frac{1}{8}$ (d) $\frac{15}{16}$ (e) $7\frac{1}{2}$ (f) $1\frac{13}{15}$ (g) $\frac{3}{4}$ (h) $1\frac{3}{7}$ **12** (a) $3\frac{3}{4}$ trips (b) 6 tonnes (c) $6\frac{3}{5}$ litres (d) $6\frac{6}{7}$ loads **13** A

Exercise 9.06

1 (a) 40% (b) 7% (c) 99% (d) 37% (e) 50% (f) 60% (g) 30% (h) 2% (i) 30% (j) 98% **2** (a) 50% (b) 25% (c) 75% (d) 20% (e) 40% (f) 60% (g) 80% (h) 10% (i) 5% (j) $2\frac{1}{2}$% **3** (a) $33\frac{1}{3}$% (b) 55% (c) $12\frac{1}{2}$% (d) $37\frac{1}{2}$% (e) $62\frac{1}{2}$% (f) $87\frac{1}{2}$% (g) $16\frac{2}{3}$% (h) $83\frac{1}{3}$% (i) $8\frac{1}{3}$% (j) $91\frac{2}{3}$% **4** (a) 150% (b) 220% (c) $333\frac{1}{3}$% (d) 225% (e) 140% (f) $266\frac{2}{3}$% (g) 475% (h) 180% (i) 260% (j) $187\frac{1}{2}$% **5** (a) 5% (b) 75% (c) 83% (d) $16\frac{2}{3}$% (e) $6\frac{2}{3}$% **6** (a) 12% (b) 45% (c) $12\frac{1}{2}$% (d) $41\frac{2}{3}$% (e) 20% (f) $66\frac{2}{3}$% (g) 80% (h) $71\frac{3}{7}$% **7** (a) 32% (b) 26% (c) 22% (d) 20% (e) 48% (f) 68% (g) 42% **8** 112% **9** (a) $\frac{12}{25}$ (b) $\frac{9}{25}$ (c) $\frac{19}{20}$ (d) $\frac{3}{20}$ (e) $\frac{29}{50}$ (f) $\frac{1}{8}$ (g) $\frac{1}{12}$ (h) $\frac{7}{8}$ (i) $\frac{1}{16}$ (j) $\frac{3}{8}$ **10** (a) $\frac{2}{5}$ (b) $\frac{3}{20},\frac{17}{20}$ (c) $\frac{3}{10}$ (d) $\frac{11}{20}$ (e) $87\frac{1}{2}$% **11** (a) 3 students (b) \$3 (c) 200 drivers (d) 12 000 km (e) 11 million (f) 2 minutes (g) 3 million tonnes (h) 9 ha (i) \$9 (j) 30 km **Who am I?** 100

Exercise 9.07

1 (a) 0.47 (b) 0.55 (c) 0.06 (d) 2.05 (e) 0.6 (f) 0.225 (g) 0.0625 (h) $0.\dot{3}$ (i) 0.005 (j) 0.037 **2** (a) 62% (b) 9% (c) 145% (d) 70% (e) 0.4% (f) $66.\dot{6}$% (g) $83.\dot{3}$% (h) $45.\dot{4}\dot{5}$% (i) 62.5% (j) 203.5% **3** (a) 26% (b) no (c) $\frac{31}{40}$ (d) $\frac{1}{8}$ (e) 64% **4** 0.5, 50%; $\frac{1}{4}$, 25% **;** $\frac{1}{3}, 0.\dot{3}$; 0.75, 75%; $\frac{1}{5}$, 20% ; $\frac{1}{20}$, 0.05 ; 0.1, 10%; $\frac{1}{8}$, 12.5% ; $\frac{1}{100}$, 0.01 ; $1.\dot{6}, 166\frac{2}{3}$% ; $\frac{1}{200}, \frac{1}{2}$% ; $\frac{1}{6}, 0.1\dot{6}$ **5** (a) 40 metres (b) 4 minutes (c) 56 kg (d) 15 years (e) 12 cm (f) 12 hours (g) 30 gm (h) 22.5 km (i) 21.25 litres **6** (a) 70% (b) 200 gm (c) $2\frac{5}{8}$ hours $(2\text{hrs}\,37.5\,\text{min})$ (d) 40% (e) 6 kg (f) $2\frac{1}{3}$ (g) 27 (h) 0.48 m (i) better (j) $\frac{3}{50}$, 16 (k) yes (l) $1\frac{3}{10}, 5\frac{1}{5}$ (m) $\frac{2}{5}$,18 (n) 9 oranges (o) 0.14 gm (p) 125 (q) 300 gm (r) 20

Exercise 9.08

1 $5\frac{1}{11}$ hours (5h 6min) **2** 1 km **3** 69.4% **4** 1 hr 58 min **5** $2\frac{1}{2}$ times **6** 80 mins **7** $\frac{8}{9}$ of a hour(53 min) **8** 20 boys,10 girls **9** 12 hours **10** 80% of A and 20% of B **11** $\frac{2}{7}$ **12** 20, 6th rung **13** $\frac{3}{16}$ **14** 40 min **15** 40 sandwiches **16** 7 **17** 7 **18** $\frac{97}{198}$ **19** $\frac{10}{19}$ **20** $\frac{11}{21}$ **21** 8 **22** 4 white, 16 black **23** 29 **24** \$29.10 **25** 1.176 kg **26** 20 ohm, 20 ohm **27** 25% **28** Angelina (1), Petra (4), Nick (4), Danny (2) **29** 30% **30** 10% **31** $\frac{4}{5}$ or $\frac{5}{4}$ **32** $2^{10} = 1024$

Exercise 9.09

1 false **2** 84 yrs **3** $\frac{40}{91}$ **4** 20 laps **5** 84 **6** 18 **7** $\frac{2}{3}, \frac{3}{2}$ **8** (a) $\frac{1}{4}$ of \$13 = \$3.25 (b) 5% of \$95 = \$4.75 **9** 3 hrs 10 min **10** $3\frac{1}{3}$ **11** $\frac{3}{17}$

12 $\frac{1}{10}$ **13** $6\frac{3}{4}$ hours **14** 256 ways **15** shirt \$19.50, shorts \$23.50, sneakers \$47 **16** 89% **17** 12 600 days or about 35 years

Diagnostic Test

1 (a) $\frac{3}{8}$ (b) $\frac{1}{4}$ (c) $\frac{4}{7}$ **2** (a) $\frac{3}{4}$ (b) $\frac{2}{3}$ (c) $\frac{5}{6}$ **3** (a) $\frac{2}{3}$ (b) $\frac{8}{29}$ (c) $\frac{3}{5}$ **4** (a) $\frac{10}{3}$ (b) $\frac{21}{8}$ (c) $\frac{59}{10}$ **5** (a) $1\frac{1}{2}$ (b) $3\frac{3}{4}$ (c) $6\frac{2}{3}$ **6** (a) false (b) true (c) false **7** (a) $\frac{11}{12}$ (b) $\frac{5}{12}$ (c) $1\frac{7}{24}$ **8** (a) $\frac{7}{8}$ (b) $\frac{5}{18}$ (c) $\frac{11}{36}$ **9** (a) $\frac{1}{6}, \frac{1}{4}, \frac{1}{3}$ (b) $\frac{7}{12}, \frac{5}{8}, \frac{3}{4}$ (c) $\frac{9}{15}, \frac{2}{3}, \frac{7}{10}$ **10** (a) $5\frac{3}{4}$ (b) $4\frac{31}{40}$ (c) $6\frac{11}{24}$

11 (a) $3\frac{1}{4}$ (b) $2\frac{5}{12}$ (c) $1\frac{9}{20}$ **12** (a) $\frac{1}{6}$ (b) $\frac{8}{15}$ (c) $\frac{3}{10}$ **13** (a) $\frac{3}{8}$ (b) $8\frac{1}{8}$ (c) 9 **14** (a) 3 (b) $1\frac{1}{15}$ (c) $1\frac{1}{2}$ **15** (a) 6 (b) $2\frac{2}{15}$ (c) 2 **16** (a) \$15 (b) $2\frac{2}{5}$ min (2 min 24 sec) (c) 875 m **17** (a) 75% (b) $62\frac{1}{2}\%$ (c) $266\frac{2}{3}\%$ **18** (a) 25% (b) 75% (c) \$0.05 **19** (a) $\frac{83}{100}$ (b) $\frac{4}{5}$ (c) $\frac{15}{8}\left(1\frac{7}{8}\right)$

20 (a) 0.37 (b) 0.155 (c) 3.0625 **21** (a) \$40 (b) 150 metres (c) 15 eggs **22** (a) 3 hours (b) 40 (c) 55.6%, 3 **23** $1\frac{7}{13}$ days(1day, 4 hours) for an 8 hour day **24** 240 horses, 60 cows **25** 40 rungs

Chapter 10: Revision Papers

Revision Paper 4

1 C **2** A **3** A **4** B **5** C **6** D **7** B **8** A **9** B **10** C **11** A **12** A **13** D **14** D **15** D **16** D **17** C **18** B **19** C **20** C **21** B **22** D **23** B **24** B **25** D **26** 1092 **27** 33 **28** pentagon **29** 1440° **30** triangular pyramid or tetrahedron **31** \$238 000 **32** 31 700 **33** $x = 128$ equal alternate angles **34** 12, 24, 36 **35** 1001 **36** 15 **37** cylinder **38** 12 **39** octagonal prism 10 **40** 18 **41** scalene **42** 3 cents **43** Woles' suits are the best deal since a suit costs \$199 - \$19.95 = \$179.05 SFR suits cost \$230 — \$49.95 = \$180.05 **44** 134º **45** 8 **46** 156 **47** $\frac{31}{48}$ **48** \$90 **49** $37\frac{1}{2}$ **50** $y = 3x - 3$

Revision Paper 5

1 A **2** C **3** B **4** D **5** D **6** B **7** C **8** D **9** B **10** C **11** D **12** B **13** C **14** D **15** B **16** B **17** D **18** C **19** D **20** D **21** B **22** D **23** B **24** A **25** D **26** 852 **27** 62 **28** 32: 1, 2, 4, 8, 16, 32 and 24: 1, 2, 3, 4, 6, 8, 12, 24. Common factors: 1, 2, 4, 8. **29** 98 **30** 2 **31** 60 **32** rectangular prism **33** 10 faces **34** triangular prism, 9 edges **35** 5 **36** rectangle **37** regular hexagon **38** one **39** isosceles **40** 301 **41** $y = 2x + 1$

42

n	0	1	2	3
t	–1	0	3	8

43 0.72 **44** \$79.20 **45** 45° **46** 80° **47** 4038 **48** 16 cans **49** 1 km **50** 80

Revision Paper 6

1 D **2** B **3** C **4** D **5** C **6** B **7** A **8** A **9** A **10** A or D **11** B **12** B **13** A **14** C **15** C **16** C **17** C $\frac{4}{3}$ **18** D **19** D **20** B **21** C **22** B **23** C **24** B **25** C

26 1918 **27** 7490 **28** {a, e ,i} **29** no **30** $x = 30$ **31** 135º **32** 0.006 **33** 359.784 **34** two times one less than the width plus the width **35** 148 **36** $P = 4 \times (s - 1)$ **37** 50º **38** rhombus, rectangle **39** kite **40** a pattern consisting of at least 2 different regular polygons, which will interlock to cover the entire plane **41** 70 **42** 1 **43** 28 **44** $4\frac{1}{12}$ **45** $26\frac{1}{2}\%$ **46** \$1350 **47** 33 tonnes **48** 20 **49** rectangular pyramid **50** 192

Chapter 11: 3-D Solids

Getting Started

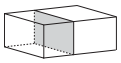
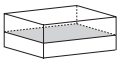
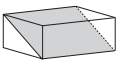
1 (a) isosceles triangle (b) hexagon (c) pentagon (d) quadrilateral (e) heptagon (f) square (g) parallelogram (h) equilateral triangle (i) trapezium (j) decagon (k) octagon (l) nonagon (m) dodecagon. Regular polygons are hexagon, pentagon, square, equilateral triangle, octagon, nonagon, dodecagon.

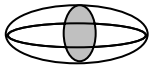
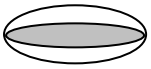
Exercise 11.01

1 (a) yes (b) no (c) yes (d) no (e) yes (f) no **2** (a) polyhedron (composed of 2 pyramids) (b) pyramid (c) polyhedron (d) prism (e) none of these (not a polyhedron) (f) prism (g) prism (h) pyramid (i) prism **3** hexagonal prism, trapezoidal prism, rectangular prism, triangular prism **4** cube, square prism (cuboid) **5** (a) cone, cylinder (b) triangular prism, rectangular prism (c) small cylinder on large cylinder (d) 2 square pyramids (e) triangular prism, rectangular prism (f) hemisphere (half a sphere), cylinder (g) rectangular prism, triangular prism (h) rectangular prism, rectangular prism (i) trapezoidal prism, rectangular prism **6** (a) 12 (b) 6 (c) 10 (d) no (e) yes **7** (a) rectangle (b) triangle (c) triangle (d) rectangle (e) trapezium (f) circle **8** they do not have uniform cross-sections, hexagons and pentagons **9** (a) same as the cube (b) 4 congruent sloping triangle faces, 1 square base, 5V, 5F, 8F **Who Am I? 1.** Regular hexagonal prism**,** 2. Square pyramid, **3.** triangular prism 10 faces, 12 vertices, 18 edges **10** (a) A

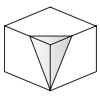
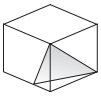
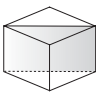
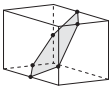
Exercise 11.02

1 (a) rectangle (b) rectangle (c) rectangle (d) rectangle (e) rectangle (f) rectangle (g) triangle (h) rectangle (i) triangle

2 (a) (i)  (ii)  (iii)  (iv)  (b) (i)  (ii)  (iii) 

(c) (i)  (ii)  (d)(i)  (ii) 

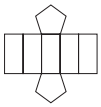
3 (a) circle (b) rectangle (c) square (d) triangle (e) rectangle (f) triangle **4** (a)  (b)  (c)  (d)  (e) 

5 (a)  (b)  (c)  (d)  (e)  (f)  **6** (a) rectangular pyramid

(b) triangular prism (c) triangular pyramid (d) triangular pyramid (e) half cylinder (f) trapezoidal prism **7** (a) (i) AB, TU, DC (ii) AR, CU, DT (iii) BC, SU , RS, AB (iv) RT, SU, DT, CU (v) S (vi) C (b) AU, DS, BT, CR (i) yes (ii) yes (iii) yes (iv) no **8** (a) B (b) CF (c) E (d) HG (e) DC, EF, HG (f) no (g) parallel (h) skew (i) yes (j) yes, as plane ADEH is parallel to plane BCFG (k) skew (l) DEHA and DCBA (m) G

Exercise 11.03

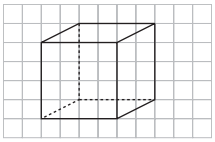
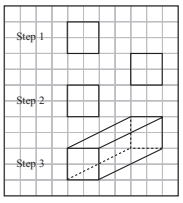
1 (a) triangular pyramid (b) triangular prism (c) square pyramid (d) rectangular prism (e) hexagonal pyramid (f) triangular pyramid (g) triangular prism (h) rectangular prism (i) square pyramid

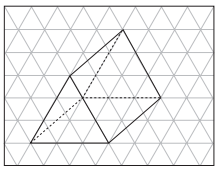
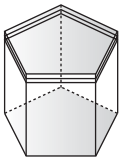
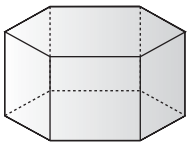
2 (a)  (b)  (c)  (d)  (e)  (f)  **3** 2, 4, 6

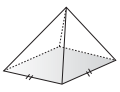
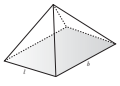
4 (a) rectangular prism (b) cube (c) square pyramid (d) pentagonal prism (e) octahedron

5 D **6** (a)  (b)  (c)  **7** B **8** A **10**  **11** D **12** (a) no (b) 4 (c) 1 (d) 5 (e) no (f) no (g) no (h) 4

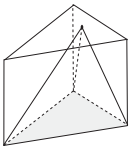
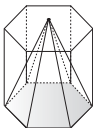
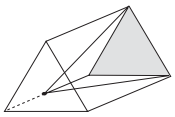
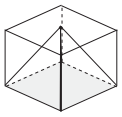
Exercise 11.04

1 (a)  (b) 

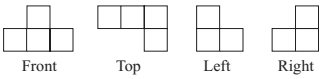
(c)  (d)  (e) 

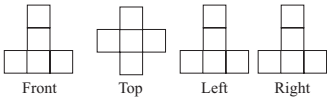
2 (a)  (b)  (c)  (d) **5** (a) (b) (c)

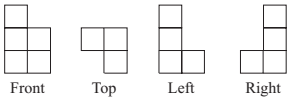
(d) **7** (a) (b) (c) (d)

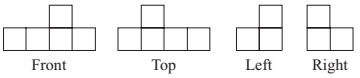
8 (a)  (b)  (c)  (d)  **10** A and D

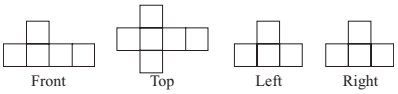
Exercise 11.05

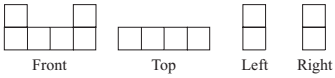
1 (a) 

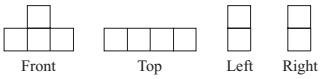
(b) 

(c) 

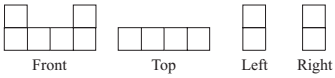
(d) 

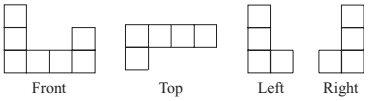
(e) 

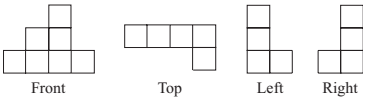
(f) 

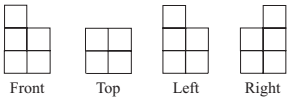
2 (a) 

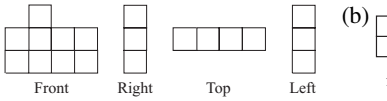
(b) 

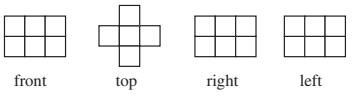
(c) 

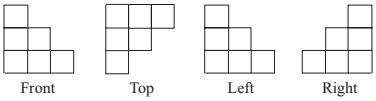
(d) 

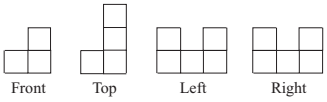
(e) 

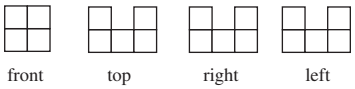
(f) 

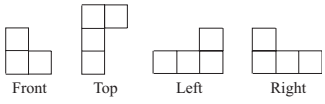
3 (a) 

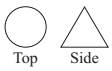
(b) 

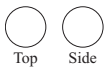
(c) 

(d) 

(e) 

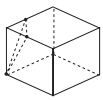
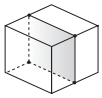
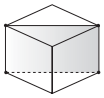
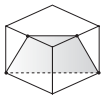
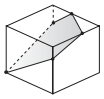
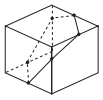
(f) 

4 (a) 

(b) 

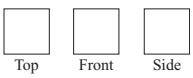
5 (a) rectangular prism (b) triangular prism (c) trapezoidal prism (d) sphere (e) cone (f) square pyramid (g) hexagonal pyramid (h) hexagonal prism (i) triangular prism plus rectangular prism

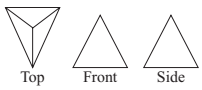
Exercise 11.07

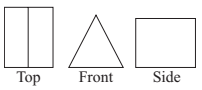
2 yes **3** 112 **4** (a)  (b)  (c)  (d)  (e)  (f)  **5** 1 × 1 × 48 **6** A **7** D

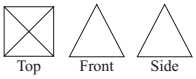
Diagnostic Test

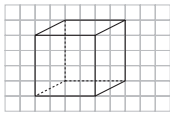
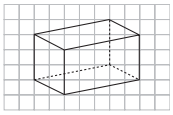
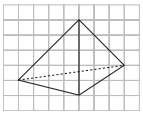
2 (a) rectangular prism (b) triangular prism (c) triangular pyramid (d) square pyramid (e) trapezoidal prism **3** (a) rectangle (b) circle (c) rectangle (d) rectangle (e) triangle (f) triangle **4** (a) AB, EF, HG (b) AE, CG, DH (c) skew (d) F (e) AB (f) BC (g) b (h) yes **5** (a) cube (b) triangular pyramid (c) triangular prism (d) square pyramid

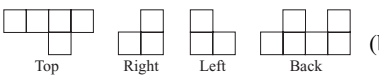
6 (a) 

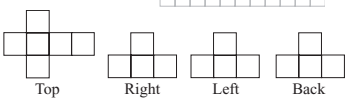
(b) 

(c) 

(d) 

7 (a) 
(b) 
(c) 

8 (a) 

(b) 

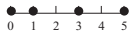
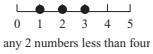
9 tetrahedron (triangular pyramid) 4; cube 6; octahedron 8; dodecahedron 12; icosahedron 20

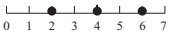
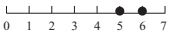
Chapter 12: Directed Numbers and Number Plane

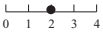
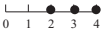
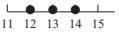
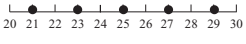
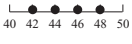
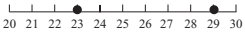
Getting Started

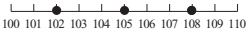
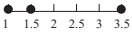
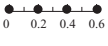
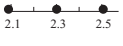
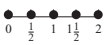
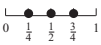
4 west, south, east, north **5** (a) 8, 10, 12 (b) 9, 6, 3 (c) 16, 20, 24 (d) 16, 32, 64 (e) 15, 10, 5 (f) 4, 2, 1 (g) 1.9, 2.0, 2.1 (h) 1.8, 1.6, 1.4 (i) 11.0, 10.5, 10.0 **6** (a) 15 (b) 11 (c) 18 (d) 10 (b) yes (f) yes

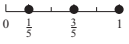
Exercise 12.01

1 (a)  (b) 

(c)  (d)  (e)  (f) number of people in your family

(g)  (h)  (i)  (j)  (k)  (l) 

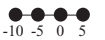
(m)  (n)  **2** (a)  (b)  (c)  (d)  (e) 

(f)  **3** (a) 2, 4, 7, 9 (b) 2, 4, 5, 8 (c) 5, 8, 15, 18 (d) 0.3, 0.7, 1.4, 1.8 **4** (a) T (b) T (c) T (d) F (e) T (f) F (g) F (h) T (i) T (j) F (k) T (l) F **5** (a) 9 < 10 (b) 34 > 28 (c) 28 < 34 (d) 2 < 3 < 7 (e) 13 > 8 > 5 (f) 5 < 8 < 13 (g) 0 < 5 < 10 or 10 > 5 > 0 (h) 41 <45 <50

Exercise 12.02

1 (a) below (b) right (c) north (d) west (e) lose (f) after (g) hot (h) out (i) loss (j) bottom (k) increase (l) withdraw (m) behind (n) full (o) down (p) minimum (q) low tide

2 (a)  (b)  (c)  (d)  (e)  (f) 

(g)  (h)  (i)  (j)  (k)  (l)  **3** (a) 35, 15 (b) 18, 5 (c) 29, 0 (d) 3, –3 (e) –5, –10 (f) 0, –8 (g) –4, –14 (h) –4, –6 (i) 0, –4 (j) 1, –1 (k) 32, –32 (l) –3, –5 **4** (a) 30 (b) 35 (c) –4 **5** (a) Orange 2 (b) Katoomba 6 (c) Smiggins 3 (d) Perisher 10 (e) Barrington Tops 2 (f) Leura 8 (g) Blue Cow 2 (h) Berridale 1 **6** (a) 5 (b) –25cm (c) –2 (d) 120 km (e) –37 km (f) –3 (g) $1500 (h) –200 m (i) $3500 (j) –55 km (k) 24 (l) –30 min (m) –$50 (n) –2 (o) 28 km (p) 20° **7** (a) 2 km east (b) 0 (c) 1 km west (d) 3 km west (e) 0 (f) 2 km east **8** (a) 3 km north (b) 0 (c) 3 km north (d) 4 km south (e) 4 km north (f) 3 km south

9 (a) 4 km east (b) 0 (c) 6 km east (d) 2 km west (e) 0 (f) 4 km east (g) 1 km east **10** (a) 13 (b) 21 (c) 16 **11** (a) > (b) < (c) > (d) < (e) < (f) > (g) < (h) < (i) > (j) < (k) > (l) > (m) > (n) < (o) < (p) > (q) < (r) > (s) < (t) > **12** (a) 5 (b) –7 (c) –7, –6, –3, 0, 2, 3, 5 **13** Grafton, Nowra, Richmond, Bowral, Cooma, Orange **14** 4 strokes **15** 5 under par **16** 0

Exercise 12.03

1 (a) –4, (b) 2 (c) –12 (d) 22 (e) – 22 (f) 45 (g) –77 (h) 0 **2** (a) 8 (b) 13 (c) –1 (d) 0 (e) 3 (f) – 5 (g) 1 (h) 0 (i) –27 (j) –52 (k) –20 (l) –16 (m) 29 (n) –16 (o) 23 (p) 0 **3** (a) 4 – (–3) = 7, 4 – (–4) = 8, 4 – (–5) = 9 (b) 4, 5, 6, 7, 8, 9 (c) 4, 5, 6, 7, 8, 9 (d) 3, 4, 5, 6, 7, 8 **4** (a) 4, 3, 2, 1, 0, –1, –2, (b) 8, 6, 4, 2, 0, –2, –4, –6, –8 (c) 5, 3, 1, –1, –3, –5 (d) –1, –3, –5, –7, –9 (e) –7, –10, –13, –16, –19, –22 (f) –12, –9, –6, –3, 0, 3 (g) –9, –7, –5, –3, –1, 1, 3 **5** (a) + (+2) (b) + (+4) (c) + (+7) (d) + (+10) (e) + (–14) (f) + (–7)(g) + (–13) (h) + (+1) **6** (a) 3 (b) 3 (c) –4 (d) –3 (e) 7 (f) 25 (g) 0 (h) –2 (i) –7 (j) –20 (k) –6 (l) –11 (m) 9 (n) –2 (o) 14 (p) 12 (q) 8 (r) 2 (s) 1 (t) –25 (u) –69 (v) –7 (w) –19 (x) 7 (a) –21 (b) –2 (c) 0 (d) –3 (e) 8 (f) –8 (g) 5 (h) –17 (i) 7 (j) –20 (k) 26 (l) 10 (m) –11 (n) –4 (o) –15 **8** (a) 17 (b) –1 (c) 2 (d) –8 (e) –10 (f) 0 (g) 0 (h) –18 (i) –16 (j) –15 (k) 20 (l) 6 (m) 15 (n) 15 (o) 0 (p) –14 (q) –4 (r) –40 (s) 4 (t) –3 (u) –22 **9** (a) 3.0 (b) 1.6 (c) –1.6 (d) –3.0 (e) –3.0 (f) –1.6 (g) 4.0 (h) –15.0 (i) 5.28 (j) –0.35 (k) –0.35 (l) 0 **10** (a) –6 (b) 8 (c) –10 (d) 3 (e) –13 (f) –13 (g) 4 (h) –8 (i) 10 (j) –5 (k) –8 (l) 8 (m) –6 (n) –8 (o) 13 (p) –2 (q) 16 (r) 9 (s) –3 (t) –3 (u) –6 (v) 4 (w) –3 (x) 12 **11** D **12** D **13** (a) 1 m (b) –6 m (c) 7 m **14** lost $20 **15** –$200 **16** –$235 **17** 32 **18** (a) 1 (b) –3 (c) –2 (d) 5 (e) –4 (f) –10 **19** (a) 0 (b) 0 (c) 0 (d) 0 (e) 0 (f) 0 (g) 0 (h) 0 (i) 0 (j) 0 (k) 0 (l) 0 **20** (a) –500 (b) 51

Exercise 12.04

1 (a) –4 (b) –21 (c) –36 (d) –72 (e) –30 (f) –110 (g) 0 (h) –9 (i) 0 (j) –27 (k) –22 (l) –75 (m) 16 (n) 21 (o) 30 (p) 0 (q) 48 (r) –162 (s) 125 (t) –224 **2** (a) – 21 (b) –72 (c) 63 (d) –100 (e) –52 (f) 32 (g) –72 (h) –125 (i) 33 (j) –63 (k) 168 (l) –120 (m) 45 (n) –45 0 –54 (p) –28 **3** (a) –0.12 (b) –0.72 (c) –0.002 (d) 0.62 (e) 25 (f) 81 (g) 100 (h) 144 (i) 1.44 (j) 0.09 (k) –49 (l) –121 (m) –8 (n) –125 (o) 64 (p) –0.08 **4** (a) –3.2 (b) –8.4 (c) 10.8 (d) –39 (e) –5 (f) 8.2 (g) –2.8 (h) 0.56 (i) 720 (j) –36 (k) 36 (l) –36 (m) 28 (n) 90 (o) –80 (p) –24 (q) 120 (r) –9 (s) –27 (t) –120

Exercise 12.05

1(a) 3 (b) –3 (c) –3 (d) 3 (e) –4 (f) 4 (g) 4 (h) –4 (i) 0 (j) 5 (k) –5 (l) 1 (m) 0 (n) –5 (o) 30 (p) –40 (q) –135 (r) –1 (s) –1 (t) 1 (u) –1 (v) –3 (w) –19 (x) 5 **2** (a) –10 (b) –20 (c) –1 (d) –1 (e) –10 (f) 1 (g) –10 (h) 0.12 (i) –0.12 (j) –50 (k) 100 (l) 43 (m) –6 (n) 6 (o) 2 (p) –2

3 (a) –5 (b) –2 (c) 7 (d) –2 (e) 9 (f) –8 (g) –4 (h) –4 (i) 25 (j) –8 (k) –70 (l) 106 (m) –1 (n) 4 (o) 5 (p) $\frac{4}{3}$ (q) –1 (r) –4 (s) 2 (t) 1 (u) $-\frac{1}{2}$

4 (a) 1, –1, –3 (b) 0, 2, 4 (c) 2, 5, 8 (d) –16, –19, –22 (e) 32, –64, 128 (f) 2, 1, $\frac{1}{2}$ (g) 2, –1, $\frac{1}{2}$ (h) –24, –48, –96 (i) –1, 1, –1 (j) –4, 2, –1 (k) –0.0002, 0.00002, –0.000002 (l) –2, –2.5, –3 **5** (a) –1 (b) –7 (c) 8 (d) 4 (e) –2 (f) –1 (g) –17 (h) –17 (i) 27 (j) 16 (k) –40 (l) 47 (m) 12 (n) 60 (o) –54 (p) 12 (q) 1 (r) 1 (s) 14 (t) –100 (u) –1 **6** (a) –8 (b) 40 (c) 11 (d) $-\frac{1}{2}$ (e) –36 (f)–3

Exercise 12.06

1 21 **2** –3 **3** Fell 7 points **4** Fell 10 cents **5** –28 **6** –10 **7** 0 **8** –4, –3, –1, 0, 3, 4 **9** (a) 4 (b) 0 (c) –1 (d) –0.01 (e) 0.02 (f) 0 (g) $\frac{1}{2}$ (h) $-\frac{1}{4}$ (i) $-\frac{1}{2}$ (j) $\frac{1}{3}$ (k) –99 (l) –9 **10** 11 km/h **11** 6800 m **12** \$5.13 **13** (a) Dead Sea, Lake Eyre, Katoomba, Mt Kosciusko, Mt Everest (b) (i) 1186 m (ii) 6610 m (iii) 381 m (iv) 9237 m **14** 370 m below sea level **15** (a) 42 km (b) 42 km (c) 32 km south (d) 52 km **16** (a) (i) 11 (ii) 5 (iii) 16 (b) 5 (c) –9 **17** 0.75 **18** \$2176 **19** (a) 21 m (b) 44 m **20** (a) 5 east (b) 3 west (c) 2 east (d) 2 west (e) 7 west **21** (a) –4, –6 (b) –8, 6 (c) –16, –8 **22** 10 am **Who Am I?** (1) –15 (2) –5

Exercise 12.07

1 (a) 11 (b) 11 (c) 14 (d) 4 (e) 3 (f) 1 (g) –10 (h) 11 (i) –4 (j) 6 (k) 14 (l) 10

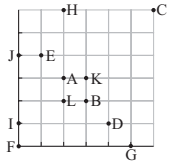
Exercise 12.08

1 (a) library, railway station, church, pool, council chambers (b) F4, A3, G2, C2, E3, F2 **2** (a) hot bread shop (b) C1 (c) H4 (d) right (e) C4, E6, F3, H3, D3 **3** (a) Woolworths, E (b) north, N8 (c) west, A6 (d) Martin Place, Sydney Aquarium (e) F6, E16, J12, M14, P10 (f) D8, E8, F8; L8, M8, N8; A12, B12, B13; B14, B15, C15; N9, N10, N11

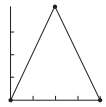
Exercise 12.09

1 (1, 1), (4, 2), (5,4), (6,3), (5, 0), (0, 3), (0, 5), (3, 5), (2, 3), (2, 0), (2, 0), (6, 0), (0, 0), (4, 3), (4, 4)

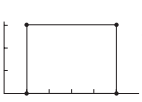
2



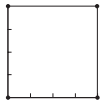
3 (a)



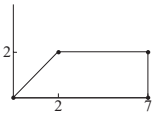
(b)



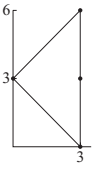
(c)



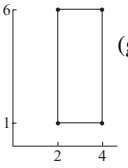
(d)



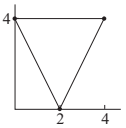
(e)



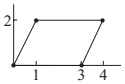
(f)



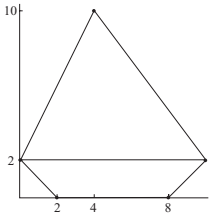
(g)



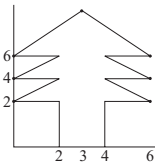
(h)



4



5

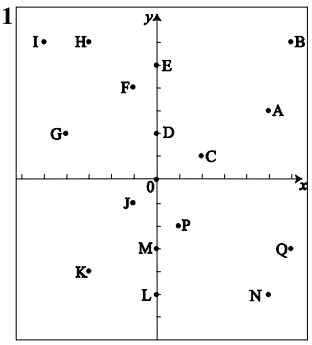


6 STUDENTS MAY HAVE A HOLIDAY ON FRIDAY

7 (1, 4), (0, 0), (3, 3), (4, 3), (4, 0) / (2, 2), (3, 2), (4, 3) / (1, 4), (0, 0), (2, 2), (4, 3) / (2, 2), (3, 2), (4, 3)

Exercise 12.10

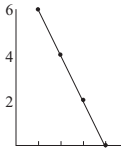
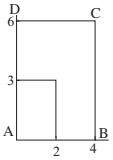
1



2 1st, 2nd, 3rd, 4th, 3rd, 4th, 2nd, 1st, 4th **3** (2, 3), (1, 2), (0, 1), (–1, 0), (–2, –1) **4** (a) MATHS IS EASY (b) SPEED KILLS (c) JUST DO IT (d) ONE DAY AT A TIME **5** (a) (–4, –1), (–2, –1) / (1, –1), (–3, 2), (4, 1), (–4, –1), (–4, –1), (–2, –1) / (2, 2), (–3, 2), (4, 1), (–4, –1) (b) (0, –3), (4, 1), (–4, 0) (–1, 3) / (–4, 0), (–1, 3), (–3, 2), (–4, –1), (–1, –2) / (–4, 0), (–2, –1), (–4, –1), (–1, 3), (1, –4) (c) (–1, 0), (–2, –1), (–2, –1), (4, 0) / (1, 4), (–1, 3), (0, 3), (–2, –1), (–3, –2), (–1, 3) / (1, –4), (2, –3) / (–1, 0), (–1, 3), (–3, 2), (1, –1) **6** (a) (0, 1), (1, 3), (2, 5), (3, 7)

(b)

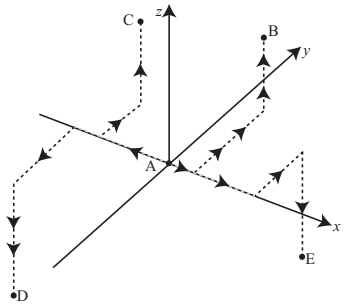
x	0	1	2	3
y	1	3	5	7

(c) y = 2x + 1 **7** (a) (1, 6), (2, 4), 3, 2) (4, 0) (b)  **8** (a)  A(0, 0), B(4, 0), C(4, 6), D(0, 6)

(b) A(2, 2), B(2, 0), C(5, 0), D(5, 2) (c) A(4, 0), B(2, 0), C(2, 3), D(4, 3)

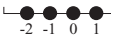
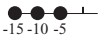
Exercise 12.11

1



2 Q(2, 0, 0), R(–1, –1, 0), S(1, –2, –1), T(1, 1, 1), U(2, 2, 1), V(–1, 1, 1), W(–1, –1, 2), X(0, –1, 2), Y(0, 0, 2), Z(1, 2, 2) **3** C(4, 0, 1), D(3, 0, 3), E(2, 1, 3), F(6, 1, 0), G(1, 1, 2), H(5, 1, 2) **4** B: 2 east, 3 down; C: 1 south, 2 east, 2 down; D: 1 west, 2 south, 1 down, E: 2 south, 3 down, F: 1 east, 2 south, 2 down

Diagnostic Test

1 (a) 12, 13, 14, 15 (b) 44, 48 **2** (a) (i)  (ii)  (b) –6 (c) Cooma by 6 degrees (d) 8 under par **3** (a) –3 (b) –9 (c) –3 (d)–14 (e) 0 (f) –0.22 **4** (a) –7 (b) –6 (c) 14 **5** –4 **6** (a) –72 (b) 72 (c) 0 (d) –81 (e) –4 **7** (a) –4 (b) –4 (c) 4 (d) 4 (e) –20 (f) –2 (g) 5 (h) –36 **8** (a) 15 km/h (b) –9, –8 (c) –24, 6 (d) 9 am **9** (a) –7 (b) 32 **10** A(1, 2), B(2, 1), C(3, 0), D(–4, 3), E(–3, 0), F(–2, –2), G(0, –2), H(1, –1), I(3, –3)

Chapter 13: Further Algebra

Getting Started

1 B **2** B **3** B **4** A **5** A **6** A **7** B **8** D **9** A **10** B

Exercise 13.01

1 (a) 6 (b) 7 (c) 8 (d) 9 (e) $x + 1$ **2** (a) 4 (b) 5 (c) 6 (d) 7 (e) $x - 1$ **3** (a) 15 (b) 20 (c) 32 (d) $x + 3$ **4** (a) 8 (b) 13 (c) 25 (d) $y - 4$ **5** (a) 12, 14, 28 (b) 16, 23, 34 (c) 10, 22, 17 (d) 4, 6, 20 (e) 9, 6, 17 (f) 9, 11, 6 (g) 11, 23, 19 (h) 24, 36, 11 **6** (a) 65, 74, 102 (b) $n + 3$ **7** (a) $\$(x + 3)$ (b) $\$(x - 13)$ (c) $x + 2$ (d) $y + 4$ (e) $t - 8$ (f) $n - 4$ Gb (g) $m - 1$ (h) $x - 15$ (i) $p + 3$ cm (j) $\$(50 - x)$ **8** (a) $x + 4$ (b) $y - 6$ (c) $d + 5$ (d) $g + 7$ (e) $k + 10$ (f) $6 - k$ (g) $3 + t$ (h) $j - 9$ (i) $p + 2$ (j) $7 - c$

Exercise 13.02

1 (a) 35 (b) $7n$ **2** (a) $7n$ (b) true **3** (a) $6x$ (b) $8y$ (c) $12a$ (d) $3b$ (e) $0.5x$ (f) $7g$ (g) $11f$ (h) $9c$ (i) $\frac{3}{4}d$ (j) $\frac{5}{3}y$ **4** (a) $4x$ (b) 100 (c) $x = 30$

5 (a) $2x$ cm^2 (b) $15y$ cm^2 (c) $8w$ cm^2 (d) $7z$ cm^2 (e) $24t$ cm^2 (f) $96b$ cm^2 **6** (a) $4n + 7$ (b) $4x + 2$ (c) $3y + 4$ (d) $12k - 3$ (e) $52 - 5z$ **7** (a) 27 (b) 26 (c) 23 (d) 6 (e) 19 (f) –61 (g) 24 (h) 20 (i) 9 (j) 22 (k) 14 (l) 11 (m) –13 (n) 37 **8** (a) $36x$ (b) 108 (c) 144 (d) $36x + 2$ (e) 5 **9** (a) $16y - 3$ (b) 29 (c) 157 (d) 93 (e) 8 **10** (a) $4n + 2$ (b) 34, 50, 62 (c) 9 **11** (a) $\frac{5}{6}y = \frac{5y}{6}$ (b) $\frac{4}{5}p = \frac{4p}{5}$ (c) $\frac{2}{3}g = \frac{2g}{3}$ (d) $\frac{3}{4}b = \frac{3b}{4}$ (e) $\frac{1}{2}x = \frac{x}{2}$

(f) $\frac{7}{8}g = \frac{7g}{8}$ (g) $\frac{8}{5}f = \frac{8f}{5}$ (h) $\frac{3}{2}c = \frac{3c}{2}$ (i) $\frac{11}{4}d = \frac{11d}{4}$ (j) $\frac{5}{3}y = \frac{5y}{3}$

Exercise 13.03

1 2 **2** $\frac{n}{5}$ **3** (a) $\frac{x}{6}$ (b) $\frac{y}{4}$ (c) $\frac{a}{12}$ (d) $\frac{b}{3}$ (e) $\frac{x}{15}$ (f) $\frac{2g}{7}$ (g) $\frac{4t}{9}$ (h) $\frac{5c}{8}$ (i) $\frac{4d}{3}$ (j) $\frac{5y}{9}$ **4** (a) $\frac{x}{3}$ (b) 32 **5** (a) $\frac{y}{3}$ (b) $\frac{y}{3} - 2$ (c) 6 **6** (a) $\frac{y}{5}$

(b) $\frac{y}{5} - 1$ **7** (a) 9 (b) –3 (c) 11 (d) –3 (e) $1\frac{1}{2}$ (f) 11 (g) 1 (h) 11 (i) –6 (j) 7 (k) –4 (l) –4 (m) 4 (n) $-2\frac{2}{3}$ **8** (a) $\frac{k}{3} - 5$ (b) 5 **9** (a) $\frac{d}{4} + 2$

(b) $\frac{y}{2} + 3$ (c) $\frac{t}{3}$ (d) $\frac{n}{12} + 2$ **10** (a) 10y (b) $\frac{10y}{f}$ **Who am I?** Infinity

Exercise 13.04

1 $3xy$ **2** (a) $x \times y$ (b) $a \times b \times c$ (c) $3 \times f \times g$ (d) $12 \times p \times q \times r$ (e) $x \times y + 3$ (f) $j \times k \times k$ (g) $h \times h \times h \times k \times k$ (h) $5 \times m \times m \times n$ (i) $12 \times k \times l \times l$ (j) $y \times y - 6$ **3** (a) $12xy$ (b) $10ya$ (c) $35ht$ (d) $15bcsa$ (e) $12tipq$ (f) $30xyt$ (g) $24abj$ (h) $48abcdef$ (i) $3yab$ (j) $4btpqr$ **4** (a) $6xy$ cm^2 (b) $21gh$ cm^2 (c) $24ab$ cm^2 **5** (a) $5jg$ ml (b) $2nP$ seats (c) $30pb$ pages (d) $100zv$ bytes (e) $6dy$ seconds (f) $30tvw$ spaces (g) \$$120cx$ **6** (a) $\frac{3}{8}ay$ l (b) $\frac{4}{3}yb$ (c) $\frac{5}{6}hj$ (d) $\frac{1}{4}bcst$ (e) $2typ$ (f) ayt (g) $\frac{2}{5}cdap$ (h) $\frac{1}{60}acbdef$ (i) $\frac{1}{4}yad$ (j) $\frac{4}{3}btpqr$ **7** (a) p^4 (b) t^5 (c) $5a^3$ (d) $12b^6$ (e) $7x^5$ (f) $48m^4$ (g) $24g^3$ (h) $35y^5$ (i) $20x^5$ (j) 0 **8** (a) x^{10} (b) a^6 c j^8 (d) d^{11} (e) w^6 (f) $6t^7$ (g) $30e^9$ (h) $30h^6$ (i) $60y^{12}$ (j) $10z^{12}$ **9** (a) $10x^2$ cm^2 (b) $18g^2$ cm^2 (c) $21a^2$ cm^2 **10** (a) $2x^2$ cm^2 (b) $5y^2$ cents (c) $20b^2$ cm (d) $3n^3$ (e) $8x^3$ km **11** (a) a^2x^4 (b) s^3a^6 c x^4j^6 (d) a^3d^9 (e) a^2bw^6 (f) $6x^2t^7$ (g) $10y^5e^7$ (h) $60b^3h^5$ (i) $150a^6y^{12}$ (j) $10a^3b^3z^9$ **12** (a) x^5 (b) a^3 (c) j^3 (d) d (e) w^2 (f) $3t^5$ (g) $3e^2$ (h) $3h^3$ (i) $2y$ (j) z **13** (a) $5x^2$cm (b) $12g^2$cm (c) $24a^3$ mm **14** (a) $5x^2$L (b) $2y^2$min (c) $4b^3$ (d) $5r$ rows (e) $4t^3$kph **15** (a) x^2 (b) s^2a (c) x^2j (d) a^2d (e) a^2w^2 (f) $3x^2t^6$ (g) 3 (h) $2bh$ (i) $6y^2$ (j) $4abz^5$ **16** (a) 6 (b) 90 (c) 30 (d) 288 (e) 2 (f) 45 (g) 144 (h) 5000 (i) 240 (j) 1440 **17** (a) p^9 (b) t^8 (c) $x^{15}y^{20}$ (d) $a^8b^{12}c^{16}$ (e) $8a^6$ (f) $81t^{12}$ (g) $16a^{12}b^{20}$ (h) $9x^{10}y^{12}$ (i) $32x^5y^{10}z^{15}$ (j) x^{10000}

Exercise 13.05

1 (a) $4(x + 7)$ (b) $3(x + 3)$ (c) $5(y - 3)$ (d) $6(8 + z)$ (e) $2(5 - a)$ (f) $3(9x + 11)$ (g) $8(1 + 4x)$ (h) $10(6x - 9)$ (i) $5(2 - 7y)$ (j) $2(t + 6) + 3(2t + 8)$ (k) $4(6g + 1) + 5(g - 2)$ (l) $9(t + 7)$ (m) $4(6 - x)$ **2** (a) $6s + 30$ (b) $5p + 20$ (c) $8t + 24$ (d) $15d + 27$ (e) $16f + 2$ (f) $12 + 3z$ (g) $24 + 4t$ (h) $5 + 15s$ (i) $12 + 36a$ (j) $49 + 7c$ **3** (i) $4(n + 7) = 4n + 28$ (ii) $7(4x + 2) = 28x + 14$ (iii) $6(3y + 4) = 18y + 24$ (d) $5(f + 2) = 5f + 10$ (e) $6(b + 2) = 6b + 12$ **4** (a) $3x - 12$ (b) $4y - 12$ (c) $10a - 15$ (d) $10b - 2$ (e) $15c - 20$ (f) $8d - 48$ (g) $12x - 66$ (h) $8y - 48$ (i) $15g - 18$ (j) $14a - 21$ **5** (a) $2x + 6$ cm^2 (b) $15y - 10$ cm^2 (c) $2w + 4$ cm^2 (d) $15z + 25$ cm^2 (e) $3 + 12t$ cm^2 (f) $8 - 2b$ cm^2 **6** (a) 2, –2, 0 (b) 4, –1, –12 (c) –9, –16, –14 (d) –14, –22, –42 (e) 11, 16, 20 (f) 36, 39, 54 (g) –12, –8, –14 (h) –7, 0, 2 **7** (a) $-3x - 15$ (b) $-12y + 8$ (c) $-25x - 15$ (d) $-8x + 2$ (e) $-15x - 20$ (f) $-8x + 48$ (g) $-18x - 60$ (h) $-8x + 48$ (i) $-4y + 12$ (j) $-14x - 35y + 21$ **8** (a) $-8ax$ (b) $-6ab$ (c) $-35ht$ (d) $-6acst$ (e) $15pt$ (f) $-30xyt$ (g) $-24baj$ (h) $36abcdef$ (i) $-3aby$ (j) $4btpqr$ **9** (a) –6 (b) –30 (c) 288 (d) –2 (e) 45 (f) 144 (g) 5000 (h) –240 (i) –1440 (j) 0

Exercise 13.06

1 (a) $n + 2n + 1$ (b) $2n + n + 1$ (c) $3n + 1$ (d) $3 + 3(n - 1) + 1$ (e) $4 + 3(n - 1)$ (f) $2n + n + 1$ (g) $1 + 3n$ (h) $n + (n + 1) + n$ **2** (a) 3 (b) 2 (c) 4 (d) 4 (e) 5 (f) 2 (g) 5 (h) 6 **3** (a) $6x$, $8x$ (b) $3b$, $9b$ (c) $15a$, $\frac{3}{4}a$ (d) $7ab$, $5ba$ (e) $3st$, $7ts$ (f) $22a^2$, $20a^2$ (g) $3a^2b$, $2a^2b$ (h) $5a^3$, $-2a^3$ (i) am, ma (j) abc, bca **4** (a) $11a$ (b) $11x$ (c) $3y$ (d) $6u$ (e) $6f$ (f) $6t$ (g) p (h) $13r$ (i) g (j) s (k) $5ab$ (l) $9mn$ (m) $3cd$ (n) $10a^2$ (o) b^2 **5** (a) $12a + 5$ (b) $9x + 4$ (c) $7y - 7$ (d) $4u + 5$ (e) $5f - 10$ (f) $3t - 9$ (g) $-3p - 10$ (h) $11r + 1$ (i) $-4g - 3$ (j) $6s + 8$ (k) $5ab + 5$ (l) $2mn - 14$ (m) $9a^2 - 6a$ (n) $5b^2 + b$ (o) $8x^2 + 3x - 6xy$ **6** (a) $7x + 12$ (b) $18x + 11$ (c) $30x + 3$ (d) $12x - 17$ (e) $9x + 11$ (f) $5ab + 4$ (g) $2xy - 21$ (h) 18 (i) $2st$ (j) $5mn - 20$ (k) $5x^2 - 13$ (l) $5y^2 - 18$ (m) $-z^2 - 25$ (n) $9x^2 - 2$ (o) $-a^2 + 7$ **7** 12x + 2 cm^2 **8** (a) $2(x + 1)$ (b) $3(x + 1)$ (c) $5(x + 1)$ **9** (a) $2(y - 1)$ (b) $6(y - 1)$ (c) $8(y - 1)$ **10** (a) $6(t + 1)$ (b) $7(t - 2)$ (c) $8t$ (d) $21t - 8$ **11** (a) true (b) true (c) true (d) 2n + 1 (e) true (f) true (g) true (h) $2n + 1$ **12** (a) $x^2 + 3x$ (b) $3y^2 - 6y$ (c) $8z^2 + 10z$ (d) $10a^2 - 15a$ (e) $30n^2 + 66n$ (f) $2p^3 + 3p^2$ (g) $2n^4 - 6n^3$ (h) $6a^3 + 3a^2$ (i) $10y^4 - 6y^2$ (j) $12x^5 + 4x^3$ **13** (a) A, D (b) B, E (c) D, E (d) A, B (e) A, B, C, D, E **Who am I?** pi

Exercise 13.07

1 (a) A, B, E (b) C, D, E (c) B, D, E (d) B, C (e) A, B, C **2** (a) $\frac{2x}{7}$ (b) $\frac{y}{2}$ (c) a (d) $\frac{7b}{5}$ (e) $\frac{2xy}{3}$ (f) $\frac{x}{5}$ (g) $\frac{3y}{7}$ (h) $\frac{a}{4}$ (i) $\frac{ab}{5}$ (j) $\frac{2x^2}{3}$ **3** (a) $\frac{7x}{12}$ (b) $\frac{7y}{10}$ (c) $\frac{8z}{15}$ (d) $\frac{9a}{20}$ (e) $\frac{11b}{28}$ (f) $\frac{5b}{12}$ (g) $\frac{5a}{18}$ (h) $\frac{3z}{5}$ (i) $\frac{5y}{8}$ (j) $\frac{3x}{8}$ **4** (a) $\frac{a}{20}$ (b) $\frac{3x}{10}$ (c) $\frac{2b}{15}$ (d) $\frac{-x}{6}$ (e) $\frac{c}{6}$ (f) $\frac{x}{12}$ (g) $\frac{-a}{36}$ (h) $\frac{7z}{30}$ (i) $\frac{3x}{8}$ (j) $\frac{-x}{8}$ **5** (a) $\frac{7a}{6}$ (b) $\frac{-3x}{10}$ (c) $\frac{19b}{15}$ (d) $\frac{x}{6}$ (e) $\frac{3c}{2}$ (f) $\frac{7x}{12}$ (g) $\frac{a}{12}$ (h) $\frac{7z}{10}$ (i) $\frac{5x}{8}$ (j) $\frac{x}{8}$ **6** (a) $\frac{3x+2y}{6}$ (b) $\frac{5a-8b}{10}$ (c) $\frac{10f+9g}{15}$ (d) $\frac{4h-3j}{6}$ (e) $\frac{4c+5d}{6}$ (f) $\frac{7x^2}{12}$ (g) $\frac{5a^2}{12}$ (h) $\frac{7y^3}{10}$ (i) $\frac{12x-7a}{8}$ (j) $\frac{5z-2x}{8}$ **7** (a) $\frac{x^2}{6}$ (b) $\frac{3a^2}{10}$ (c) $\frac{8f^2}{15}$ (d) $\frac{5h^2}{6}$ (e) $\frac{2c^2}{5}$ (f) $\frac{3x^2}{5}$ (g) $\frac{a^4}{2}$ (h) $\frac{54y^6}{5}$ (i) $\frac{21xa}{16}$ (j) $\frac{zx}{12}$ **8** (a) $\frac{x}{2}$ (b) $\frac{3y}{2}$ (c) $\frac{2}{3}$ (d) $\frac{a}{2}$ (e) 2b (f) $\frac{7a}{3b}$ (g) $\frac{5a}{4x}$ (h) $\frac{3a}{4c}$ (i) $\frac{2c}{x}$ (j) $\frac{2}{x}$

Exercise 13.08

1 (a) $2(x + 10)$ (b) $3(y + 2)$ (c) $5(a + 20)$ (d) $4(t + 4)$ (e) $6(d + 3)$ (f) $10(b - 5)$ (g) $3(5k - 2)$ (h) $7(3y - 7)$ (i) $17(g - 2)$ (j) $3(4a + 2b - 1)$
2 (a) $x(x + 4)$ (b) $y(y + 22)$ (c) $a^2(a + 4)$ (d) $t^2(t^3 + 9)$ (e) $b(b^4 + 4)$ (f) $c(c^2 - 5)$ (g) $x(x - 2)$ (h) $y^2(y - 5)$ (i) $a^2(a^2 - 3)$
(j) $t^2(t^2 - 5t + 4)$ **3** (a) $3y(y + 2)$ (b) $4a(a + 3)$ (c) $5t^2(2t + 1)$ (d) $9b^2(2b^2 + 1)$ (e) $2at(3t^2 + 2a)$ (f) $5d(5d^2 - 1)$ (g) $7p(2p - 1)$
(h) $5a^2(4a - 1)$ (i) $3a^2(16a^2 - 5)$ (j) $2x^2(x^2 - 2x + 4)$ **4** (a) $x + 4$ (b) $x + 5$ (c) $2x + 1$ (d) $a^2 + 4a$ (e) $3t^3 + 2t$ (f) $a - 2$ (g) $t - 15$
(h) $2y - 4$ (i) $x^2 - 3x$ (j) $3x^3 - 9x$ **5** (a) $2x + 1$ (b) $6y - 12$ (c) $y + 5$ (d) $4x^2 - 6x$ (e) $4a^2 + 2$ (f) $\frac{4 - 28t}{t}$ (g) $t + 4$ (h) $\frac{5c - 6}{4}$ (i) $4t + 2$
(j) $3y^2 - 9$ **6** (a) $x + 2y$ (b) $6ab - cd$ (c) $y + 6$ (d) $2 - 3x$ (e) $a^2 + 2$ (f) $\frac{2bc - 14bf}{f}$ (g) $bt + 16b$ (h) $\frac{5cd - 6ay}{4c}$ (i) $\frac{12yt + 5y}{3}$
(j) not possible **7** $5axy$ metres **8** (a) B (b) C (c) A (d) C (e) B (f) C (g) B (h) B (i) B (j) A **9** (a) $8x + 12$ (b) $8x$ (c) 12 (d) $4x$ (e) 6 (f) $4x$ (g) 6
10 (a) (i) $3n$ (ii) n (iii) 1 (b) (i) $2n$ (ii) n (iii) $n + 1$ (c) (i) n (ii) $2n$ (iii) $n + 1$ (d) (i) $4n$ (ii) 1 (e) (i) $4(n - 1)$ (ii) 5 **11** (b) $4n + 1$ (c) 401 (d) $4n - 3$

Exercise 13.09

1 (a) $x = 6$ (b) $y = 3$ (c) $z = 7$ (d) $a = 5$ (e) $c = 6$ (f) $c = 14$ (g) $a = 3$ (h) $y = 13$ (i) $x = 10$ (j) $z = 54$ **2** (a) $x = 4$ (b) $y = 3$ (c) $z = 5$ (d) $a = 9$
(e) (b) = 2 (f) $a = 24$ (g) $b = 6$ (h) $y = 5$ (i) $x = 6$ (j) $z = 8$ **3** (a) $x = 7$ (b) $y = 4$ (c) $z = 8$ (d) $a = 2$ (e) $x = 31$ (f) $a = -4$ (g) $y = -5$ (h) $x = -10$
(i) $x = -18$ (j) $z = 15$ **4** (a) $x = 2$ (b) $x = 3$ (c) $x = 50$ (d) $z = 5$ (e) $a = 2$ (f) $y = 5$ (g) $z = 1$ (h) $c = 2$ (i) $x = 5$ (j) $x = 10$ **5** (a) $a = 6$ (b) $x = 12$
(c) $y = 10$ (d) $z = 30$ (e) $x = 3$ (f) $x = -8$ (g) $a = -4$ (h) $z = 0$ (i) $b = 25$ (j) $x = 27$ **6** (a) $x = 9$ (b) $y = 20$ (c) $y = 13$ (d) $z = 7$ (e) $z = 22$ (f) $c = 6$
(g) $a = -3$ (h) $x = 7$ (i) $x = 21$ (j) $a = 8$ **7** (a) $x = 12$ (b) $y = 8$ (c) $a = 15$ (d) $x = 10$ (e) $x = 6$ (f) $a = 6$ (g) $y = 20$ (h) $c = -5$ (i) $x = \frac{25}{3}$
(j) $x = \frac{-8}{3}$ **8** (a) $x = 7$ (b) $y = 6$ (c) $z = 7$ (d) $x = 1$ (e) $y = 5$ (f) $y = -1$ (g) $a = -2$ (h) $c = 6$ (i) $x = 0$ (j) $a = 11$ **9** (a) 25 (b) 584 pages (c) 11
(d) 24 (e) \$50 (f) 29 students (g) 11 cars (h) 15 (i) 12 (j) 5 **10** (a) x+1 (b) x+7 (c) x+8 (d) $4x$+16 (e) 18^{th},19^{th},25^{th},26^{th}. (f) Yes.

Exercise 13.10

1 $\{180 - (x + y)\}°$ **2** $(180 - 2x)°$ **3** $\frac{5x}{12}$ **4** $\{360 - (x + y + z)\}°$ **5** 25 min **6** one way 97 + 2 **7** 3 and 16 **8** (a) 890 + 110 = 1000, 1000 – 499 =
501 (b) $4 \times \frac{3}{4} \times 231 = 3 \times 231 = 693$ **9** 52 min **10** –7 **11** \$60xy **12** $26x + 5$ **13** (a) $x = 1$, $x = 2$ (b) yes **14** $x = \frac{3}{2}\left(1\frac{1}{2}\right)$ **15** (a) $4x + 3$ (b) 27
(c) 51; no (d) 39, 63, 83 (e)13 **16** (a) $8n + 3$ (b) 43 (c) 51 (d) 3 **17** (a) $x + 4$ (b) (i) 166 cm (ii) 175 cm (iii) 173 cm (iv) $y + 4$ cm

Diagnostic Test

1 (a) $x + 12$ cartons (b) $y - 4$ medals (c) $20 - x$ **2** (a) 9 (b) –4 (c) 14 **3** (a) $t + 5$ (b) $r - 7$ (c) $10 - x$ **4** (a) $h + 8$ cm (b) $v - 50$ ml
(c) 4000 – m metres **5** (a) $8x$ sticks (b) $\frac{3y}{4}$ litres (c) $5z - 3$ **6** (a) 23 (b) 8 (c) 13 **7** (a) 11 (b) –7 (c) $14\frac{1}{2}$ **8** (a) 14yb (b) 12$dgafk$ (c) 30$yacdkx$
9 (a) 8gn people (b) 8nt km (c) \$180pj **10** (a) $\frac{gf}{6}$ (b) $\frac{tky}{10}$ (c) $\frac{abefcz}{4}$ **11** (a) a^7 (b) $20x^7$ (c) $24y^9$ **12** (a) 120 (b) –60 (c) 2 **13** (a) $3(k + 8)$
(b) $5(y - 9)$ (c) $6(3 - 2x)$ **14** (a) $3y + 6$ (b) $8t - 20$ (c) $20c - 15$ **15** (a) $-3x - 15$ (b) $-12y + 28$ (c) $-10c + 5$ **16** (a) $-12ab$ (b) $24xyz$ (c) $-18axty$
17 (a) 72 (b) –90 (c) 800 **18** (a) $6x + 14$ (b) $16y + 7$ (c) $2x - 2$ **19** (a) $6a^2 + 21a$ (b) $10t^5 - 6t^3$ (c) $x^5 - 2x^3$ **20** (a) $\frac{11y}{15}$ (b) $\frac{7x}{20}$
(c) $\frac{3a^2 - 8ay}{12}$ **21** (a) $\frac{2y^2}{15}$ (b) $\frac{3x^3}{10}$ (c) $\frac{a^2by}{6}$ **22** (a) $x + 2$ (b) $2x - y$ (c) $\frac{at - 4ay}{t}$ **23** (a) $x = 12$ (b) $x = 9$ (c) $a = 9$ **24** (a) $x = 4$ (b) $x = 14$
(c) $a = 11$ **25** (a) $2b$ (b) $4ay$ (c) $16f^{12}g^{20}$

Chapter 14: Measurement

Getting Started

5 1 pm **8** 4 cm^2 **9** 12 cm **10** 2 hours **11** D **12** B **13** C **14** A **15** C

Exercise 14.01

1 (a) km (b) mm (c) cm (d) m (e) m (f) cm **2** (a) m (b) cm (c) cm (d) cm (e) m (f) mm (g) m (h) mm (i) mm (j) m (k) cm (l) mm **3** (a) 6 cm (b) 3 cm (c) 9 cm **4** (a) 25 mm (b) 50 mm (c) 73 mm **5** (a) 35 (b) 75 km/h (c) $\frac{3}{8}$ (d) cold to warm (e) 20 mL (f) 500 mL **6** (a) 5 cm (b) 8 cm (c) 6.3 cm (d) 8 cm **7** (a) 3 sides each 3 cm (b) square of side 2 cm (c) Parallelogram 2.3 cm by 2.1 cm (d) 2 cm by 2.8 cm (kite), (a) and (b) are regular **8** (a) 30 mm (b) 220 mm (c) 665 mm (d) 5000 m (e) 49 500 m (f) 500 m (g) 7800 cm (h) 5580 cm (i) 1350 cm (j) 1 000 000 cm (k) 46 800 mm (l) 8 535 000 mm (m) 9070 mm (n) 9 500 000 cm (o) 54 500 mm **9** (a) 7.5 m (b) 15 m (c) 0.5 m (d) 4.99 m (e) 7.5 m (f) 15 m (g) 1.35 km (h) 0.755 m (i) 0.065 km (j) 5 cm (k) 10 m (l) 0.5 cm (m) 2.6 km (n) 0.035 km (o) 1.2 km **10** (a) 6850 cm (b) 11.5 km (c) 250 mm (d) 33 500 m (e) 9.85 m (f) 0.25 m (g) 98 km (h) 15 600 m (i) 4.5685 km (j) 65 200 mm (k) 8 278 000 cm (l) 100 m (m) 2.5 km (n) 3 500 000 mm (o) 0.825 m (p) 0.85 km (q) 653 m (r) 250 m **11** 4.7 m **12** 45 cm **13** 2250 mm **14** 1.75 m just fits **15** (a) 95 m (b) 950 m **16** 54.5 bricks **17** 9 trees **18** 857 cm **19** 955 m **20** 25 laps **21** 2.4m × 0.8 m **22** 2.56 m × 4.8 m **23** 4.4 km **24** (a) 1000 km (b) 1000 μm (c) 10 000 000 m (d) 0.01 Mm (e) 10^5 μm (f) 50 km (g) 100 mm (h) 20 000 cm (i) 150 mm(j) 1000 000 000 mm

Exercise 14.02

1 (a) g (b) g or mg (c) t (d) g (e) kg (f) t (g) mg (h) kg (i) mg (j) kg (k) kg (l) kg (m) g (n) g (o) g **2** (a) 1.6 kg (b) 3750 g (c) 25 kg (d) 0.75 kg (e) 10630 g (f) 5 t (g) 10 t (h) 20 000 kg (i) 7500 kg (j) 350 kg (k) 1.5 g (l) 7.2 g (m) 15 800 mg (n) 22 800 mg (o) 1 500 000 g (p) 6 200 000 mg (q) 85 t (r) 0.654 kg (s) 7 500 000 g (t) 97.32 t (u) 0.1 kg (v) 250 000 g **3** 375 000 kg **4** 875 g **5** 2500 mg **6** 136 t **7** 2935 kg **8** 101.5 kg **9** 40 000 kg **10** no **11** 8.35 kg **12** CD, calculator, milk, brick, potting mix, lawnmower **13** 350 g **14** 665 g **15** 3.7 kg

Exercise 14.03

1 Jan 31, Feb 28, Mar 31, Ap 30, May 31, June 30, Jul 31 Aug 31, Sept 30, Oct 31, Nov 30, Dec 31 **2** Summer Dec–Feb, Autumn Mar–May, Winter June–Aug, Spring Sept–Nov. No. Winter, Spring, Summer, Autumn **3** 14 days, 2 weeks; 10 years, 100 years, 1000 years **4** People wanted to celebrate the beginning of the last year in the millennium instead of the end. The 3rd millennium began in 2001. The millennium bug was mostly fixed by computer programmers before the due date. **5** (a) 12 (b) 14 (c) 26 (d) 300 (e) 50 (f) 2 (g) 5 (h) 14 (i) 28 (j) 4 (k) 1500 (l) 1.5 (m) 3653 (n) 112 **6** (a) no (b) yes (c) no (d) no (e) yes (f) no (g) yes (h) no (i) no **7** There are not exactly 2 fortnights/month. The estate agent charges rent by the week and doubles it for the fortnight amount. **8** (a) 96 h (b) 180 min (c) 2 min (d) 4 days (e) 300 min (f) 6 h (g)150 min (h) 8 min (i) 3 days (j) 720 s (k) 4 h (l) 7200 s (m) 86 400 s (n) 96 h (o) 8760 h (p) 14 400 min **9** (a) minutes (b) years (c) hours (d) hours (e) seconds (f) years (g) minutes (h) days **10** (a) 16th (b) 18th (c) 20th (d) 1st (e) 11th (f) 15th (g) 21st (h) 1st century BC **11** (a) 15/7/97 (b) 3/12/01 (c) 6/1/78 (d) 20/11/03 **12** (a) 30 Apr (b) 7 May (c) 13 May **13** (a) 29 Dec (b) 22 Dec (c) 26 Dec **14** 20 Dec **15** 87.75 h **16** 40 centuries ; 4 millenia **17** (a) 77 days (b) 184 days **18** Thursday

Exercise 14.04

1 (a) 0730 (b) 0500 (c) 0845 (d) 1320 (e) 2250 (f) 1015 **2** (a) 0120, 2320 (b) 1050, 2250 **3** (a) 6.45 am (b) 11.35 am (c) 3 pm (d) 8.15 am (e) 12.03 pm (f) 6.50 am (g) 11 pm (h) 00.15 am (i) 11.57 pm (j) 5.59 am (k) 11.59 am (l) 2.02 am **4** (a) 7 pm (b) 10.30 am (c) 7.25 pm (d) 6.30 am (e) 1.49 pm (f) 10.45 pm **5** (a) 5 h (b) 7 h (c) 3 h 45 min (d) 11 h (e) 12 h (f) 19 h (g) 11 h (h) 5 h 30 min (i) 18 h (j) 10 h 30 min (k) 11 h (l) 23 h (m) 47h (n) 54 h **6** (a) 3.50 pm (b) 11.20 am (c) 9.05 am (d) 12.15 pm (e) 7.15 pm (f) 12.30 pm (g) 11.59 pm (h) 9.45 pm (i) 1.55 pm (j) 12.25 am **7** (a) 8.20 am (b) no **8** 35 min **9** 41 h 30 min **10** (a) 5 h 5 min (b) 5 h 20 min (c) 13 h 13 min (d) 12 h 45 min (e) 8 h 45 min (f) 17 h 15 min **11** (a) 1.6 m, Sunday 2358 (b) 0.2 m, Friday 0500 (c) 1.3 m (d) 12 h 10 min(e) 12 h 18 min (f) 8.40 to 9.40 am and 8.58 to 9.58 pm **12** (a) 6 (b) (i) 6.02 train (ii) 6.53 pm (iii) 5.48 pm (iv) 5.58 (c) yes (d) (i) 40 min (ii) 9 min (iii) 25 min (iv) 14 min **13** (a) 40 min (b) 4.10 (c) 10 min (d) 4.00 bus **14** (a) 4.30 pm (b) 11.30 pm (c) 6 am (d) 11.40 am (e) 11 am (f) 11.30 pm (g) 5 pm (h) 1.15 am **16** (a) (i) ahead (ii) behind (iii) ahead (iv) ahead (v) behind (vi) ahead (vii) behind (viii) ahead (b) noon, 10 am (c) 11 am, 1 pm, 3 pm (d) 1 am **17** (a) 7 am (b) 7 am (c) 10 pm (d) 9 am (e) 12 noon (f) 8 pm (g) 11 pm (h) 1 am (i) 6 pm (j) 2 am (k) 1.30 pm the next day

Exercise 14.05

1 12 km **2** 4 h **3** (a) 90 km/h (b) 60 km/h **4** $\frac{1}{3}$ km/min **5** 570 km **6** 24 km/h **7** 24 000m/h **8** (a) 40 km (b) 30 km (c) 70 km, 17.5 km/h **9** 8 h **10** 4 h 12 min **11** (a) 12 cm (b) 15 weeks **12** (a) 20 min (b) 90 cm **13** 17 000 km/h **14** 24 km/h **15** 18 km/h **16** (a) 1800 L (b) 3600 L/h (c) 70 min **17** 48 km/h **18** 72 km/h **19** 40 km/h **20** (a) 2 km/s (b) 120 km/min (c) 7200 km/h

Exercise 14.06

1 (a) 18 (b) 13 (c) 16 (d) 18 (e) 13 (f) 12 **2** (a) 16 cm (b) 30 cm (c) 14 cm (d) 54 cm (e) 87 cm (f) 46 cm **3** (a) 15 (b) 30 (c) 12 (d) 48 **4** (a) 8 (b) 10 (c) 10 (d) 10 (e) 10 (f) 10 No **5** (a) 14 (b) 12 (c) 10 (d) 14 (e) 14 (f) 14 **6** (a) 14 (b) 14 (c) 14 (d) 20 (e) 14 (f) 14 (g) 18 (h) 14 (i) 10 **9** (a) 20 (b) 15 (c) 21 (d) 13.2 (e) 30 (f) 20 (g) 24 (h) 48 (i) 32 (j) 96 (k) 38 (l) 30 **10** 36 cm **11** (a) 108 (b) 90 (c) This can be done in 2 ways 60, 66. No. **12** 3 × 2 smallest, 3 × 4 largest **13** D **14** D **15** (a) 1720 m (b) $4816 **16** 10 km **17** 52 m **18** 300 cm 1**9** 110 cm

Exercise 14.07

1 (a) 6 (b) 8 (c) 16 (d) 9 (e) 9 (f) 7 (g) 11 (h) 11 (i) 7 (j) 7 (k) 6 (l) 9 **2** (a) 2 (b) 4 (c) 5 (d) 4 (e) 8 (f) 6 (g) 5 (h) 8 (i) 10

Exercise 14.08

1 (a) 18 (b) 48 (c) 24 (d) 24 (e) 48 (f) 240 (g) 882 (h) 40 (i) 15 **2** (a) 5 (b) 6 (c) 3, 5 (d) 12 **3** (a) 5 (b) 12.5 (c) 25 (d) 7.5 **4** (a) 25 (b) 12.5 (c) 2 (d) 10.5 **5** (a) 60 (b) 28 (c) 210 (d) 31 (e) 88 (f) 20 (g) 48 (h) 24 (i) 72 (j) 45 (k) 24 (l) 24 (m) 104 (n) 28 (o) 144 (p) 140 (q) 72 (r) 80 (s) 20 (t) 81 (u) 48 (v) 30 (w) 250 (x) 150 **6** (a) 16 (b) 18 (c) 60

Exercise 14.09

1 (a) 500 (b) 2000 (c) 50 (d) 8 (e) 120 (f) 50 000 (g) 8 (h) 4.5 (i) 60 (j) 20 000 (k) 55 000 (l) 10 (m) 9.5 (n) 1 000 000 (o) 2 000 000 (p) 400 (q) 50 (r) 30 (s) 4.5 (t) 1

Exercise 14.10

1 308 m^2 **2** 1400 m^2 **3** (a) 480 m^2 (b) 576 m^2 (c) 96 m^2 **4** (a) 400 ha (b) 2643 **5** 26 m^2 **6** 6 cm **7** 225 cm^2 **8** 52 cm **9** 100 **10** 5 m^2
11 \$1050 **12** 488 cm^2 **13** 2500 **14** (a) 144 (b) \$216 **15** 4 tins **16** 36 m^2 **17** 24 × 1, 12 × 2, 8 × 3, 6 × 4 gives the smallest perimeter
18 60 m^2 **19** 82 500 cm^2 **20** The area remains constant at 400 m^2 whilst the perimeter increases. **21** 46 cm **22** (a) {5, 20} (b) {6, 8, 10}
23 4 by 4, 6 by 3 **24** (a) $A = \frac{1}{2}bh = \frac{1}{2} \times 4 \times 3 = 6$ square units **25** 64 cm^2

Exercise 14.11

1 (a) 9 (b) 12 (c) 28 (d) 8 (e) 16 (f) 8 (g) 9 (h) 20 (i) 38 (j) 29 (k) 7 (l) 22 **2** (a) 48 cm^3 (b) 30 cm^3 (c) 120 cm^3 (d) 30 cm^3 (e) 72 cm^3
(f) 288 cm^3 **3** (a) 24 cm^3 (b) 27 cm^3 (c) 48 cm^3 (d) 48 cm^3 **4** (a) 72 cm^3 (b) 360 cm^3 (c) 144 cm^3 (d) 392 cm^3 **5** (a) 12 cm^2, 18 cm^2, 24 cm^2
(b) 108 cm^2 (c) 72 cm^3 **6** 64 cm^3

Exercise 14.12

1 (a) 5000 mL (b) 10 000 mL (c) 500 mL (d) 250 mL (e) 3L (f) 8.5 L (g) 7.5 L (h) 0.9 L (i) 0.650 L (j) 0.05 L **2** (a) mL (b) L (c) kL (d) mL
(e) L (f) mL (g) mL (h) L (i) L (j) mL (k) L (l) mL **3** 20 **4** 45 kL **5** (a) A (b) B (c) C (d) C (e) C (f) B **6** (a) 7.2 L (b) 1209.6 L (c) 5 184 L
(d) 63 115 L **7** 4 m **8** 1600 cars **9** (a) 36 g (b) 160 g (c) 375 kg (d) 750 kg **10** (a) 1 000 000 mL (b) 1 000 L (c) 1 kL **11** 48 L
12 (a) 1800 cc (b) 2.2 L **13** (a) 102.2 kL (b) 21.9 kL

Exercise 14.13

1 20 **2** 27 cm^2 **3** 2.3 L **4** 25 **5** (a) 128 000 cm^3 (b) 128 L (c) 138.5 kg **6** $2\frac{2}{3}$ **7** 2 **8** 20 cm **9** 32 cm^2 **10** 15 cm^2 **11** 3 **12** 1.5 **13** B **14** one is 4 m^2,
the other is 2 m^2 **15** 15 cm **16** 268 cm **17** 24 **18** 1.4 kg **19** C **20** 24 cm^3 **21** 500 cm^2

Diagnostic Test

1 (a) cm (b) m (c) km **2** (a) 6 cm (b) 5 cm (c) 7.5 cm **3** (a) 40 cm (b) 280 cm (c) 42 000 m (d) 0 (e) 9.25 km (f) 6.5 m **4** 12.5 **5** (a) g
(b) kg (c) tonnes (d) mg (e) mg (f) kg **6** (a) 2 g (b) 4.75 kg (c) 3.65 t (d) 8700 g (e) 9 500 000 mg (f) 48 t **7** 4.9 kg **8** April, June, September,
November **9** (a) 14 days (b) 366 days (c) 250 years (d) 5000 years **10** (a) 180 min (b) 3 days (c) 270 s (d) 2.5 h **11** (a) 9 Oct (b) 23 Oct
12 (a) 0130 (b) 1445 **13** (a) 10.20 pm (b) 8.50 am **14** 3 h 55 min **15** Sydney 11.30 am, Perth 9.30 am, Auckland 1.30 pm **16** (a) 100 km/h
(b) 315 km (c) 2.5 h **17** 15 km/h **18** 24 km/h **19** (a) 14 cm (b) 24.6 cm (c) 8.4 cm (d) 36 cm **20** 472 m **21** (a) 38 cm (b) 32 cm (c) 28 cm
22 (a) 22.5 cm^2 (b) 4.5 cm^2 (c) 24 cm^2 (d) 20 cm^2 (e) 48 cm^2 **23** (a) yes (b) yes **24** (a) 600 cm^2 (b) 30 cm^2 (c) .06 m^2 (d) 50 000 m^2 (e) 2.5 ha
(f) 500 ha **25** (a) 1050 (b) 432 cm^2 (c) 9 × 9 (d) 5, 6 × 6 **26** 240 m^3 **27** (a) 12 000 mL (b) 0.7 L (c) 12 000 L (d) 5 000 000 mL **28** 8 **29** (a) mL
(b) L (c) ML (Megalitres) **30** None of the answers are correct **31** 120

Chapter 15: Probability

Getting Started

1 (a) certain (b) unlikely (c) likely (d) unlikely (e) impossible (f) unlikely (g) unlikely (h) unlikely (i) even chance (j) unlikely (k) unlikely
(l) depends on the student

Exercise 15.01

1 (a) even chance (b) even (c) likely (d) certain (e) impossible (f) likely (g) even (h) likely (i) unlikely (j) certain **2** (a) impossible
(b) unlikely (c) certain (d) unlikely (e) unlikely (f) unlikely **3** (a) 0.5 (b) 0.25, 0.5, 0.75, 1 (c) 0 (d) 0.75 (e) 0.25 (f) 0.5 (g) 0.75 (h) 0.25
4 (a) 1/5 (b) 1/2 (c) 7/10 **5** B, D, C, A **6** black, red, blue **7** (a) even (b) unlikely (c) unlikely (d) impossible (e) unlikely (f) even (g) certain
(h) unlikely (i) impossible

Exercise 15.02

Results from practical experiments.

Exercise 15.03

1 (a) 3 (b) 5 (c) 4 (d) 3 (e) 1 (f) 5 (g) 4 **2** (a) $\frac{1}{12}$ (b) $\frac{1}{6}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$ (e) 0 (f) $\frac{1}{4}$ (g) $\frac{1}{4}$ (h) $\frac{1}{6}$ (i) $\frac{1}{3}$ (j) $\frac{1}{6}$ (k) $\frac{7}{12}$ (l) $\frac{1}{3}$ **3** (a) $\frac{1}{3}$ (b) $\frac{2}{9}$ (c) $\frac{2}{9}$ (d) $\frac{4}{9}$ (e) 0 (f) $\frac{7}{9}$ **4** $\frac{1}{20}$ **5** (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{2}$ (d) $\frac{1}{2}$ **6** $\frac{2}{3}$ **7** (a) $\frac{1}{13}$ (b) $\frac{1}{2}$ (c) $\frac{1}{26}$ (d) $\frac{3}{13}$ (e) $\frac{1}{52}$ (f) $\frac{1}{2}$ (g) $\frac{1}{13}$ (h) 0 (i) $\frac{1}{4}$ (j) $\frac{1}{26}$ (k) $\frac{1}{4}$ (l) 1 (m) $\frac{1}{52}$ (n) $\frac{2}{13}$ (o) $\frac{1}{26}$ **8** (a) $\frac{1}{26}$ (b) $\frac{5}{26}$ (c) $\frac{1}{13}$ (d) $\frac{21}{26}$ (e) $\frac{3}{26}$ (f) $\frac{5}{26}$ **9** (a) $\frac{1}{5}$ (b) $\frac{2}{5}$ (c) $\frac{4}{5}$ (d) $\frac{3}{5}$ (e) $\frac{1}{5}$ (f) $\frac{3}{5}$ **10** (a) $\frac{1}{11}$ (b) $\frac{2}{11}$ (c) $\frac{1}{11}$ (d) 0 (e) $\frac{1}{11}$ (f) $\frac{2}{11}$ (g) $\frac{9}{11}$ (h) $\frac{9}{11}$ (i) $\frac{7}{11}$

Exercise 15.04

1 1, 2, 4, 6; not a club; odd number; not Sunday, not Australia Day **2** (a) $\frac{1}{6}$ (b) $\frac{5}{6}$ (c) $\frac{1}{3}$ (d) $\frac{2}{3}$ (e) $\frac{1}{2}$ (f) $\frac{1}{2}$ **3** (a) $\frac{1}{12}$ (b) $\frac{11}{12}$ (c) $\frac{1}{3}$ (d) $\frac{2}{3}$ (e) $\frac{2}{3}$ (f) $\frac{5}{6}$ **4** (a) $\frac{2}{9}$ (b) $\frac{7}{9}$ (c) $\frac{4}{9}$ (d) $\frac{5}{9}$ (e) 0 (f) $\frac{2}{3}$ (g) $\frac{4}{9}$ (h) $\frac{5}{9}$ (i) $\frac{4}{9}$ **5** (a) $\frac{1}{52}$ (b) $\frac{51}{52}$ (c) $\frac{1}{4}$ (d) $\frac{3}{4}$ (e) $\frac{2}{13}$ (f) $\frac{11}{13}$ (g) $\frac{12}{13}$ (h) $\frac{1}{2}$ (i) $\frac{12}{13}$ (j) $\frac{25}{26}$ (k) $\frac{3}{4}$ (l) $\frac{10}{13}$

Exercise 15.05

1 (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{5}{8}$ (e) $\frac{3}{8}$ (f) $\frac{2}{3}$ **2** (a) $\frac{21}{50}$ (b) $\frac{9}{25}$ (c) $\frac{11}{50}$ (d) $\frac{9}{10}$ **3** (a) $\frac{4}{9}$ (b) $\frac{1}{3}$ (c) $\frac{2}{9}$ (d) $\frac{7}{9}$ (e) $\frac{5}{9}$ (f) $\frac{5}{9}$ (g) $\frac{7}{9}$ **4** (a) False. Names A to Z are not all equally likely. (b) False. Not the same number of attendance from each state. (c) False. Each toss is an independent event. (d) False. For simple probability P(Phoenix) + P(Swifts) = 1. Two fractions do not add to 1. **5** (a) $\frac{8}{25}$ (b) $\frac{9}{25}$ (c) $\frac{2}{25}$ (d) $\frac{6}{25}$ (e) $\frac{14}{25}$ (f) $\frac{3}{5}$ **6** (a) 9 (b) (i) $\frac{5}{9}$ (ii) $\frac{2}{9}$ (iii) $\frac{4}{9}$ (iv) $\frac{2}{9}$ (v) $\frac{2}{9}$ (vi) $\frac{1}{9}$ (vii) $\frac{4}{9}$ (viii) $\frac{1}{9}$ (ix) $\frac{2}{9}$ (x) 0 **7** (a) (i) 1 (ii) 0 (b) cube is unbiased as cube has 6 equal sides; rectangular prism is biased as it has 3 sets of different sides

Exercise 15.06

1 (a) $\frac{1}{4}$ (b) $\frac{1}{4}$ (c) $\frac{1}{4}$ **2** (a) $\frac{1}{12}$ (b) $\frac{1}{12}$ (c) $\frac{1}{4}$

3

	1	**2**	**3**	**4**
H	H1	H2	H3	H4
T	T1	T2	T3	T4

(a) $\frac{1}{8}$ (b) $\frac{1}{4}$ (c) $\frac{1}{4}$ (d) 0

4

	R	**B**
R	RR	RB
B	BR	BB

(a) $\frac{1}{4}$ (b) $\frac{1}{4}$ (c) $\frac{1}{2}$ (d) $\frac{1}{4}$ (e) $\frac{1}{4}$ (f) $\frac{1}{2}$ (g) $\frac{1}{4}$ (h) $\frac{3}{4}$ (i) 0 **5** (a) 36 (b) 2, 3, 4, … 12 (c) (i) $\frac{1}{36}$ (ii) $\frac{1}{36}$ (iii) $\frac{1}{36}$ (iv) $\frac{1}{6}$ (v) $\frac{1}{12}$ (vi) $\frac{1}{6}$ (vii) $\frac{1}{4}$ (viii) $\frac{1}{4}$ (d) 7 (e) 2 knives **6** (a) 100 (b) $\frac{7}{12}$ (c) 50% (d) 44% (e) (i) $\frac{13}{25}$ (ii) $\frac{7}{25}$ (iii) $\frac{1}{5}$ (iv) $\frac{1}{50}$ (f) $\frac{25}{19}$

7(a)

	Music	**VA**	**Total**
Male	21	25	46
Female	30	24	54
Total	51	49	100

(b) 46% (c) 41.2% (d) $\frac{24}{49}$ (e) (i) $\frac{21}{100}$ (ii) $\frac{51}{100}$ (iii) $\frac{6}{25}$ (iv) $\frac{49}{100}$

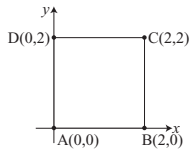
Diagnostic Test

1 (a) even chance (b) unlikely (c) unlikely (d) impossible **2** red, yellow, black **3** (a) even (b) unlikely (c) unlikely (d) impossible (e) unlikely (f) unlikely **4** (a) $\frac{12}{25}, \frac{13}{25}$ (b) 1, all probabilities add to 1 (c) we expect 50 heads and 50 tails from the second 100; Therefore expect 98 H and 102 T **5** (a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{4}$ (d) $\frac{1}{4}$ (e) $\frac{7}{8}$ (f) 0 (g) $\frac{1}{4}$ (h) $\frac{1}{4}$ **6** (a) $\frac{3}{8}$ (b) $\frac{3}{8}$ (c) $\frac{5}{8}$ (d) 0 (e) $\frac{3}{8}$ (f) 1 **7** (a) $\frac{1}{13}$ (b) $\frac{1}{52}$ (c) $\frac{1}{2}$ (d) $\frac{3}{13}$ (e) $\frac{1}{4}$ (f) $\frac{3}{4}$ (g) 1 (h) $\frac{2}{13}$ (i) $\frac{1}{2}$ (j) $\frac{12}{13}$ (k) 0 (l) $\frac{12}{13}$ **8** (a) false, probability is $\frac{1}{2}$ (b) false, not all equally likely **9** (a) $\frac{12}{25}$ (b) $\frac{8}{25}$ (c) $\frac{11}{25}$ (d) $\frac{7}{25}$ (e) $\frac{4}{25}$ (f) $\frac{6}{25}$

Chapter 16: Revision Papers

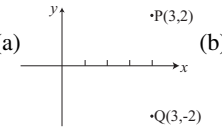
Revision Paper 7

1 A **2** D **3** B **4** C **5** D **6** A **7** C **8** D **9** D **10** C **11** A **12** C **13** B **14** A **15** A **16** C **17** B **18** C **19** A **20** B **21** B **22** B **23** B **24** C **25** Neither B nor C **26** (a) $4a^2b^3$ (b) $-6xy$ **27** (a) $6m + 3n$ (b) $7mn - 5a$ (c) $\frac{4ab}{c}$ (d) $\frac{5a-3b}{2a}$ **28** (a) 18 (b) –36 **29** (a) m^6 (b) $4ab^2$ (c) $4a^6$ **30** (a) $6p - 3pq$ (b) $4kj - 8k^2$ **31** (a) 2 (b) –6 (c) 1 **32** (a) 7 (b) 9 (c) 16 (d) –19

33 

a square with area 4

34 21 **35** $y = 3x + 2$ **36** (a) 100 (b) 10 000 m^2 **37** 6 cm **38** (a) pqr (b) $2(c + d)$ (c) $3x - 4$ **39** (a) 12 (b) 36 **40** (a) 60 km (b) 3 h 56 min

41 (a) $\frac{5}{8}$ (b) 1 (c) $5\frac{1}{4}$ (d) $\frac{5}{9}$ **42** (a) 

(b) 4 **43** (a) $2 \times 3 \times 5$ (b) 5^4, 25 **44** (a) $\frac{2}{5}$ (b) $\frac{3}{5}$ (c) $\frac{3}{5}$ **45** 3 m^3 **46** 72 kg **47** 8, 45, 46

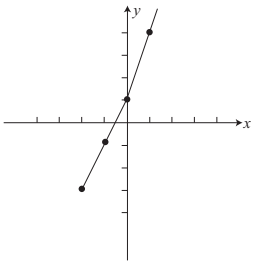
48 \$1.80 **49** 1.06 pm **50** $2\frac{1}{2}$ h

Revision Paper 8

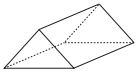
1 C **2** B **3** D **4** B **5** C **6** B **7** A **8** A **9** A **10** B **11** C **12** C **13** D **14** D **15** B **16** A **17** C **18** B **19** D **20** C **21** D **22** A **23** C **24** C **25** D **26** (a) –21 (b) –14 (c) –4 (d) 3

27

x	–2	–1	0	1	2
y	–3	–1	1	3	5



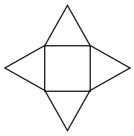
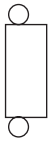
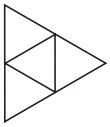
straight line

28 (a) $3a$ (b) $\frac{y}{2x}$ (c) $-2k^2 \bullet 4km$ (d) $20m^7$ **29** (a) 10 (b) 6 (c) 5 (d) –3 **30** (a) 4 (b) 27 **31** (a) 20 m (b) 2500 m (c) 40 000 cm^2 (d) 50 000 m^2 (e) 1000 000 cm^3 (f) 10 000 mm^3 **32** (a)  (b)  **33** (a) \$1170 (b) 225 tiles **34** 104 m^3 **35** 94 cm^2 **36** (a) 20 cm^2 (b) 36 cm^2 **37** (a) 320 km (b) 3 h 20 min **38** (a) $\frac{1}{2}$ (b) $\frac{1}{52}$ (c) $\frac{1}{26}$ (d) $\frac{1}{4}$ (e) $\frac{1}{13}$ (f) $\frac{12}{13}$

39

	Boy	Girl
Boy	BB	BG
Girl	GB	GG

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{4}$ **40** (a)  (b)  (c)  **41** 10 cm^2 **42** (a) cm (b) mL (c) m (d) m^3 (e) kL or ML **43** (a) 144 cm^2

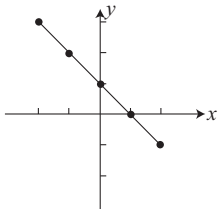
(b) 20 cm **44** (a)  (b)  (c)  **45**  **46** (a) 21 m^2 (b) 84 000 L **47** (a) B (b) AE

(c) EH, AD, BC (d) skew (e) parallel (f) yes **48** $\frac{3}{4}$, $\frac{1}{4}$ **49** (a) $x - 7$ (b) $x - 7 + x = 53$; $x = 30$ Maria 30 and Gino 23 **50** 4

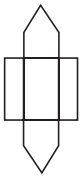
Revision Paper 9

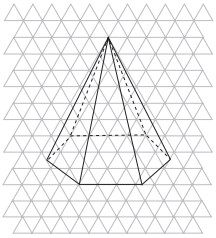
1 B **2** B **3** A **4** D **5** C **6** both B and C **7** B **8** C **9** D **10** B **11** D **12** D **13** A **14** D **15** D **16** B **17** C **18** B **19** B **20** A **21** B **22** A **23** B **24** B **25** C
26 (a) 9 (b) 2
27

x	–2	–1	0	1	2
y	3	2	1	0	–1



28 (a) 25%, 54% (b) 0.72, 0.125 (c) $1\frac{7}{20}$, $\frac{17}{20}$ **29** 340 m **30** (a) $6xy^2$ (b) $2a + 4$ (c) $\frac{st}{3+xy}$ (d) $\frac{a}{4}$ **31** (a) 24 (b) –2 (c) –32 **32** (a) $10a$ (b) $6y^2$

(c) $2ab$ (d) $14x - 2y$ **33** (a) faces 7 ; vertices 10 ; edges 15. (b) 

34 (a) hexagonal pyramid 

35 (a) m = 7 (b) y = 5 (c) k = −8 (d) w = 13 **36** (a) $\frac{3}{10}$ (b) $\frac{7}{10}$ (c) $\frac{3}{10}$ (d) 0 **37** 200 cm^3

38 60 cubes **39** (a)–10 (b) 32 **40** 334 tiles **41** (a) $\frac{1}{5}$ (b) 55% (c) $36 060 **42** perimeter = 77 cm, area = 320 cm^2 **43** (a) hexagonal prism

(b) rectangle (c) trapezium prism **44** (a) 68 (b) 25 **45** $180 + a + b$ **46** The perimeter remains the same whilst the area decreases.
47 48 000 km **48** 1.5 $units^2$ **49** 48 cm^3 **50** 20 000 bulbs