

Number

1 Number Value

Numbers up to 1000

A. Place value (p 1)

- 165
 - 53
 - 212
 - 403
 - 990
 - 68
 - 820
 - 7
 - 217
 - 902
- Two hundred and thirty-six;
2 hundreds, 3 tens, 6 units
 - One hundred and five; 1 hundred, 5 units
 - Six hundred and seventeen;
6 hundreds, 1 ten, 7 units
 - Eighty-two; 8 tens, 2 units
 - Seven hundred and fifty;
7 hundreds, 5 tens
 - Five hundred; 5 hundreds
 - One hundred and twenty-three;
1 hundred, 2 tens, 3 units
 - Ninety; 9 tens
 - Nine hundred and thirty-eight;
9 hundreds, 3 tens, 8 units
 - Three hundred and forty-four;
3 hundreds, 4 tens, 4 units

| Planet | Number of days | Planet | Approx number of years |
|---------|----------------|---------|------------------------|
| Earth | 365 | Jupiter | 12 |
| Mercury | 88 | Neptune | 165 |
| Mars | 687 | Saturn | 30 |
| Venus | 225 | Uranus | 84 |

- Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune
- Ceres: five, Eris: five hundred and fifty-seven, Haumea: two hundred and eighty-five, Makemake: three hundred and ten, Pluto: two hundred and forty-eight.

B. Count in 10s (p 3)

- 41
 - 461
 - 403
- 165
 - 576
 - 119

C. Count in 100s (p 3)

- 225
 - 163

- 782
 - 807

582
607

282
307

7

Large numbers

A. Place value (p 4)

| | Thousands | | | | | | |
|----|-----------|---|---|---|---|---|---|
| | M | H | T | U | H | T | U |
| a. | | | | 2 | 0 | 0 | 0 |
| b. | | | 3 | 2 | 0 | 0 | 0 |
| c. | | 1 | 6 | 5 | 2 | 0 | 0 |
| d. | | 1 | 0 | 9 | 8 | 7 | 0 |
| e. | 4 | 2 | 0 | 0 | 0 | 0 | 0 |
| f. | | | 9 | 0 | 7 | 5 | 0 |
| g. | | | | 8 | 0 | 2 | 5 |
| h. | | 1 | 1 | 9 | 0 | 0 | 0 |
| i. | 6 | 2 | 9 | 9 | 0 | 0 | 0 |
| j. | 9 | 0 | 0 | 0 | 3 | 0 | 6 |

- Forty-five thousand
 - Three hundred and seventy-five thousand
 - Six million, seven hundred thousand
 - Two hundred and five thousand
 - Seventy thousand, seven hundred and fifty
 - One million, two hundred thousand
 - Five thousand and sixty-five
 - Twenty thousand, three hundred and six
 - Forty thousand, three hundred and fifty-two
 - Nine million, six hundred and seventy thousand and eighty
 - Five million, ninety thousand and four hundred
 - Three million, five hundred and three thousand, two hundred and forty-one.
- 5 065, 20 306, 40 352, 45 000, 70 750, 205 000, 375 000, 1 200 000, 3 503 241, 5 090 400, 6 700 000, 9 670 080

| Year | Estimated population |
|------|----------------------|
| 1100 | 25 000 |
| 1300 | 100 000 |
| 1500 | 50 000 |
| 1600 | 200 000 |
| 1801 | 1 117 000 |
| 1851 | 2 685 000 |
| 1939 | 8 700 000 |
| 2000 | 7 640 000 |

- c. i. 1300 and 1500, 1939 and 2000
 ii. 1939

B. Greater than > and less than < (p 6)

1. a. $1 < 3$ b. $7 > 5$ c. $9 > 4$
 d. $0 < 1$
2. a. $2 < 8$ b. $6 > 1$ c. $18 > 13$
 d. $19 < 23$ e. $99 < 101$ f. $170 > 159$
3. a. $269 < 270$ b. $15\,000 > 2500$
 c. $9900 > 7500$ d. $50\,000 < 75\,000$
 e. $9 < 900$ f. $10\,500 > 10\,499$
 g. $99\,900 < 100\,000$ h. $4010\,000 > 4\,009\,999$

Positive and negative numbers in practical contexts (p 7)

1. a. $-5^{\circ}\text{C}, -2^{\circ}\text{C}, 0^{\circ}\text{C}, 1^{\circ}\text{C}, 4^{\circ}\text{C}, 8^{\circ}\text{C}$
 b. $-10^{\circ}\text{C}, -8^{\circ}\text{C}, -7^{\circ}\text{C}, 6^{\circ}\text{C}, 9^{\circ}\text{C}, 10^{\circ}\text{C}$
 c. $-18^{\circ}\text{C}, -15^{\circ}\text{C}, -10^{\circ}\text{C}, 0^{\circ}\text{C}, 12^{\circ}\text{C}, 20^{\circ}\text{C}$
2. a. $9^{\circ}\text{C}, -1^{\circ}\text{C}$
 b. $-16^{\circ}\text{C}, -17^{\circ}\text{C}, -14^{\circ}\text{C}$
 c. $-18^{\circ}\text{C}, -19^{\circ}\text{C}, -17^{\circ}\text{C}$
3. a. M Patel b. J Robinson
4. Yes because the account will be £225 overdrawn, £25 more than the agreed overdraft.

Compare numbers of any size (p 8)

1. a. 2 500 000 b. 2 560 000
 c. 1 700 000 000 d. 1 850 000 000
 e. 30 000 000 f. 300 000 000
 g. 1 300 000 000 h. 500 000 000
 i. 250 000
2. a. 2.5 million b. 5.6 million
 c. 4.75 million d. 3.8 billion
 e. 2.95 billion f. 1.05 billion
 g. 20 million
 h. 600 million or 0.6 billion
 i. 34.5 million
3. £161 700 000, £148 700 000,
 £121 300 000, £113 000 000
4. a. i. Company B ii. Company C
 iii. Company B
 b. i. Companies C, E and G ii. Company E

2 Addition and Subtraction

Add and subtract 3-digit numbers

A. Add in columns (p 11)

1. a. 379 b. 779 c. 496
 d. 489 e. 780 f. 672
 g. 394 h. 787 i. 500

- j. 318 k. 946 l. 305
 m. 400 n. 931 o. 621
 p. 610

2. a. 989 b. 472 c. 241
3. 341 employees 4. 440 photocopies
5. 350 miles 6. 482 cases
7. £795 8. £926
9. 215 tickets

B. Add in your head (p 12)

1. a. 57 b. 57 c. 69
 d. 43 e. 72 f. 63
 g. 85 h. 98
2. a. 241 b. 181 c. 398
 d. 387 e. 208 f. 185
 g. 406 h. 246 i. 362
 j. 301 k. 568 l. 538
 m. 574 n. 371 o. 501
 p. 493

C. Subtract in columns (p 14)

1. a. 211 b. 321 c. 200
 d. 515 e. 309 f. 227
 g. 70 h. 31 i. 153
 j. 199 k. 179 l. 67
 m. 245 n. 69 o. 299
 p. 501 q. 329 r. 299
2. a. 387 b. 97 c. 698
3. 325 envelopes 4. £324
5. 127 more men 6. £106
7. 163 miles

D. Subtract in your head (p 15)

1. a. 23 b. 16 c. 28
 d. 56 e. 19 f. 42
 g. 37 h. 34
2. a. 149 b. 199 c. 149
 d. 622 e. 401 f. 205
 g. 206 h. 199 i. 326
 j. 490 k. 157 l. 699
 m. 199 n. 299 o. 709
 p. 294

E. Use addition and subtraction (p 15)

1. £94 2. 53p 3. 16
 4. 61 5. £741 6. £385
 7. 352
8. a. 540 b. 184
9. 682 10. £77

Add and subtract large numbers (p 16)

- 52 359
 - 39 505
 - 28 595
 - 160 499
 - 3 740 000
 - 6 527 500
 - 312 089
 - 212 475
 - 1 525 500
 - 895 276
 - 363 250
 - 296 350
- 23 868 miles
- 1 332 000 people
- 1734 miles
- £1 186 400
- £65 150
 - £934 850
 - 1 068 181
 - 250 235
- No. £449 500 – £372 900 = £76 600
or £77 400 + 372 900 = 450 300
- 375 160

Add and subtract positive and negative numbers (p 18)

- | Temperature now | Temperature change | New temperature |
|-----------------|--------------------|-----------------|
| -3°C | rises by 8°C | 5°C |
| -3°C | falls by 8°C | -11°C |
| 7°C | falls by 10°C | -3°C |
| -1°C | rises by 6°C | 5°C |
| -2°C | falls by 7°C | -9°C |
- £15
 - £25
 - £40
- 4.9°C
 - 4.7°C
 - 4.8°C
 - 0.7°C
- England 65°C, Northern Ireland 50°C, Scotland 60°C, Wales 58°C

Add and subtract numbers of any size (p 19)

- 3.5 million
 - 2.6 million
 - £1 113 500 million
 - £6.5 billion
 - £2.25 billion
 - £2.41 billion
- £2.19 million
- | Outlet | Total profit (£ million) |
|--------------|--------------------------|
| A | 4.7 |
| B | -0.8 |
| C | 10.7 |
| D | -4.4 |
| Total | 10.2 |

- £0.4 million
 - £0.8 million
 - £1.2 million
 - £5.5 million
 - £15.1 million
 - £3.6 million (D lost £3.6 million more than B.)

3 Multiplication and Division

Multiplication (p 21)

Multiplication Using Times Tables Check: 25, 24, 21, 72, 0, 42, 96, 121

- 60
 - 200
 - 360
 - 350
 - 270
 - 280
 - 540
 - 720
 - 640
 - 630
 - 480
 - 810
 - 600
 - 400
 - 800
- 1000

Multiplication methods

A. Multiply 1-digit with 2-digit numbers (p 22)

- 48
 - 93
 - 88
 - 126
 - 105
 - 172
 - 260
 - 450
 - 234
 - 448
 - 304
 - 534
 - 616
 - 441
 - 485
 - 837
- 60 rings
- 75 plates
- 180 minutes
- £333
- 161 rooms
- 378 pages
- 425 miles
- 600 grams

B. Multiply 2-digit with 2-digit numbers (p 24)

- 575
 - 748
 - 874
 - 990
 - 792
 - 984
 - 728
 - 957
- 720
- 960
- 270
- 336
- £884
- 750 metres

Division (p 24)

Division Using Times Tables Check: 5, 11, 6, 6, 5 r2, 7 r2, 5 r5, 8 r1

A. Use standard method to divide 2-digit numbers (p 25)

- 24
 - 33
 - 40
 - 12
 - 15
 - 23
 - 13
 - 19
 - 29
 - 29 r 1
 - 18 r 2
 - 12 r 2
 - 12 r 3
 - 17 r 2
 - 31 r 2
 - 14 r 5
- 18 doses
- £17
- 12 trays
 - 3 plants

B. Divide 3-digit numbers (p 27)

- 128
 - 232
 - 138
 - 78
 - 64
 - 73 r 1
 - 99 r 4
 - 49 r 1
 - 41
 - 102 r 2
 - 302 r 1
 - 99 r 7

2. 30 metres 3. 50 boxes
 4. £246
 5. a. 29 boxes b. 1 plant left over
 6. No, because 7 does not divide exactly into 214.
 $214 \div 7 = 30 \text{ r}4$
 7. £75 8. £32
 9. a. 42 b. 52 c. 45
 d. 37 e. 13 f. 25
 10. £48 11. 25 boxes

8. 200 hours 9. 20 tickets
 10. a. 3600 b. 50 c. 70
 d. 900 e. 300 f. 25 000
 g. 24 000 h. 40 i. 120 000
 11. £1200 12. 200 tickets
 13. 3600 seconds 14. 50 bags

Multiply and divide whole numbers by 10, 100 and 1000

A. Multiply by 10, 100 and 1000 in your head (p 29)

1. a. 130 b. 750 c. 1360
 d. 2020 e. 900 f. 1900
 g. 1200 h. 3700 i. 12900
 j. 12000 k. 30300 l. 23000
 m. 70000 n. 904000 o. 750000
 p. 3581000
 2. 500 pence 3. 200 ten-pence coins
 4. 660 millimetres 5. 1500 centimetres
 6. 2500 envelopes 7. £450
 8. 500 cards 9. £2500
 10. 12000 millimetres 11. 250000 leaflets
 12. 78000 grams 13. £300000
 14. 1000000 grams

B. Divide by 10, 100 and 1000 in your head (p 31)

1. a. 46 b. 460 c. 46 d. 46
 e. 53 f. 530 g. 53 h. 530
 i. 990 j. 75 k. 57 l. 38
 m. 64 n. 2.3 o. 96.2 p. 2.75
 2. £120 3. 15p
 4. 72 centimetres 5. 240 metres
 6. 2750 boxes 7. 350 boxes
 8. 176 calls 9. 15 people
 10. a. 18 kilometres
 b. 3.5 kilometres
 c. 0.675 kilometres
 11. £0.15 or 15p 12. £32.50

Use multiplication and division (p 32)

1. a. 28 b. 70 c. 10 d. 6
 e. 40 f. 63 g. 90 h. 6
 i. 8 j. 8 k. 400 l. 20
 2. 10 two pence coins 3. 9 boxes
 4. £9 5. £63
 6. 9 boxes 7. 4 months

Recognise numerical relationships

A. Number sequences (p 33)

1. a. Add 4; 24, 28, 32 b. Add 4; 25, 29, 33
 c. Subtract 2; 10, 8, 6 d. Add 5; 27, 32, 37
 e. Add 6; 33, 39, 45 f. Subtract 5; 45, 40, 35
 g. Subtract 3; 36, 33, 30 h. Subtract 4; 40, 36, 32
 i. Subtract 10; 47, 37, 27 j. Subtract 20; 40, 20, 0
 2. a. 7th April, 11th April
 b. Yes. Reason: 27 is in the sequence 3, 7, 11, 15, 19, 23, 27; or 27th is 24 days after the start and 24 can be divided exactly by 4.
 3. 14 tablets. Working: The number of tablets used after each day is Mon 4, Tues 8, Wed 12, Thurs 16, so the number left after Thurs is $30 - 16 = 14$; or the number left after each day is Mon 26, Tues 22, Wed 18, Thurs 14.

B. Multiples (p 34)

1. a. 12, 32, 40 b. 21, 42, 70
 c. 12, 24 d. 10, 30
 2. a. 6, 12, 18, 24, 30, 36, 42, 48, 54, 60, 66, 72, 78, 84, 90, 96
 b. 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96
 c. 9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99
 d. 11, 22, 33, 44, 55, 66, 77, 88, 99
 e. 20, 40, 60, 80
 3. a. 50, 100, 150, 200, 250, 300, 350, 400, 450, 500, 550, 600, 650, 700, 750, 800, 850, 900, 950
 b. 200, 400, 600, 800
 c. 250, 500, 750
 4. Any 5 multiples of 1000 (for example, 2000, 3000, 4000, 5000, 6000)

Square numbers and indices

A. Square numbers (p 35)

1. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144
 2. a. 900 b. 2500 c. 3600 d. 8100
 3. a. 784 b. 1764 c. 3969 d. 9801
 4. a. 16 b. 32 c. 120 d. 250

B. Calculating with indices (p 36)

1. a. 512 b. 729 c. 1728 d. 16
 e. 32 f. 1296 g. 1000000
 2. Students' checks

3. $5 \times 5 \times 5$ — 3^7
 3×3 — 81
 $2 \times 2 \times 2$ — 5^3
 9×9 — 3^3
 $3 \times 3 \times 3$ — 16
 $2 \times 2 \times 2 \times 2$ — 2^3

Multiply and divide large numbers

A. Multiply large numbers (p 37)

1. a. 4305 b. 29704 c. 12825
 d. 27360 e. 32256 f. 12978
 g. 67968 h. 27504
2. 7000 miles 3. 9125 kilometres
4. 31025 days old

B. Divide large numbers (p 39)

1. a. 985 b. 405 c. 881
 d. 3652 e. 4210 f. 6825
 g. 1813 r4 h. 10416 r4 i. 8375 r2
 j. 8158 r2 k. 5555 r5 l. 20056 r1
2. 250 people 3. £225
4. 3221 tickets 5. 4250 boxes
6. 5200 samples 7. £22500
8. £62500
9. a. 354 b. 524
 c. 512 d. 835
10. £450

Efficient methods of calculating with numbers of any size

A. Multiples, factors and prime numbers (p 40)

1. a. 98, 364, 720
 b. 165, 720, 945, 25245
 c. 165, 243, 720, 945, 25245
 d. 243, 720, 945, 25245
2. a. 15 b. 12 c. 6 d. 7
3. a. 3, 6 and 12 b. 3 and 9
4. a. 5 b. 29
5. 3

B. Calculations with numbers of any size (p 41)

1. a. £300 b. £90 c. £36
2. 42000 statements 3. £150000
4. 128000 people 5. £1500000
6. £300000 7. £2900000
8. 6.5 million tourists
9. £375000 or £0.375 million
10. £2.16 million

4 Rounding and Estimation

Approximate and estimate with numbers up to 1000

A. When to estimate (p 44)

1. a. Yes b. No c. Yes d. No
 e. No f. Yes g. Yes h. No
 i. Yes j. No

B. Round to the nearest 10 and 100 (p 45)

1. a. 40 b. 20 c. 20 d. 90
 e. 140 f. 220 g. 420 h. 990
 i. 410 j. 100 k. 700 l. 310
 m. 240 n. 180 o. 370 p. 710
 q. 370 r. 810 s. 900 t. 280
2. a. 200 b. 400 c. 600 d. 900
 e. 200 f. 400 g. 600 h. 900
 i. 400 j. 200 k. 800 l. 700
 m. 900 n. 1000 o. 200 p. 400
 q. 900 r. 800 s. 300 t. 100
3. a. 450 b. 549

C. Use estimates to check calculations (p 47)

1. a. $£70 + £30 = £100$ so answer is probably incorrect
 b. $£160 - £70 = £90$ so answer is probably correct
 c. $£70 + £60 = £130$ so answer is probably correct
 d. $£90 + £30 = 3$ so answer is probably incorrect
 e. $£85 - £25 = £60$ (or $£90 - £30 = £60$)
 so answer is probably correct
 f. $10 \times £25 = £250$ so answer is probably correct
 g. $£160 \times 3 = £480$ so answer is probably incorrect
 h. $£160 - £120 = £40$ so answer is probably incorrect
2. a. 889 b. 126
3. a. £338 b. £736 c. £858
4. Part b. too small: $900 - 100 = 800$,
 part c. too small: $30 \times 7 = 210$

Approximate and estimate with large numbers

A. Round to the nearest 1000, 10000, 100000, 1000000 (p 50)

1. a. 5000 b. 7000 c. 27000
 d. 31000 e. 256000 f. 105000
 g. 951000 h. 1366000
2. a. 30000 b. 50000 c. 150000
 d. 210000 e. 770000 f. 230000
 g. 680000 h. 1910000
3. a. 500000 b. 300000 c. 1500000
 d. 4600000 e. 1700000 f. 2800000
 g. 2000000 h. 12800000

4. a. 3 000 000 b. 3 000 000 c. 7 000 000
 d. 16 000 000 e. 4 000 000 f. 2 000 000
5. a. 3 000 000 unemployed
 b. 7000 job losses
 c. 13 000 (or 12 800) people attend charity event
 d. £2 000 000 lottery win
 e. 4700 (or 5000) new jobs created
 f. 3 000 000 copies of record sold
 g. £21 000 000 profits for company
 h. 280 000 (or 300 000) people to benefit

B. Use estimates to check calculations (p 51)

(Note: there are alternative methods.)

1. a. True $300\,000 - 100\,000 = 200\,000$
 b. False $90\,000 \times 2$ doesn't equal 300 000
 c. True $170\,000 \times 3 = 510\,000$
 d. False $120\,000 \times 3$ doesn't equal 660 000
 e. False $120\,000 + 90\,000$ doesn't equal 300 000
 f. True
 495 212 is just under 500 000 which is half a million
 g. True $300\,000 + 700\,000 = 1\,000\,000$

2. a.

| Income | Total (£) |
|-------------------------|-----------|
| 2976 tickets @ £25 each | 74 400 |
| 2204 tickets @ £12 each | 26 448 |
| 1008 progs. @ £3 each | 3024 |
| 592 mugs @ £8 each | 4736 |
| Total | 108 608 |

| Expenditure | Total (£) |
|-------------------------------|-----------|
| Hire of venue and insurance | 17 750 |
| Publicity and printing | 4899 |
| 8 technicians @ £489 | 3912 |
| 50 security staff @ £175 each | 8750 |
| Performers | 0 |
| Total | 35 311 |

- b. Money raised £73 297

Strategies for checking calculations with numbers of any size

A. Use estimates to check answers are of the correct order (p 53)

1. a. $300 \times 80 = 24\,000$. Answer given is of the wrong order so not correct.
 b. $1\,240\,000 - 40\,000 = 1\,200\,000$. Answer given is of the correct order.
 c. $288\,000 + 100 = 2\,880$. Answer given is of the wrong order so not correct.

- d. $400\,000 + 400\,000 + 1\,200\,000 = 2\,000\,000$. Answer given is of the correct order.

2. a. Between 1935 and 1945 = 672 700 000 increase
 Between 1945 and 1955 = 403 200 000 decrease
 Between 1955 and 1965 = 855 000 000 decrease
 Between 1965 and 1975 = 210 500 000 decrease
 Between 1975 and 1985 = 44 300 000 decrease
 Between 1985 and 1995 = 42 600 000 increase
 Between 1995 and 2005 = 50 000 000 increase
 Between 2005 and 2015 = 6 900 000 increase
 b. Students' check

B. Use reverse calculations to check answers are accurate (p 53)

1. a. 50 944
 Check: $50\,944 + 256 = 199$
 b. 819 163
 Check: $819\,163 - 188\,995 - 32\,546 = 597\,622$
 c. 786
 Check: $786 \times 152 = 119\,472$
 d. 9 778 412
 Check: $9\,778\,412 + 28\,732 + 192\,856 = 10\,000\,000$
2. £443 000
 Check: $443\,000 \times 3 = 1\,329\,000$
3. -£12
 Check: $-12 - 41 + 189 + 176 = 312$

5 Ratio and Proportion

Work with ratio and proportion

A. Ratios (p 56)

1. a. 200 ml b. 400 ml c. $1000\text{ ml} = 1\text{ l}$
 2. a. 1500 ml or 1.5 litres
 b. 3000 ml or 3 litres
 c. No. $800 + 4800 = 5600\text{ ml}$

3.

| | Cement | Sand |
|-----------------|--------|-------|
| Standard mortar | 5 kg | 25 kg |
| | 10 kg | 50 kg |
| | 15 kg | 75 kg |
| Strong mortar | 3 kg | 9 kg |
| | 12 kg | 36 kg |
| | 20 kg | 60 kg |

B. Direct proportion (p 57)

1. a. i. 300 ml milk 4 tsp caster sugar
 900 g plain flour 4 tsp dried yeast
 300 ml plain yoghurt 1 tsp salt
 2 eggs 2 tsp baking powder
 4 tbs veg. oil

- ii. 75 ml milk 1 tsp caster sugar
 225 g plain flour 1 tsp dried yeast
 75 ml plain yoghurt $\frac{1}{4}$ tsp salt
 1 small egg $\frac{1}{2}$ tsp baking powder
 1 tbs veg. oil
- b. 50 ml milk, 150 g plain flour
 50 ml plain yoghurt
2. a. 8 teaspoons b. 2 teaspoons
 c. 1 teaspoon
3. a. i. 500 ml (or 0.5 litres or $\frac{1}{2}$ litre)
 ii. 200 ml (or 0.2 litres or $\frac{1}{5}$ litre)
 iii. 100 ml (or 0.1 litres or $\frac{1}{10}$ litre)
 b. i. 2 litres water: 5000 g or 5 kg plaster
 ii. 4 litres water: 10 000 g or 10 kg plaster

Calculate with ratios

A. Simplify ratios and find amounts (p 59)

1. a. 2:1 b. 1:5 c. 14:1
 d. 1:5 e. 3:1
2. a. 1:4
 b. i. 12 litres ii. 100 millilitres
3. a. 5:1
 b. i. 250 litres ii. 60 litres
4. a. 2:3 b. 2:9 c. 4:1:6
 d. 2:3:5 e. 33:18:10
5. a. i. 1:4 ii. 400 ml
 b. i. 2:3 ii. 600 ml
6. a. i. 50:450:500 = 1:9:10
 ii. 720 ml moss, 800 ml leaf green
 iii. 200 ml white, 2000 ml (2 l) leaf green
 b. i. 200:300:500 = 2:3:5
 ii. 120 ml beige, 200 ml chocolate brown
 iii. 120 ml white, 300 ml chocolate brown
 iv. 300 ml white, 450 ml beige
7. a. 1:25 b. 4:1 c. 1:20
 d. 8:1 e. 1:50 f. 5:1
8. a. 1:5 b. 1 litre c. 250 ml
9. a. 1:2 b. 400 g c. $1\frac{1}{4}$ kg
10. a. 1:50 b. 12 mm
 c. 4500 mm = 4.5 m
11. a. 3:100 b. 5:4 c. 1:14
 d. 13:4 e. 1:50 000 f. 5:1
 g. 1:2:9 h. 4:2:2:3
12. a. 50:4 000 = 1:80
 b. 3200 ml or 3.2 l c. 30 ml
13. a. 1500 g:400 g:200 g = 15:4:2
 b. i. 150 g cereal, 40 g nuts
 ii. 160 g nuts, 80 g seeds
 c. i. 10 cm ii. 5 cm iii. 3 cm iv. 1.5 cm

14. a. 500 m b. 1 km

B. Make a total amount (p 63)

1. 15 black 30 white
2. a. 300 g oats 100 g fruit
 b. 750 g oats 250 g fruit
3. a. 600 g white 150 g brown
 b. 800 g white 200 g brown
4. a. 200 ml orange squash, 800 ml water
 b. 300 ml orange squash, 1200 ml water
5. a. 1 litre tangerine, 1 litre white, 3 litres buttercup
 b. 200 ml tangerine, 200 ml white, 600 ml buttercup
6. a. 12:5:3
 b. i. 480 g cereal, 200 g fruit, 120 g nuts
 ii. 1080 g cereal, 450 g fruit, 270 g nuts
7. a. 15 000:45 000:150 000
 1:3:10
 b. 30 red-haired, 90 blonde-haired and 300 dark-haired
8. a. 4000:10 000:16 000 = 2:5:8
 b. A £6000, B £15 000, C £24 000
 c. £75 000
 d. £187 500
 e. A £41 000, B £102 500, C £164 000

C. Use ratios to compare prices (p 65)

1. a. Pack of 9 b. 600 ml bottle
 c. 375 g box d. 100 envelopes
 e. 24 tins
2. a. 0.5 tonne @ £27.50 = £55 per tonne
 1 tonne @ £52.50 = £52.50 per tonne
 5 tonnes @ £240 = £48 per tonne
 25 kg @ £2.75 = £110 per tonne
 40 kg @ £4.50 = £112.50 per tonne
 5 kg @ £5.50 = £500 per tonne
 b. £11 c. 24p

Inverse proportion (p 67)

1. 10 grapes
2. 50 bags
3. a. £40 b. £20
4. a. 20 mins b. 10 mins
5. a. $1\frac{1}{2}$ hours (90 mins) b. $\frac{1}{2}$ hour (30 mins)
6. a. $1\frac{1}{2}$ minutes (90 seconds) b. 45 seconds
7. 140 minutes or 2 hours 20 minutes, assuming identical pumps
8. 12 days, assuming the crop is the same size and all workers pick at the same rate as last year
9. 1 extra labourer, assuming they all work at the same rate
10. £750 more, assuming that the same total investment is needed and they continue to contribute equally
11. 7 meals, assuming that everyone is given the same amount of rice at every meal

12. $2\frac{1}{2}$ minutes longer, assuming the relationship is inverse proportion

6 Using Algebra

Number patterns and formulae (p 70)

1. a. multiples of 4
 b. Cost = £4 × number of mugs
 c. £24
 d. Continue pattern (+ 4) giving £20, £24

2. a.

| | | | | |
|-----------------|----|----|----|----|
| Number of hours | 2 | 3 | 4 | 5 |
| Cost (£) | 40 | 55 | 70 | 85 |

- b. Total cost = £15 × number of hours + £10 (or Total cost = number of hours × £15 + £10)
 c. £130
 d. Continue sequence in table to give 6 hours £100, 7 hours £115, 8 hours £130

3. a.

| | | | | |
|--|----|----|----|-----|
| Length of fencing (metres) | 3 | 4 | 5 | 6 |
| Total cost of the fencing and gate (£) | 66 | 78 | 90 | 102 |

- b. Total cost = £12 × length of fence + £30
 c. £150
 d. Continue pattern (+ 12) giving £114, £126, £138, £150

4. a.

| | | | | |
|--|-----|-----|-----|-----|
| Number of weeks that Ian has been saving | 1 | 2 | 3 | 4 |
| Amount still to be saved (£) | 240 | 200 | 160 | 120 |

- b. Each number is 40 less than the previous number.
 c. £0 Ian has now saved what he needs.
 d. Continue pattern (−40) giving £80, £40, £0

5. a.

| | | | | |
|-----------------------|----|----|-----|-----|
| Number of hours taken | 1 | 2 | 3 | 4 |
| Total cost (£) | 67 | 92 | 117 | 142 |

- b. Each number is 25 more than the previous number
 c. Total cost = £42 + £25 × number of hours
 d. £242
 e. Continue pattern (+ 25) giving: £167, £192, £217, £242

Use simple formulae (p 71)

1. a. $\boxed{\text{Number of delegates}} \rightarrow \boxed{\text{Multiply by 15}} \rightarrow \boxed{\text{Add 75}} \rightarrow \boxed{\text{Cost in £}}$
 b. i. £225 ii. £375 iii. £825
2. a. $\boxed{\text{Number of kilograms}} \rightarrow \boxed{\text{Multiply by 50}} \rightarrow \boxed{\text{Add 25}} \rightarrow \boxed{\text{Cooking time in minutes}}$
 b. i. 125 mins (or 2 hrs 5 mins)
 ii. 150 mins (or $2\frac{1}{2}$ hours)
 iii. 65 mins (or 1 hour 5 mins)
3. a. $\boxed{\text{Number of miles}} \rightarrow \boxed{\text{Multiply by 1.6}} \rightarrow \boxed{\text{Add 8}} \rightarrow \boxed{\text{Fare in £}}$

- b. i. £16 ii. £27.20 iii. £36

4. a. $\boxed{\text{Number of customer accounts}} \rightarrow \boxed{\text{Multiply by 7.5}} \rightarrow \boxed{\text{Add 340}} \rightarrow \boxed{\text{Weekly earnings in £}}$
 b. i. £370 ii. £415 iii. £452.50
5. a. i. 90 bricks ii. 375 bricks
 b. Yes, because $6 \times 0.8 \times 60 = 288$ bricks

Order of operations (BIDMAS) (p 73)

1. a. 8 b. 6 c. 68 d. 144
 e. 5 f. 27 g. 10 h. 72
 i. 22 j. 52 k. 100 l. −4
 m. 1 n. 21 o. 150
2. a. $(12 - 4) \times 2 = 16$ b. $20 \div (5 - 3) = 10$
 c. $15 \times (8 - 6) = 30$ d. $(6 + 6) \div (7 - 3) = 3$
 e. $(4 + 1)^2 = 25$ f. $(2 \times 5)^2 = 100$
3. a. 100°C b. 20°C c. 80°C d. 0°C

Evaluate algebraic expressions and make substitutions in formulae (p 74)

1. a. $C = 50n + 25$
 b. i. £125 ii. £225 iii. £325
2. a. $P = 11t + 5n$
 b. i. £103 ii. £190 iii. £500
3. a. 50 metres b. 27 metres
4. a. £114 000 b. £159 000
 c. £195 000 d. £278 850
5. 120 volts
6. a. 60 miles per hour
 b. 0.4 km per min
 (or 400 m per min or 24 km per hour)
7. a. $C = 28n + En + 10$ or $C = 10 + n(E + 28)$ or $C = n(E + 28) + 10$
 b. i. £109 ii. £185 iii. £298.75
8. a. 18 cm² b. 68 cm²
 c. 10.5 cm² d. 285 cm²
9. a. 100°C b. 25°C
10. a. 3 cm² b. 27 cm² c. 75 cm²
11. a. 24 b. 25 c. 25

7 Mixed Operations and Calculator Practice

Solve problems (p 78)

1. 576
 2. £156
 3. a. 786 b. 22
 4. a. £468 b. £533
 5. a. £895 b. £447.50
 6. a. £153 b. £571
 7. a. 270 b. 9
 8. a. £992 b. £817

9. a. 33 boxes b. 5 bulbs
10. a. 5 × 5 litre tins and 1 × 2 litre tin
b. 7 × 5 litre tins and 2 × 2 litre tins
c. 25 × 5 litre tins, 1 × 2 litre tin and 1 × 1 litre tin
11. a. 4 packs of 10
b. 1 pack of 50 and 1 pack of 25
c. 5 packs of 50 and 1 pack of 25
d. 7 packs of 50 and 1 pack of 10
12. a. £51 b. £175
13. a. 3 packs of 2 (one pack is free) £6
b. 4 packs of 2 (one pack is free) £9
c. 1 pack of 10 £10
d. 6 packs of 2 (2 packs are free) £12
14. a. £65 2 × £25 and 1 × £15
b. £100 1 × £25 and 5 × £15
c. £90 1 × £75 and 1 × £15
d. £200 8 × £25
e. £180 2 × £75 and 2 × £15
f. £190 2 × £75, 1 × £25, 1 × £15

Calculate efficiently (p 82)

1. a. Part-time receptionist by £440 a year
b. Warehouse supervisor by £1080 a year
2. a. i. £488 ii. £1324 iii. £1776
b. £292 c. £972
d. i. 12 nights ii. 6 nights

Calculate efficiently with numbers of any size (p 83)

1. 55.6°C
2. £0.91 million
3. 25th Feb £582.81 out
26th Feb £817.11 out
27th Feb £2778.86 in
28th Feb £2097.68 out
4. a. i. in debit ii. £95.10
b. i. in credit ii. £74.00

5. a.

| Year | Profit (£) |
|------|------------|
| 2010 | 1 200 000 |
| 2011 | 700 000 |
| 2012 | -300 000 |
| 2013 | -550 000 |
| 2014 | -100 000 |
| 2015 | -1 000 000 |
| 2016 | -500 000 |
| 2017 | 0 |
| 2018 | 500 000 |

- b. i. £2 200 000 ii. -£50 000




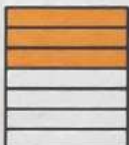


8 Fractions

Understand fractions

A. Fractions in words, numbers and sketches (p 85)

1. a. $\frac{2}{3}$ b. $\frac{1}{5}$ c. $\frac{3}{8}$ d. $\frac{5}{12}$
2. a. one half b. one quarter
c. three fifths d. five sixths
e. five eighths f. seven ninths
3. a. $\frac{1}{4}$, one quarter b. $\frac{1}{5}$, one fifth
c. $\frac{1}{9}$, one ninth d. $\frac{5}{6}$, five sixths
e. $\frac{2}{3}$, two thirds f. $\frac{5}{8}$, five eighths
g. $\frac{4}{7}$, four sevenths h. $\frac{7}{12}$, seven twelfths
i. $\frac{4}{9}$, four ninths

B. Shade fractions (p 86)

1. B, C 2. B, D
3. a.  b.  c. 
- d.  e.  f. 

or alternatives with the same number of sections shaded.

4. Fractions shown on students' own shapes
5. C does not have $\frac{3}{5}$ shaded as the parts are not equal sizes.

C. Read about fractions (p 87)

1. half $\frac{1}{2}$, one third $\frac{1}{3}$
2. quarter $\frac{1}{4}$, three quarters $\frac{3}{4}$,
one and a half $1\frac{1}{2}$, half $\frac{1}{2}$
3. two thirds $\frac{2}{3}$, half $\frac{1}{2}$
4. one fifth $\frac{1}{5}$, two thirds $\frac{2}{3}$, three quarters $\frac{3}{4}$

Equivalent fractions

A. Use sketches (p 88)

1. a. $\frac{1}{2} = \frac{2}{4} = \frac{3}{6}$ b. $\frac{1}{5} = \frac{2}{10}$
c. $\frac{3}{4} = \frac{6}{8} = \frac{9}{12}$ d. $\frac{3}{4} = \frac{12}{20}$
2. Students' own sketches

B. Use numerators and denominators (p 89)

1. a. True b. True c. False d. True
e. True f. False g. False h. True

2. a. 15 b. 24 c. 4 d. 8
e. 10 f. 3 g. 2 h. 4

3. a. Yes b. No, $\frac{1}{5}$

4. Any 6 other fractions equal to $\frac{1}{2}$ (eg $\frac{4}{8}, \frac{5}{10}, \frac{6}{12}, \frac{7}{14}, \frac{8}{16}, \frac{9}{18}$)

5. a. Any 3 other fractions equal to $\frac{2}{8}$ (eg $\frac{1}{4}, \frac{4}{16}, \frac{6}{24}, \frac{8}{32}$)

- b. Any 3 other fractions equal to $\frac{2}{5}$ (eg $\frac{4}{10}, \frac{6}{15}, \frac{8}{20}, \frac{10}{25}$)

- c. Any 3 other fractions equal to $\frac{2}{6}$ (eg $\frac{1}{3}, \frac{4}{12}, \frac{6}{18}, \frac{8}{24}$)

- d. Any 3 other fractions equal to $\frac{4}{10}$ (eg $\frac{2}{5}, \frac{8}{20}, \frac{12}{30}, \frac{16}{40}$)

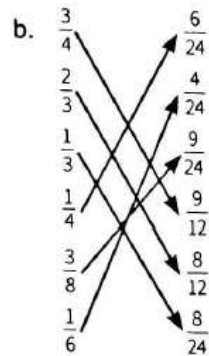
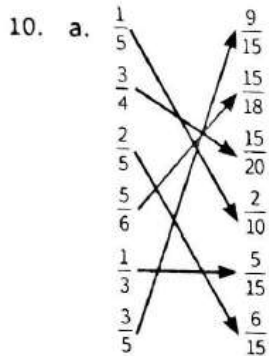
6. Yes, $\frac{12}{30} = \frac{2}{5}$

7. 2, 4, 5, 7, 11, 15, 20, 100

8. a. $\frac{6}{18}, \frac{4}{12}, \frac{5}{15}, \frac{2}{6}, \frac{3}{9}$

- b. $\frac{6}{9}, \frac{8}{12}, \frac{4}{6}, \frac{12}{18}, \frac{10}{15}$

9. No, $\frac{15}{20} = \frac{3}{4}$ not $\frac{3}{5}$



C. Write quantities as fractions (p 90)

1. a. $\frac{1}{2}$ cm b. $\frac{2}{5}$ cm c. $\frac{3}{5}$ cm
2. a. $\frac{1}{2}$ kg b. $\frac{3}{4}$ kg c. $\frac{1}{10}$ kg
d. $\frac{1}{5}$ kg e. $\frac{3}{5}$ kg
3. a. $\frac{1}{200}$ km b. $\frac{1}{20}$ km c. $\frac{1}{2}$ km
d. $\frac{1}{10}$ km e. $\frac{3}{20}$ km
4. a. $\frac{1}{50}$ ℓ b. $\frac{1}{20}$ ℓ c. $\frac{1}{5}$ ℓ
d. $\frac{1}{2}$ ℓ e. $\frac{2}{5}$ ℓ
5. a. $\frac{1}{5}$ m b. $\frac{1}{2}$ m c. $\frac{9}{10}$ m
d. $\frac{4}{5}$ m e. $\frac{1}{20}$ m f. $\frac{1}{10}$ m
g. $\frac{1}{5}$ m h. $\frac{2}{5}$ m i. $\frac{3}{5}$ m
j. $\frac{1}{50}$ m

Compare fractions

A. Compare unit fractions (p 91)

1. a. $\frac{1}{8}$ b. $\frac{1}{10}$ c. $\frac{1}{20}$ d. $\frac{1}{12}$
2. a. $\frac{1}{20}$ b. $\frac{1}{17}$ c. $\frac{1}{5}$ d. $\frac{1}{11}$
3. $\frac{1}{20}, \frac{1}{15}, \frac{1}{12}, \frac{1}{10}, \frac{1}{6}, \frac{1}{5}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}$
4. $\frac{1}{7}, \frac{1}{8}, \frac{1}{9}, \frac{1}{11}, \frac{1}{13}, \frac{1}{14}, \frac{1}{16}, \frac{1}{17}, \frac{1}{21}$

B. Use fraction walls (p 92)

1. a. 2 b. 4 c. 8 d. 6
e. 12 f. 6 g. 10 h. 1

2. a. $\frac{5}{16}, \frac{3}{8}, \frac{7}{16}$ b. $\frac{1}{2}, \frac{9}{16}, \frac{5}{8}$ c. $\frac{3}{4}, \frac{13}{16}, \frac{7}{8}$

3. a. 5, 10 b. 5 c. 2 d. 4

- e. 6 f. 10

4. $\frac{9}{10}, \frac{4}{5}, \frac{7}{10}, \frac{3}{5}, \frac{1}{2}, \frac{2}{5}, \frac{3}{10}, \frac{1}{5}, \frac{1}{10}$

5. a. $\frac{3}{4}$ b. $\frac{1}{2}$ c. $\frac{2}{5}$ (with sketches)

6. a. $\frac{1}{2}$ b. $\frac{3}{5}$ c. $\frac{3}{4}$ (with sketches)

7. Emma is wrong: $\frac{3}{7}$ is less than $\frac{1}{2}$, $\frac{3}{7} = \frac{6}{14}$ and $\frac{1}{2} = \frac{7}{14}$, $\frac{6}{14}$ is less than $\frac{7}{14}$.

C. Put fractions in order using a common denominator (p 93)

1. a. $\frac{2}{3}$ b. $\frac{7}{9}$ c. $\frac{9}{10}$
2. a. $\frac{2}{5}, \frac{3}{5}, \frac{4}{5}$ b. $\frac{1}{7}, \frac{2}{7}, \frac{4}{7}, \frac{5}{7}$ c. $\frac{1}{9}, \frac{2}{9}, \frac{4}{9}, \frac{5}{9}, \frac{8}{9}$
3. a. $\frac{1}{4}$ b. $\frac{3}{5}$ c. $\frac{3}{4}$ d. $\frac{4}{7}$
4. a. $\frac{3}{8}, \frac{1}{2}, \frac{5}{8}$ b. $\frac{1}{4}, \frac{3}{10}, \frac{2}{5}$
c. $\frac{5}{16}, \frac{1}{2}, \frac{3}{4}, \frac{7}{8}$ d. $\frac{2}{3}, \frac{3}{4}, \frac{5}{6}, \frac{11}{12}$
e. $\frac{3}{7}, \frac{1}{2}, \frac{5}{7}, \frac{3}{4}$ f. $\frac{1}{4}, \frac{1}{3}, \frac{3}{8}, \frac{5}{12}, \frac{1}{2}$
5. a. $\frac{4}{7}, \frac{1}{2}, \frac{2}{7}$ b. $\frac{5}{6}, \frac{2}{3}, \frac{5}{9}$
c. $\frac{3}{4}, \frac{2}{3}, \frac{1}{2}, \frac{4}{9}$ d. $\frac{9}{10}, \frac{13}{15}, \frac{4}{5}, \frac{2}{3}$
e. $\frac{5}{8}, \frac{7}{12}, \frac{5}{9}, \frac{4}{9}$ f. $\frac{13}{15}, \frac{11}{15}, \frac{7}{10}, \frac{2}{3}, \frac{3}{5}, \frac{2}{9}$

Mixed numbers and improper fractions (p 94)

1. a. $1\frac{1}{2} = \frac{3}{2}$ b. $1\frac{4}{5} = \frac{9}{5}$
c. $2\frac{3}{10} = \frac{23}{10}$ d. $3\frac{5}{6} = \frac{23}{6}$
e. $1\frac{7}{9} = \frac{16}{9}$ f. $2\frac{3}{8} = \frac{19}{8}$
2. Mixed numbers and improper fractions on students' own shapes
3. a. Mixed numbers and fractions on students' own shapes
b. $\frac{5}{8}, \frac{3}{4}, \frac{7}{8}, 1\frac{1}{4}, 1\frac{3}{8}, 1\frac{1}{2}, 2\frac{1}{2}$
4. a. $\frac{3}{4}, 1\frac{1}{2}, 1\frac{3}{5}, 2\frac{1}{3}, 2\frac{2}{5}$
b. $\frac{4}{7}, \frac{5}{8}, 1\frac{7}{12}, 1\frac{3}{4}, 1\frac{5}{6}$
c. $\frac{4}{9}, \frac{5}{7}, 1\frac{3}{4}, 2\frac{3}{7}, 2\frac{1}{2}, 2\frac{2}{3}$
d. $\frac{1}{4}, 1\frac{5}{8}, 1\frac{2}{3}, 1\frac{5}{6}, 1\frac{11}{12}, 2\frac{1}{8}$

Find or estimate fractions (p 96)

1. a. i. $\frac{1}{2}$ ii. $\frac{1}{2}$ b. i. $\frac{1}{3}$ ii. $\frac{2}{3}$
c. i. $\frac{3}{4}$ ii. $\frac{1}{4}$
2. a. $\frac{4}{5}$ full b. $\frac{3}{5}$ full c. $\frac{2}{5}$ full
3. a. $\frac{1}{2}$ full b. $\frac{2}{3}$ full c. $\frac{3}{4}$ full
4. a. $\frac{3}{5}$ left b. $\frac{1}{3}$ left c. $\frac{1}{5}$ left
5. a. i. $\frac{1}{4}$ ii. $\frac{3}{4}$ b. i. $\frac{1}{3}$ ii. $\frac{2}{3}$
c. i. $\frac{2}{3}$ ii. $\frac{1}{3}$

Calculate a fraction of something

A. By dividing when the numerator is 1 (p 98)

- £28
 - 24 cm
 - £156
 - £99
 - £204
 - £91
 - 72 m
 - £47
- 12
- £15
 - £30
- 14
 - 56
- 15 litres
- £85
- 3500
 - 17 500
- 125 g
 - 875 g

B. Find more than one part (p 99)

- £630
 - £104
 - 30 m
 - 150 g
 - 350 cm
 - £460
 - £1800
 - 1460 kg
- 240
- 18
- £33 750
- 31 050
- 165
- £5750
- 360 000

C. Estimate to check answers (p 100)

- A, B, E, F, H are wrong.
- A 19
 - B 76
 - E 297
 - F 450
 - H 192

D. Other methods (p 100)

- £1140
 - 42 kg
 - 324 m
- Students' own sketches
 - £480
 - £120
 - £600
- Students' own sketches
 - 64 m
 - 32 m
 - 96 m
- Students' own sketches
 - £3600
 - £2400
 - £6000
 - 1200

E. Scale up and down (p 101)

- 180 g potatoes, 300 g leeks, 500 ml milk, 100 ml stock
 - 360 g potatoes, 600 g leeks, 1 l or 1000 ml milk, 200 ml stock
- $\frac{3}{4}$
 - 300 g nuts, 150 g breadcrumbs, 180 g tomatoes, 3 onions
- $\frac{4}{5}$
 - 240 g flour, 128 g sugar, 112 g butter, 48 g ground almonds
- 3 loaves, 600 g butter, 6 tomatoes, $1\frac{1}{2}$ cucumbers, 300 g paté, 225 g chicken, 375 g cheese, $\frac{3}{4}$ lettuce
 - 5 loaves, 1 kg or 1000 g butter, 10 tomatoes, $2\frac{1}{2}$ cucumbers, 500 g paté, 375 g chicken, $625\frac{1}{4}$ lettuce

One number as a fraction of another

A. Simplest form (p 103)

- $\frac{2}{5}$
- $\frac{3}{4}$
- $\frac{1}{3}$
- $\frac{2}{5}$
- $\frac{4}{5}$
- $\frac{2}{3}$
- $\frac{1}{2}$
- $\frac{3}{4}$
- $\frac{1}{3}$
- $\frac{3}{4}$
- $\frac{1}{5}$
- $\frac{3}{10}$
- $\frac{2}{3}$
- $\frac{3}{7}$
- $\frac{3}{5}$

B. Write one quantity as a fraction of another (p 104)

- $\frac{1}{4}$ h
 - $\frac{1}{3}$ h
 - $\frac{4}{5}$ h
- $\frac{1}{10}$ kg
 - $\frac{3}{4}$ kg
 - $\frac{2}{5}$ kg
 - $\frac{16}{25}$ kg
- $\frac{3}{10}$ cl
 - $\frac{1}{2}$ cl
 - $\frac{1}{5}$ cl
 - $\frac{2}{5}$ cl
 - $\frac{3}{5}$ cl
- $\frac{1}{20}$ kg
 - $\frac{1}{2}$ g
 - $\frac{1}{4}$ kg
 - $\frac{1}{4}$ g
 - $\frac{1}{5}$ kg
- $\frac{1}{2}$ lb
 - $\frac{1}{4}$ lb
 - $\frac{3}{4}$ lb
 - $\frac{3}{8}$ lb
- $\frac{2}{3}$
- $\frac{1}{5}$
- $\frac{3}{5}$
- $\frac{11}{18}$

10. a.

| | Men | Women | Total |
|-------|-----|-------|-------|
| Car | 240 | 300 | 540 |
| Bus | 120 | 270 | 390 |
| Train | 80 | 100 | 180 |
| Cycle | 15 | 10 | 25 |
| Walk | 25 | 40 | 65 |
| Total | 480 | 720 | 1200 |

- Men: Car $\frac{1}{2}$ Bus $\frac{1}{4}$ Train $\frac{1}{6}$
Cycle $\frac{1}{32}$ Walk $\frac{5}{96}$
 - Women: Car $\frac{5}{12}$ Bus $\frac{3}{8}$ Train $\frac{5}{36}$
Cycle $\frac{1}{72}$ Walk $\frac{1}{18}$
- $\frac{2}{5}$
 - $\frac{3}{5}$

C. Estimate one quantity as a fraction of another (p 105)

- $\frac{1}{4}$
 - $\frac{3}{4}$
- $\frac{5}{6}$
 - both are 200, giving 1
 - $\frac{4}{5}$
- $\frac{3}{4}$
 - $\frac{2}{3}$
 - all
- $\frac{1}{10}$
 - $\frac{1}{60}$
 - $\frac{1}{30}$
 - $\frac{7}{8}$
 - $\frac{5}{8}$
 - $\frac{3}{8}$
- $\frac{3}{4}$
 - $\frac{1}{4}$

Note: Other answers are possible.
- 141 200 000
 - $\frac{2}{7}$
 - $\frac{3}{14}$
 - $\frac{3}{7}$
 - $\frac{1}{14}$
- Paper and cardboard $\frac{1}{2}$, glass $\frac{1}{4}$, metal $\frac{1}{10}$, plastic $\frac{1}{7}$, wood $\frac{1}{20}$

Add and subtract fractions

A. Add and subtract fractions with the same denominator (p 107)

1. $\frac{4}{5}$ 2. $\frac{2}{5}$ 3. 1 4. $\frac{2}{3}$
 5. $\frac{5}{7}$ 6. $\frac{3}{7}$ 7. $\frac{1}{2}$ 8. $\frac{2}{3}$
 9. $\frac{4}{5}$ 10. 1 11. $\frac{2}{5}$ 12. $\frac{1}{2}$
 13. a. $\frac{3}{5}$ b. $\frac{2}{5}$ 14. a. $\frac{3}{8}$ b. $\frac{1}{4}$

B. Add and subtract fractions with different denominators (p 109)

1. $\frac{7}{10}$ 2. $\frac{1}{2}$ 3. $\frac{5}{6}$ 4. $\frac{1}{3}$
 5. $\frac{11}{12}$ 6. $\frac{7}{20}$ 7. $\frac{1}{8}$ 8. $\frac{8}{9}$
 9. $\frac{4}{15}$ 10. $\frac{19}{21}$ 11. $\frac{11}{15}$ 12. $\frac{3}{10}$
 13. $\frac{3}{4}$ 14. $\frac{9}{40}$ 15. $\frac{29}{30}$ 16. $\frac{1}{18}$
 17. $\frac{17}{36}$ 18. $\frac{3}{20}$ 19. 0 20. $\frac{7}{8}$
 21. a. $\frac{3}{4}$ b. $\frac{1}{4}$

C. Improper fractions and mixed numbers (p 110)

1. $1\frac{4}{5}$ 2. $2\frac{3}{5}$ 3. $4\frac{1}{3}$ 4. $5\frac{2}{3}$
 5. $3\frac{3}{4}$ 6. $4\frac{1}{2}$ 7. $6\frac{1}{2}$ 8. $1\frac{3}{7}$
 9. $5\frac{1}{4}$ 10. $2\frac{5}{6}$ 11. $6\frac{1}{3}$ 12. $6\frac{3}{5}$
 13. $2\frac{7}{8}$ 14. $3\frac{7}{10}$ 15. $4\frac{4}{9}$ 16. $1\frac{1}{3}$
 17. $1\frac{1}{7}$ 18. $1\frac{5}{8}$ 19. $1\frac{1}{6}$ 20. $1\frac{1}{2}$
 21. $1\frac{9}{28}$ 22. $1\frac{1}{5}$ 23. $2\frac{5}{24}$

D. Add and subtract mixed numbers (p 111)

1. $\frac{3}{2}$ 2. $\frac{5}{2}$ 3. $\frac{7}{2}$ 4. $\frac{5}{3}$
 5. $\frac{8}{3}$ 6. $\frac{11}{5}$ 7. $\frac{19}{5}$ 8. $\frac{13}{6}$
 9. $\frac{11}{6}$ 10. $\frac{19}{8}$ 11. $\frac{17}{7}$ 12. $\frac{47}{8}$
 13. $\frac{49}{10}$ 14. $\frac{31}{9}$ 15. $\frac{44}{7}$ 16. $2\frac{3}{4}$
 17. $\frac{17}{20}$ 18. $5\frac{1}{3}$ 19. $1\frac{5}{12}$ 20. $8\frac{1}{8}$
 21. $2\frac{5}{6}$ 22. $\frac{19}{20}$ 23. $6\frac{1}{10}$ 24. $3\frac{13}{15}$
 25. $6\frac{1}{14}$ 26. $7\frac{1}{4}$ 27. $1\frac{1}{8}$
 28. 3 hours 29. $4\frac{1}{4}$ pounds
 30. a. $15\frac{1}{2}$ hours b. $1\frac{1}{4}$ hours
 c. $2\frac{3}{4}$ hours

Multiply fractions (p 113)

1. $\frac{1}{10}$ 2. $\frac{1}{21}$ 3. $\frac{2}{9}$ 4. $\frac{4}{7}$
 5. $\frac{6}{11}$ 6. $\frac{1}{10}$ 7. $\frac{1}{2}$ 8. $\frac{7}{10}$
 9. Yes 10. $\frac{1}{3} \times \frac{1}{4} = \frac{1}{12}$ and $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$
 11. $1\frac{2}{3}$ 12. $1\frac{4}{5}$ 13. $1\frac{1}{4}$ 14. $\frac{2}{3}$

15. 3 16. $4\frac{1}{2}$ 17. $10\frac{1}{2}$ 18. $5\frac{5}{7}$
 19. $1\frac{2}{3}$ kg
 20. a. $2\frac{2}{5}$ m b. $1\frac{3}{5}$ m c. $\frac{4}{5}$ m $\frac{1}{6} \times \frac{24}{5} = \frac{24}{5} = 4\frac{4}{5}$

Divide fractions (p 115)

1. 3 2. $\frac{1}{2}$ 3. 4 4. 2
 5. $\frac{3}{4}$ 6. $\frac{7}{10}$ 7. $\frac{5}{6}$ 8. $1\frac{11}{24}$
 9. 8
 10. $\frac{6}{9} = \frac{2}{3}$ (cancelling by 3) and $\frac{2}{3} \div \frac{1}{9} = \frac{2}{3} \times \frac{9}{1} = \frac{18}{3} = 6$
 11. 10 12. $\frac{1}{2}$ 13. $3\frac{3}{4}$ 14. $\frac{5}{8}$
 15. $1\frac{17}{18}$ 16. $1\frac{5}{7}$ 17. $\frac{2}{3}$ 18. $2\frac{13}{28}$
 19. 6 20. 8

9 Decimals

Understand decimals in context (up to 2 decimal places) (p 118)

1. a. 0.4 cm b. 2.5 cm c. 4.1 cm
 d. 5.6 cm e. 7.8 cm f. 10.3 cm
 g. 12.5 cm h. 15.2 cm i. 17.9 cm
 j. 20.6 cm k. 21.4 cm l. 23.7 cm
 2. a. 2.5 cm, 2.4 cm, 2.1 cm, 1.9 cm, 1.8 cm
 b. 4.5 cm, 4.3 cm, 4.1 cm, 3.9 cm, 3.8 cm, 3.4 cm
 c. 11.1 cm, 10.7 cm, 10.6 cm, 10.5 cm, 9.9 cm, 9.6 cm
 d. 6.4 m, 6.2 m, 6.1 m, 5.8 m, 5.7 m, 5.5 m, 5.3 m, 5.1 m
 e. 2.9 km, 2.3 km, 2.1 km, 1.8 km, 1.7 km, 1.4 km, 1.2 km, 0.9 km
 3. a. 100p b. 218p c. 109p
 d. 407p e. 62p f. 824p
 g. 570p h. 904p i. 1017p
 j. 1640p
 4. a. £2.13 b. £4.02 c. £0.85
 d. £3.50 e. £1.03 f. £6.00
 g. £7.25 h. £9.37 i. £10.00
 j. £24.09
 5. a. £1.02 £1.19 £1.21 £1.37
 £1.46 £1.87 £2.07
 b. £47.20 £56.78 £63.02
 £63.21 £66.18 £74.02
 c. £10.07 £10.08 £10.70
 £11.01 £11.17 £11.91
 6. a. 22 cm b. 107 cm c. 173 cm
 d. 74 cm e. 133 cm f. 112 cm
 g. 115 cm h. 67 cm i. 260 cm
 j. 540 cm
 7. a. 1.54 m b. 3.15 m c. 0.94 m
 d. 1.2 m e. 7.62 m f. 4.02 m
 g. 0.7 m h. 2.5 m i. 11.34 m
 j. 22.3 m

8. a. 1.5m 1.55m 1.63m 1.67m
 1.72m 1.74m 1.8m
- b. 1.26m 1.28m 1.3m 1.31m
 1.32m 1.39m 1.4m
- c. 0.72m 0.84m 0.88m 0.99m
 1.01m 1.02m 1.03m
9. a. i. 1.5m ii. 7.5m iii. 10.5m
 b. i. $2\frac{1}{2}$ m ii. $6\frac{1}{2}$ m iii. $15\frac{1}{2}$ m

Write and compare decimals up to 3 decimal places

A. Place value (p 122)

1. a.

| Hundreds 100s | Tens 10s | Units 1s | Tenths 10ths | Hundredths 100ths | Thousandths 1000ths |
|------------------|-------------|-------------|-----------------|----------------------|------------------------|
| 1 | 1 | 6 | 7 | 4 | |
| | 3 | 7 | 5 | 4 | |
| | 1 | 2 | 0 | 6 | |
| | | 4 | 5 | 2 | |
| 5 | 3 | 6 | 0 | 9 | |
| 5 | 0 | 6 | 9 | 2 | 6 |
| | 6 | 7 | 3 | 5 | 4 |
| 1 | 2 | 7 | 0 | 6 | 3 |
| 1 | 0 | 7 | 4 | 0 | 1 |
| 2 | 3 | 1 | 0 | 7 | 9 |
| 6 | 1 | 9 | 1 | 0 | 2 |
| 4 | 2 | 3 | 0 | 7 | 3 |

- b. i. $\frac{7}{10}$ ii. $\frac{4}{100}$ iii. 2
 iv. $\frac{5}{10}$ v. 500 vi. $\frac{6}{1000}$
 vii. $\frac{5}{100}$ viii. $\frac{3}{1000}$ ix. $\frac{4}{10}$
 x. $\frac{9}{1000}$ xi. $600; \frac{1}{10}$ xii. $20; \frac{3}{1000}$

2.

| Hundreds 100s | Tens 10s | Units 1s | Tenths 10ths | Hundredths 100ths | Thousandths 1000ths |
|------------------|-------------|-------------|-----------------|----------------------|------------------------|
| | 5 | 7 | 3 | 2 | |
| | | 6 | 9 | | |
| | 1 | 2 | 4 | 1 | |
| 1 | 0 | 0 | 3 | 5 | |
| | 9 | 6 | 0 | 7 | |
| | 1 | 2 | 5 | 0 | 6 |
| 4 | 9 | 7 | 6 | 4 | 3 |

3. a. $\frac{7}{10}$ b. $\frac{6}{100}$ c. $\frac{3}{1000}$ d. $\frac{4}{100}$
 e. $3\frac{5}{100}$ f. $6\frac{4}{10}$ g. $15\frac{7}{1000}$ h. $8\frac{2}{100}$
 i. $10\frac{6}{10}$ j. $240\frac{9}{1000}$
4. a. $\frac{1}{10} + \frac{7}{100} + \frac{17}{100}$ b. $\frac{4}{10} + \frac{9}{100} + \frac{49}{100}$
 c. $\frac{3}{100} + \frac{1}{1000} + \frac{31}{1000}$ d. $\frac{3}{10} + \frac{5}{100} + \frac{7}{1000} + \frac{357}{1000}$
 e. $6 + \frac{2}{10} + \frac{3}{100} + 6\frac{23}{100}$ f. $8 + \frac{4}{100} + \frac{3}{1000} + 8\frac{43}{1000}$
 g. $42 + \frac{1}{10} + \frac{7}{1000} + 42\frac{107}{1000}$ h. $1 + \frac{2}{10} + \frac{4}{100} + \frac{1}{1000} + 1\frac{241}{1000}$
 i. $502 + \frac{6}{10} + \frac{9}{100} + 502\frac{69}{100}$
 j. $17 + \frac{6}{10} + \frac{5}{100} + \frac{3}{1000} + 17\frac{653}{1000}$

B. Write decimals as common fractions (p 123)

1. $\frac{1}{2}$ 2. $\frac{1}{5}$ 3. $\frac{2}{5}$ 4. $\frac{3}{5}$ 5. $\frac{4}{5}$
 6. $\frac{3}{20}$ 7. $\frac{7}{20}$ 8. $\frac{11}{20}$ 9. $\frac{1}{4}$ 10. $\frac{9}{20}$

C. Put decimals in order of size (p 124)

1. a. 7.21 7.11 6.76 6.12 5.98
 5.03 5.02 4.68 4.32
- b. 14.26 14.21 13.1 13.03
 12.97 12.5 12.43 12.07
- c. 26.47 26.42 26.11 25.17
 25.06 21.8 21.5 21.43
- d. 7.84 7.21 6.96 6.48 5.74
 4.06 3.5 3.21 3.19
2. a. 0.003 0.23 0.307 1.05
 1.075 1.11 1.761
- b. 12.005 12.05 12.121 12.429
 12.5 12.502
- c. 19.006 19.16 19.375 20.095
 21.101 21.35
- d. 412.438 428.003 483.562 581.098
 581.879 604.002
3. a. 2.032kg 2.009kg 1.762kg 1.104kg
 1.045kg
- b. 1.707kg 1.7kg 1.077kg 1.07kg
 1.007kg
- c. 0.405kg 0.318kg 0.201kg 0.058kg
 0.041kg
4. a. 11.099 11.909 12.009 12.037
 12.056 12.201
- b. 18.302 18.411 18.567 18.591
 19.002 19.041
- c. 25.021 25.072 25.503 25.601
 26.001 26.057

Use a calculator to solve problems (p 125)

1. a. 14.05 b. £4.76 c. 2m
 d. 10.7 e. £3.71 f. £8.81
 g. 4.5m h. 21.86 i. 15.09
 j. £1.53 or £1.54 k. 1kg l. £28.60
 m. 2.15 (2dp) n. £0.78 (2dp) o. 20
 p. 6.75
2. £11.70 3. £5.37 4. £28
5. a. 5.25m b. 0.3m
6. £29.10 7. £8.76 8. £4.26

Multiply and divide decimals by 10, 100 and 1000 (p 127)

1. a. 174 b. 563 c. 17200
 d. 117.43 e. 16010 f. 11220
2. a. 5.622 b. 0.6304 c. 0.0144
 d. 10.201 e. 0.0574 f. 0.106
3. a. 261.1 b. 0.577 c. 104
 d. 1.21 e. 47200 f. 0.56602

4. a. 300 mm b. 370 cm c. 1.45 m
 d. 4.5 cm e. 345 p f. £7.89
 g. 66 cm h. 0.65 litres i. 1.567 kg
 j. 1.8 cm k. 600 m l. 7.58 km
5. a. ~~7500 g~~ ~~2.3 m~~ b. ~~0.5 m~~ ~~750 g~~
~~230 cm~~ ~~0.75 l~~ ~~1.2 l~~ ~~5 ml~~
~~2300 g~~ ~~7.5 kg~~ ~~0.75 kg~~ ~~50 cm~~
~~75 cℓ~~ ~~1.25 l~~ ~~1.2 cm~~ ~~120 cℓ~~
~~125 cℓ~~ ~~2.3 kg~~ ~~0.5 cℓ~~ ~~12 mm~~

Round decimal numbers and approximate (p 128)

1. a. 15 b. 13 c. 7 d. 4
 e. 10 f. 6 g. 16 h. 12
 i. 10 j. 12 k. 15 l. 1
 m. 4 n. 6 o. 0 p. 27
 q. 250 r. 100
2. £15 3. 6 m 4. £6 5. 6 kg 6. £14.50
7. a. 5.68 b. 16.59 c. 11.33
 d. 21.90 e. 155.79 f. 16.22
 g. 131.08 h. 6.75 i. 121.90
 j. 1.89 k. 2.40 l. 16.71
 m. 15.92 n. 13.56 o. 1.01
8. a. £1.27 b. 2.73 kg c. £12.16
 d. 17.42 m e. 22.57 km f. 14.73 g
 g. 16.19 cm h. £9.64 i. 0.47 l
 j. 15.10 km
9. a. £15 b. 14 kg c. 5.11 litres
 d. £31.57 e. £7.17 f. 6.60 m
10. a. 9.5 b. 12.4 c. 13.2
 d. 6.7 e. 121.8 f. 5.7
 g. 91.8 h. 151.9 i. 65.1
 j. 73.6
11. a. £7.36 b. 6.2 kg c. 4.75 m
 d. £123.69 e. 9.2 litres
12. a. 5.792 b. 16.938 c. 3.749
 d. 0.974 e. 4.032 f. 16.770
 g. 12.081 h. 27.901 i. 1.550
 j. 17.700
13. 1.609 km 14. 0.568 litres

Add and subtract decimals (p 131)

1. a. 9.1 kg b. 2.8 m c. 23.36 cm
 d. £22.67 e. £7.77 f. £30.54
 g. £127.16 h. 1.35 m i. 163.16 km
 j. £1.05 k. 127.57 kg l. £156.54
2. £136.86 3. £882.81 4. £6.51
 5. £86.35 6. 150.25 m 7. £415.41
 8. 309 m
9. a. Team A 91.13 seconds,
 Team B 90.78 seconds
 b. Team B by 0.35 seconds

10. £244.67
 11. £1927.61
 12. a. 10.491 b. 6.315 c. 4.129
 13. 16.116 seconds

Decimal sequences (p 133)

1. a. Add 0.2; 2.2, 2.4, 2.6 b. Add 0.2; 3.7, 3.9, 4.1
 c. Add 0.05; 1.8, 1.85, 1.9 d. Add 1.1; 6.6, 7.7, 8.8
 e. Add 0.3; 1.7, 2, 2.3 f. Add 0.05 0.3, 0.35, 0.4
 g. Subtract 0.5; 7.5, 7, 6.5 h. Subtract 0.2; 3, 2.8, 2.6
 i. Subtract 0.01; 1.91, 1.9, 1.89
 j. Subtract 0.1; 10.1, 10, 9.9
2. a. 0.95 m b. 1.85 m

3. a.

| Number of cakes tied with ribbon | Length of remaining ribbon (metres) |
|----------------------------------|-------------------------------------|
| 0 | 5 |
| 1 | 4.4 |
| 2 | 3.8 |
| 3 | 3.2 |
| 4 | 2.6 |
| 5 | 2 |
| 6 | 1.4 |
| 7 | 0.8 |
| 8 | 0.2 |

- b. 8 cakes c. 0.2 m

4. a.

| Number of glasses | Amount of remaining lemonade (litres) |
|-------------------|---------------------------------------|
| 0 | 2 |
| 1 | 1.7 |
| 2 | 1.4 |
| 3 | 1.1 |
| 4 | 0.8 |
| 5 | 0.5 |
| 6 | 0.2 |

- b. 6 c. 0.2 litres

Multiply decimals (p 134)

1. a. 2.4 b. 0.02 c. 0.35
 d. 0.12 e. 14.6 f. 59.1
 g. 5.61 h. 14.85 i. 32.56
 j. 5.14 (to 2 dp) k. 10.52 (to 2 dp)
 l. 1.24 (to 2 dp) m. 37.89 (to 2 dp)
 n. 8.02 (to 2 dp) o. 66.25 (to 2 dp)
 p. 13.05 (to 2 dp)
2. 15 m 3. 4.5 litres 4. £335.63 (2dp)

4. a. 35 b. 112 kg c. 6.3 litres
 d. £1.75 e. 28.35 cm f. £6.23
 5. a. 180 b. £65.70 c. 10.8 m
 d. 6.3 kg e. 6.75 litres f. £5.58

3.

| Fraction | Decimal | % |
|----------------|----------|-------------------|
| $\frac{1}{2}$ | 0.5 | 50% |
| $\frac{1}{4}$ | 0.25 | 25% |
| $\frac{3}{4}$ | 0.75 | 75% |
| $\frac{1}{10}$ | 0.1 | 10% |
| $\frac{1}{5}$ | 0.2 | 20% |
| $\frac{1}{3}$ | 0.333... | $33\frac{1}{3}\%$ |

Equivalent fractions, decimals and percentages

A. Convert between percentages and decimals (p 146)

1. a. 0.25 b. 0.35 c. 0.4
 d. 0.3 e. 0.8 f. 0.05
 g. 0.1 h. 0.15 i. 0.04
 j. 0.08 k. 0.55 l. 0.85
 2. a. 0.16 b. 0.32 c. 0.49
 d. 0.95 e. 0.64 f. 0.52
 g. 0.175 h. 0.625 i. 0.378
 j. 0.036 k. 0.025 l. 0.0125
 3. a. 75% b. 25% c. 65%
 d. 60% e. 6% f. 10%
 g. 1% h. 50% i. 5%
 j. 90% k. 9% l. 99%
 4. a. 29% b. 57% c. 43%
 d. 150% e. 250% f. 87.5%
 g. 32.5% h. 6.5% i. 0.5%
 j. 20.5% k. 16.8% l. 245%
 5. a. 0.013, 0.045, 12.5%, 15%, 0.9
 b. 0.098, 0.1, 11%, 0.65, 75%
 c. 0.018, 0.202, 22%, 33.3%, 0.4
 d. 0.5%, 0.006, 17%, 0.3, 0.52
 e. 0.2%, 1.2%, 0.017, 16%, 31%

| Fraction | Decimal | % |
|----------------|---------|-----|
| $\frac{2}{5}$ | 0.4 | 40% |
| $\frac{7}{10}$ | 0.7 | 70% |
| $\frac{7}{20}$ | 0.35 | 35% |
| $\frac{3}{5}$ | 0.6 | 60% |
| $\frac{9}{10}$ | 0.9 | 90% |
| $\frac{3}{20}$ | 0.15 | 15% |

4. a. 0.55, 55% b. 0.625, 62.5%
 c. 0.875, 87.5% d. 0.28, 28%
 e. 0.675, 67.5% f. 0.667, 66.667% (3dp)
 g. 0.0625, 6.25% h. 0.1333, 13.3333% (4dp)
 5. a. $\frac{3}{4}$, 0.75, 78% b. 0.49, $\frac{1}{2}$, 51%
 c. 0.22, 24%, $\frac{1}{4}$ d. 19%, $\frac{1}{5}$, 0.21
 e. 50%, $\frac{5}{9}$, 0.58 f. 88%, $\frac{8}{9}$, 0.9
 g. 0.56, $\frac{7}{12}$, 59% h. $\frac{7}{16}$, 45%, 0.49

B. Write percentages as fractions (p 147)

1. a. $\frac{1}{10}$ b. $\frac{1}{5}$ c. $\frac{2}{5}$ d. $\frac{4}{5}$
 e. $\frac{7}{10}$ f. $\frac{9}{10}$ g. $\frac{1}{2}$ h. $\frac{1}{4}$
 i. $\frac{1}{20}$ j. $\frac{3}{20}$ k. $\frac{9}{20}$ l. $\frac{3}{100}$
 2. a. $\frac{19}{100}$ b. $\frac{16}{25}$ c. $\frac{19}{20}$ d. $\frac{2}{25}$
 e. $\frac{43}{50}$ f. $\frac{18}{25}$ g. $\frac{41}{100}$ h. $\frac{24}{25}$
 3. a. $\frac{3}{200}$ b. $\frac{1}{40}$ c. $\frac{8}{125}$ d. $\frac{1}{8}$
 e. $\frac{17}{200}$ f. $\frac{5}{8}$ g. $\frac{3}{8}$ h. $\frac{21}{200}$
 i. $\frac{7}{80}$ j. $\frac{2}{3}$ k. $\frac{16}{125}$ l. $\frac{3}{80}$

C. Write fractions as decimals and percentages (p 149)

1. a. 50% b. 30% c. 25%
 d. 45% e. 80% f. 28%
 g. 34% h. 72%
 2. a. 0.1, 10% b. 0.2, 20% c. 0.4, 40%
 d. 0.05, 5% e. 0.06, 6% f. 0.04, 4%
 g. 0.35, 35% h. 0.16, 16%

Percentage increase and decrease

A. Find the change first (p 150)

1. Breakfast £8.40, Lunch £16.80, Evening Meal £25.20
 Single Room £73.50, Double Room £126
 2. a. i. £88 ii. £132 iii. £858
 iv. £70.40 v. £11.77 vi. £70.84
 b. i. £104 ii. £156 iii. £1014
 iv. £83.20 v. £13.91 vi. £83.72
 3. £630 4. 27.5m
 5. a. 675 b. 225
 6. 72 7. £780 8. £1242
 9. Jess £364, Kate £338, Luke £332.80 Wes £306.80
 10. £18.20
 11. a. £11.16 b. £82.77 c. £550.56
 d. £1357.80 e. £14229
 12. a. £842.40 b. £2073.60 c. £91.26
 d. £22.95 e. £18.09

B. Find the new amount directly (p 152)

- £10.30
- choco bar 88p, pastilles 55p, toffee £1.32, chocolate truffles £8.25
- £39.20
- £10800

Use a calculator to find percentages (p 153)

- £3.25
 - £59.50
 - 9.6 m
 - £442
 - 3.75 kg
 - 414 g
 - 23.50 euros
 - 13.8 cm
 - 0.8 litre
 - 92.4 m
 - £504
 - £97.90
 - 48.1 km
 - £6.75
 - £34
 - 84 cm
- | | |
|----------------|------------------|
| dress £43.19 | stereo £209.99 |
| guitar £202.80 | crockery £107.99 |
| TV £299.99 | |
- Website A: £181.30
Website B: £186.75
Website A's offer is best buy.

- £9620
-

| | Loan | Bayleys | Anchor | Rock Solid | Direct |
|-----|--------------|---------|---------|------------|---------|
| APR | | 6.6 | 6.5 | 6.3 | 6.7 |
| a. | £1000 | £66 | £65 | £63 | £67 |
| b. | £2500 | £165 | £162.50 | £157.50 | £167.50 |
| c. | £1750 | £115.50 | £113.75 | £110.25 | £117.25 |
| d. | £3225 | £212.85 | £209.63 | £203.18 | £216.08 |
| e. | £12500 | £825 | £812.50 | £787.50 | £837.50 |
| f. | £0.8 million | £52800 | £52000 | £50400 | £53600 |

- 4.5 cm × 3 cm
 - 7.5 cm × 5 cm
 - 7.98 cm × 5.32 cm
 - 8.46 cm × 5.64 cm
- £32.76
 - 113.4 g
 - 690 m
 - 34.02 m
 - 31.68 km
 - 93.28 kg
 - 65.55 m
 - 16.25 litres
 - £22.40
 - £11.25
- £98.29

Write one number as a percentage of another (p 155)

- 60%
 - 40%
- 40%
-

| Assignment | 1 | 2 | 3 | 4 |
|-----------------|-----|-----|-----|-----|
| Student's marks | 18 | 56 | 52 | 66 |
| Marks available | 30 | 70 | 80 | 120 |
| % | 60% | 80% | 65% | 55% |

- 50%
 - $33\frac{1}{3}\%$
 - 5%
 - 25%
 - 5%
 - 33%
- 8%
- £1045
 - 4.5%
- 60%
- 12.5%
- 28%
- 32%
 - 14%
 - 57.3%
- 66.7%
 - 33.3%

b. Students' checks
- 46.3%
- 28.5%
 - 7.0%
- 14.2%
- 50%
 - 50%
 - 25%
 - 25%

(Other estimated percentages are acceptable.)
- 20% women
 - 25% children
 - 55% men
- £593.26
 - 20%
 - 10%
 - 30%
 - 40%

(Other estimated percentages are acceptable.)
 - Students' checks

Calculate the original value after a percentage change (p 159)

- £200
- £210
- £236
- 27300
- £68
- 9
- £486.80
- £400
 - The shopper has found 40% of the reduced price.
- 160 ml

Measures, Shape and Space

11 Money

Write in pounds (£) and pence (p 161)

- £30
 - 3p
 - £3
 - 30p
 - £300
- £90
 - 90p
 - £9
 - 9p
 - £900
- £110
 - £25.20
 - £12.50
 - £30.05
 - £230.15
 - £413.25
 - £303.03
 - £325
- £731.34, £732.61, £736.02, £741.12
- ten pounds, fifty pence
 - five pounds, ninety-nine pence
 - twelve pounds, fifty pence
 - five hundred and five pounds
 - two pounds, fifteen pence
 - four hundred and ten pounds, four pence
 - forty-five pounds, forty-nine pence
 - two hundred and nine pounds, nine pence
- | | | | |
|---------|---------|---------|---------|
| £342.41 | £342.14 | £324.41 | £324.14 |
| £234.41 | £234.14 | | |

Calculate with money

A. Add and subtract money (p 162)

- | | | |
|----------|-----------|-----------|
| a. £6.31 | b. £16.80 | c. £2.67 |
| d. £5.40 | e. £4.35 | f. £3.45 |
| g. £5.05 | h. £2.60 | i. £1.01 |
| j. £3.51 | k. £25.56 | l. £64.06 |
- £8
- £2.65
- | | |
|----------|-----------|
| a. £4.24 | b. £15.76 |
|----------|-----------|

B. Use a calculator to add and subtract money (p 163)

- | | | |
|----------|-----------|-----------|
| a. £2.05 | b. £2.50 | c. £2.98 |
| d. £3.02 | e. £3.39 | f. 97p |
| g. £2.83 | h. £4.45 | i. 59p |
| j. £6.25 | k. £12.98 | l. £12.52 |

C. Multiply and divide money (p 164)

- | | | |
|-----------|------------|----------|
| a. £27.80 | b. £89.94 | c. £4.50 |
| d. £5.16 | e. £116.55 | f. £2.10 |
| g. 83p | | |
- | | |
|------------|------------|
| a. £253.50 | b. £282.10 |
|------------|------------|
- £137.20
- | | |
|-----------|-----------|
| a. £31.98 | b. £15.99 |
|-----------|-----------|
- £42.72

Round money to the nearest 10p or £1

A. Round to the nearest 10p (p 165)

- | | | | |
|--------|--------|--------|--------|
| a. 10p | b. 30p | c. 30p | d. 40p |
| e. 90p | f. 60p | g. 30p | h. 60p |
| i. 50p | j. 80p | k. 90p | l. 0p |
- | | | |
|----------|-----------|-----------|
| a. £2.10 | b. £4.40 | c. £5.70 |
| d. £7.20 | e. £6.90 | f. £9.10 |
| g. £5.70 | h. £4.20 | i. £3.30 |
| j. £8.90 | k. £18.00 | l. £28.00 |
- | |
|------------------------------|
| a. $40p + 30p + 40p = £1.10$ |
| b. $30p + 30p + 50p = £1.10$ |
| c. $40p + 30p + 50p = £1.20$ |

B. Round to the nearest £1 (p 166)

- | | | | |
|-------|-------|--------|--------|
| a. £3 | b. £3 | c. £5 | d. £5 |
| e. £7 | f. £7 | g. £8 | h. £9 |
| i. £2 | j. £1 | k. £10 | l. £20 |
- | | | | |
|---------|---------|--------|--------|
| a. £12 | b. £34 | c. £16 | d. £27 |
| e. £337 | f. £9 | g. £26 | h. £24 |
| i. £13 | j. £229 | k. £77 | l. £76 |
- | | | |
|----------------------------|-----------|-------------|
| a. i. $£2 + £2 + £6 = £10$ | | |
| ii. $£2 + £3 + £1 = £6$ | | |
| iii. $£4 + £4 + £5 = £13$ | | |
| b. i. £10.16 | ii. £6.53 | iii. £13.09 |

Discounts in multiples of 5%

A. Find the discount (p 168)

- | | |
|----------|------------------------|
| a. £3 | b. £1.20 |
| c. £2.80 | d. £1.75 |
| e. 39p | f. 29p (nearest pence) |
- | | |
|-------------------|-----------------------|
| a. trainers £6.30 | b. racket £18.75 |
| c. ball £8.25 | d. cricket set £16.98 |
| e. T-shirt £17.49 | f. helmet £17.18 |
| g. skates £107.24 | h. bottle £2.80 |
- No. Hotel break discount = £258, river cruise discount = £269.15, so she will save £11.15 more on the river cruise.

B. Find the price after the discount (p 169)

- | | | |
|------------|-----------|-------------|
| a. i. £152 | ii. £475 | iii. £1425 |
| iv. £1748 | v. £10.07 | vi. £847.40 |
| b. i. £128 | ii. £400 | iii. £1200 |
| iv. £1472 | v. £8.48 | vi. £713.60 |
| c. i. £120 | ii. £375 | iii. £1125 |
| iv. £1380 | v. £7.95 | vi. £669 |
| d. i. £136 | ii. £425 | iii. £1275 |
| iv. £1564 | v. £9.01 | vi. £758.20 |
- | | |
|-----------|-----------|
| a. £42.25 | b. £27.30 |
|-----------|-----------|
- £855

Simple interest (p 170)

- | | | |
|--------|---------|----------|
| a. £20 | b. £175 | c. £2500 |
|--------|---------|----------|
- £48.29
- £15
- | | | |
|--------|------------|----------|
| a. £45 | b. £397.50 | c. £4950 |
|--------|------------|----------|
- £9775
- No. It will be £2000.

Compound interest (p 171)

- | | | |
|------------|-------------|-------------|
| a. £530.45 | b. £4455.78 | c. £8062.84 |
|------------|-------------|-------------|
- | | |
|-------------|-----------------------------|
| a. £6998.40 | b. £7558.27 (nearest pence) |
|-------------|-----------------------------|
- | | |
|-------------|-----------------------------|
| a. £2315.25 | b. £2431.01 (nearest pence) |
|-------------|-----------------------------|
- | | |
|---------------------------------|-------------|
| a. £562.75 | b. £3492.28 |
| c. £8349.42 (all nearest pence) | |
- | | |
|-----------------------------------|---------------|
| a. £2382.03 | b. £10 617.82 |
| c. £20 787.88 (all nearest pence) | |
- Yes. The total interest is £3077.27. (nearest pence)

Budget with money

A. Simple budgeting (p 173)

- No, Yasmin can't quite afford it. The total cost comes to £3565 and she has only £3500
- There is £86 left in Ethan's budget for the weekend. He can afford:
either 5 km run + 10 km run = £65
or 5 km run + half marathon = £80
He cannot afford 10 km run + the half marathon = £89



3. Cost of flowers = £48.05. Parveen can afford vase A, with £1.45 left over. She needs an extra £1.55 for vase B.
4. a. i. £275.89 ii. £260.89 iii. £249.89 iv. £234.89
b. Either **iii** or **iv** with reasons (for example, within budget and **iii** because hens will be safer or **iv** because cheaper).
5. The table gives the total cost of the different options, including the bed and the desk.

| Wardrobe | Chair | Total cost | Is this within budget? |
|----------|----------|------------|------------------------|
| medium | swivel | £573.96 | no |
| medium | standard | £569.46 | no |
| small | swivel | £558.46 | Yes |
| small | standard | £553.96 | Yes |

Either of the last two options are acceptable (with appropriate reasons). The student must buy the small wardrobe with either the swivel chair (more comfortable) or the standard chair (cheaper).

6. Yes. Saving on wages £1 805 500; savings on other items £664 000; total savings £2 469 500
7. a. £50.40 b. £34

B. Household budgeting (p 175)

1. a. £52.93
b. No, not a good idea as this is not much for petrol and repairs.
2. a. i. £7.25 ii. £15.65
b. Yes
£97.90 + £50 saving = £147.90
£206.20 - £147.90 = £58.30 left over
3. a. i. £75 ii. £21 iii. £7
b. £817.14
c. Yes, probably. Holidays £125 per month, so she would still have £692.14 a month for other expenses.
4. a. £747.24 b. £1497.76
c. Student's budget - appropriate amounts for food, travel, purchases and repairs, leisure and holidays, saving, adding up to £1497.
5. Lesley has £2316.12 after all the bills, but she is unlikely to save £2000 as she has not budgeted for any unexpected bills.

Calculate using rates of pay (p 178)

1. a. £290 b. £304 c. £327 d. £352
2. 4 TVs
3. a. Poppy b. 20p per hour
4. Bees' Academy is better, because the annual salary there of £12529.44 is £174.44 more than the Alpha College salary.
5. £378
6. a. Week beginning 4th March
b. $\frac{1}{2}$ hour

- c. Week beginning 18th March
d. £13.86 more than week beginning 11th March, £27.72 more than week beginning 4th March
7. a. £380.63 (nearest pence) b. £10.28
c. i. £10.22 ii. £362.81
d. Liu
8. a. $36\frac{1}{4}$ hours b. £406 c. 6 weeks

Value Added Tax (VAT)

A. Calculate VAT (p 181)

1. a. £180 b. £480 c. £36
d. £72 e. £19.60 f. £9.20
g. £5.16 h. £1.92 i. £4.48
j. £19.36 k. £24.16 l. £5.50
2. a. £20 b. £15
c. £38 d. £3.50
e. £6.40 f. £1.22
g. £1.52 (nearest pence) h. 97p (nearest pence)
3. £96
4. £13.74
5. a. £196 b. £49.80 c. £11.98
d. £13.90 e. £2.99 f. £12.00

B. Calculate total cost including VAT (p 183)

1. a. £144 b. £252 c. £86.40
d. £57.60 e. £358.80 f. £39
2. £8880 3. £160.23 4. £89.25
5. coffee maker £58.32, washing machine £478.80, radio £31.08, camera £203.99 (nearest pence)

C. Calculate original price and VAT (p 184)

1. a. £155, £31 b. £60, £12 c. £20, £4
d. £10, £2 e. £305, £61 f. £45, £9
g. £199, £39.80 h. £21.50, £4.30 i. £39, £7.80
2. £230
- 3 a. £123.20 b. £156.80
c. £203.20 d. £398.60
4. a. £4895 b. £979

Taxes on income

A. Income tax (p 185)

1. a. £1230 b. £1550 c. £2570 d. £3670
e. £598 f. £2910 g. £5100 h. £6214

B. National Insurance (NI) (p 185)

1. a. £4.56 b. £22.56
c. £9.36 d. £32.40
e. £42.96 f. £54.78
g. £67.63 (nearest pence) h. £87.39
2. a. £1149.12 b. £1341.12 c. £1953.12
d. £2613.12 e. £769.92 f. £2157.12
g. £3471.12 h. £4139.52

C. Net pay (p 187)

- NI = £2229.12, income tax = £3030, net pay = £21 740.88
 - NI = £2889.12, income tax = £4130, net pay = £25 480.88
 - NI = £1203.12, income tax = £1320, net pay = £15 926.88
 - NI = £1953.12, income tax = £2570, net pay = £20 176.88
 - NI = £2805.12, income tax = £3990, net pay = £25 004.88
 - NI = £4026.72, income tax = £6026, net pay = £31 927.28
 - NI = £1806.12, income tax = £2325, net pay = £19 343.88
 - NI = £4228.08, income tax = £6361.60, net pay = £33 068.32
- £17 537.68
 - £18 738.48
 - £21 392.88
 - £15 136.08
 - £17 221.68
 - £22 631.60
 - £27 042.96
 - £30 967.68
- £578
- £22 505.60
 - £49.05 (nearest pence)
- a.

| Payment for week | | Deductions for week | |
|------------------|-------------|-------------------------|----------------|
| Hours worked | 35 | National Insurance | £56.16 |
| Wage per hour | £18 | Income tax | £80.42 |
| Total pay | £630 | Total deductions | £136.58 |
| | | Take-home pay | £493.42 |

b.

| Earnings | | Monthly deductions | |
|------------------------|---------|-----------------------------|-----------------|
| Annual gross earnings | £28 500 | NI | £200.76 |
| Monthly gross earnings | £2375 | Pension (6%) | £142.50 |
| | | Income tax | £249.00 |
| | | Total | £592.26 |
| | | Net monthly earnings | £1782.74 |

Convert between currencies (p 189)

- Mr Black 1116 US dollars
Mrs Smith 3502.5 zloty
Miss Patten 21 384 rand
Ms Chang 265 920 yen
Mr Davies 13 128 rupees
Ms Bailey 96 250 euros
- £245
 - £29
 - £252
 - £8
 - £108
 - £1538
- Mr Wragg £554
Miss Yen £194
Mr Ennis £24
Ms Masters £62

Miss Sharif £1043

Mr Caine £1837

Ms Wright £19

- £704
- 1165 (US dollars)
 - £886
 - £64
- 5874 zloty
 - 106 zloty
 - £133

12 Time

Read, measure and record time

A. am and pm (p 192)

- 7:00 am
 - 4:00 pm
 - 11:30 am
 - 5:00 pm
 - 1:00 am
 - 8:45 am
- iii
 - i
 - ii
- Any suitable suggestions
- 12 hours
 - 13 hours
 - 17 hours
 - $9\frac{1}{2}$ hours
 - 11 hours
 - $11\frac{1}{2}$ hours

B. Read and record time to the nearest 5 minutes (p 193)

- 20 minutes past 2, 2:20
 - 40 minutes past 1, 1:40
 - 25 minutes past 11, 11:25
 - 50 minutes past 1, 1:50
- 35 minutes past 10, 25 minutes to 11, 10:35
 - 40 minutes past 2, 20 minutes to 3, 2:40
 - 40 minutes past 12, 20 minutes to 1, 12:40
 - 45 minutes past 3, 15 minutes to 4, 3:45
 - 35 minutes past 2, 25 minutes to 3, 2:35
 - 55 minutes past 7, 5 minutes to 8, 7:55
 - 50 minutes past 11, 10 minutes to 12, 11:50
 - 55 minutes past 5, 5 minutes to 6, 5:55

Use the 12 and 24 hour clock

A. 12 and 24 hour clock times (p 195)

- 15:50
 - 07:00
 - 09:15
 - 22:26
 - 15:42
 - 13:30
 - 06:45
 - 00:05
 - 19:40
 - 18:59
 - 06:42
 - 20:25
- 03:15
 - 16:45
 - 07:30
 - 08:50
 - 23:10
 - 12:00
 - 15:55
 - 07:45
 - 17:35
 - 14:50
 - 16:05
 - 11:10
- 16:06
 - 15:15
 - 08:11
 - 09:45
 - 18:50
 - 23:35
 - 10:55
 - 12:12
 - 21:20
 - 18:30
- 11:30 pm
 - 6:45 am
 - 7:12 am
 - 4:45 pm
 - 12:10 pm
 - 1:10 am
 - 12:16 pm
 - 2:10 pm
 - 12 am
 - 6:05 am
 - 1:46 pm
 - 9:15 am

5. a. 15:52, 8 minutes to 4 in the afternoon, 3:52 pm
b. 03:46, 14 minutes to 4 in the morning, 3:46 am
c. 17:05, 5 minutes past 5 in the afternoon, 5:05 pm
d. 23:54, 6 minutes to midnight, 11:54 pm
e. 19:09, 9 minutes past 7 in the evening, 7:09 pm
f. 16:32, 28 minutes to 5 in the afternoon, 4:32 pm

B. Use timetables (p 197)

1. a. i. 0628 ii. 0703
b. 0702
c. i. 0620 ii. 0633
d. 0640 e. 0707
f. i. 0637 ii. 0648
2. a. 8:45 am b. 12:20 pm
c. i. 2:10 pm ii. 3 pm
d. 8:53 am e. 12:45 pm
f. i. 9:15 am ii. 12:30 pm iii. 12:55 pm
g. 2:03 pm

Units of time (p 198)

1. a. 30 b. 3 c. 30 d. 200
e. 15 f. 1000 g. 6 h. 104
i. 14 j. 26
2. a. i. 30 ii. 30 iii. 29
b. i. 62 ii. 61
3. a. minutes b. seconds
c. days d. days or weeks
e. hours f. weeks or months
g. years or centuries
4. a. 210 b. 3 c. 270 d. 5
e. 36 f. $2\frac{1}{2}$ g. 49 h. 5
i. 450 j. 5 k. 3000 l. 10
5. £1250 6. 4 weeks
7. 150 seconds 8. 105 min 9. 13 weeks
10. a. £78 b. £312
11. a. August 4th b. 14 nights

Calculate time

A. Add and subtract time in hours, minutes and seconds (p 200)

1. a. 5 hours 20 minutes
b. 8 minutes 57 seconds
c. 3 minutes 35 seconds
d. 6 minutes 15 seconds
e. 9 hours 45 minutes
f. 4 hours 5 minutes
2. a. 2 hours 20 minutes
b. 1 hour 40 minutes
c. 1 minute 20 seconds
d. 52 seconds
e. 3 hours 35 minutes
f. 1 minute 21 seconds

3. a. 11 minutes b. 7 minutes 15 seconds
4. 55 minutes
5. $4\frac{3}{4}$ hours or 4 hours 45 minutes

B. Find the difference between times by adding on (p 201)

1. a. 2 hours 41 min b. 2 hours 42 min
c. 2 hours 45 min d. 1 hour 33 min
e. 3 hours 48 min f. 3 hours 50 min
g. 3 hours 11 min h. 3 hours 21 min
i. 4 hours 15 min j. 8 hours 36 min
k. 3 hours 41 min l. 5 hours 50 min
m. 5 hours 6 min n. 7 hours 30 min
o. 9 hours 45 min p. 21 hours 45 min
2. a. 3 hours 30 min b. 6 hours 15 min
c. 5 hours 30 min d. 4 hours 15 min
e. 5 hours 30 min f. 7 hours 45 min
3. a. 5 hours 21 min b. 4 hours 18 min
c. 4 hours 6 min d. 4 hours 12 min
e. 4 hours 35 min f. 2 hours 13 min
g. 2 hours 32 min h. 2 hours 24 min
i. 3 hours 25 min j. 3 hours 9 min
k. 4 hours 14 min l. 2 hours 12 min
4. 7 hours 59 min

C. Find the difference between times by subtracting (p 202)

1. a. 2 hours 27 min b. 2 hours 29 min
c. 1 hour 13 min d. 1 hour 33 min
e. 7 hours 26 min f. 6 hours 11 min
g. 1 hour 49 min h. 3 hours 45 min
i. 1 hour 27 min j. 4 hours 17 min
k. 1 hour 40 min l. 10 hours 29 min
2. a. i. 3 hours 48 minutes
ii. 3 hours 43 minutes
iii. 2 hours 38 minutes
iv. 4 hours 7 minutes
b. 5 minutes

Use timers (p 204)

1. Analogue and digital clocks (as in question) showing:
 - a. 10:30 pm b. 6 am
 - c. 11:15 pm d. 8:30 am
2. a. Start cooking 17:30 b. Start cooking 15:15
Cooking time 1:30 Cooking time 2:15
c. Start cooking 18:35 d. Start cooking 17:15
Cooking time 1:40 Cooking time 1:45
3. a. 1 minute, 16 seconds and 47 hundredths of a second, 1 min 16.47 s
b. 1 minute, 21 seconds and 5 hundredths of a second, 1 min 21.05 s

- c. 1 minute, 16 seconds and 59 hundredths of a second, 1 min 16.59 s
- d. 1 minute, 22 seconds and 2 tenths of a second, 1 min 22.20 s
- e. 1 minute, 17 seconds and 8 hundredths of a second, 1 min 17.08 s
- f. 1 minute, 22 seconds and 4 tenths of a second, 1 min 22.40 s
- 4 a. 2.21 s b. 0.56 s c. 2.15 s
d. 10.68 s e. 13.52 s f. 25.02 s
- 5 02:16.43, 02:34.05, 02:44.51, 02:49.30, 03:00.24, 03:01.09
Difference: 17.62 s, 10.46 s, 4.79 s, 10.94 s, 0.85 s

- g. 22 mm, 2 cm 2 mm, 2.2 cm
- h. 45 mm, 4 cm 5 mm, 4.5 cm
5. e b f d h a c g
6. a. 74 mm, 7 cm 4 mm, 7.4 cm
b. 46 mm, 4 cm 6 mm, 4.6 cm
c. 67 mm, 6 cm 7 mm, 6.7 cm
7. a. 26 mm, 2 cm 6 mm, 2.6 cm
b. 52 mm, 5 cm 2 mm, 5.2 cm
c. 33 mm, 3 cm 3 mm, 3.3 cm
d. 44 mm, 4 cm 4 mm, 4.4 cm
e. The safety pin (a) is easiest because it starts at the 0 mark.

13 Length

Understand distance: miles and kilometres

A. Use distances marked on a map (p 207)

1. a. 8 miles b. 8 miles
c. 8 miles d. 17 miles
e. 16 miles f. 18 miles
g. 11 miles h. 15 miles
2. 23 miles 3. 26 miles

B. Use a mile or kilometre chart (p 208)

1. a. 261 miles b. 284 miles c. 95 miles
d. 239 miles e. 84 miles f. 416 miles
2. a. 98 km b. 106 miles c. 45 miles
d. 82 km e. 48 miles f. 11 miles
g. 72 km h. 255 km

Measure length in metric units

A. Measure in millimetres and centimetres (p 210)

1. b. i. 3 cm ii. 31 mm
c. i. 5 cm ii. 48 mm
d. i. 7 cm ii. 66 mm
e. i. 7 cm ii. 74 mm
f. i. 9 cm ii. 93 mm
g. i. 11 cm ii. 106 mm
h. i. 11 cm ii. 113 mm
2. a. 2 cm b. 30 mm c. 5 cm
d. 70 mm e. 6 cm f. 80 mm
g. 4 cm h. 90 mm i. 12 cm
3. a. 1.5 cm b. 12 mm c. 2.6 cm
d. 13 mm e. 1.4 cm f. 21 mm
g. 8.4 cm h. 39 mm i. 12.5 cm
4. a. 32 mm, 3 cm 2 mm, 3.2 cm
b. 67 mm, 6 cm 7 mm, 6.7 cm
c. 31 mm, 3 cm 1 mm, 3.1 cm
d. 54 mm, 5 cm 4 mm, 5.4 cm
e. 90 mm, 9 cm 0 mm, 9 cm
f. 59 mm, 5 cm 9 mm, 5.9 cm

B. Measure in metres, centimetres and millimetres (p 213)

1. c. 99 cm, 990 mm d. 102 cm, 1020 mm
e. 104 cm, 1040 mm f. 107 cm, 1070 mm
g. 110 cm, 1100 mm h. 112 cm, 1120 mm
2. c. 0.99 m d. 1.02 m e. 1.04 m
f. 1.07 m g. 1.1 m h. 1.12 m
3. c. i. 361 cm ii. 3.61 m
d. i. 370 cm ii. 3.7 m
e. i. 361 cm ii. 3.61 m
f. i. 363 cm ii. 3.63 m
g. i. 369 cm ii. 3.69 m
h. i. 367 cm ii. 3.67 m
4. c. 360.7 cm, 3607 mm, 3 m 607 mm, 3.607 m
d. 370.3 cm, 3703 mm, 3 m 703 mm, 3.703 m
e. 361.3 cm, 3613 mm, 3 m 613 mm, 3.613 m
f. 363.1 cm, 3631 mm, 3 m 631 mm, 3.631 m
g. 369.3 cm, 3693 mm, 3 m 693 mm, 3.693 m
h. 366.6 cm, 3666 mm, 3 m 666 mm, 3.666 m

Estimate and measure lengths (p 214)

1. a. accurate b. round up c. accurate
d. round up e. accurate
2. a. 1 m b. 40 km c. 2 m
d. 3 cm e. 30 cm f. 14 cm
g. 11 cm h. 3 mm i. 1 mm
(Alternative answers are possible for some parts.)
3. a. A i. 10 cm ii. 10.3 cm
B i. 7 cm ii. 6.7 cm
C i. 4 cm ii. 4.3 cm
D i. 13 cm ii. 12.6 cm
E i. 9 cm ii. 8.8 cm
F i. 2 cm ii. 2.3 cm
G i. 10 cm ii. 9.5 cm
b. as aii

Convert between metric lengths (p 217)

1. a. 23 mm b. 43 mm
c. 43 500 mm d. 4500 mm
e. 12 450 mm f. 2 000 000 mm



2. a. 1300 cm b. 4000 cm c. 960 cm
 d. 1370 cm e. 6.5 cm f. 250 000 cm
3. a. 4 m b. 5000 m c. 24 m
 d. 5840 m e. 740 m f. 3.534 m
 g. 5.3 m h. 0.68 m i. 0.96 m
 j. 13 750 m k. 659 m l. 50 m
4. a. 7 km b. 9.4 km c. 4.5 km
 d. 95 km e. 2.5 km
5. a. 4000 m b. 500 cm c. 450 mm
 d. 5 km e. 25 cm f. 3.6 m
 g. 2.75 m h. 0.275 km i. 3600 m
 j. 270 cm k. 122 mm l. 7.563 km
6. 6 mm, 2.6 cm, 200 mm, 0.5 m, 650 mm, 150 cm, 2 m
7. 2.5 m 8. 10 km
9. a. 60 cm b. 0.6 m
10. a. 75 cm b. 750 mm
11. a. 50 cm b. 25 cm c. 500 mm
 d. 250 mm e. $\frac{2}{5}$ m f. $\frac{3}{10}$ m
 g. $\frac{7}{10}$ h. $\frac{6}{10}$
12. a. 175 cm b. 3500 mm c. 325 cm
 d. 3200 mm e. 5400 mm f. 380 cm

Calculate with metric lengths

A. Metres and centimetres (p 219)

1. a. 5.3 m b. 3.3 m c. 4.5 m
 d. 4.25 m e. 10.65 m f. 3.64 m
 g. 2.25 m h. 2.75 m i. 3.8 m
2. a. $7\frac{1}{2}$ m b. $2\frac{1}{4}$ m c. $3\frac{3}{4}$ m d. $4\frac{3}{4}$ m
 e. $4\frac{1}{4}$ m f. $1\frac{1}{4}$ m g. $11\frac{1}{2}$ m h. $2\frac{1}{2}$ m

B. Metres and millimetres (p 220)

1. a. 2.675 m b. 3.025 m c. 2.115 m
 d. 2.25 m e. 7.7 m f. 2.034 m

C. Mixed calculations (p 221)

1. a. 2.625 m b. 5.47 m c. 3.045 m
2. No, the items won't fit because their total width is 3.2 m.
3. 5.45 m 4. 2.9 m
5. a. 22.2 m b. 13.8 m
6. a. $1\frac{1}{4}$ m
 b. i. $5\frac{9}{10}$ m or 5.9 m ii. $1\frac{3}{5}$ m or 1.6 m
7. Yes. The builder uses $10.5 + 1.2 = 8.75$ or $8\frac{3}{4}$ pieces of fence panel. 9 pieces are left

Use a scale on a plan or map (p 222)

1.

| Room | Length on plan | Actual length | Width on plan | Actual width |
|-------------|----------------|----------------------|---------------|----------------------|
| Bedroom | 3 cm | $3 \times 2 = 6$ m | 2 cm | $2 \times 2 = 4$ m |
| Kitchen | 2.5 cm | $2.5 \times 2 = 5$ m | 1.5 cm | $1.5 \times 2 = 3$ m |
| Living room | 4 cm | $4 \times 2 = 8$ m | 3 cm | $3 \times 2 = 6$ m |
| Bathroom | 1.5 cm | $1.5 \times 2 = 3$ m | 1 cm | $1 \times 2 = 2$ m |
| Cupboard | 1 cm | $1 \times 2 = 2$ m | 0.5 cm | $0.5 \times 2 = 1$ m |

2.

| House | Measurements on the plan | | | | Actual measurements | | | |
|-------|--------------------------|-------------|-------------|------------|---------------------|-------------|-------------|------------|
| | House length | House width | Plot length | Plot width | House length | House width | Plot length | Plot width |
| A | 11 mm | 6 mm | 25 mm | 16 mm | 11 m | 6 m | 25 m | 16 m |
| B | 10 mm | 9 mm | 35 mm | 16 mm | 10 m | 9 m | 35 m | 16 m |
| C | 13 mm | 10 mm | 28 mm | 16 mm | 13 m | 10 m | 28 m | 13 m |
| D | 17 mm | 6 mm | 31 mm | 16 mm | 17 m | 6 m | 31 m | 16 m |

3. a. A 48 mm B 62 mm C 27 mm D 43 mm
 b. A .8 m B 6.2 m C 2.7 m D 4.3 m
 c.

| | Measurement on drawing in mm | Actual measurement |
|---|------------------------------|--------------------|
| i. The length of the house | 59 mm | 5.9 m |
| ii. The width of the downstairs window | 18 mm | 1.8 m |
| iii. The width of the smaller upstairs window | 18 mm | 1.8 m |
| iv. The width of the larger upstairs window | 23 mm | 2.3 m |
| v. The height of the downstairs window | 16 mm | 1.6 m |
| vi. The height of the upstairs windows | 13 mm | 1.3 m |
| viii. The width of the front porch | 23 mm | 2.3 m |

4. a. i. approx 14 km ii. approx 10 km
 iii. approx 29 km iv. approx 12.5 km
 b. i. approx 17 km ii. approx 15 km
 iii. approx 34 km iv. approx 12.5 km

5.

| Journey | Length on map | Actual distance |
|-------------------|---------------|-----------------|
| Tutor's home to A | 7.4 cm | 3.7 km |
| Tutor's home to B | 5 cm | 2.5 km |
| Tutor's home to C | 2.4 cm | 1.2 km |
| Tutor's home to D | 3.6 cm | 1.8 km |

(Allow ± 0.2 km)

Use ratios on scale drawings

A. Use ratio scales (p 225)

1. a. 50m b. 30m c. 25m
 d. 20m e. 10m f. 6m
 g. 16m h. 11.5m

2. a.

| Room | Dimension | On plan | Actual distance |
|----------|-----------|---------|-----------------|
| Lounge | length | 30 mm | 6 m |
| | width | 25 mm | 5 m |
| Kitchen | length | 18 mm | 3.6 m |
| | width | 14 mm | 2.8 m |
| Bathroom | length | 15 mm | 3 m |
| | width | 12 mm | 2.4 m |
| Bedroom | length | 24 mm | 4.8 m |
| | width | 16 mm | 3.2 m |

- b. 2 m
3. a. A 41 mm × 19 mm B 37 mm × 19 mm
 C 31 mm × 15 mm D 47 mm × 15 mm
- b. A 8.2 m × 3.8 m B 7.4 m × 3.8 m
 C 6.2 m × 3 m D 9.4 m × 3 m
4. a. 6.6 m b. 3.15 m c. 3 m
 d. 2.4 m e. 4.05 m f. 2.7 m
 g. 11.25 m h. 10.8 m

5.

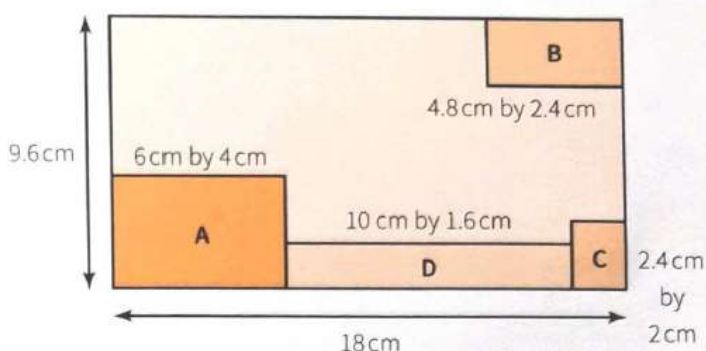
| Distance | On map | Actual |
|----------------------------------|--------|----------|
| a. The Minster - Hospital | 1.8 cm | 0.45 km |
| b. The Minster - Cemetery | 4.2 cm | 1.05 km |
| c. Snow Close Farm - Hospital | 5.1 cm | 1.275 km |
| d. College - The Minster | 3.5 cm | 0.875 km |
| e. Snow Close Farm - The Minster | 5.6 cm | 1.4 km |
| f. Schools - Hospital | 2.7 cm | 0.675 km |
| g. Studley - The Minster | 5.2 cm | 1.3 km |

6. a. 1:100 b. 1:50
 c. 1:20 d. 1:2000
 e. 1:50 000 f. 1:250 000
 g. 1:160 h. 1:125 000
 i. 1:1000 j. 1:200 000
 k. 1:5 l. 1:2500

B. Draw scale diagrams (p 228)

1. Lines of length:
- a. i. 6 cm ii. 13 cm
 b. i. 3.2 cm ii. 4.8 cm
 c. i. 13 cm ii. 8.7 cm
 d. i. 7 cm ii. 4.3 cm
 e. i. 4.5 cm ii. 3.6 cm
 f. i. 4.2 cm ii. 9 cm
 g. i. 7 cm ii. 11.4 cm

2. Scale drawing should have the dimensions shown below:



Measure lengths in imperial units (p 229)

1. a. $1\frac{1}{8}$ " b. $1\frac{11}{16}$ " c. $1\frac{3}{16}$ "
 d. $1\frac{1}{4}$ " e. $\frac{3}{4}$ " f. $1\frac{5}{8}$ "
 g. $1\frac{3}{8}$ " h. $1\frac{9}{16}$ " i. $\frac{11}{16}$ "
 j. $1\frac{15}{16}$ " k. $1\frac{5}{8}$ " l. $\frac{3}{4}$ "

Convert between imperial lengths (p 230)

1. a. 180 in b. 72 in c. 336 in
 d. 192 in e. 72 in f. 432 in
 g. 113 in h. 54 in
2. a. 6 ft b. 240 ft c. $2\frac{1}{2}$ ft
 d. 12 ft e. 15 ft f. 5 ft
 g. 4 ft h. $2\frac{1}{3}$ ft
3. a. 2 yd b. 5 yd
 c. 7040 yd d. 4 yd
4. a. 3 miles b. 9 miles
 c. 10 miles d. 6 miles
5. a. 45 ft b. 15 yd
6. Hana 4 ft 10 inches Imran 5 ft 5 inches
 Caleb 6 ft 1 inch
7. a. 13' 10" b. 4' 10"

Convert between metric and imperial lengths

A. Approximate metric/imperial conversions (p 231)

1.

| Inches | Centimetres |
|--------|-------------|
| 2 in | 5 cm |
| 6 in | 15 cm |
| 8 in | 20 cm |
| 3 in | 7.5 cm |
| 7 in | 17.5 cm |
| 10 in | 25 cm |
| 32 in | 80 cm |
| 18 in | 45 cm |
| 40 in | 100 cm |

| Yards/feet | Centimetres | Metres |
|--|-------------|--------|
| 2 ft | 60 cm | 0.6 m |
| $2\frac{1}{2}$ ft | 75 cm | 0.75 m |
| 1 yd or 3 ft | 90 cm | 0.9 m |
| $3\frac{1}{2}$ ft or 1 yd $\frac{1}{2}$ ft | 105 cm | 1.05 m |
| $4\frac{1}{2}$ ft | 135 cm | 1.35 m |
| 5 ft or 1 yd 2 ft | 150 cm | 1.5 m |
| 7 ft or 2 yd 1 ft | 210 cm | 2.1 m |
| 2 yd 2 ft | 240 cm | 2.4 m |
| 3 yd | 270 cm | 2.7 m |

2. a. i. 50 miles ii. 130 miles iii. 18.75 miles
 b. i. 96 km ii. 384 km iii. 48 km

3.

| Journey | miles | km |
|---------------------------|-------|------|
| a. Paris to Boulogne | 159 | 254 |
| b. Brussels to Calais | 135 | 216 |
| c. Berlin to Cherbourg | 847 | 1355 |
| d. Brussels to Dieppe | 194 | 310 |
| e. Paris to Dunkerque | 174 | 278 |
| f. Frankfurt to Amsterdam | 283 | 453 |
| g. Munich to Boulogne | 590 | 944 |
| h. Turin to Ostend | 604 | 967 |
| i. Zurich to Calais | 476 | 762 |
| j. Warsaw to Dieppe | 1047 | 1675 |

B. More accurate conversions (p 233)

1. a. 10.16 cm b. 22.86 cm c. 26.67 cm
 d. 30.48 cm e. 45.72 cm
2. a. 9.14 m b. 5.48 m c. 4.11 m
 d. 2.13 m e. 4.57 m
3. a. 5.91 in b. 17.72 in c. 9.76 in
 d. 98.43 in e. 118.11 in
4. a. 29.8 miles b. 9.9 miles c. 24.8 miles
 d. 18.6 miles e. 14.6 miles
5. a. 24.2 km b. 40.3 km c. 67.6 km
 d. 48.3 km e. 15.3 km
6. a. 1030 km b. 1755 km
7. 99 miles
8. 75 mph and 62 mph

14 Weight

Measure weight in metric units

A. Know metric units of weight (p 235)

1. a. g b. kg c. g
 d. g e. kg f. mg

2. a. 500 g b. 700 g c. 530 g
 d. 220 g e. 750 g f. 30 g
 g. 160 g h. 420 g i. 640 g
 j. 750 g or $\frac{3}{4}$ kg k. 500 g or $\frac{1}{2}$ kg l. 250 g or $\frac{1}{4}$ kg
3. a. 7 kg b. 4 kg
 c. 2 kg d. 8 kg
 e. 4 kg 200 g f. 7 kg 300 g
 g. 2 kg 600 g h. 2 kg 870 g
 i. 5 kg 80 g j. 5 kg 389 g
 k. 5 kg 20 g l. 1 kg 5 g
4. a. 4000 g b. 2000 g c. 3000 g
 d. 1000 g e. 1500 g f. 1250 g
 g. 2500 g h. 3750 g

B. Measure in grams and kilograms (p 236)

1. a. 2 b. 500 g
 c. i. 500 g ii. 2 kg 500 g iii. 4 kg
 iv. 5 kg 500 g v. 7 kg 500 g vi. 9 kg
2. a. 6 kg b. 10 c. 100 g
 d. i. 700 g ii. 2 kg 300 g
 iii. 3 kg 400 g iv. 4 kg 400 g v. 5.2 kg
 e. i. 0.7 kg ii. 2.3 kg iii. 3.4 kg
 iv. 4.4 kg v. 5.2 kg
3. a. 500 g
 b. i. 50 g ii. 150 g
 iii. 300 g iv. 450 g
4. iii. 4 kg iv. 5 kg v. 7 kg vi. 9 kg
5. a. i. 1 kg 200 g ii. 2 kg 700 g
 iii. 3 kg 800 g iv. 5 kg 200 g
 v. 6 kg 800 g vi. 9 kg 300 g
 b. i. 1.2 kg ii. 2.7 kg
 iii. 3.8 kg iv. 5.2 kg
 v. 6.8 kg vi. 9.3 kg
6. a. 50 g b. 10 g
 c. i. 120 g ii. 270 g
 iii. 490 g iv. 640 g
 v. 830 g vi. 940 g
7. a. A 6 kg B 12.5 kg C 18 kg
 D 27 kg E 34.5 kg F 42.5 kg
 b. i. 6.5 kg ii. 9 kg iii. 8 kg
8. a. 1 kg b. 200 g
 c. A 2 kg 600 g B 5 kg 200 g
 C 9 kg D 12 kg 400 g
 E 16 kg 600 g F 20 kg 800 g
 d. i. 2 kg 600 g ii. 3 kg 400 g
 iii. 4 kg 200 g

C. Estimate weights between marked divisions (p 239)

(Allow any equivalent weights and some leeway.)

- A 250g B 650g C 975g
D 1525g E 1950g F 2350g
 - 400g ii. 550g iii. 400g
iv. 2100g v. 975g vi. 875g
 - A 1kg B 600g C 275g
 - D 975g E 550g F 150g
 - 2300g

Choose units and instruments (p 240)

- 410g b. 25g c. 5kg
d. 125g e. 1.5kg f. 50g
g. 250g h. 500g i. 1kg
j. 70kg

(Allow reasonable alternatives.)
- kg b. g c. 10g d. 100g
- PA QB RA SB b. Q, S, R, P
c. Scale B: there are extra divisions allowing you to weigh more accurately.

Convert between metric weights (p 241)

- 4kg b. 6.5kg c. 5.485kg
d. 34.5kg e. 0.8kg f. 0.25kg
g. 300kg h. 0.75kg i. 4000kg
j. 3540kg k. 500kg l. 250kg
- 7000g b. 4500g c. 8268g
d. 16400g e. 3050g f. 300g
g. 60g h. 1025g i. 2g
j. 7.5g k. 0.5g l. 1000g
- 44000mg b. 30500mg
c. 3300mg d. 830mg
e. 12300mg f. 70mg
g. 50000mg h. 3750000mg
- 503 tonnes b. 42 tonnes
c. 4.5 tonnes d. 0.589 tonnes
- 3000kg b. 500mg
c. 1500g d. 500kg
e. 7000kg f. 250mg
g. 0.75 tonnes h. 5 tonnes
i. 10000g
- 0.4kg 450g 4000000mg
0.4 tonnes 450kg
b. 25600mg 0.25kg 330g 0.45kg $\frac{1}{2}$ kg

Calculate using metric weights

A. Kilograms and grams (p 242)

- 5.7kg b. 3.075kg c. 3.15kg
d. 2.25kg e. 3.77kg f. 2.27kg

- 4.7kg h. 1.6kg i. 3.94kg
- 1.625kg k. 1.65kg l. 4.044kg
- 2.345kg n. 0.996kg or 996g
- 3.25kg b. 1.75kg c. 6.025kg
- 6.05kg 4. 285g 5. 1.8kg
- 960g 7. 850g
- 650g b. 3.25kg

B. Mixed calculations (p 243)

- 14.5kg 2. 10 3. 3.61kg
- 2.64kg 5. 2.1kg 6. 350g
- 15 8. 15g 9. 50
- 50

C. Kilograms and tonnes (p 244)

- 16 days 2. 400
- 48 tonnes
i. locomotive
ii. 52 tonnes more than the cars
- 300 tonnes d. 448 tonnes

Convert between imperial weights (p 245)

- 32oz b. 70oz c. 100oz
d. 192oz e. 72oz f. 55oz
g. 4oz h. 8oz i. 12oz
j. 40oz
- 1lb b. 6lb c. 3lb
d. 8lb e. 5lb f. 28lb
g. 56lb h. 35lb i. 4480lb
j. 3360lb
- 3lb 8oz b. 5lb 2oz
c. 2lb 6oz d. 4lb 9oz
e. 2lb 12oz f. 1lb 4oz
g. 3lb 7oz h. 5lb 1oz

Calculate using imperial weights (p 246)

- 13st 1lb 2. 8st 3lb
- 68lb b. 4st 12lb
- 149lb b. 10st 9lb
- 149lb or 10st 9lb
- See the chart below.
b. 20lb or 1st 6lb
c. 1st 2lb or 16lb

| Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 |
|-----------|----------|----------|--------|-----------|----------|
| 4lb | 4lb | 4lb | 3lb | 3lb | 2lb |
| 12st 11lb | 12st 7lb | 12st 3lb | 12st | 11st 11lb | 11st 9lb |
| 179lb | 175lb | 171lb | 168lb | 165lb | 163lb |

- 21oz or 1lb 5oz b. 19oz over

Convert between metric and imperial weights

A. Approximate metric/imperial conversions (p 247)

- a. 100g b. more
- a. 15oz b. 10oz c. 22oz
d. 11oz e. 19oz f. 29oz
- a. 350g b. 25g c. 125g
d. 200g e. 100g f. 90g
g. 65g h. 190g

B. More accurate conversions (p 248)

- a. 8.8lb b. 10kg c. 19.8lb d. 5.45kg
- a. 112g b. 5oz c. 420g d. 2.5oz

15 Capacity

Measure capacity and volume

A. Know metric measures (p 251)

- a. 2 b. 5 c. 10
- a. 1000ml b. 500ml c. 250ml
d. 750ml e. 1500ml
- a. 3l b. 5l c. 9l
d. 12l e. $4\frac{1}{2}l$

B. Measure in litres and millilitres (p 251)

- a. i. 200ml ii. 600ml
iii. 1000ml iv. 1200ml
v. 1600ml
b. i. 0.2 litres ii. 0.6 litres
iii. 1 litre iv. 1.2 litres v. 1.6 litres
- a. 1 litre b. 100ml c. 50ml
d. i. 100ml ii. 250ml
iii. 500ml iv. 750ml
v. 950ml
e. 500ml
- a. 200ml b. 5 c. 20ml
d. 10ml
e. i. 30ml ii. 60ml
iii. 110ml iv. 130ml
v. 170ml

C. Estimate between marked divisions (p 252)

- i. 375ml ii. 275ml iii. 225ml
iv. 175ml v. 145ml vi. 60ml
- a. 200ml
b. i. 30ml ii. 60ml iii. 90ml
iv. 140ml v. 190ml

Choose units and instruments (p 254)

- a. litres b. ml c. ml
d. litres e. litres f. ml
- a. C b. C c. B d. A e. A
- a. B b. B c. B d. A or B
e. A f. A g. B h. A or B
- a. 100ml or 1 litre b. 100ml c. 1ml
d. 100ml e. 1 litre
f. 1 litre or 100ml g. 1ml

Convert between millilitres, litres and centilitres (p 255)

- a. 5000ml b. 2600ml c. 12500ml
d. 3625ml e. 682ml f. 1850ml
g. 5063ml h. 750ml i. 83ml
j. 40ml
- a. 6l b. 3.5l c. 11l
d. 1.1l e. 65.4l f. 0.33l
g. 0.25l h. 0.425l i. 7.3l
j. 5.32l
- a. 3400ml b. 6250ml
c. 3630ml d. 8760ml
- a. i. 1l 200ml ii. 1.2l
b. i. 3l 830ml ii. 3.83l
c. i. 4l 935ml ii. 4.935l
d. i. 5l 769ml ii. 5.769l
e. i. 15l 800ml ii. 15.8l
f. i. 5l 98ml ii. 5.098l
- A and G B and K C and L
D and H E and J F and I
- C A D B
- a. 3l b. 2.5l c. 30.5l
d. 7.4l e. 0.5l f. 0.33l
g. 0.75l h. 32.1l
- a. 3cl b. 50cl c. 25cl
d. 8.5cl e. 350cl f. 175cl
g. 50cl h. 46cl

Calculate using metric units of capacity

A. Litres and millilitres (p 257)

- a. 3.7l b. 3.425l c. 9.075l
d. 4.53l e. 2.08l f. 6.75l
g. 205ml h. 5.96l i. 2.66l
j. 4.375l
- 6.5l 3. 1.62l
- a. 6.83l b. 1.08l
c. 4.57l d. 8.99l
- a. 500ml b. 400ml c. 400ml
d. 160ml

6. a. 4.67 l b. 730 ml or 0.73 l
c. B and D d. 800 ml e. 5 l

B. Mixed calculations (p 258)

1. a. 20 ml b. 7 2. 20
3. 4.8 l
4. a. 9.6 l b. 7 5. 9
6. a. 1.8 l b. 75 ml
7. 4.25 l 8. 6 l
9. a. 150 ml orange, 200 ml lemonade,
75 ml rum, 50 ml tequila
b. 475 ml
10. Answers depend on the number in the group.

Convert between imperial units of capacity (p 261)

1. a. 3 pints b. 2 pints
c. 3.5 pints d. 7.5 pints
e. 32 pints f. 12 pints
g. 4 pints h. 2 pints
2. a. 3 gallons b. $\frac{1}{4}$ gallon
c. 7.5 gallons d. 17.5 gallons
3. a. 40 fl oz b. 2 fl oz
c. 10 fl oz d. 5 fl oz

Calculate capacity and volume using imperial units (p 261)

1. a. 20 fl oz lemonade 10 fl oz orange juice
5 fl oz apple juice $2\frac{1}{2}$ fl oz mango pulp
2 fl oz lemon juice
b. $39\frac{1}{2}$ fl oz
2. $2\frac{1}{4}$ gal 3. a. 40 b. £21.76
4. 6 gallons
5. a. i. 80 pints ii. 560 pints iii. 29 200 pints
b. i. 10 gallons ii. 70 gallons iii. 3650 gallons

Convert between metric and imperial measures

A. Approximate metric/imperial conversions (p 262)

1. a. a litre b. 1 pint
2. a. $3\frac{1}{2}$ pt b. 2 l c. 4 fl oz
d. 10 gal e. 18 l f. 240 ml
3. $\approx \frac{2}{3}$ litre 4. a. 10 l b. 6 fl oz

B. More accurate conversions (p 263)

1. a. 1.14 l b. 5 pt c. 4.56 l
d. 7.02 pt (to 2 dp)
2. a. 22.75 l b. 110 gal (nearest gal)
c. 40.95 l d. 7.91 gal (to 2 dp)

3. a. 4.4 gallons b. 54.5 litres (to 1 dp)
4. 85.2 ml
5. a. 364 litres
b. 3.85 gal (2dp) c. 21 weeks

16 Temperature

Measure temperature on the Celsius scale (p 265)

1. a. 40 °C b. 35 °C
c. i. 35.5 °C ii. 36.6 °C iii. 36.9 °C
iv. 37.2 °C v. 37.6 °C vi. 38 °C
2. a. 50 °C b. 0 °C
c. i. 12 °C ii. 23 °C iii. 26 °C
iv. 35 °C v. 44 °C
3. a. 50 °C b. 0 °C c. 2 °C
d. i. 3 °C ii. 16 °C iii. 27 °C
iv. 36 °C v. 44 °C
4. a. 9 °C b. 7 °C c. 8 °C
d. 16 °C e. 24 °C f. 27 °C
5. a. 9 °C b. 18 °C c. 7 °C
6. a. 54 °C b. 11 °C c. 6000 °C
d. 20 °C e. 0 °C f. 28 °C

Temperatures below freezing point (p 266)

1. a. 50 °C b. -20 °C
c. i. 22 °C ii. 13 °C iii. 8 °C
iv. 2 °C v. -2 °C vi. -6 °C
vii. -12 °C viii. -17 °C
d. i. 22 °C ii. -17 °C
2. A too cold
3. a. 21 °C 12 °C 2 °C -2 °C -12 °C -21 °C
b. 23 °C 14 °C 4 °C 0 °C -2 °C -4 °C
c. 7 °C 5 °C 3 °C 1 °C -2 °C -7 °C
4. a. 9 °C b. 14 °C c. 14 °C
d. 16 °C e. 22 °C f. 41 °C
g. 5 °C h. 17 °C
5. a. 23 °C b. 26 °C c. 21 °C
d. 18 °C e. 26 °C f. 19 °C
g. 9 °C h. 14 °C
6. a. i. 6 °C ii. -5 °C
b. days 4, 5, 6, 7, 8 c. 11 °C

7.

| | | | | |
|--------------|-------|-------|-------|-------|
| Sitting room | 21 °C | 10 °C | 15 °C | 24 °C |
| Dining room | 20 °C | 9 °C | 14 °C | 23 °C |
| Kitchen | 16 °C | 5 °C | 10 °C | 19 °C |
| Bedroom 1 | 19 °C | 8 °C | 13 °C | 22 °C |
| Bedroom 2 | 16 °C | 5 °C | 10 °C | 19 °C |
| Bedroom 3 | 13 °C | 2 °C | 7 °C | 16 °C |



Celsius and Fahrenheit (p 269)

- 200 °C
 - 180 °C
 - 110 °C
 - 400 °F
 - 350 °F
 - 225 °F
- 350 °F
 - 400 °F
- dials showing:
 - 180 °C (meat), 350 °F (meat)
 - 200 °C (poultry), 400 °F (poultry)

Use formulae to convert temperatures (p 269)

- 68 °F
 - 86 °F
 - 41 °F
 - 59 °F
 - 50 °F
 - 77 °F
 - 53.6 °F
 - 57.2 °F
- 11 °C
 - 19 °C
 - 34 °C
 - 9 °C
 - 27 °C
 - 13 °C
 - 15 °C

17 Shape

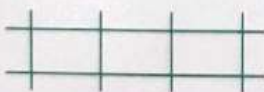
Angles (p 271)

- 1
 - 2
 - 3
 - 2
 - 4
 - 4
- Any 10 objects with right angles
- 40°, b. 70°, c. 110°, d. 145°
- Students' own estimates
 - 90°
 - 60°
 - 30°
 - 25°
 - 130°
 - 25°
 - 55°
 - 45°
 - 80°
 - 127°
 - 13°
 - 40°
 - Student's comparisons between answers to **b i** and **a**
 - a right angle, b acute, c acute, d acute, e obtuse, f acute, g acute, h acute, i acute, j obtuse, k acute, l acute
- Students' own estimates
 - Week 1 40°, week 2 68°, week 3 107°, week 4 122°, week 5 148°; and comparisons with **a**.

Horizontal, vertical and parallel lines

A. Horizontal and vertical lines (p 273)

- D, H
 - C, F
- Students' own examples of vertical lines
 - Students' own examples of horizontal lines
- See below, or similar with 4 verticals and 2 horizontals.



B. Parallel lines (p 274)

- B, D
- Any examples of parallel lines
- 55°
 - 125°
- 112°
 - 68°
 - 112°
 - 68°

Two-dimensional (2-D) shapes (p 275)

| Shape | Number of angles that are: | | |
|------------------|----------------------------|---------|--------|
| | Right angles | Smaller | Larger |
| Square | 4 | | |
| Rectangle | 4 | | |
| Regular hexagon | | | 6 |
| Regular octagon | | | 8 |
| Regular pentagon | | | 5 |
| Parallelogram | | 2 | 2 |
| Rhombus | | 2 | 2 |
| Trapezium | | 2 | 2 |

2.

| Shape | 4 sides equal | 4 right angles | Opposite sides equal | Opposite angles equal | No parallel lines | 1 pair of parallel lines | 2 pairs of parallel lines |
|---------------|---------------|----------------|----------------------|-----------------------|-------------------|--------------------------|---------------------------|
| Square | ✓ | ✓ | ✓ | ✓ | | | ✓ |
| Rectangle | | ✓ | ✓ | ✓ | | | ✓ |
| Parallelogram | | | ✓ | ✓ | | | ✓ |
| Rhombus | ✓ | | ✓ | ✓ | | | ✓ |
| Trapezium | | | | | | ✓ | |

- all 108°
 - all 120°
 - all 135°
- A: 2.5 cm, 1.5 cm, 2.5 cm, 1.5 cm
B: All sides 2 cm
C: 2.5 cm, 2.8 cm, 4.5 cm, 2 cm
 - A: 80°, 100°, 80°, 100°
B: 60°, 120°, 60°, 120°
C: 90°, 135°, 45°, 90°
 - A: Parallelogram
B: Rhombus
C: Trapezium

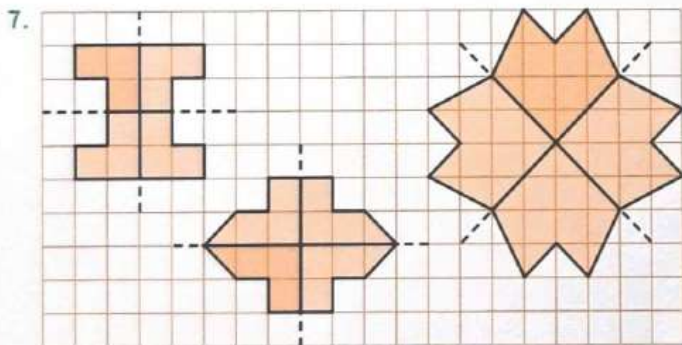
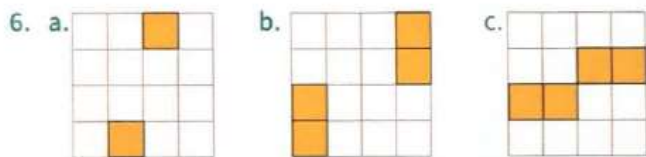
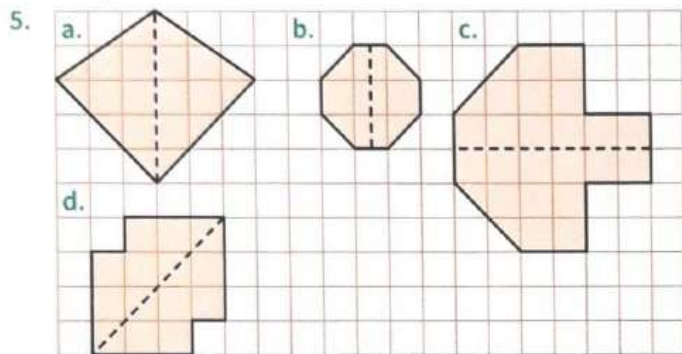
Triangles (p 277)

| Shape | 3 equal sides | 3 equal angles | 2 equal sides | 2 equal angles | no equal sides | no equal angles |
|----------------------|---------------|----------------|---------------|----------------|----------------|-----------------|
| Equilateral triangle | ✓ | ✓ | | | | |
| Scalene triangle | | | | | ✓ | ✓ |
| Isosceles triangle | | | ✓ | ✓ | | |

- C, E
 - A, F
 - B, D
- 140°
 - 65°
 - 50°
- 130° each
- Isosceles triangles
 - 45°, 45°, 90°
- Equilateral
 - Isosceles
 - $x = 60^\circ, y = 120^\circ, z = 30^\circ$

Symmetry (p 281)

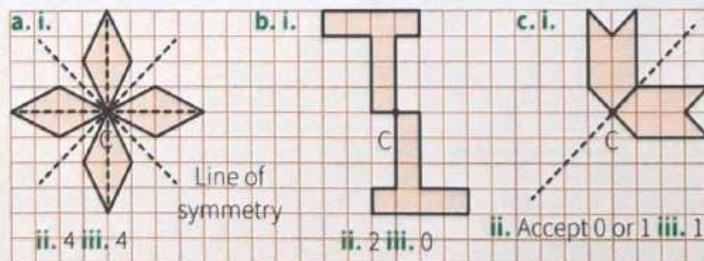
- 1
 - 2
 - 1
 - 1
 - 1
 - 2
 - 1
 - 0
 - 1
 - 2
 - 1
- H order 2, O order 2, Z order 2, S order 2, X order 2
- parallelogram, scalene triangle
 - isosceles triangle
 - rectangle, rhombus
 - square, regular hexagon, equilateral triangle
- square order 4, rectangle order 2, parallelogram order 2, rhombus order 2, regular pentagon order 5, regular octagon order 8, equilateral triangle order 3, isosceles triangle order 1



8. Students' diagrams

9. i. 4 ii. 0

10.



11. Students' diagrams

Tessellations (p 283)

- 8
 - 8
 - 28
 - 8
- hexagon, triangle
 - square, rhombus, triangle

Three-dimensional (3-D) shapes (p 284)

1.

| Shape | Shape of faces | Number of faces | Number of edges | Number of vertices |
|----------------------|-------------------------------|-----------------|-----------------|--------------------|
| Cube | Squares | 6 | 12 | 8 |
| Cuboid | Rectangles | 6 | 12 | 8 |
| Cylinder | Circles and curved rectangles | 3 | 2 | 0 |
| Square-based pyramid | Square and triangle | 5 | 8 | 5 |
| Triangular prism | Triangles and rectangles | 5 | 9 | 6 |

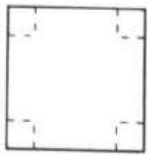
Plans and elevations

A. Interpret plans and elevations (p 285)

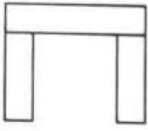
- Shape C
 - Shape A
 - Shape B
- cube
 - cuboid
 - square-based pyramid
 - cone
 - cylinder
 - triangular prism
- plinth
 - ramp
 - planter
- Any spherical objects, e.g. ball, ball bearing, marble
- B
 - A
 - D
 - C
- L (F) I (A) F (B) T (E) H (C) E (B) N (D)
 - L (G) I (D) F (B) T (A) H (C) E (E) N (F)
- Solid B, side
 - Solid B, plan
 - Solid C, front
 - Solid D, side
 - Solid A, side
 - Solid A, front
 - Solid C, plan
 - Solid D, front
 - Solid B, front
 - Solid D, plan
 - Solid A, plan
 - Solid C, side

B. Draw plans and elevations (p 289)

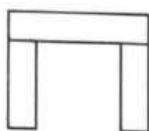
1. a.



plan



front

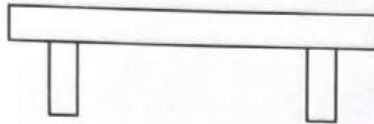


side

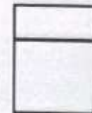
b.



plan

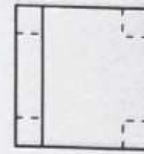


front

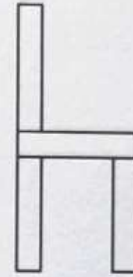


side

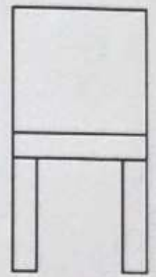
c.



plan



front

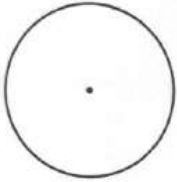


side

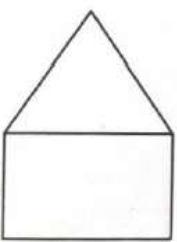
2.

a.

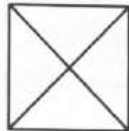
Plan



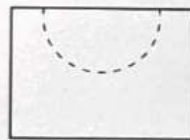
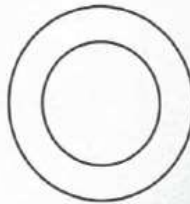
Front elevation



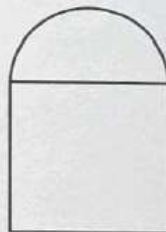
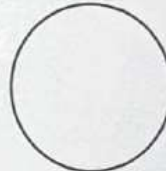
b.



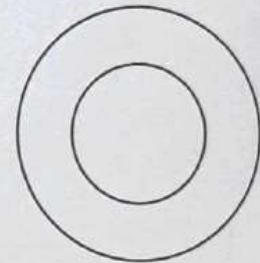
c.



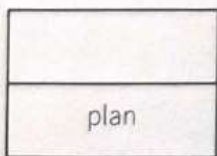
d.



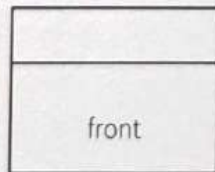
e.



3. a. Scale 1 : 500 (1 cm represents 5m). Other scales are also acceptable.



plan



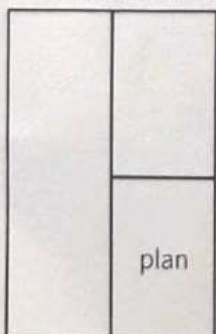
front



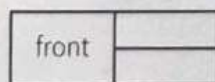
side

b. In b to e, side elevations from other sides also acceptable.

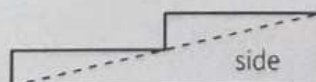
Scale 1 : 50 (1 cm represents 0.5m)



plan



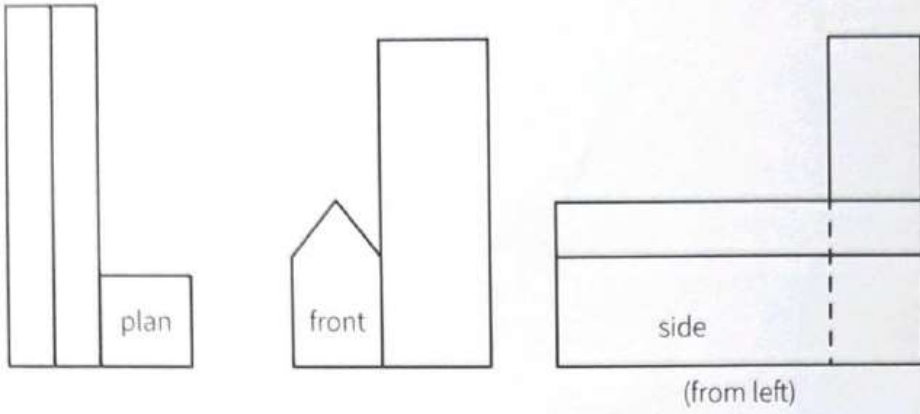
front



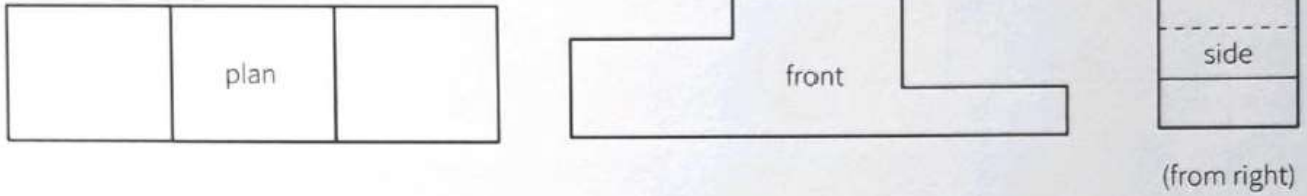
side

(from right)

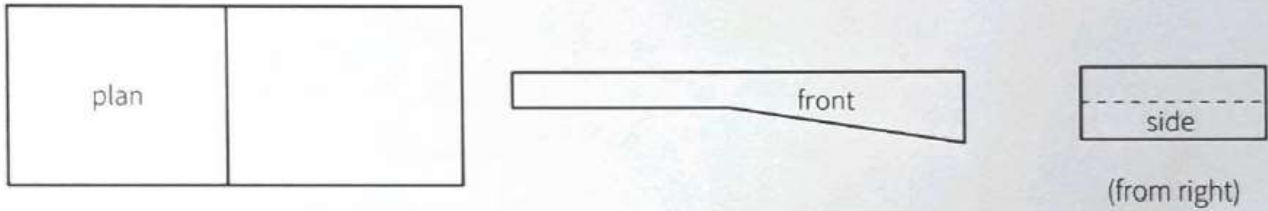
c. Scale 1 cm represents 5 m



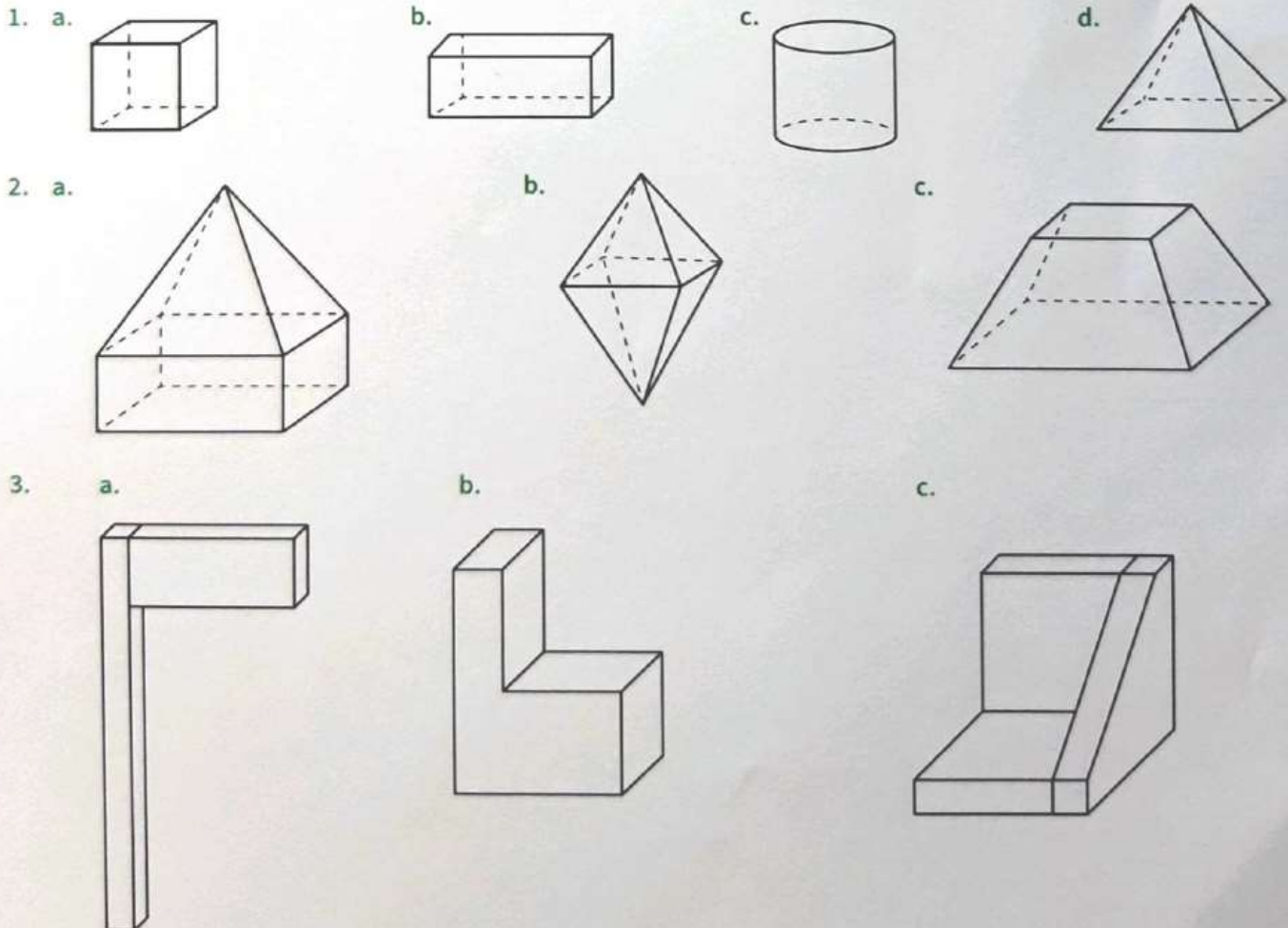
d. Scale 1 : 50 (1 cm represents 0.5 m)

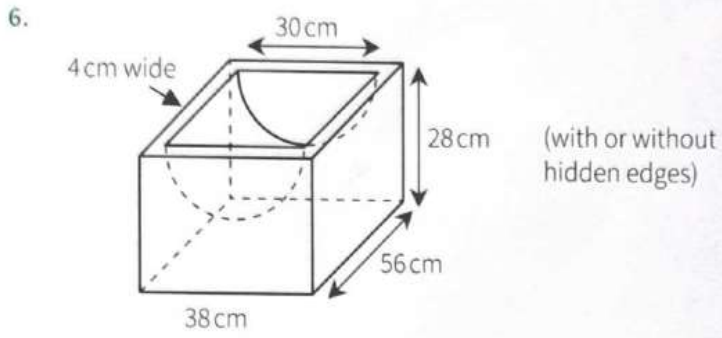
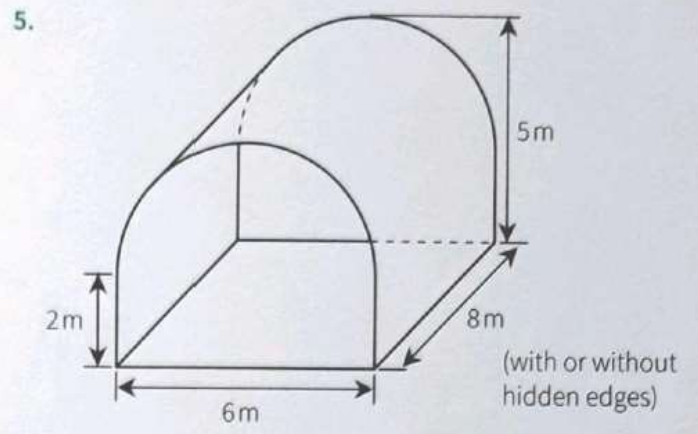
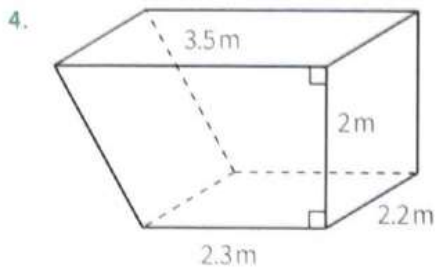


e. Scale 1 : 500 (1 cm represents 5 m)

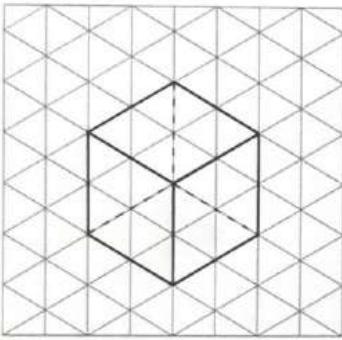


C. Draw 3-D shapes (p 291)

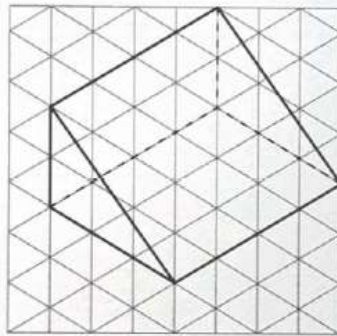




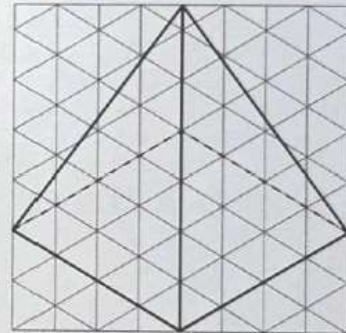
7. a.



b.

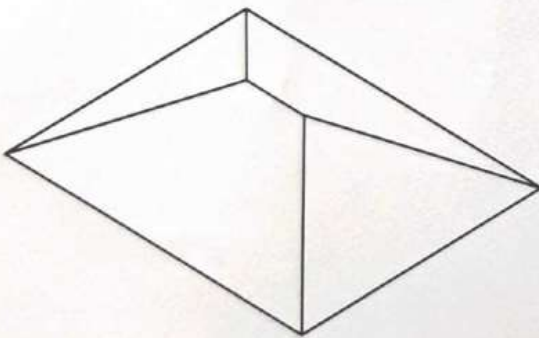


c.

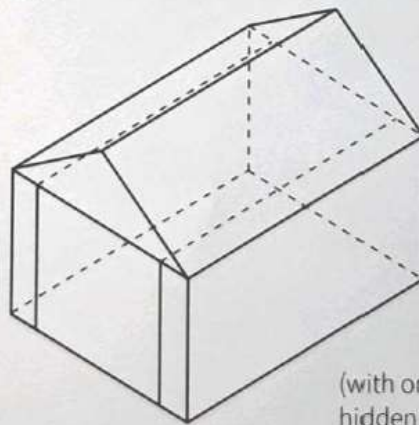


(with or without hidden edges)

8. a.

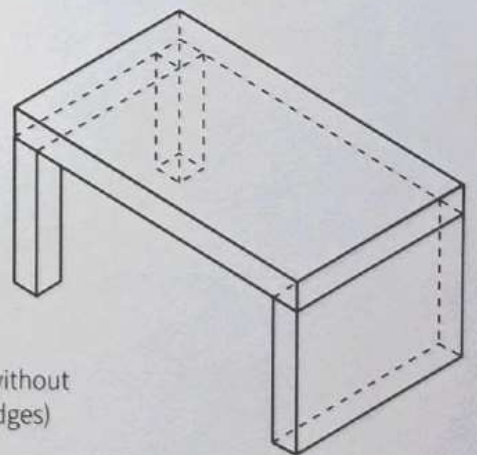


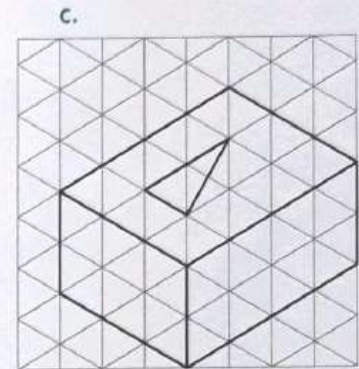
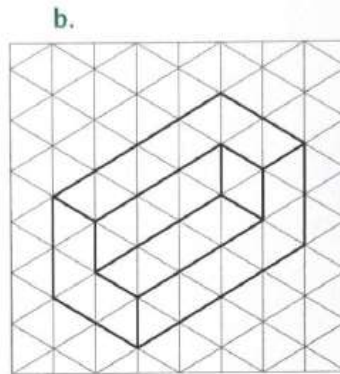
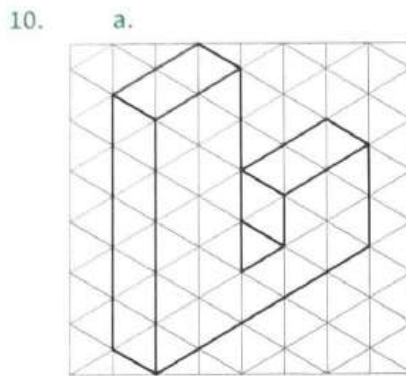
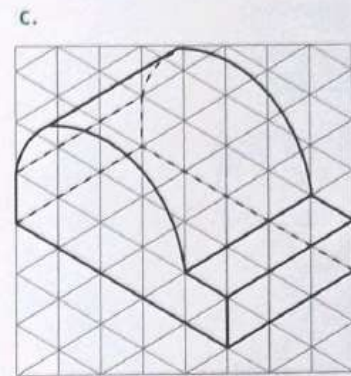
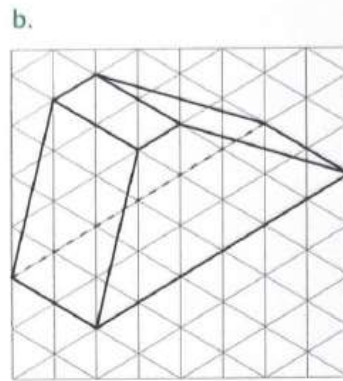
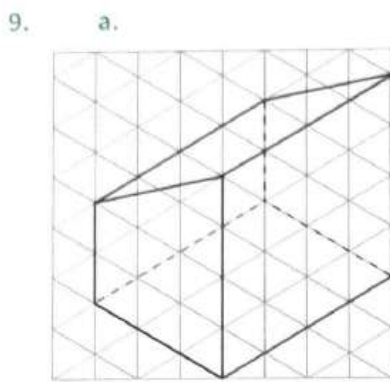
b.



(with or without hidden edges)

c.





18 Position and Direction

Compass points (p 295)

- | | | |
|-------------------------------------|---------------|----------------|
| 1. a. 6 | b. 8 | c. 4 |
| 2. a. south | b. west | c. north |
| d. $\frac{1}{4}$ turn anticlockwise | e. south-west | |
| f. north-east | g. south-east | |
| 3. a. 180° | b. 90° | c. 45° |
| d. 90° | e. 45° | f. 135° |
| g. 180° | h. 45° | i. 135° |

Describe positions and give directions (p 296)

- bank
 - card shop
 - right (east)
 - left (south)
 - east, right, south, Cross Street, left (east), Fir Tree Lane, right
- Students' own questions and answers
- (Other routes are possible.)
 - Go straight on at the roundabout. The college is on the left.
 - Turn left (south) at the roundabout. The college is on the left.
 - Go straight on until the roundabout. Turn right (south) and the college is on the left.
 - Turn right (east) at the first junction, follow the road past the school and round the left-hand bend. The college is on the right.

- Turn left (east) at the Town Hall then right (south) at the roundabout. The college is on the left.
 - Turn left (east) at the traffic lights then right (south) at the roundabout. The college is on the left.
- (Accept alternative routes.)
 - Turn right (north) from the college, then left (west) at the roundabout. The post office is on the left.
 - Turn left (west) out of the school. Turn right (north) at the 1st T-junction and left (west) at the 2nd T-junction. The petrol station is on the right.
 - Turn left (west) out of the gym. Turn left (south) at the 1st T-junction and right (west) at the 2nd T-junction and right (north) at the 3rd T-junction. The fish and chip shop is on the right.
 - Turn right (west) out of the cinema. Turn left (south) at the 1st T-junction, right (west) at the 2nd T-junction and right (north) at the 3rd T-junction, then first left. The supermarket is on the left.
 - e., f. There is more than one good answer.
 - (Accept alternative answers.)
 - First route**
On leaving the college, turn left (south). Follow the road round a right-hand bend and straight on to the T-junction. Turn right (north) at the T-junction, then take the second left turn. The swimming pool is on the left.

Second route

On leaving the college, turn right (north), then go left (west) at the roundabout (1st exit).

Take the third left turn, then first right.

The swimming pool is on the left.

- b. Either route with a valid reason, for example, the first route because it has fewer road junctions.
6. Students' own questions and answers

Bearings (p 299)

1. a. 050° b. 084° c. 116° d. 230° e. 281° f. 345°
2. a. 256° b. 076°
3. a. Jane
- b. Student's diagram

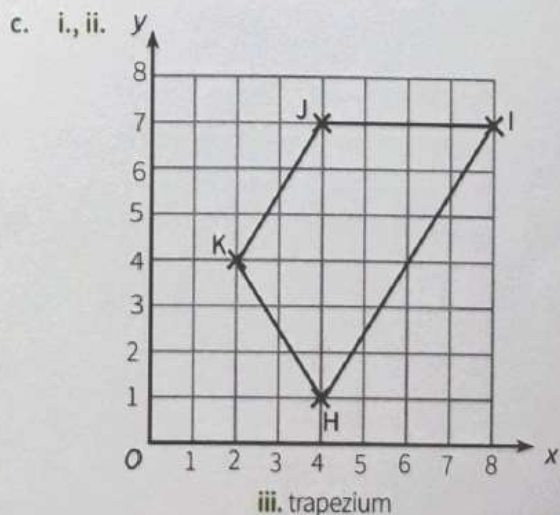
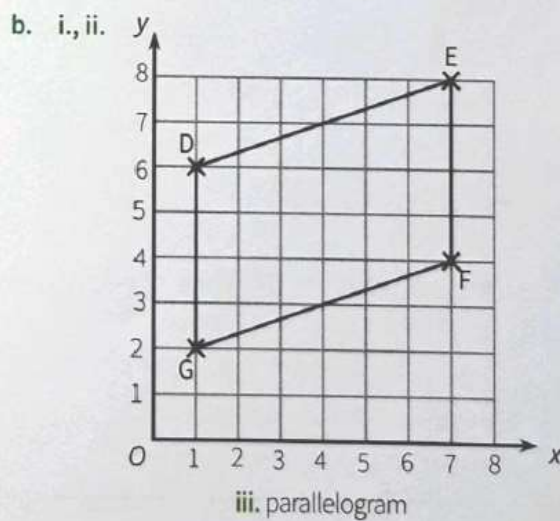
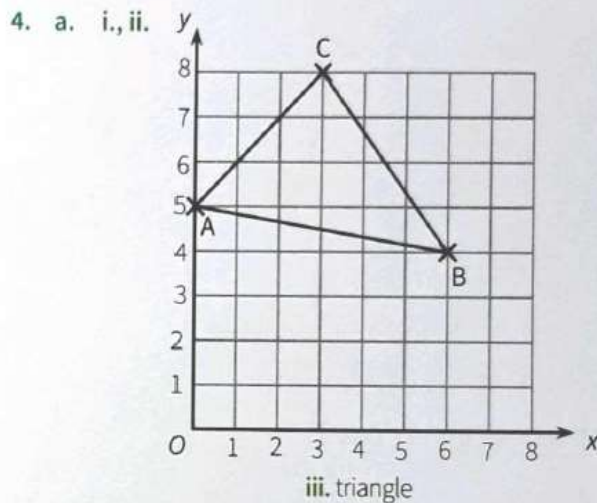
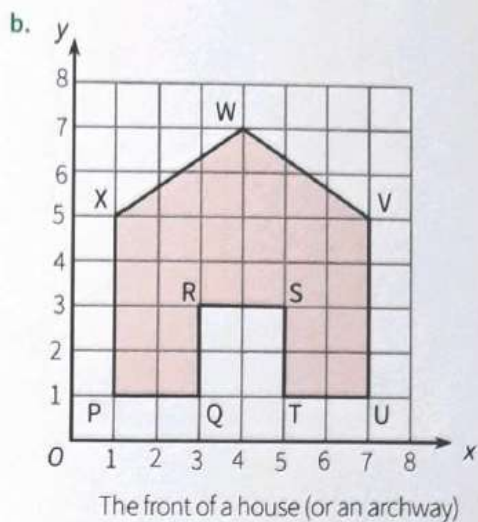
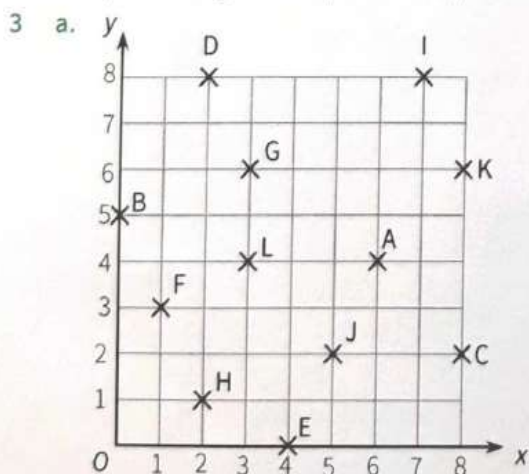
Positions on maps (p 300)

1. a. Netherlands b. Peter Pan
- c. i. E2 ii. C1 iii. C3
2. a. A1, A3, B1, D1
- b. B1, B3, D2, E2
3. a. C1, D2, D3, C3, C2
- b. A3, A2, A1, B1, C1, D2, E2, E3

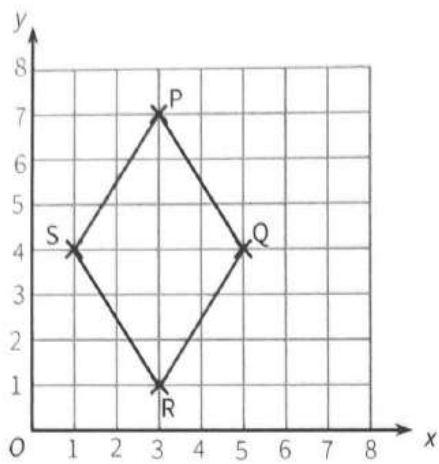
Coordinates

A. Positive coordinates (p 301)

1. a. A(2, 8) B(7, 7) C(0, 7) D(5, 7) E(1, 3) F(4, 5)
G(6, 2) H(8, 7) I(1, 0) J(4, 1) K(8, 5) L(8, 1)
- b. P(2, 4) Q(3, 7) R(5, 6) S(7, 8) T(8, 4) U(7, 0)
V(5, 2) W(3, 1)
2. a. (15, 6) (17, 4)
- b. Move right 3 and up 3, then move right 2 and down 2.
(Or move right 5 and up 1 in two separate rows of trees.)

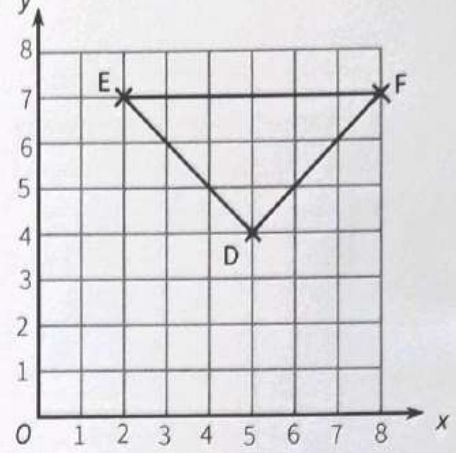


d. i., ii.



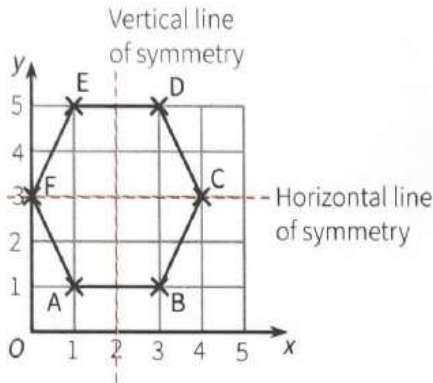
iii. rhombus

b. i., ii.



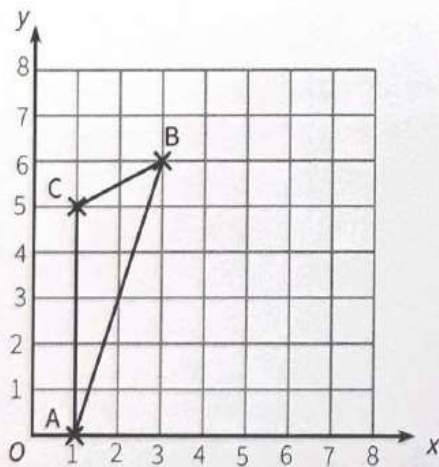
iii. isosceles - 2 equal sides ($DE = DF$) and 2 equal angles (angle $E =$ angle F)

5. a,b,ci,di



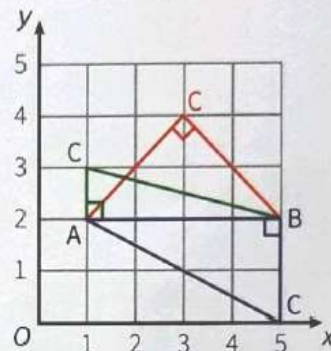
- c ii (2, 1), (2, 2), (2, 3), (2, 4), (2, 5) or any others with x coordinate 2. All points have x-coordinate 2.
 d ii (0, 3), (1, 3), (2, 3), (3, 3), (4, 3) or any others with y coordinate 3. All points have y-coordinate 3.

6. a. i., ii.



iii. scalene - sides and angles all different

7. a., b. Three of many possible triangles:

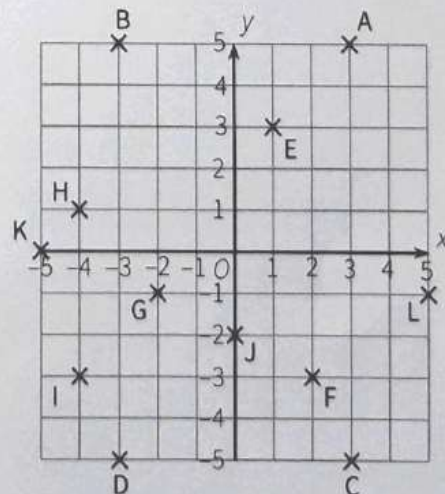


c. Coordinates of students' point C

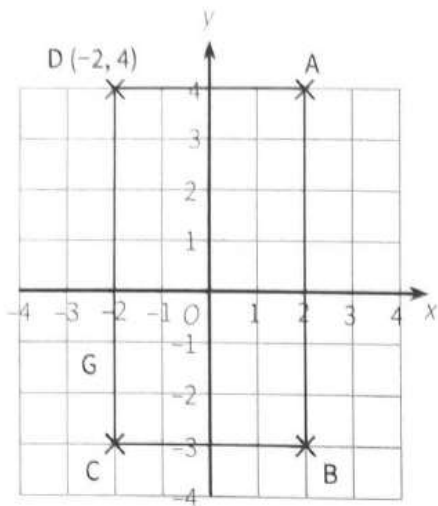
B. Negative coordinates (p 303)

- A(5, 7) B(7, 3) C(1, 4) D(2, -3) E(7, -4) F(-8, -6) G(-5, 6) H(-6, 3) I(4, -6) J(-4, -6) K(-2, 2) L(-5, -2)
 - A, B, E, I
 - F, G, H, J, L
 - B, C, D, E, F, H, I, J, K, L
 - A, B, C, D, E, G, H, K, L

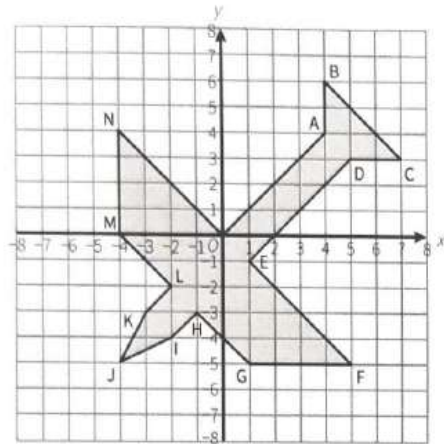
2.



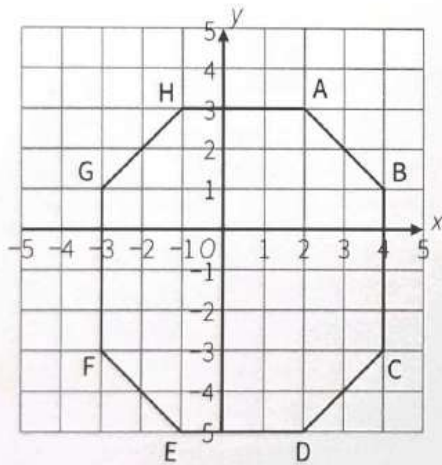
3.



4.



5. a.

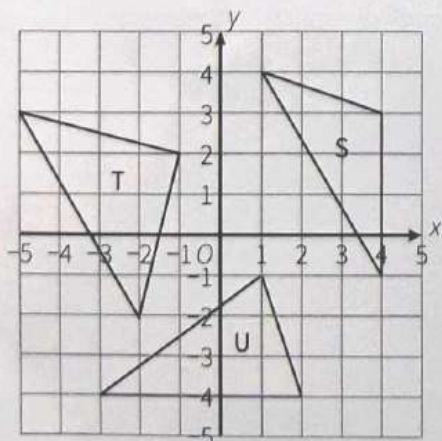


b. octagon

c. 135°

d. No - the sides are not equal.

6. a.



b. i. T is isosceles — it has 2 equal sides and 2 equal angles.

ii. None of the triangles is equilateral — none has 3 equal sides and 3 equal angles.

c. i. T ii. S

Grid references (p 305)

- | | | |
|----------------------|------------------------|-----------|
| 1. a. 268940 | b. 291951 | c. 244962 |
| d. 258952 | e. 292947 | f. 248957 |
| g. 272968 | h. 298948 | |
| 2. a. White Lee Farm | b. Allman Well Hill | |
| c. Ewden Village | d. Spout House Hill | |
| e. parking | f. woodland | |
| g. viewpoint | h. Broomhead Reservoir | |

3-D coordinates (p 306)

- $O(0, 0, 0)$, $A(3, 0, 0)$, $B(0, 5, 0)$, $F(3, 0, 4)$, $G(0, 5, 4)$
- $Q(10, 0, 6)$, $R(10, 0, 0)$, $S(10, 8, 0)$, $T(0, 8, 6)$, $U(0, 0, 6)$, $V(0, 8, 0)$
- $B(3, 1, 2)$, $C(3, 4, 2)$, $D(0, 4, 2)$, $E(0, 1, 5)$, $F(3, 1, 5)$, $G(3, 4, 5)$, $H(0, 4, 5)$
- $A(2, 0, 0)$, $B(2, 0, 1)$, $C(4, 1, 0)$, $D(3, 4, 0)$, $E(3, 4, 1)$, $F(2, 4, 1)$
- $P(1, 4, 0)$, $Q(1, 3, 1)$, $R(1, 3, 3)$, $S(0, 1, 1)$, $T(0, 1, 3)$, $U(0, 3, 3)$
- length 5 m, width 4 m, height 5 m
 - $O(0, 0, 0)$, $A(4, 0, 0)$, $B(4, 0, 3)$, $C(2, 0, 5)$, $D(0, 0, 3)$, $E(0, 5, 0)$, $F(4, 5, 0)$, $G(4, 5, 3)$, $H(2, 5, 5)$, $I(0, 5, 3)$
- Supermarket (20, 5, 15), house (35, 7.5, 15), bungalow (45, 5, 10), church (90, 5, 20)
- (8, 0, 0)
 - (4, 4, 6)

19 Perimeter, Area and Volume

Perimeter (p 309)

- Students' measurements
 - 10 cm
 - 12 cm
 - 10 cm
 - 12.2 cm
 - 13.4 cm
 - 14.2 cm
- 26 cm
 - No, the bottom is equal to $4 + 6 = 10$ cm and the right-hand side is equal to $2 + 1 = 3$ cm
- 21 m
 - 21 m
 - 218 m
 - 18.8 m
- 5 m
 - 3.8 m

| Length | Width | Perimeter |
|--------|--------|-----------|
| 6 cm | 2 cm | 16 cm |
| 10 mm | 6 mm | 32 mm |
| 20 cm | 6.2 cm | 52.4 cm |
| 4.5 m | 3 m | 15 m |
| 20 mm | 15 mm | 70 mm |
| 2.7 m | 2.25 m | 9.9 m |

- Any dimensions which fit the given perimeters
- 1300 m 9. 320 cm 10. 7.8 m

Area

A. Measuring in square units (p 312)

- a. 5 cm^2 b. 7 cm^2 c. 8 cm^2
- Any 4 shapes with an area of 12 cm^2

B. Area of a rectangle (p 313)

- a. 15 m^2 b. 26 m^2 c. 400 mm^2
d. 15 cm^2 e. 1700 mm^2
f. 9750 cm^2 or 0.975 m^2
- Any dimensions which match the given areas
- a. 54 m^2 b. 1080 g

C. Areas of shapes made from rectangles (p 314)

- a. 21 m^2 b. 13 m^2 c. 21 m^2
d. 18.32 m^2 e. 25.8 m^2
- a. 10.8 m^2 b. 25.64 m^2
c. Yes since 2.5 litres covers 30 m^2 .

Circles

A. Circumference (p 316)

- a. 10p diameter = 2.4 cm £2 = 2.8 cm
b. 10p circumference = 7.5 cm £2 = 8.8 cm
c. Students' check
- a. 31.4 cm b. 44.0 cm (1dp)
c. 4.7 m (1dp) d. 5.0 m (1dp)
e. 141.3 m ; 141.4 m (1dp) using π f. 94.2 m

| Radius | Diameter | Circumference |
|---------|----------------|---------------|
| 2 cm | 4 cm | 12.6 cm |
| 15 mm | 30 mm | 94.2 mm |
| 3 m | 6 m | 18.8 m |
| 1.2 m | 2.4 m | 7.5 m |
| 2.5 cm | 5 cm or 5.0 cm | 15.7 cm |
| 12.0 mm | 24.0 mm | 75.4 mm |

- 151 cm
- 251 cm
- a. 84.8 mm b. 8.5 cm

B. Area of a circle (p 317)

- a. 3.1 m^2 b. 28.3 cm^2
c. 78.5 cm^2 d. 15.2 m^2
- a. 153.9 cm^2 b. 12.6 m^2
c. 201.0 mm^2 or 201.1 mm^2
d. 452.2 mm^2 or 452.4 mm^2
e. 706.5 cm^2 or 706.9 cm^2
f. 6.2 m^2
- a. 50.2 cm^2 or 50.3 cm^2
b. 314 mm^2 or 314.2 mm^2 c. 95.0 cm^2
d. 4.9 m^2 e. 153.9 mm^2
f. 5024 cm^2 or 5026.5 cm^2

- 4420 cm^2
- a. 31 cm b. 754.4 cm^2 or 754.8 cm^2
c. 176.6 cm^2 or 176.7 cm^2 d. 578 cm^2

Use formulae to find areas of triangles and other shapes (p 318)

- a. 6 cm^2 b. 10.8 m^2 c. 94.5 cm^2
- 1.05 m^2 3. 4800 cm^2 or 0.48 m^2
- 180 cm^2 5. 2.2 m^2

Perimeters and areas of composite shapes (p 319)

- a. 339 cm (nearest cm) b. 7.8 m (to 1 dp)
c. 200 mm (nearest mm)
- a. 610 m^2
b. 820 cm^2 (nearest cm^2) c. 370 cm^2
- a. perimeter = 12.6 m , area = 9.12 m^2
b. perimeter = 169 cm (nearest cm),
area = 1370 cm^2 (nearest 10 cm^2)
c. perimeter = 209 mm (nearest mm),
area = 3180 mm^2 (nearest 10 mm^2)
- Total area = 104.24 m^2
Number of bricks = 6254.4 so 6255
It would be sensible for the builder to order about 6500 or 7000 bricks, to allow for some breakages.
- a. i. 5.76 m^2 ii. 10.32 m^2 iii. 1.13 m^2 iv. 24.55 m^2 (2dp)
b. 210 g c. 1.23 kg or 1230 g
- a. 25 times round track = $397.0796\dots \times 25 = 9927\text{ m}$
This is a little less than 10 km , so what the athlete says is not accurate, though 10 km is a reasonable estimate.
b. Area = $7963.495\dots\text{ m}^2$
Amount of grass seed needed = 238.9 kg
Number of packs needed = $238.9 \div 5 = 47.78$
 50 packs is sensible as it allows some spare in case of spillages or in case some of the seeds do not germinate.
- a. i., ii. Students' own explanations
b. Perimeter $\approx 8.2\text{ m}$, area $\approx 4.7\text{ m}^2$

Nets (p 321)

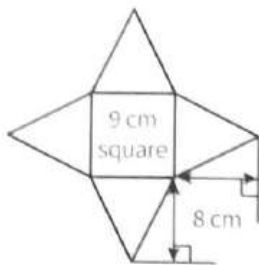
- a. cuboid b. triangular prism
c. square-based pyramid
- A, B, D, E
- A, C, D, F

Surface area (p 323)

- a. 3384 cm^2 b. 31.7 m^2 (to 1 dp)
c. 264 cm^2
- a. 20.88 m^2 b. 348 cm^2 (nearest cm^2)
c. 7704 mm^2



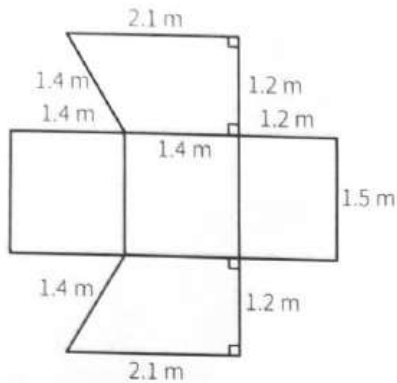
3. a.



b. 225 cm^2

4. 236 cm^2 (nearest cm^2)

5. a.



b. 10.2 m^2

6. 4.3 m^2 (to 1 dp)

Volume of a cuboid (p 325)

1. a. 6 cm^3 b. 4 cm^3 c. 18 cm^3

d. 30 cm^3

2. a. 36 m^3 b. 8000 mm^3

c. 32.4 cm^3 d. 28.8 cm^3

3.

| Length | Width | Height | Volume |
|--------|--------|--------|---------------------------------------|
| 2 cm | 4 cm | 5 cm | 40 cm^3 |
| 3 m | 3.4 m | 3.5 m | 35.7 m^3 |
| 4 mm | 2.5 mm | 6 mm | 60 mm^3 |
| 9 cm | 6.2 cm | 8 cm | 446.4 cm^3 |

4. 0.5 m^3 5. 4000 cm^3

6. Any 3 dimensions which multiply to make a volume of 1000 cm^3

7. 112500 cm^3 8. 15625 mm^3

9. a. 100 cm b. 10000 cm^2

c. 1000000 cm^3

10. 1st 0.384 m^3 2nd 0.224 m^3 3rd 0.14 m^3

b. 0.748 m^3

11.

| Length | Width | Height | Volume |
|------------|-------------|-------------|------------------|
| 4 m | 2 m | 3 m | 24 m^3 |
| 3 cm | 2 cm | 8 cm | 48 cm^3 |
| 2 m | 3 m | 9 m | 54 m^3 |
| 4 cm | 4 cm | 4 cm | 64 cm^3 |

Volume of a cylinder (p 327)

1. a. 56.5 cm^3 b. 19.6 m^3

c. 2.4 m^3 d. 17.0 m^3

e. 6.8 cm^3

2. a. 9.0 m^3

b. 1017.4 cm^3 or 1017.9 cm^3

c. 62.2 m^3 d. 45.2 m^3

e. 282.6 cm^3 or 282.7 cm^3

f. 0.4 m^3

3. a. 3.77 m^3 b. 7.85 cm^3

c. 2.71 cm^3 d. 0.92 m^3

e. 0.11 m^3 f. 0.57 m^3

4. 0.34 m^3 (2dp)

Use other formulae to find volumes (p 329)

1. 1200 cm^3

2. a. 75000 cm^3 b. 2 bags

3. a. 60 cm^3 b. 416

4. 27 litres

5. Volume of sphere = $36\pi\text{ cm}^3$ (or 113 cm^3 to nearest cm^3)

Volume of cone = $36\pi\text{ cm}^3$ (or 113 cm^3 to nearest cm^3)

6. 198 cm^3 (to nearest cm^3)

Solve problems involving 2-D and 3-D shapes (p 330)

1. a. 88 cm b. 22 cm

2. a. 1.6 m b. 1.15 m

3. 41 streetlights

4. a. 12 packs b. 12 packs

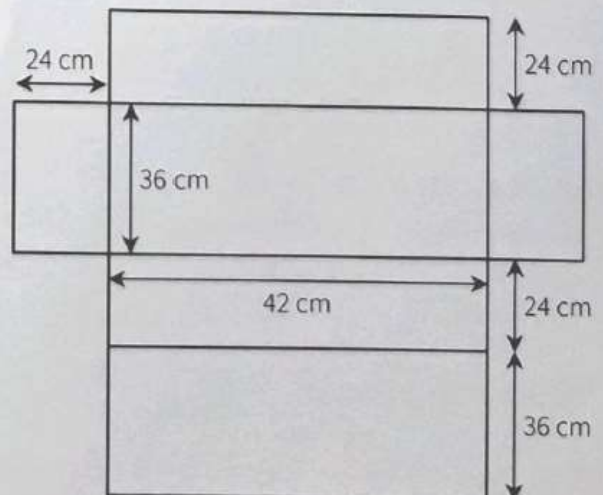
5. a. 136 tiles b. £149.94

6. a. £43.96 b. 4.32 m^2

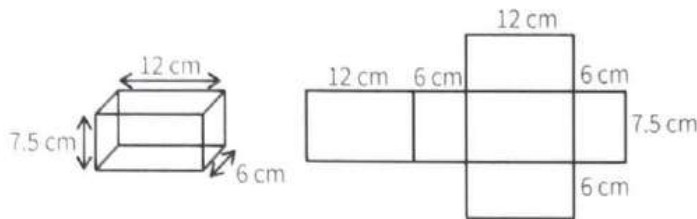
7. a. 360 cans b. 12 cans

8. a. 168

b. As below. Or other net that gives the box, with correct dimensions



9. a i. 1.5 cm ii. 3.375 cm³
 b There are variety of possible answers.
 For example, the dice could be arranged in 5 layers, each with 4 rows of 8 dice.
 This would lead to a box with dimensions 7.5 cm by 6 cm by 12 cm.



10. For 120 glasses as shown they need 27.7 litres of juice.
 As a minimum they should buy 28 cartons costing £22.12. It would be sensible to buy 30 litres costing £23.70 to allow extra in case of spills.

20 Compound Measures

Calculate using compound measures

A. Calculate speed, distance and time (p 334)

- a. 40 mph b. 5 mph c. 42.5 km/h
 d. 580 km/h e. 5 m/s f. 8 mph
 g. 1.25 m/s h. 0.6 km/h
- a. 90 miles b. 3250 km
 c. 60 metres d. 4 miles
- a. 2 hours b. 4 hours
 c. 4 seconds d. 8 seconds
- 45 mph
- 1.4 km/h

B. Convert speeds (p 336)

- a. 20 m/s b. 5 m/s c. 30 m/s
 d. 90 km/h e. 43.2 km/h f. 28.8 km/h
- a. 37.5 m/s b. 135 km/h

3.

| Speed limits in France | | |
|------------------------|------|-----|
| | km/h | mph |
| 2-lane roads | 80 | 50 |
| 3-lane roads | 90 | 56 |
| 4-lane expressways | 110 | 69 |
| motorways | 130 | 81 |

4. Student's table, for example

| Speed limits in the UK | | |
|------------------------|-----|------|
| | mph | km/h |
| urban areas | 30 | 48 |
| single carriageways | 60 | 96 |
| dual carriageways | 70 | 112 |
| motorways | 70 | 112 |

C. Density, mass and volume (p 337)

- Copper 9.0 g/cm³, lead 11.3 g/cm³, steel 7.8 g/cm³, iron 7.9 g/cm³
- a. 107 g b. 382.5 g c. 84.9 g (1 dp) d. 50.4 g
- a. 20 cm³ b. 8.0 cm³ (1 dp)
 c. 16.6 cm³ (1 dp) d. 3.2 cm³ (1 dp)
 e. 51.8 cm³ (1 dp) f. 357 cm³ (nearest cm³)
- £23.30 5. 50 g
- 7788 kg/m³ (nearest kg/m³)
- a. 88.0 cm³ (1 dp) b. 0.9 g/cm³ (1 dp)
- 770 tonnes (nearest 10 tonnes)
- a. i. 113 g (nearest gram) ii. 33929 g or 33.929 kg
 b. £127.23 c. £101.07 d. £295.56

D. Population density (p 339)

- 423 people/km² (to nearest whole number)
- 5.4 million people (to 1 dp)
- 20 700 km² (to nearest hundred km²)
- a. 128 people/km² (to nearest whole number)
 b. The population density of England is the highest, followed by Wales, then Northern Ireland, then Scotland.

5. a.

| Country | Area (km ²) | Population | Population density |
|---------|-------------------------|--------------|----------------------------|
| Spain | 500 000 | 46 million | 92 people/km ² |
| Germany | 357 000 | 82 million | 230 people/km ² |
| Iceland | 100 000 | 330 thousand | 3 people/km ² |

- b. Spain has the greatest area, followed by Germany, then Iceland which is only one fifth the area of Spain. Germany has the greatest population, with Spain having just over half as many people. Iceland has by far the smallest population (Germany has about 250 times as many people and Spain about 140 times as many). Germany is the most densely populated with, on average, over twice as many people per square kilometre than Spain and nearly 80 times as many as Iceland.

Handling Information and Data

21 Extracting and Interpreting Information from lists, tables and pictograms

A. Find information from lists (p 341)

- a. alphabetically b. easy to find items
 c. 791455 d. 787652
 e. Doctor's
- a. by date b. Dinner date
 c. 20th April d. 17th March
 e. Between dinner date and wedding anniversary

3. a. alphabetically b. by date
c. by date d. alphabetically
e. alphabetically in categories

B. Find information from tables (p 343)

1. a. 11 b. 7 c. 11 d. 17
e. Carpentry (19 students)
2. a. £11.00 b. £11.99 c. internet
d. The Invasion e. £3.01
3. a. i. £75 ii. £179
b. Economy
c. £125
d. i. £21 ii. £51
e. £21
4. a. 791/75S b. 11:10 c. 06:30
d. Gatwick-Pula e. Saturday
5. a. Title and column headings
b. Redrawn table with suitable title (for example, Hotel Prices) and column headings (for example, Resort, Hotel, Length of stay and price for HB/FB)
c. £1286 d. £500
e. i. Altea Hotel Esplandia ii. full board
 iii. 7 nights
f. £105
6. a. £101 b. £528

C. Find information from pictograms (p 346)

1. a. 45
b. i. Poultry ii. Meat
c. 15 d. 230
2. a. i. carpet ii. decorating
b. i. curtains £80 bed linen £70 ii. £465
 carpet £155 furniture £104
 decorating £56 (allow \pm £3)

Information from bar charts and line graphs

A. Find information from bar charts (p 347)

1. a.

| Type of drink | Number of workers |
|---------------|-------------------|
| Tea | 25 |
| Decaff tea | 12 |
| Coffee | 30 |
| Decaff coffee | 13 |
| Water | 7 |
| Fruit juice | 15 |

- b. 13 c. 8 d. 25 e. 102
2. a. i. 38 ii. 65 iii. 39 iv. 21
b. i. Soaps ii. Music
c. 17
d. 9 people

- e. 139 people
f. 140 people
g. 300

3. a. i. Germany ii. Ireland
b. UK 65 million, Spain 49 million, Netherlands 17 million, Ireland 5 million, Germany 81 million, Belgium 12 million
c. i. 16 million ii. 48 million
d. 70 million
4. a. Music b. Gardening
c. i. £4.20 ii. £3.70
d. £0.80 or 80 pence

5. a.

| Student | Height (m) |
|----------|------------|
| Jameela | 1.5 |
| Florence | 1.6 |
| David | 1.9 |
| Nasma | 1.7 |
| Matthew | 1.8 |
| Ruaridh | 1.7 |
| Mohamed | 1.8 |

- b. Jameela c. David
d. Ruaridh e. Mohamed
6. a. Title, vertical axis label, (gridlines)
b. Cheese c. Baked beans
d.

| Filling | Number bought |
|---------------|---------------|
| Baked beans | 16 |
| Cheese | 37 |
| Chicken tikka | 28 |
| Coleslaw | 19 |
| Tuna | 18 |

- e. 118 f. 19
7. a. Chart B
b. i., ii. Students' own estimates
(Exact values given below:)

| Year | Chart A | Chart B |
|------|---------|---------|
| 1 | 51 | 51 |
| 2 | 59 | 59 |
| 3 | 62 | 62 |
| 4 | 63 | 63 |
| 5 | 68 | 68 |

- iii. Chart B
8. a. Catering, Electrical installation
b. i. 5 ii. 2 iii. 10
c. i. 26 ii. 35 iii. 34
d. i. 92 ii. 110

9. a. i. Pete ii. £690
 b. i. Amy ii. £550
 c. Ahmed £640, Jim £570, Sally £680
 d. i. Sally ii. £450
 e. i. Amy and Jim ii. £380
 f. i. Amy £170, Ahmed £210, Jim £190, Pete £290, Sally £230
 ii. Pete, Sally, Ahmed, Jim, Amy
10. Any 3 examples of each type of data
11. a. Maths b. Media
 c.

| Grades | Percentage of candidates | | | |
|--------|--------------------------|-----|-------|-------|
| | Computing | Law | Maths | Media |
| A* | 3 | 5 | 18 | 2 |
| A | 14 | 14 | 24 | 10 |
| B | 21 | 27 | 22 | 32 |
| C | 24 | 25 | 16 | 37 |
| D | 21 | 16 | 11 | 15 |
| E | 12 | 9 | 6 | 3 |
| U | 5 | 4 | 3 | 1 |

(allow $\pm 2\%$)

12.

| Magazine | Number of readers | |
|---------------------|-----------------------|-----------------------|
| | a. to nearest million | b. to nearest 100 000 |
| Autocar | 1 million | 900 000 |
| New Musical Express | 1 million | 1 200 000 |
| Radio Times | 3 million | 3 400 000 |
| Time Out | 2 million | 2 000 000 |
| TV Times | 1 million | 1 400 000 |
| What's On TV? | 3 million | 2 800 000 |

B. Find information from line graphs (p 355)

(Allow approximate answers.)

1. a. 5 mm
 b. i. November ii. 150 mm
 c. i. September ii. 35 mm
 d. 76 mm \pm 5 mm e. 1072 mm \pm 20 mm
2. a. i. 22 ii. 23
 b. i. 2018 ii. 28
 c. i. 2016 ii. 19
 d. Yes. 20 children attended in 2014 and 27 children attended in 2019. $27 - 20 = 7$
3. a. i. 1 hour ii. 0.5 °C
 b. every 2 hours
 c. i. 5.5 °C ii. 14:00
 d. i. -3.5 °C ii. 04:00
 e. i. 08:00 ii. 00:20, 18:40 (± 10 min)

- f. i. 04:00 to 14:00
 ii. 00:00 to 04:00 and 14:00 to 24:00
 g. 06:00 to 10:00
4. a. i. Graph B

ii.

| Year | Profits (£000s) |
|------|-----------------|
| 1 | 2130 |
| 2 | 2420 |
| 3 | 2390 |
| 4 | 2510 |
| 5 | 2680 |

(allow ± 10)

- b. Axis does not start at zero.
5. a. i. April ii. May
 b. i. December ii. January and December
 c. i. 0.5 hour (or 30 minutes) per day
 ii. 2 hours per day
 d. i. 3.4 hours (or 3 hours 24 minutes) per day
 ii. 2.7 hours (or 2 hours 42 minutes) per day
 e. More sunshine in England than in Scotland. Least sunshine in winter, but more in spring than in summer.
6. a. 2015 b. 1972
 c. 42 million tonnes (of oil equivalent)
 d. 16 million tonnes
 e. 56 or 57 million tonnes
 f. Solid fuel consumption fell sharply by about 8 million tonnes. Petroleum consumption rose sharply by about 8 million tonnes.
 g. Solid fuel consumption fell to just under a quarter of the original amount. Gas consumption rose to about 7 times as much then started to fall. Overall petroleum consumption fell by about half, then remained fairly steady until 2010 when it started to fall again gradually. (Other wording and details are acceptable.)

Information from pie charts (p 358)

1. a. work b. 0.5 hour
 c. 24 hours — total time in a day
2. a. i. drive ii. cycle
 b. i. $\frac{1}{4}$ ii. $\frac{1}{10}$ iii. $\frac{1}{5}$ iv. $\frac{2}{5}$ v. $\frac{1}{20}$
 c. walk 40, drive 160, bus 100, train 80, cycle 20
3. a. Grade A: $\frac{1}{8}$ Grade B: $\frac{1}{4}$
 Grade C: $\frac{1}{2}$ Grade D: $\frac{1}{8}$
 b. Grade A: 6 Grade B: 12
 Grade C: 24 Grade D: 6
4. a. i. T ii. F iii. T iv. T
 b. Terraced, Flats, Semi-detached, Detached and Bungalows (approx. equal)



5. a., b.

| Flatmate | Angle | Amount to pay |
|--------------|-------|-------------------|
| Bev | 120° | 120 × £0.50 = £60 |
| Mia | 40° | 40 × £0.50 = £20 |
| Jess | 100° | 100 × £0.50 = £50 |
| Oliver | 20° | 20 × £0.50 = £10 |
| Matt | 80° | 80 × £0.50 = £40 |
| Total | | £180 |

6. a. Paint b. more c. true
 d. Wallpaper £1755, Paint £2340
 Decorating equipment £945,
 Plants £1440, Gardening tools £1260,
 Other £360 (Allow ±£22.50)
7. a. 1.5 workers
 b. 360 factory workers, 48 sales workers,
 42 managers
 c. 540
8. a. A, B, D, F
 b. i. 96° ii. 2.5 people
 iii. and c. i. see table
 c. Yes

| | Fri | Sat |
|--------------|------------|-------------|
| Men | 240 | 250 |
| Women | 420 | 370 |
| Children | 240 | 580 |
| Total | 900 | 1200 |

Information from conversion graphs (p 362)

1. a. i. 10 gallons ≈ 45 litres
 ii. 5 gallons ≈ 23 litres
 iii. 18 gallons ≈ 82 litres
 iv. 7.5 gallons ≈ 34 litres
 b. i. 40 litres ≈ 9 gallons
 ii. 72 litres ≈ 16 gallons
 iii. 24 litres ≈ 5.5 gallons
 iv. 67 litres ≈ 14.5 gallons
 c. 68 litres d. 18 gallons e. 68 litres
2. a. i. 2 °C ii. 5 °F
 b. i. 20 °C ≈ 68 °F ii. 48 °C ≈ 118 °F
 iii. 75 °C ≈ 167 °F iv. 27 °C ≈ 81 °F
 v. -10 °C ≈ 14 °F vi. -7 °C ≈ 19 °F
 c. i. 50 °F ≈ 10 °C ii. 140 °F ≈ 60 °C
 iii. 75 °F ≈ 24 °C iv. 205 °F ≈ 96 °C
 v. 184 °F ≈ 84 °C vi. 28 °F ≈ -2 °C
 d. Freezes at 32 °F, boils at 212 °F.
 e. 57 °F is approximately 14 °C so it was approximately 3 °C warmer in July 2010.

22 Collecting and Illustrating Data

Create frequency tables (p 365)

1. a. Cat 14, Rabbit 5, Bird 2, Fish 3,
 Reptile 1, Other 6, None 13
 b. Dog
 c. Any type of pet not in the table, e.g. hamster

2. a.

| Number of pets | Tally | Frequency |
|----------------|-------|-----------|
| 0 | | 13 |
| 1 | | 26 |
| 2 | | 9 |
| 3 | | 7 |
| 4 | | 2 |
| 5 | | 1 |
| 6 | | 2 |

- b. i. 13 ii. 7 iii. 5
 c. 60

3. a.

| Grade | Frequency |
|-------------|-----------|
| Distinction | 7 |
| Merit | 14 |
| Pass | 19 |
| Fail | 10 |

- b. 50 c. i. $\frac{7}{50}$ ii. $\frac{7}{25}$ d. 20%

4. a.

| Number of books | Frequency |
|-----------------|-----------|
| 1 | 31 |
| 2 | 16 |
| 3 | 14 |
| 4 | 11 |
| 5 | 8 |
| 6 | 4 |

- b. 1 c. 84 d. 14% (nearest %)

5. a.

| Time (minutes) | Tally | Frequency |
|----------------|-------|-----------|
| 6-10 | | 3 |
| 11-15 | | 7 |
| 16-20 | | 8 |
| 21-25 | | 10 |
| 26-30 | | 5 |

- b. 21-25 minutes
 c. 33
 d. $\frac{1}{11}$
 e. 45% (to nearest %)

6.

| Age | Frequency | |
|-------|-----------|------|
| | Pass | Fail |
| 17-20 | 7 | 5 |
| 21-30 | 6 | 5 |
| 31-40 | 2 | 1 |
| 41-50 | 3 | 0 |
| 51-60 | 0 | 1 |

(other age groupings possible)

Represent data in pictograms (p 368)

1. Sunshine at a seaside resort in a week in August

| | |
|-----------|--|
| Monday | |
| Tuesday | |
| Wednesday | |
| Thursday | |
| Friday | |
| Saturday | |
| Sunday | |

Key: = 2 hours = 1 hour

2. Number of houses sold by estate agent

| | |
|----------|--|
| January | |
| February | |
| March | |
| April | |
| May | |
| June | |

Key: = 10 houses

3. Students' own design of pictogram

Represent data in bar charts and line graphs

A. Draw a bar chart (p 369)

Bar charts may have either vertical or horizontal bars, and a variety of scales may be used. Refer to the fully worked solutions for examples.

- Students' own charts
 - pepperoni
 - seafood
- Students' own charts
 - apple
 - 7
- Students' own charts
 - France
 - 48
 - 9

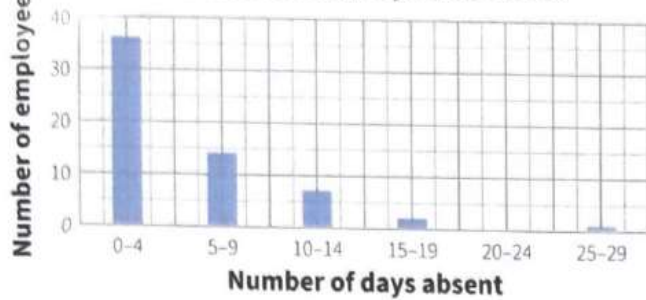
- Students' own charts
 - Adventure
 - Musical
 - Adventure, Children's, Horror, Thriller, Comedy, Sci-fi, Musical
- Students' own charts
 - Most houses he supplies get 1 paper. As the number of papers increases, the number of houses decreases.
- Students' own charts
 - Daily Mail
 - Daily Star
 - Daily Mail, Sun, Guardian, Daily Mirror, Daily Telegraph, Daily Express, Times, Daily Star
- Students' own charts
 - UK
 - Angola
 - Life expectancy is greater for females than males in all countries.
 - Russia
 - The UK, closely followed by the USA, have the best life expectancy for both males and females. Life expectancy is also reasonably good for both genders in China and Brazil. Life expectancy in Russia is reasonably good for females but poorer for males. Life expectancy for males is slightly better in India than Russia, but about 6 years worse for females. Life expectancy is poor for both males and females in Malawi and even worse in Angola, especially for males.

8. a.

| Industry | Number of employees (thousands) | | |
|------------------------|---------------------------------|--------|-------|
| | Male | Female | Total |
| Construction | 2034 | 296 | 2330 |
| Education | 912 | 2324 | 3236 |
| Health and social work | 906 | 3356 | 4262 |
| Manufacturing | 2194 | 724 | 2918 |
| Wholesale and retail | 2277 | 1981 | 4258 |

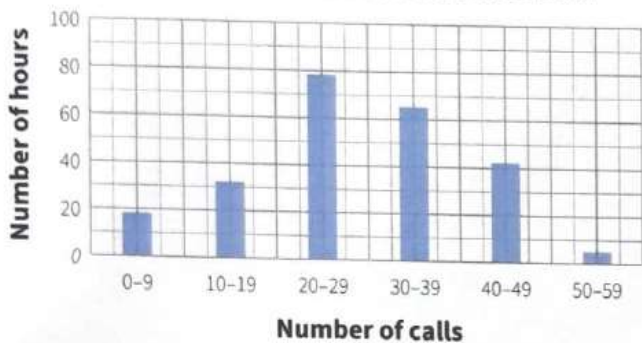
- Students' own charts
- Health and social work (accept both Health and social work and Wholesale and retail).
 - Wholesale and retail
 - Health and social work
- Many more men than women are employed in Construction and Manufacturing. Many more women than men are employed in Education and Health and social work. Roughly the same number of men and women are employed in Wholesale and retail.

9. **Number of employee absences**



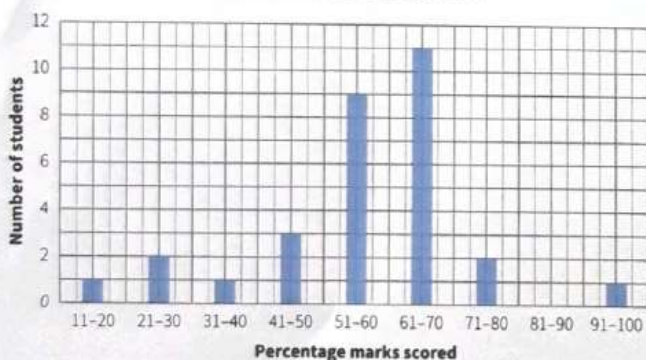
The bar chart shows the majority of employees had between 0 and 4 days of absence. Very few employees had more than 14 days of absence.

10. **Number of calls received each hour**



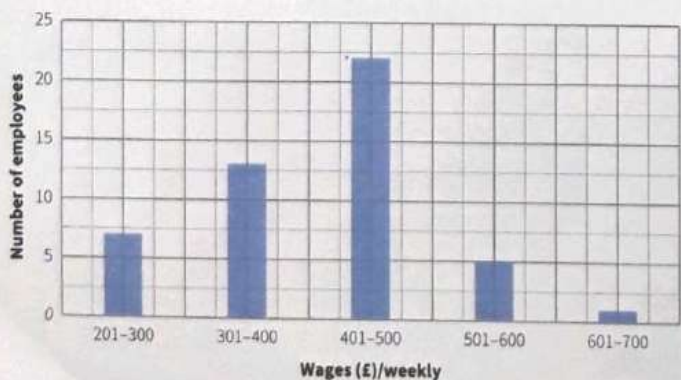
The bar chart shows that there are a few hours with only a few calls, also only very few hours with the largest number of calls. The majority of hours have between 20 and 39 calls.

11. **Exam marks by students**



The bar chart shows that the majority of students scored between 51% and 70%.

12. **Weekly wages of company employees**



The bar chart shows that the majority of employees earn between £401 and £500 per week. A few employees earn the lowest wages (between £201 and £300 per week) and one employee earns over £600 per week.

B. Draw a line graph (p 373)

Line graphs may use a variety of scales. Refer to the fully worked solutions for examples.

- Students' own graphs
 - Week 8
 - Week 2
 - Low at first, but increasing to 15 after 8 weeks. Decreased at the end.
- Students' own graphs
 - 50
 - 180
 - 300 (approx)
 - 1998
 - 2003
 - 2014
- Students' own graphs
 - There were no lawnmowers sold in November, December and January, and few in February, because in the UK this is winter and the grass does not grow in winter temperatures. Sales showed a sharp peak in March and April, which is when grass starts to grow rapidly. Sales were medium in the summer months, when probably lower rainfall meant little growth, and possibly most people had already bought a lawnmower. Then sales showed a small peak in October which was possibly wet but still fairly warm (or there may have been discounted prices).
- Students' own graphs
 - 80 °C
 - 69 °C
 - 46 °C
 - 25 min
 - 39 min
 - 56 min
 - In the first 10 min
 - Between 70 and 80 min
 - It will drop about 2 °C in the next 10 min and continue to fall gradually, eventually reach a constant temperature of about 25 °C (room temperature).
- Students' own graphs
 - 9:45 am, 12:15 pm, 1:35 pm, 3:15 pm
 - 6 hours 50 minutes (allow ±10 min)
 - Starts low at 8 am (before most of work begins), builds to peak of almost 90 dB at 11 am (peak time for morning work), then falls to 74 dB at 1 pm (lunchtime — less work going on) before rising again to about 84 dB between 2 pm and 3 pm (peak period for afternoon work). Finally falls to 54 dB at 5 pm (most of work finished for day).
- Students' own graphs
 - London Dec, Manchester Dec
 - London Feb, Manchester Feb
 - London — Jan, Nov, Dec
Manchester — Dec
 - Jan
 - Jul
 - Both sold a lot in January (sales) and in December (before Christmas). Both sold less in February (after the sales), but then sales rose during the spring with

London reaching a peak in June and Manchester in July. Sales at both shops dipped slightly in August. From September onwards the sales in London increased, whereas in Manchester sales didn't rise significantly until after October.

7. a. Students' own graphs
- b. E&W Jan, Dec
Scot Jan, Feb, Mar, Dec
NI Feb, Dec
- c. All low in winter months and high in summer, reaching a peak in August. Generally E&W has higher temperatures than NI, with Scotland the coolest. The only exception was in January when NI was warmer than E&W.
8. a. Students' own graphs
- b. approx $19\frac{1}{2}$ hours
- c. 5:20 am (approx)
9. a. Students' own graphs
- b. The number of speeding offences in Surrey and Sussex fluctuate, mostly between 50 000 and 70 000. But the number in Essex rises sharply from 30 000 to almost 100 000 in this period.
- c. The total volume of traffic in the areas should be considered. Other possible considerations include the number of speed cameras or mobile speed traps, areas with substantial roadworks, general congestion on roads.

Illustrate data using a pie chart (p 377)

Pie charts may arrange sections in a variety of different orders. Refer to the fully worked solutions for examples.

1. a. Students' own charts
- b. i. Fail ii. Pass
2. a. 24 b. 15°

| Lunch | Number of students | Angle |
|--------------|--------------------|-------------------------------|
| Sandwich | 6 | $6 \times 15 = 90^\circ$ |
| Pasta | 5 | $5 \times 15 = 75^\circ$ |
| Baked potato | 8 | $8 \times 15 = 120^\circ$ |
| Salad | 4 | $4 \times 15 = 60^\circ$ |
| Pizza | 1 | $1 \times 15 = 15^\circ$ |
| Total | 24 | 360° |

- d. Students' own charts
3. a. Angles: 0 cars 90° , 1 car 155° ,
2 or more cars 115°
Students' own charts
- b. 1. c. $\frac{1}{4}$

4. a. Angles: Europe 82° , N America 69° ,
S America 10° , Asia 196° , Other 3°

Students' own charts

- b. Asia
5. a. Angles: Internet 190° , Cinema 6° ,
Radio 11° , TV 98° , Press 55°
Students' own charts
- b. i. Internet ii. more
iii. Yes
6. a. Pop. angles England 303° , NI 10° , Scotland 30° ,
Wales 17°
Area angles England 193° , NI 20° ,
Scotland 116° , Wales 31°

Students' own charts

- b. England has over $\frac{3}{4}$ of the population but just over $\frac{1}{2}$ of the land area. Scotland has over $\frac{1}{4}$ of the land area but a much smaller proportion of the population. Wales and Northern Ireland also have a greater proportion of the land area than their population would suggest. This means that the population density in England is greater than in any of the other countries. Scotland is more sparsely populated than the other countries.

Draw and use conversion graphs (p 379)

1. a. Horizontal 0.2 inches, Vertical 0.5 cm
- b. Student's checks
- c. i. 6 in \approx 15.2 cm
ii. 9 in \approx 22.9 cm
iii. 2.6 in \approx 6.6 cm
iv. 4.3 in \approx 10.9 cm
v. 10 cm \approx 3.9 in
vi. 25 cm \approx 9.8 in
vii. 18 cm \approx 7.1 in
viii. 12.5 cm \approx 4.9 in

Allow ± 0.5 cm and ± 0.2 in

2. a. Students' own graphs
- b. i. 15 kg \approx 33 lb ii. 9 kg \approx 19.8 lb
iii. 12.5 kg \approx 27.5 lb iv. 30 lb \approx 13.6 kg
v. 14 lb \approx 6.4 kg vi. 38.5 lb \approx 17.5 kg
Allow ± 1 lb and ± 0.5 kg
3. a. Students' own graphs
- b. i. 5.5 or 5.6 gallons ii. £48.60

Choosing a statistical diagram (p 381)

A variety of statistical diagrams could be used. The best types for each question are given below.

1. Line graph (or bar chart)
Students' own diagrams

The graph shows that the highest attendance was in August (perhaps because children were taken to the cinema in the school holidays).

The attendance was also quite high in July and February. The attendance was low in the spring (March and April) and also September.

2. Pie chart (or bar chart)
Students' own diagrams
Angles: Food 105°, Rent 115°, Transport 32°, Clothes 50°, Entertainment 36°, Other 22°
Tracy spent over a quarter of her earnings on rent (the largest amount) and over a quarter on food. This left less than a half to be spent on transport, clothes, entertainment and other things.
3. Comparative bar chart (or component bar chart)
Students' own diagrams
Most of the readers of Car Buyer are men. Most of the readers of Gardeners' World are women. Hello! is by far the most popular magazine and vastly more women than men read it. Few people, both men and women, read Country Life.
4. Line graph (or bar chart)
Students' own diagrams
Many drink-drive accidents occur at night between 5 pm and 3 am, with the largest number occurring around midnight.
Few drink-drive accidents occur between 7 am and 3 pm, with the lowest number occurring around 11 am.
5. Comparative bar chart or component bar chart.
Students' own diagrams
The biggest age group is 20–39 but almost as many employees are in the 40–59 age group. Very few of the employees are in the smallest age group which is 16–19. None of the 16–19 year-olds work in Deliveries. The number of employees aged 60 or over is about half as many as the number who are between 20 and 39 years old.
More people work in Sales than in the Office or Deliveries. The biggest age group in both Sales and Deliveries is 20–39 but the biggest in the Office is 40–59. The smallest age group in all departments is 16–19.
6. Pie chart
Angles: Need different size of house 108°, Personal 76°, To move to a better area 36°, Job-related reason 115°, Other 25°
Students' own diagrams
7. Comparative bar chart
Students' own diagrams
The students had better results on Paper 1. The most common grade on Paper 1 was C, whilst on Paper 2 it was E. Also more students achieved grades A and C on Paper 1 whilst more got the low grades E and F on

Paper 2. The same number of students achieved grade B and grade D on both papers.

8. Pie chart (or bar chart)
Students' own diagrams
Angles: Asia 215°, Africa 60°, Europe 35°, North America 17°, South America 31°, Oceania 2°
Well over half of the world's population live in Asia. Only a very small number live in Oceania.
9. Component bar chart (or comparative bar chart)
Students' own diagrams
This shows clearly that the USA won more medals of each type than other countries, that China and GB were roughly on a par and Russia came fourth. The number of silver and bronze medals cannot be compared easily on this chart.
A comparative bar chart with separate bars for gold, silver and bronze would also be suitable but it would not be so easy to compare total numbers of medals.

23 Averages and Range

Find the mean (p 384)

1. a. 1.8 b. 6 c. 6.6
d. 4.25 e. 0.375 kg f. £40
2. a. Andy 45, Imran 37, Mark 24, Stuart 28.75, Tim 39.75
b. i. Andy ii. Mark
3. a. £18.60
b. No — nobody gets £18.60 per hour and it is distorted by the high wage of the manager.
4. a. 303 b. 189.6
5. a. Jen £11.00, Kim £10.50, Ben £14.50, Nasma £12.00, Mike £10.00, Wes £11.50
b. £11.58 c. Ben, Nasma

(Represent data in pictograms data): **(p 385)**

1. 6.4 hours per day (1 dp)
2. 45 houses (nearest whole number)

(Draw a bar chart data): (p 385)

1. 12.8 pizzas (1 dp)
2. 22.8 trees (1 dp)
3. 39.5 properties
4. 190 films

(Draw a line graph data): (p 385)

1. 7.3 students
3. 21.2 (1 dp)
5. 72.8 dB

6. a. 20 b. 0.9 errors per page
7. a. 2.85 children per family b. 10
8. a. 1.2 trains per day b. 24%

3. a. 77.9 minutes (1 dp) b. 120 minutes
 4. a. 5 visits b. 3 visits
 5. a. 19 students b. 5 students
 6. a. 0.5 m b. 0.8 m
 7. a. i. 7 years ii. 5 years
 b. i. 10 years ii. 11 years
 c. The boys' ages are more spread out than the girls' ages. On average the girls are older.

(Find the mean data): (p 396)

6. 4 errors 7. 5 children
 8. 4 late trains 9. 6 years
 10. Home 6 goals, Away 4 goals

(Find the mode and median data): (p 396)

2. 3 years 3. 12
 4. 4 attempts for both age groups

- 8 a. i. 3 points ii. 5 points
 iii. 5.1 points (1 dp) iv. 6 points
 b. i. 3 points ii. 3 points
 iii. 3.8 points (1 dp) iv. 5 points
 c. On average the women were awarded fewer points and the points awarded to women were less variable.

Compare data sets (p 398)

1. Class A: Mode 4 Median 4 Mean 3.2(1dp) Range 5
 Class B: Mode 4 Median 4 Mean 3.5 Range 4
 The mode and the median are the same; the mean is slightly higher for Class B showing that on average they completed more assignments. The mean is the most appropriate average to use. Class B was also more consistent than Class A.
2. a. Ahmed: Mode none Median 37.5 Mean 42.6 Range 71
 Mark: Mode none Median 29 Mean 38.7 Range 92
 b. Ahmed, because both his median and mean average are higher and the range is lower, showing he scores more on average and his score is less variable.
3. Home: Mode 2 Median 2 Mean 2.3 Range 6
 Away: Mode 1 Median 1 Mean 1.4 Range 4
 All 3 averages show a higher average score for home matches. The number of goals scored was more variable in home matches.
4. Girls: Mode £5 Median £6.25 Mean £6.50 Range £4
 Boys: Mode £8 Median £7.75 Mean £7.25 Range £5
 All 3 averages are higher for boys, although the range shows there is a greater variation in the amount of pocket money they get.
5. a. Book A: Mode 4 Median 4 Mean 3.5 Range 7
 Book B: Mode 4 Median 4 Mean 4.1 Range 9

- b. Books A and B have the same mode and median, but the mean and range are higher for book B. It may therefore be harder to read because the words are on average longer and more variable.

24 Scatter diagrams

Scatter diagrams and correlation

A. Draw and interpret scatter diagrams (p 404)

Scatter graphs may use a variety of scales. Refer to the fully worked solutions for examples.

- Students' own graphs.
 Fairly strong positive correlation — students who don't do very well on the first paper also get a poor mark on the second paper, and students who do well on the first paper also tend to get a good mark on the second paper.
- Students' own graphs.
 Strong negative correlation — the larger the number of sunhats that are sold, the fewer the number of umbrellas that are sold and vice versa.
- Students' own graphs.
 Strong positive correlation — when the petrol price is high, so is the diesel price and when the petrol price is low, so is the diesel price.
- Students' own graphs.
 Weak negative correlation — the more time students spend watching TV, the less time they spend on social media, but the relationship is not very strong.
- a. Students' own graphs.
 Strong, positive correlation — the bigger the engine size, the higher the carbon dioxide emissions.
 b. Students' own graphs.
 Weak positive correlation — the bigger the engine size, the higher the nitrous oxide emissions.
 c. Both carbon dioxide and nitrous oxide emissions increase with engine size, but the relationship is less strong for nitrous oxide than for carbon dioxide.
- Students' own graphs.
 Strong positive correlation — the longer the distance the longer it takes to reach the resort.
- a. i. Students' own graphs.
 Strong negative correlation — the greater the car's age, the lower the price.
 ii. Students' own graphs.
 Weak negative correlation — the greater the car mileage, the lower the price.
 b. The graphs suggest that Seth is correct — the car's age has more effect on the car's price than the mileage.

B. Draw and use lines of best fit (p 406)

- 21
 - 54
- Students' line of best fit
 - 210 min (3 hours 30 mins) \pm 10 mins
 - 320 miles \pm 10 miles
- Students' line of best fit
 - 1340 cm³ \pm 10 cm³
 - 116 g per km \pm 1 g per km
- Students' own graphs
 - Fairly strong positive correlation.
 - 39 cm (or close answer)
 - 16 or 17 cm (or close answer)
- Students' own graphs
 - In both cases there is negative correlation. This means that as the temperature increases the consumption of coal and gas decreases. The correlation of coal consumption with temperature is stronger than that of gas consumption with temperature, meaning that the relationship between coal consumption and temperature is stronger than that between gas consumption and temperature.
 - Coal 3.1 million tonnes of oil equivalent
Gas 7.5 million tonnes of oil equivalent

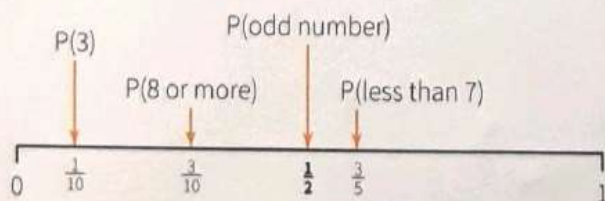
25 Probability

Compare the likelihood of events (p 408)

- Students' own answers
 - unlikely
 - impossible
 - certain
- 2
 - 1 in 2
- 1 in 5
 - 2 in 5
 - 3 in 5
 - odd number
- 52
 - 4 in 52 (or 1 in 13)
 - 13 in 52 (or 1 in 4)
 - 1 in 52
- 26
 - 1 in 26
 - 5 in 26
 - 21 in 26

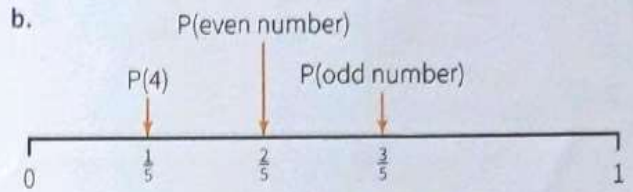
Use fractions to measure probability (p 410)

- $\frac{1}{10}$
 - $\frac{1}{2}$
 - $\frac{3}{5}$
 - $\frac{3}{10}$



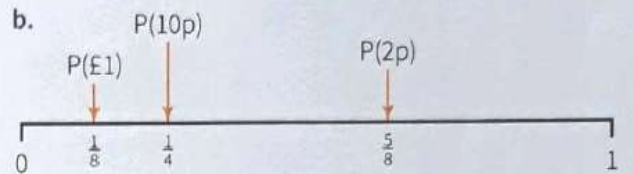
- $\frac{1}{6}$
 - $\frac{1}{2}$
 - 0
 - 1

- $\frac{1}{5}$
 - $\frac{2}{5}$
 - $\frac{3}{5}$



- $\frac{1}{13}$
 - $\frac{1}{4}$
 - $\frac{1}{52}$
 - $\frac{1}{2}$
 - $\frac{1}{26}$
 - $\frac{2}{13}$
 - the king of clubs, a red king, a king, a jack or queen, a club, a red card

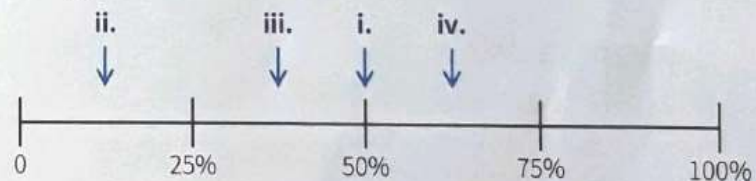
- $\frac{5}{8}$
 - $\frac{1}{4}$
 - $\frac{1}{8}$



- $\frac{1}{8}$
 - $\frac{3}{8}$
 - $\frac{7}{20}$
 - $\frac{1}{4}$
 - ii iii iv i

Write probabilities as decimals and percentages (p 412)

- 10%, 0.1
 - 4%, 0.04
 - 50%, 0.5
 - 16%, 0.16
- 50%
 - 12.5%
 - 37.5%
 - 62.5%



- 0.2, 20%
- $\frac{1}{366}$
 - $\frac{31}{366}$
 - $\frac{5}{61}$
 - $\frac{29}{366}$
 - $\frac{121}{366}$
- $\frac{7}{25}$ or 0.28 or 28%
 - $\frac{9}{25}$ or 0.36 or 36%

b. Sally is correct because there are 12 men and 13 women so $P(\text{man}) = \frac{12}{25}$ or 0.48 or 48% and $P(\text{woman}) = \frac{13}{25}$ or 0.52 or 52%. The probability of a woman being chosen is higher than that of a man being chosen.

- $\frac{1}{4}$
 - $\frac{1}{2}$
 - 10
 - 20
- $\frac{1}{6}$
 - $\frac{1}{2}$
 - $\frac{1}{3}$
 - 10
 - 30
 - 20

8. a. Ball sports 76.0%, Combat sports 3.3%, Wheel sports 5.2%, Winter sports 3.2%, Animal sports 3.1%, Water sports 3.4%, Other 5.8%
- b. Far more hospital treatments are for injuries from ball sports than from any other type of sport.

Combined events

A. Identify possible outcomes of combined events (p 414)

1. a. Score on 1st dice

| | | | | | | | |
|-------------------|---|---|---|---|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| Score on 2nd dice | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | 6 | 7 | 8 | 9 | 10 | 11 | 12 |

- b. 36
- c. $P(2) = \frac{1}{36}$, $P(3) = \frac{1}{18}$, $P(4) = \frac{1}{12}$, $P(5) = \frac{1}{9}$,
 $P(6) = \frac{5}{36}$, $P(7) = \frac{1}{6}$, $P(8) = \frac{5}{36}$, $P(9) = \frac{1}{9}$,
 $P(10) = \frac{1}{12}$, $P(11) = \frac{1}{18}$, $P(12) = \frac{1}{36}$

- d. 7

2. Score on 1st dice

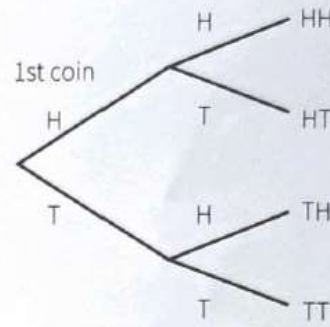
| | | | | | | | |
|-------------------|---|---|----|----|----|----|----|
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| Score on 2nd dice | 1 | 1 | 2 | 3 | 4 | 5 | 6 |
| | 2 | 2 | 4 | 6 | 8 | 10 | 12 |
| | 3 | 3 | 6 | 9 | 12 | 15 | 18 |
| | 4 | 4 | 8 | 12 | 16 | 20 | 24 |
| | 5 | 5 | 10 | 15 | 20 | 25 | 30 |
| | 6 | 6 | 12 | 18 | 24 | 30 | 36 |

- a. $\frac{1}{4}$ b. $\frac{3}{4}$

3. a. 1st coin

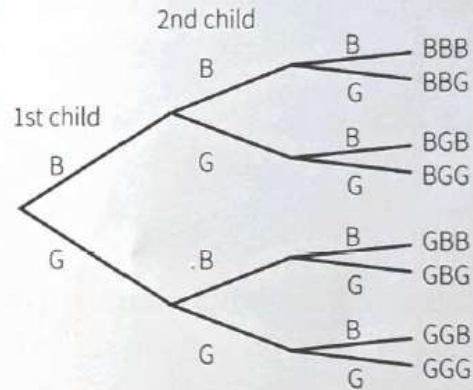
| | | | |
|----------|---|----|----|
| | | H | T |
| 2nd coin | H | HH | TH |
| | T | HT | TT |

- b. 2nd coin

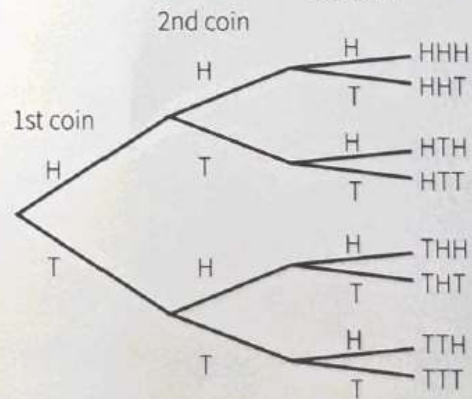


- c. i. $\frac{1}{4}$ ii. $\frac{1}{2}$

4. 3rd child



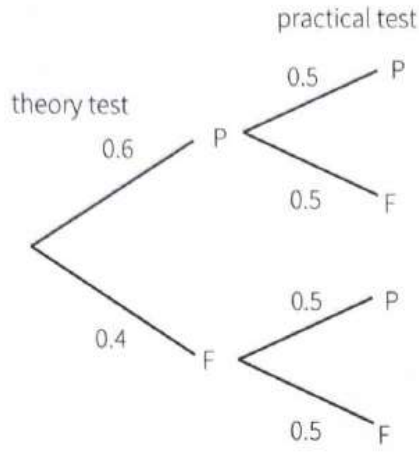
5. a. 3rd coin



- b. i. $\frac{1}{8}$ ii. $\frac{3}{8}$

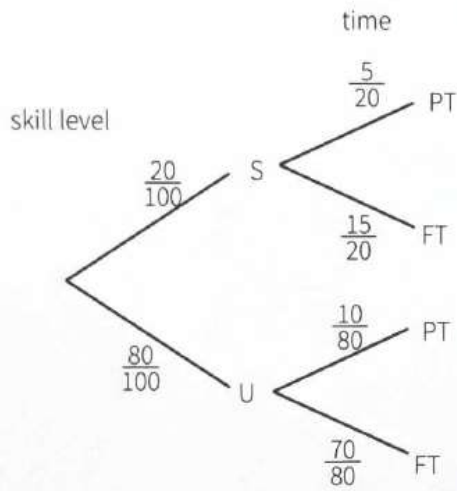
B. Calculate combined probability (p 416)

1. a.



b. i. 0.3 ii. 0.8

2. a.



b. i. $\frac{1}{10}$ (or 0.1 or 10%) ii. $\frac{17}{20}$ (or 0.85 or 85%)

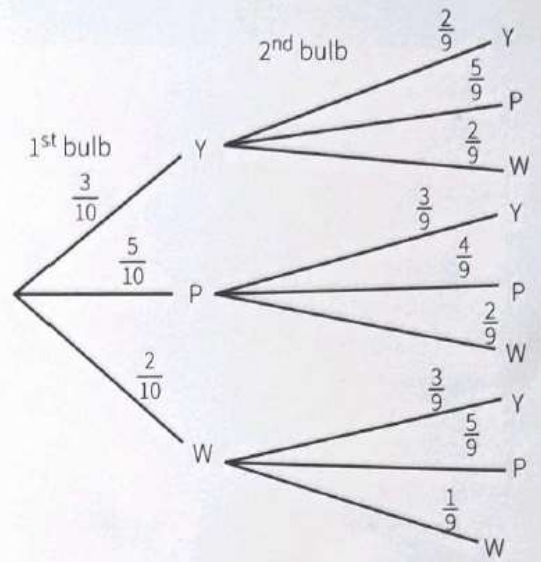
3. a. 0.81 b. 0.01

4. a. 0.68 b. 0.29

5. a. i. $\frac{1}{4}$ ii. $\frac{1}{2}$

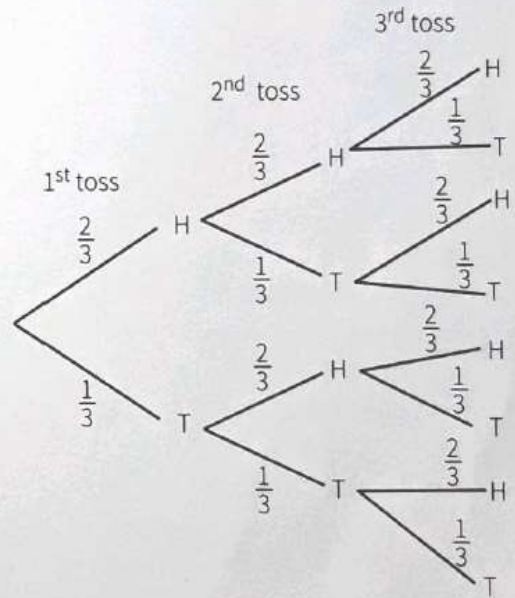
b. i. $\frac{25}{102}$ ii. $\frac{26}{51}$

6. a.



b. i. $\frac{1}{15}$ ii. $\frac{14}{45}$ iii. $\frac{31}{45}$

7.



$P(\text{more H than T}) = \frac{20}{27}$

8. $P(\text{test correct}) = 0.94$