ST(P) MATHEMATICS 1A
NOTES AND ANSWERS

The book starts with a large section on arithmetic. This has been kept together because we feel that all children starting a new school with a new teacher benefit from a thorough revision of basic arithmetic. Many children arrive at secondary school not sure of what they do or do not know, and what they do know is often obscured by the use of unfamiliar words.

However, many teachers will want to break up the arithmetic with other work. Tables and Networks (Chapter 13) is particularly suitable for this purpose. It is self-contained and can easily be divided into two sections that can be taught at different times. Symmetry (Chapter 10) is another self-contained unit that can be taught at an earlier stage.

CHAPTER 1 Addition and Subtraction of Whole Numbers

This chapter is intended to give practice in addition and subtraction of whole numbers. We have not introduced the calculator until near the end of this chapter but an earlier introduction may be felt to be appropriate; it can be used to check answers.

EXERCISE 1a (p. 1)
Can be used for discussion, e.g. other methods of adding several numbers such as looking for pairs of numbers that add up to ten; can also be used for mental arithmetic.

1. 10  8. 19  15. 33  22. 17  29. 26
2. 11  9. 20  16. 18  23. 20  30. 32
3. 14 10. 27  17. 25  24. 33  31. 26
4. 15  11. 15  18. 32  25. 30  32. 26
5. 17  12. 17  19. 39  26. 21  33. 40
6. 24  13. 27  20. 32  27. 21  34. 37
7. 24  14. 27  21. 24  28. 19  35. 39

EXERCISE 1b (p. 2)

1. 79  10. 2292  19. 797  28. 2764  37. 509
4. 308 13. 9072  22. 177  31. 1693  40. 1832
5. 259  14. 21829  23. 202  32. 1382  41. 2892
6. 399  15. 16244  24. 1252  33. 1896  42. 6779
7. 882  16. 112  25. 2783  34. 5230  43. 2226
8. 2039 17. 158  26. 2062  35. 4095  44. 3569
9. 991  18. 242  27. 1267  36. 581  45. 11 932

EXERCISE 1c (p. 3)
Confidence in problem solving comes from getting the answer right. More able children can be asked for some form of explanation, at least writing the answer in sentence form. Some worked examples will be necessary to indicate what they are expected to write down.
1. 89p
2. 69p
3. 88
4. £757
5. a) 261  b) 302  c) 3056  d) 1300
6. a) three hundred and twenty-four
   b) five thousand two hundred and eight
   c) one hundred and fifty
   d) one thousand five hundred

EXERCISE 1d (p. 4)

1. 11  5. 7  9. 8  13. 11  17. 5
2. 12  6. 12  10. 6  14. 8  18. 6
3. 14  7. 15  11. 13  15. 10  19. 14
4. 5  8. 9  12. 3  16. 4  20. 8

EXERCISE 1e (p. 5)

1. 211  9. 126  16. 136  23. 4823  30. 676
2. 551  10. 186  17. 713  24. 6615  31. 4077
3. 406  11. 470  18. 255  25. 575  32. 1048
4. 218  12. 354  19. 279  26. 3344  33. 77
5. 73  13. 287  20. 149  27. 1524  34. 192
6. 141  14. 178  21. 8  28. 189  35. 4195
7. 406  15. 187  22. 2828  29. 703  36. 1644
8. 126

EXERCISE 1f (p. 6)

1. 403p (or £4.03)  4. 89  7. 213  10. 19cm
2. 464  5. 287  8. 48
3. 85  6. 6483  9. 7500m

EXERCISE 1g (p. 6)

1. 6  3. 7  5. 9  7. 2  9. 9
2. 5  4. 4  6. 4  8. 7  10. 7

EXERCISE 1h (p. 7)

1. 17  7. 13  13. 0  19. 0  25. 29
2. 5  8. 3  14. 67  20. 95  26. 597
3. 2  9. 6  15. 83  21. 73  27. 19
4. 20  10. 4  16. 50  22. 20  28. 129
5. 30  11. 0  17. 0  23. 104  29. 250
6. 28  12. 25  18. 39  24. 7  30. 65
EXERCISE 1i (p. 8)
Intended for the above average but others may be able to obtain the answers with the help of a calculator.

1. 10p  
2. 72  
3. 80cm  
4. 318  
5. 144  
6. 69lb  
7. 17  
8. 45  
9. 9p  

EXERCISE 1j (p. 9)

1. 8  
2. 15  
3. 63  
4. 1  
5. 4  
6. 23  
7. 16  
8. 16  
9. 7  
10. 0  
11. 8  
12. 3  
13. 8  
14. 12  
15. 14  
16. 5  
17. 16  
18. 38  
19. 10  
20. 20  
21. 250, 257  
22. 60, 56  
23. 210, 209  
24. 510, 507  
25. 330, 334  
26. 40, 38  
27. 370, 366  
28. 260, 264  
29. 180, 176  
30. 770, 777  
31. 60, 58  
32. 20, 16  
33. 160, 163  
34. 160, 154  
35. 150, 148  
36. 40, 42  
37. 280, 284  
38. 230, 229  
39. 370, 362  
40. 160, 160  
41. 370, 360  
42. 210, 206  
43. 230, 227  
44. 250, 251  
45. 330, 328  
46. 290, 293  
47. 250, 250  
48. 300, 291  
49. 180, 170  
50. 360, 353

CHAPTER 2  Multiplication and Division of Whole Numbers

The word “product” is used at the beginning of this chapter and will need explanation.

EXERCISE 2a (p. 12)
Discussion of the properties of odd and even numbers is useful here, e.g. is the product of two even numbers even or odd and why? These properties can be used as simple checks on answers.

1. 46  
2. 126  
3. 104  
4. 304  
5. 290  
6. 93  
7. 100  
8. 144  
9. 144  
10. 415  
11. 141  
12. 324  
13. 126  
14. 588  
15. 324  
16. 292  
17. 162  
18. 132  
19. 536  
20. 657  
21. 294  
22. 168  
23. 224  
24. 243  
25. 608  
26. 2456  
27. 768  
28. 388  
29. 1989  
30. 844  
31. 2859  
32. 1632  
33. 2628  
34. 2184  
35. 852  
36. 2565  
37. 3174  
38. 5142  
39. 3486  
40. 5211  
41. 4606  
42. 2989  
43. 6784  
44. 5931  
45. 5236  
46. 5552  
47. 1652  
48. 5157  

EXERCISE 2b (p. 13)

1. 270  
2. 8200  
3. 360  
4. 1080  
5. 256 000  
6. 540  
7. 24 600  
8. 2040  
9. 7800  
10. 2800  
11. 29 200  
12. 3480  
13. 6630  
14. 88 900  
15. 146 000  
16. 35 100  
17. 9420  
18. 23 600  
19. 6160  
20. 70 000  
21. 48 720  
22. 54 000  
23. 38 920  
24. 243 000  
25. 35 100  
26. 42 800  
27. 19 200  
28. 8800  
29. 19 000  
30. 59 920
EXERCISE 2c (p. 14)

1. 672  7. 2782  13. 398 793  19. 37 814  25. 1 438 200
2. 559  8. 4346  14. 35 028  20. 565 915  26. 36 575
3. 1290  9. 7844  15. 112 893  21. 86 172  27. 337 500
5. 1428  11. 7712  17. 39 934  23. 169 422  29. 915 264
6. 1558  12. 40 086  18. 70 952  24. 191 430  30. 1 203 000

EXERCISE 2d (p. 15)

Checks other than the estimate should be encouraged, e.g. is it even or odd, does it end in zero or five?

1. 2400  13. 60 000  25. 7200, 6612  37. 24 000, 22 222
2. 900  14. 300 000  26. 40 000, 42 987  38. 560 000, 563 997
3. 3200  15. 300 000, 244 326  27. 50 000, 46 657  39. 25 000, 23 124
4. 1500  16. 300 000, 11 136  28. 600 000, 579 424  40. 35 000, 35 972
5. 900  17. 12 000, 10 192  29. 30 000, 298 717  41. 24 000, 23 458
6. 1200  18. 12 000, 10 192  30. 30 000, 298 717  42. 200 000, 231 548
7. 1200  19. 36 000, 34 225  31. 5600, 5382  43. 480 000, 465 234
8. 3600  20. 16 000, 18 768  32. 45 000, 40 091  44. 4 900 000, 5 053 014
9. 3000  21. 7200, 7098  33. 54 000, 51 888  45. 350 000, 346 320
10. 15 000  22. 6000, 8750  34. 1000, 846
11. 18 000  23. 30 000, 32 406  35. 6000, 6076
12. 24 000  24. 30 000, 30 012  36. 45 000, 40 281

EXERCISE 2e (p. 16)

If it has not been done earlier, this is an appropriate place to introduce the more able pupils to a more formal setting down of answers.

1. 8188  3. 272  5. 22 500  7. 2592  9. 792
2. 10 896  4. 840  6. 1428  8. 420  10. 672

EXERCISE 2f (p. 18)

Not intended for use with a calculator.

1. 29  10. 13 r4  19. 201 r2  28. 85  37. 1479 r4
2. 14  11. 9 r6  20. 124 r1  29. 121 r3  38. 2193
3. 6  12. 12 r1  21. 171  30. 140 r2  39. 1214
4. 19  13. 13  22. 231  31. 1167  40. 287
5. 18  14. 2 r3  23. 103  32. 440 r3  41. 198 r6
6. 48 r1  15. 13  24. 71 r3  33. 2414 r1  42. 183
7. 14 r3  16. 27  25. 24  34. 351 r3  43. 354 r3
8. 20 r3  17. 213  26. 32 r6  35. 428  44. 1727 r2
9. 23  18. 274  27. 81 r3  36. 1067 r3  45. 1501

EXERCISE 2g (p. 19)

Not intended for use with a calculator.

1. 25 r6  4. 27 r83  7. 18 r6  9. 9 r426  11. 30 r77
EXERCISE 2h (p. 19)
Not intended for use with a calculator.

1. 12 r14  13. 215 r9  25. 304 r19  37. 2 r33  49. 7 r87
2. 52 r9    14. 348 r7  26. 573 r7  38. 107 r17  50. 26 r15
3. 18 r1    15. 246 r28 27. 96 r28  39. 111 r13  51. 24 r65
4. 34 r12   16. 456 r1  28. 64 r8   40. 190 r20  52. 32 r200
5. 20 r14   17. 127 r22 29. 202 r22 41. 25 r0   53. 12 r6
6. 8 r11    18. 86 r28  30. 89 r24 42. 111 r5   54. 56 r91
7. 35 r0    19. 75 r0   31. 200 r13 43. 90 r30  55. 25 r75
8. 16 r13   20. 120 r21 32. 65 r14 44. 200 r0   56. 20 r110
9. 16 r21   21. 221 r0  33. 83 r29 45. 11 r6   57. 6 r142
10. 21 r4   22. 135 r24 34. 146 r34 46. 20 r10  58. 74 r44
   11. 28 r13 23. 236 r0  35. 77 r9   47. 20 r4   59. 27 r109
   12. 22 r20 24. 217 r15 36. 469 r1  48. 42 r38  60. 22 r152

EXERCISE 2i (p. 21)
Not intended for use with a calculator. If calculators are used to check answers, tuition on
their use for mixed operations will be needed and will vary with the type of calculator used.
A simple four-function calculator does not usually give priority to $\times$ and $\div$ but a scientific
calculator usually does and if pupils have a calculator with this facility it should be used.

1. 18   9. 7  17. 3  25. 6  33. 12
2. 0    10. 21  18. 13  26. 8  34. 13
3. 12   11. 9  19. 26  27. 10  35. 32
4. 19   12. 17 20. 6  28. 8  36. 9
5. 0    13. 2  21. 8  29. 5  37. 16
6. 5    14. 5  22. 22 30. 9  38. 14
7. 22   15. 1  23. 13 31. 21  39. 14
8. 7    16. 10 24. 17 32. 14  40. 30

EXERCISE 2j (p. 22)
Not for use with a calculator.

1. 2    7. 49  13. 17  19. 4  25. 10
2. 56   8. 2   14. 2  20. 36  26. 1
3. 9    9. 45  15. 11  21. 45  27. 4
4. 14   10. 2  16. 7  22. 6  28. 25
5. 15   11. 17 17. 30  23. 14  29. 1
6. 8    12. 3  18. 1  24. 0  30. 18

EXERCISE 2k (p. 23)
Intended for the above average; with the others it should be approached with caution or
omitted.

1. 6 and 2p over  16. 9p, 18p, 33p
2. 68p           17. 412p (or £4.12)
3. 14
4. 18
5. 8p
6. 15p
7. 150 miles
8. 74
9. £1.45
10. 16 and 2kg over
11. 76
12. 40p
13. 20p
14. 90
15. 840cm

18. £21
19. 225 275
20. 54 (one not full)
21. 67
22. 1831 or 1832 depending on her birth date
23. 26
24. 124
25. 600m
26. 12min
27. 15
28. 15p
29. 34
30. 1h; 25min

EXERCISE 21 (p. 26)
Gives interesting variations on straightforward arithmetic.

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5. 9, 11
6. 13, 16
7. 4, 2
8. 17, 21
9. 32, 64
10. 15, 18
11. 4, 2
12. 81, 243
13. 36, 49
14. 10 000, 100 000
15. 45, 36
16. 19, 23
17. 37, 50

18.  

\[1 + 3 + 5 + 7 + 9 = 25 = 5 \times 5\]
\[1 + 3 + 5 + 7 + 9 + 11 = 36 = 6 \times 6\]
\[1 + 3 + 5 + 7 + 9 + 11 + 13 = 49 = 7 \times 7\]
a) 64
b) 400

19.  

\[2 + 4 + 6 + 8 + 10 = 30 = 5 \times 6\]
\[2 + 4 + 6 + 8 + 10 + 12 = 42 = 6 \times 7\]
\[2 + 4 + 6 + 8 + 10 + 12 + 14 = 56 = 7 \times 8\]

20.  

\[1 + 5 + 10 + 10 + 5 + 1 = 36 \times 1\]
\[1 + 6 + 15 + 20 + 15 + 6 + 1 = 72 \times 1\]

21. 35

22.  

\[1, 4, 9, 16\]
\[25\]
\[36, 49\]
\[7, 9\]
\[2, 3, 4, 5, 6, 7\]
\[1, 1, 1, 1\]

23. a) 1, 3, 6, 10, 15, 21, 28
    b) 2, 3, 4, 5, 6, 7
    c) 1, 1, 1, 1, 1

24. a) 1, 3, 6, 10, 15, 21, 28
    b) 2, 4, 8, ..., 38, ...
    c) 1, 2, 4, 8, ..., 32, ...

25. a) (i) 20, 24, 28
      (ii) 4
      (iii) 0
    b) (i) 24, 29, 34
      (ii) 5
      (iii) 0
    c) (i) 32, 64, 128
      (ii) 2, 4, 8, 16, 32, 64
      (iii) 2, 4, 8, 16, 32

26.  

\[1, 5, 10, 10, 5, 1 = 40 \times 1\]
\[1, 6, 15, 20, 15, 6, 1 = 66 \times 1\]
\[1, 7, 21, 35, 35, 21, 7, 1 = 120 \times 1\]
d) (i) 162, 486, 1458 (ii) 4, 12, 36, 108, 324, 972 (iii) 8, 24, 72, 216, 648

in (ii) and (iii), multiply by 3 each time

29. 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, ...

30. 1, 2, 4, 8, 32, 256, 8192, ...

31. 15 and 33. ...add 6 each time

32. 1 and ¼. ...divide by 2 each time

33. 3 and 9. ...multiply by 3 each time

34. a) 9  b) 15

35. a) 15  b) 36

EXERCISE 2m (p. 30)
1. 1005  3. 684  5. 6608  7. 242  9. 6 (10p over)
2. 17  4. 28  6. 1018  8. 7  10. 46p

EXERCISE 2n (p. 30)
1. 870  3. 672  5. 29  7. 50  9. 7 (3 left)
2. 54  4. 9 r7  6. 118  8. 37  10. 5

EXERCISE 2p (p. 31)
1. 2304  3. 413  5. 277 r8  7. 260  9. 35, 45
2. 263  4. 3392  6. 393 r3  8. 19 r133  10. 33

EXERCISE 2q (p. 31)
1. 3133  3. 8200  5. 278 r1  7. 3  9. 34p
2. 169  4. 4544  6. 713  8. 132

CHAPTER 3  Fractions: Addition and Subtraction

EXERCISE 3a (p. 33)
1. 1/6  5. 2/6  9. 1/2  13. 1/7
2. 3/6  6. 7/10  10. 3/10  14. 2/6
3. 1/3  7. 1/4  11. 5/12  15. 1/8
4. 3/6  8. 3/4  12. 1/4  16. 1/6

EXERCISE 3b (p. 34)
This may be used for discussion.

1. a) 1/60  b) 9/60  c) 30/60  d) 45/60  11. 150/500
2. 5/7  12. 45/120
3. 11/31  13. 37/3600
4. 51/305  14. 35/80
5. 35/100  15. a) 10/32  b) 8/32  c) 25/32
6. 90/500  16. 15/40  25/40
7. 26/180  17. a) 20/62  b) 10/62  c) 48/62
8. 3/31  18. a) 12/37  b) 8/37  c) 20/37
9. \( \frac{12}{61} \)  
10. \( \frac{5}{27} \)

EXERCISE 3e (p. 37)

7. 6  
8. 4  
9. 21  
10. 36  
11. 18  
12. 4  
13. 15  
14. 12  
15. 100  
16. 6  
17. 16  
18. 18  
19. 18  
20. 30  
21. 10  
22. 10  
23. 100  
24. 8  
25. 300  
26. 110  
27. 40  
28. 1000  
29. 90  
30. 8000

34. a) \( \frac{12}{23} \)  
b) \( \frac{8}{24} \)  
c) \( \frac{4}{24} \)  
d) \( \frac{18}{34} \)  
e) \( \frac{10}{25} \)  
f) \( \frac{9}{34} \)

35. a) \( \frac{6}{45} \)  
b) \( \frac{20}{45} \)  
c) \( \frac{27}{45} \)  
d) \( \frac{15}{45} \)  
e) \( \frac{45}{45} \)  
f) \( \frac{9}{45} \)

36. a) \( \frac{22}{35} \)  
b) \( \frac{20}{35} \)  
c) \( \frac{6}{35} \)  
d) \( \frac{10}{35} \)  
e) \( \frac{24}{35} \)  
f) \( \frac{24}{35} \)

37. a) \( \frac{12}{72} \)  
b) \( \frac{12}{18} \)  
c) \( \frac{12}{12} \)  
d) \( \frac{12}{18} \)  
e) \( \frac{12}{18} \)  
f) \( \frac{12}{18} \)

38. b) \( \frac{2}{3} = \frac{6}{9} \)  
e) \( \frac{7}{10} = \frac{20}{100} \)

EXERCISE 3d (p. 38)

1. \( \frac{1}{2} \)  
2. \( \frac{5}{6} \)  
3. \( \frac{4}{5} \)  
4. \( \frac{2}{3} \)  
5. \( \frac{3}{8} \)  
6. \( \frac{1}{4} \)  
7. \( \frac{7}{9} \)  
8. \( \frac{5}{6} \)  
9. \( \frac{3}{4} \)  
10. \( \frac{4}{5} \)  
11. \( \frac{3}{5} \)  
12. \( \frac{3}{5} \)  
13. \( \frac{1}{11} \)  
14. \( \frac{4}{5} \)  
15. \( \frac{5}{11} \)  
16. \( \frac{4}{11} \)  
17. \( \frac{7}{9} \)  
18. \( \frac{5}{8} \)  
19. \( \frac{3}{11} \)  
20. \( \frac{7}{9} \)  
21. \( \frac{6}{11} \)  
22. \( \frac{3}{5} \)  
23. \( \frac{1}{5} \)  
24. \( \frac{5}{6} \)  
25. \( \frac{5}{8} \)  
26. \( \frac{2}{3} \)  
27. \( \frac{27}{20} \)  
28. \( \frac{19}{20} \)  
29. \( \frac{5}{6} \)  
30. \( \frac{5}{6} \)  
31. \( \frac{5}{6} \)  
32. \( \frac{5}{6} \)  
33. \( \frac{5}{6} \)  
34. \( \frac{5}{6} \)  
35. \( \frac{5}{6} \)  
36. \( \frac{5}{6} \)  
37. \( \frac{7}{9} \)  
38. \( \frac{4}{9} \)  
39. \( \frac{1}{3} \)  
40. \( \frac{3}{8} \)  
41. \( \frac{1}{4} \)  
42. \( \frac{2}{5} \)  
43. \( \frac{5}{6} \)  
44. \( \frac{3}{5} \)  
45. \( \frac{1}{4} \)  
46. \( \frac{3}{5} \)  
47. \( \frac{3}{4} \)  
48. \( \frac{5}{9} \)

Simplifying fractions: this is the first time that the word “factor” is used. It will need explanation and much discussion to clarify its meaning, e.g. is 2 a factor of 14; what are the factors of 6? Factors are discussed again in Chapter 12, and Exercise 12a could be done now. Children not familiar with simplifying fractions need a lot of discussion before they do any themselves. Discussion of the other words used for simplifying is needed, i.e. reducing and cancelling. (Cancelling really means the act of removing the common factors.)

EXERCISE 3e (p. 42)

1. \( \frac{1}{3} \)  
2. \( \frac{7}{3} \)  
3. \( \frac{1}{5} \)  
4. \( \frac{1}{5} \)  
5. \( \frac{2}{5} \)  
6. \( \frac{3}{5} \)  
7. \( \frac{4}{5} \)  
8. \( \frac{5}{5} \)  
9. \( \frac{6}{5} \)  
10. \( \frac{7}{5} \)  
11. \( \frac{8}{5} \)  
12. \( \frac{9}{5} \)  
13. \( \frac{10}{5} \)  
14. \( \frac{11}{5} \)  
15. \( \frac{12}{5} \)  
16. \( \frac{13}{5} \)  
17. \( \frac{14}{5} \)  
18. \( \frac{15}{5} \)  
19. \( \frac{16}{5} \)  
20. \( \frac{17}{5} \)  
21. \( \frac{18}{5} \)  
22. \( \frac{19}{5} \)  
23. \( \frac{20}{5} \)  
24. \( \frac{21}{5} \)  
25. \( \frac{22}{5} \)  
26. \( \frac{23}{5} \)  
27. \( \frac{24}{5} \)  
28. \( \frac{25}{5} \)  
29. \( \frac{26}{5} \)  
30. \( \frac{27}{5} \)  
31. \( \frac{28}{5} \)  
32. \( \frac{29}{5} \)  
33. \( \frac{30}{5} \)  
34. \( \frac{31}{5} \)  
35. \( \frac{32}{5} \)  
36. \( \frac{33}{5} \)  
37. \( \frac{34}{5} \)  
38. \( \frac{35}{5} \)  
39. \( \frac{36}{5} \)  
40. \( \frac{37}{5} \)
Addition and subtraction of fractions: many pupils try to add or subtract at the same time as changing denominators and are then baffled by their inevitable mistakes. This is a case where they should be encouraged to write down each step, as shown in the worked examples, so that they separate the two operations.
EXERCISE 3i (p. 49)

1. $\frac{3}{8}$  
2. $\frac{5}{7}$  
3. $\frac{1}{10}$  
4. $\frac{5}{12}$  
5. $\frac{6}{50}$  
6. $\frac{5}{17}$  
7. $\frac{3}{9}$  
8. $\frac{12}{1}$  
9. $\frac{50}{9}$  
10. $\frac{2}{1}$  
11. $\frac{3}{4}$  
12. $\frac{1}{2}$  
13. $\frac{1}{18}$  
14. $\frac{1}{12}$  
15. $\frac{1}{5}$  
16. $\frac{1}{17}$  
17. $\frac{5}{7}$  
18. $\frac{5}{18}$  
19. $\frac{2}{9}$  
20. $\frac{1}{3}$  

EXERCISE 3j (p. 50) Intended for the above average; can be used for discussion with others.

1. $\frac{13}{15}$, $\frac{2}{15}$  
2. $\frac{11}{17}$, $\frac{4}{17}$  
3. $\frac{1}{7}$, $\frac{1}{17}$  
4. $\frac{3}{8}$, $\frac{7}{8}$  
5. $\frac{11}{10}$, $\frac{10}{7}$, $\frac{7}{10}$

EXERCISE 3k (p. 52)

1. $2\frac{1}{4}$  
2. $4\frac{3}{8}$  
3. $6\frac{1}{6}$  
4. $5\frac{3}{10}$  
5. $9\frac{2}{9}$  
6. $3\frac{1}{2}$  
7. $6\frac{1}{2}$  
8. $5\frac{1}{8}$  
9. $25\frac{2}{3}$  
10. $10\frac{4}{17}$  
11. $13\frac{5}{8}$  
12. $6\frac{6}{7}$  
13. $13\frac{4}{5}$  
14. $15\frac{1}{6}$  
15. $7\frac{11}{17}$  
16. $12\frac{5}{6}$  
17. $13\frac{2}{5}$  
18. $13\frac{2}{5}$  
19. $24\frac{1}{2}$  
20. $4\frac{9}{10}$

EXERCISE 3l (p. 52)

1. $\frac{13}{17}$  
2. $\frac{8}{13}$  
3. $\frac{57}{9}$  
4. $\frac{45}{17}$  
5. $\frac{5}{216}$  
6. $\frac{33}{17}$  
7. $\frac{20}{11}$  
8. $\frac{25}{6}$  
9. $\frac{11}{3}$  
10. $\frac{11}{2}$  
11. $\frac{27}{4}$  
12. $\frac{22}{9}$  
13. $\frac{19}{7}$  
14. $\frac{43}{9}$  
15. $\frac{55}{14}$  
16. $\frac{23}{7}$  
17. $\frac{19}{10}$  
18. $\frac{20}{3}$  
19. $\frac{59}{7}$  
20. $\frac{101}{10}$

EXERCISE 3m (p. 53)

1. $5\frac{1}{9}$  
2. $6\frac{1}{6}$  
3. $4\frac{4}{11}$  
4. $2\frac{1}{2}$  
5. $16\frac{2}{3}$  
6. $7\frac{1}{4}$  
7. $13\frac{2}{3}$  
8. $7\frac{1}{9}$  
9. $8\frac{1}{6}$  
10. $10\frac{7}{10}$  
11. $7\frac{2}{9}$

EXERCISE 3n (p. 54)

Again it is important to encourage the writing down of each step so that only one operation is performed at a time.

1. $5\frac{3}{4}$  
2. $3\frac{5}{9}$  
3. $5\frac{23}{40}$  
4. $9\frac{4}{9}$  
5. $5\frac{29}{36}$  
6. $4\frac{1}{6}$  
7. $4\frac{9}{20}$  
8. $3\frac{1}{14}$  
9. $7\frac{2}{10}$  
10. $13\frac{17}{21}$  
11. $10\frac{12}{16}$  
12. $6\frac{1}{3}$  
13. $11\frac{3}{14}$  
14. $8\frac{1}{10}$  
15. $12\frac{1}{10}$  
16. $11\frac{9}{10}$  
17. $8\frac{1}{10}$  
18. $18\frac{1}{2}$  
19. $10\frac{1}{10}$  
20. $11\frac{1}{5}$  
21. $11\frac{1}{2}$  
22. $17\frac{1}{7}$  
23. $17\frac{1}{10}$  
24. $21\frac{1}{18}$  
25. $15\frac{2}{5}$  
26. $15\frac{4}{9}$  
27. $14\frac{51}{100}$  
28. $17\frac{11}{32}$  
29. $22\frac{2}{7}$  
30. $22\frac{1}{2}$
EXERCISE 3p (p. 56)

1. \( 1 \frac{5}{8} \)  
2. \( 1 \frac{11}{15} \)  
3. \( 1 \frac{2}{5} \)  
4. \( \frac{3}{4} \)  
5. \( 5 \frac{5}{12} \)  
6. \( 1 \frac{1}{2} \)  
7. \( 1 \frac{5}{14} \)  
8. \( 2 \frac{1}{10} \)
9. \( 1 \frac{7}{19} \)
10. \( 3 \frac{14}{33} \)
11. \( 2 \frac{3}{15} \)
12. \( 3 \frac{1}{4} \)
13. \( 3 \frac{3}{10} \)
14. \( 2 \frac{1}{11} \)
15. \( 3 \frac{7}{24} \)
16. \( 2 \frac{3}{10} \)
17. \( 1 \frac{7}{8} \)
18. \( 3 \frac{7}{20} \)
19. \( 3 \frac{9}{15} \)
20. \( 6 \frac{1}{33} \)
21. \( 3 \frac{1}{29} \)
22. \( 1 \frac{5}{8} \)
23. \( \frac{1}{4} \)
24. \( 1 \frac{7}{15} \)
25. \( 1 \frac{3}{8} \)
26. \( 2 \frac{7}{10} \)
27. \( 3 \frac{1}{2} \)
28. \( 2 \frac{1}{2} \)
29. \( 7 \frac{1}{9} \)
30. \( 1 \frac{7}{9} \)
31. \( 2 \frac{5}{7} \)
32. \( 2 \frac{7}{8} \)
33. \( 3 \frac{16}{17} \)
34. \( \frac{2}{3} \)
35. \( 1 \frac{1}{2} \)
36. \( 2 \frac{16}{31} \)

EXERCISE 3q (p. 56)

1. a) \( 2 \frac{1}{3} \)
   b) \( \frac{11}{24} \)
   c) \( \frac{35}{82} \)
   d) \( 2 \frac{1}{6} \)
   e) \( \frac{11}{12} \)
2. a) \( 2 \frac{1}{4} \)
   b) \( 3 \frac{1}{2} \)
3. a) \( \frac{3}{7} \)
   b) \( \frac{17}{30} \)
4. a) \( \frac{3}{2} \), \( \frac{1}{3} \), \( \frac{13}{20} \), \( \frac{7}{10} \)
   b) \( \frac{3}{12} \), \( \frac{7}{12} \), \( \frac{3}{12} \), \( \frac{5}{6} \)
   c) \( \frac{3}{2} \), \( \frac{7}{10} \), \( \frac{31}{100} \), \( \frac{17}{20} \)
5. a) \( < \)
   b) \( > \)
   c) \( > \)
6. a) \( \frac{3}{17} \)
   b) \( \frac{1}{7} \)
   c) \( \frac{9}{17} \)

EXERCISE 3r (p. 57)

1. a) \( \frac{2}{15} \)
   b) \( 1 \frac{7}{10} \)
   c) \( \frac{3}{22} \)
   d) \( 6 \frac{7}{12} \)
   e) \( \frac{1}{2} \)
   f) \( 2 \frac{13}{30} \)
2. a) \( \frac{7}{8} \)
   b) \( 1 \frac{5}{6} \)
   c) \( \frac{12}{13} \)
3. a) \( \frac{13}{100} \)
   b) \( \frac{333}{566} \)
4. a) \( > \)
   b) \( < \)
   c) \( < \)
5. a) \( \frac{3}{10} \), \( \frac{7}{20} \), \( \frac{7}{8} \)
   b) \( \frac{3}{10} \), \( \frac{7}{12} \)
   c) \( \frac{3}{12} \), \( \frac{3}{10} \), \( \frac{5}{8} \), \( \frac{1}{4} \)
6. a) \( \frac{16}{26} \)
   b) \( \frac{7}{9} \)

EXERCISE 3s (p. 57)

1. a) \( \frac{41}{140} \)
   b) \( \frac{17}{45} \)
   c) \( \frac{1}{8} \)
   d) \( 3 \frac{13}{15} \)
   e) \( 0 \)
   f) \( 5 \)
2. a) \( 1 \frac{3}{8} \)
   b) \( 2 \frac{3}{5} \)
   c) \( \frac{5}{16} \)
3. a) \( < \)
   b) \( < \)
4. a) \( \frac{1}{2} \), \( \frac{3}{5} \), \( \frac{3}{4} \), \( \frac{5}{6} \)
   b) \( \frac{1}{2} \), \( \frac{5}{6} \), \( \frac{3}{4} \), \( \frac{5}{8} \)
5. a) \( \frac{7}{40} \)
   b) \( \frac{1}{7} \)
   c) \( \frac{28}{49} \)
6. a) \( \frac{17}{19} \)
   b) \( \frac{13}{19} \)

EXERCISE 3t (p. 58)

1. a) \( 1 \frac{1}{5} \)
   b) \( \frac{3}{5} \)
   c) \( 1 \frac{11}{14} \)
   d) \( 2 \frac{9}{20} \)
   e) \( \frac{11}{12} \)
   f) \( 3 \frac{2}{5} \)
2. a) \( 4 \frac{1}{8} \)
   b) \( \frac{1}{8} \)
   c) \( 2 \frac{4}{7} \)
### 3. a) \( \frac{5}{24} \)  
   b) \( \frac{1}{10} \)  
   c) \( \frac{5}{12} \)

### 4. a) \( > \)  
   b) \( < \)

### 5. a) \( \frac{5}{11}, \frac{1}{2}, \frac{23}{44}, \frac{13}{22} \)  
   b) \( \frac{5}{6}, \frac{7}{12}, \frac{3}{8}, \frac{3}{4} \)

### 6. a) \( \frac{1}{5} \)  
   b) \( \frac{8}{15} \)  
   c) \( \frac{1}{3} \)

### CHAPTER 4 Fractions: Multiplication and Division

If pupils have not done multiplication of fractions before, much classroom discussion is advisable, using cake diagrams, rectangles, etc., to get across the meaning that, for example, \( \frac{1}{2} \times \frac{1}{4} \) means \( \frac{1}{2} \) of \( \frac{1}{4} \) and that \( \frac{1}{2} \times \frac{1}{4} = \frac{1}{2} \times \frac{1}{4} \).

### EXERCISE 4b (p. 60)

1. \( \frac{2}{7} \)  
   9. \( \frac{5}{24} \)  
   16. \( \frac{2}{3} \)  
   23. \( \frac{4}{11} \)  
   30. \( \frac{3}{16} \)
2. \( \frac{10}{37} \)  
   10. \( \frac{14}{27} \)  
   17. \( \frac{1}{9} \)  
   24. \( \frac{4}{17} \)  
   31. \( \frac{1}{20} \)
3. \( \frac{2}{15} \)  
   11. \( \frac{3}{20} \)  
   18. \( \frac{15}{28} \)  
   25. \( \frac{7}{9} \)  
   32. \( \frac{2}{3} \)
4. \( \frac{7}{16} \)  
   12. \( \frac{1}{15} \)  
   19. \( \frac{7}{4} \)  
   26. \( \frac{2}{17} \)  
   33. \( 4 \)
5. \( \frac{3}{7} \)  
   13. \( \frac{1}{6} \)  
   20. \( \frac{6}{7} \)  
   27. \( \frac{2}{3} \)  
   34. \( \frac{1}{18} \)
6. \( \frac{8}{13} \)  
   14. \( \frac{5}{4} \)  
   21. \( \frac{1}{17} \)  
   28. \( \frac{1}{7} \)  
   35. \( \frac{7}{22} \)
7. \( \frac{6}{35} \)  
   15. \( \frac{7}{18} \)  
   22. \( \frac{11}{10} \)  
   29. \( \frac{1}{9} \)  
   36. \( \frac{1}{6} \)
8. \( \frac{5}{7} \)

### EXERCISE 4c (p. 61)

1. \( \frac{1}{5} \)  
   7. \( \frac{2}{7} \)  
   13. 30  
   19. 20  
   25. 23
2. 2  
   8. 2  
   14. 16  
   20. 60  
   26. 9
3. \( \frac{3}{4} \)  
   9. 16  
   15. 7  
   21. 7  
   27. 14
4. 11  
   10. \( \frac{17}{21} \)  
   16. 9  
   22. 15  
   28. 12
5. \( \frac{1}{2} \)  
   11. 14  
   17. 10  
   23. 5  
   29. 3
6. \( \frac{1}{2} \)  
   12. 4  
   18. 10  
   24. 6  
   30. 8

### EXERCISE 4d (p. 63)

1. 23  
   4. 37  
   7. 36  
   9. 120  
   11. 14
2. 30  
   5. 110  
   8. 8  
   10. 18  
   12. 44
3. 12  
   6. 13

### EXERCISE 4e (p. 63)

1. 6  
   7. 5  
   13. 45 litres  
   19. 15 miles  
   25. 292 days
2. 6  
   8. 8  
   14. 33 miles  
   20. 88 gallons  
   26. 9h
3. 3  
   9. 30  
   15. 21 gallons  
   21. 50p  
   27. 1 day
4. 16  
   10. 15  
   16. 8m  
   22. 8p  
   28. £3
5.  10  11. 12m  17. 10 dollars  23. 30p  29. 60p
6.  6  12. 25 dollars  18. 28 litres  24. 12p  30. 21h

**Division:** if not already done, much discussion is necessary before deducing the “rule”.

**EXERCISE 4f (p. 64)**

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**EXERCISE 4g (p. 66)**

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<td>5½</td>
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<td>6½</td>
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<td>9/10</td>
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<td>1⅔</td>
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<td>4</td>
<td>11.</td>
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<tr>
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<td>12</td>
<td>14.</td>
<td>6</td>
<td>15.</td>
<td>3½</td>
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<td>18.</td>
<td>3</td>
<td>19.</td>
<td>1⅔</td>
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**EXERCISE 4h (p. 68)**

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**EXERCISE 4i (p. 69)**

Intended as extra practice for the above average.

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**EXERCISE 4j (p. 70)**

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<td>4⅓</td>
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<td>1⅔</td>
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</tr>
<tr>
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<td>4.</td>
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<tr>
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<tr>
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<td>7/10</td>
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<tr>
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<td>⅗</td>
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18. | 2⅗ |
21. | 1⅗ |
22. | 1⅕ |
23. | ⅗ |
24. | ⅗ |
25. | ⅗ |
26. | 1⅗ |
27. | ⅗ |
28. | ⅗ |
29. | ⅗ |
30. | ⅗ |
31. | ⅗ |
32. | ⅗ |
33. | ⅗ |
34. | ⅗ |
35. | ⅗ |
36. | ⅗ |
37. | ⅗ |
38. | ⅗ |
39. | ⅗ |
40. | ⅗ |
41. | ⅗ |
42. | ⅗ |
43. | ⅗ |
44. | ⅗ |
45. | ⅗ |
46. | ⅗ |
47. | ⅗ |
48. | ⅗ |
49. | ⅗ |
50. | ⅗ |
51. | ⅗ |
52. | ⅗ |
53. | ⅗ |
54. | ⅗ |
55. | ⅗ |
56. | ⅗ |
57. | ⅗ |
58. | ⅗ |
59. | ⅗ |
60. | ⅗ |
61. | ⅗ |
62. | ⅗ |
63. | ⅗ |
64. | ⅗ |
65. | ⅗ |
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77. | ⅗ |
78. | ⅗ |
79. | ⅗ |
80. | ⅗ |
81. | ⅗ |
82. | ⅗ |
83. | ⅗ |
84. | ⅗ |
85. | ⅗ |
86. | ⅗ |
87. | ⅗ |
88. | ⅗ |
89. | ⅗ |
90. | ⅗ |
91. | ⅗ |
92. | ⅗ |
93. | ⅗ |
94. | ⅗ |
95. | ⅗ |
96. | ⅗ |
97. | ⅗ |
98. | ⅗ |
99. | ⅗ |
100. | ⅗ |
EXERCISE 4k (p. 71)
1. 30kg
2. \( \frac{7}{20} \) litres

EXERCISE 4l (p. 72)
1. a) 1 \( \frac{7}{15} \) b) 2 \( \frac{7}{5} \) c) 8 \( \frac{7}{10} \)
2. 6
3. \( \frac{5}{6} \)
4. 1 \( \frac{13}{20} \)
5. \( \frac{2}{3} \), \( \frac{7}{7} \), \( \frac{7}{10} \)
6. \( \frac{2}{9} \)
7. \( \frac{1}{2} \)
8. \( \frac{1}{5} \)
9. 18 min
10. 3 \( \frac{9}{10} \)
11. a) 27 b) 40
12. a) 2 \( \frac{3}{5} \) b) 3 \( \frac{2}{5} \) c) 5 \( \frac{2}{5} \)
13. a) T b) T c) F
14. 63 min
15. 124 \( \frac{1}{2} \) g

EXERCISE 4m (p. 73)
1. a) 15 b) 11 \( \frac{1}{5} \)
2. a) 1 \( \frac{7}{15} \) b) 4 \( \frac{11}{18} \)
3. a) < b) <
4. a) 1 \( \frac{1}{5} \) b) 9
5. \( \frac{1}{5} \), \( \frac{2}{5} \), \( \frac{7}{15} \)
6. 2
7. \( \frac{8}{17} \)
8. 125s
9. a) 24 b) 21
10. a) 3 \( \frac{1}{5} \) b) 5 \( \frac{4}{5} \) c) 6 \( \frac{1}{5} \)
11. 12 \( \frac{1}{8} \) km; \( \frac{77}{97} \)
12. 6

EXERCISE 4n (p. 74)
1. a) 2 \( \frac{32}{35} \) b) 0
2. a) 1 \( \frac{1}{5} \) b) \( \frac{4}{5} \)
3. 25 days
4. \( \frac{12}{20} \), \( \frac{1}{5} \), \( \frac{7}{10} \)
5. a) 6 \( \frac{1}{2} \) b) 17 \( \frac{1}{12} \)
6. \( \frac{8}{17} \)
7. \( \frac{1}{5} \)
8. 2 \( \frac{2}{5} \)
9. a) 7 \( \frac{1}{5} \) b) 9 \( \frac{1}{5} \) c) 10 \( \frac{3}{5} \)
10. a, b and c
11. 18 min
12. 1 \( \frac{4}{5} \) kg

CHAPTER 5 Introduction to Decimals

EXERCISE 5b (p. 77)
1. \( \frac{1}{5} \)
2. \( \frac{3}{50} \)
3. \( \frac{1}{10} \)
4. \( \frac{3}{100} \)
5. \( \frac{1}{100} \)
9. 1 \( \frac{4}{5} \)
16. \( \frac{20}{1000} \)
17. \( \frac{67}{10000} \)
18. \( \frac{17}{100} \)
19. \( \frac{71}{1000} \)
20. \( \frac{73}{100} \)
23. \( \frac{31}{1000} \)
24. \( \frac{47}{100} \)
25. \( \frac{1}{4} \)
26. \( \frac{9}{125} \)
27. \( \frac{19}{50} \)
30. \( \frac{1}{40} \)
31. \( \frac{7}{20} \)
32. \( \frac{1}{625} \)
33. \( \frac{11}{250} \)
34. \( \frac{1}{8} \)
EXERCISE 5c (p. 79)

1. 0.03  
2. 0.9  
3. 1.1  
4. 0.002  
5. 0.4  
6. 1.1  
7. 0.04  
8. 7.8  
9. 7.08  
10. 0.0006  
11. 4.005

EXERCISE 5d (p. 80)

1. 10.8  
2. 7.55  
3. 0.039  
4. 3.98  
5. 5.83  
6. 14.04  
7. 7.6  
8. 2.06  
9. 0.2673  
10. 2.102  
11. 0.00176

EXERCISE 5e (p. 81)

1. 2.5  
2. 7.8  
3. 18.5  
4. 0.41  
5. 0.0321  
6. 16.87  
7. 2.241  
8. 0.191  
9. 71.4  
10. 6.65  
11. 41.45  
12. 6.939  
13. 0.00176  
14. 0.131  
15. 9.12  
16. 4.698  
17. 2.66  
18. 7.882  
19. 2.772  
20. 0.000197

EXERCISE 5f (p. 82)

1. 10.32  
2. 6.92  
3. 2.98  
4. 6.6  
5. 4.4  
6. 100.28  
7. 99.72  
8. 0.014  
9. 202.84  
10. 17.76  
11. 0.234  
12. 77.62  
13. 0.026  
14. 3.62  
15. 39.88  
16. 20.026  
17. 0.26  
18. 0.007  
19. 0.382  
20. 0.000197  
21. 0.00067  
22. 1.1974  
23. 0.000197  
24. 10.52  
25. 1

EXERCISE 5g (p. 85)

1. 72 000  
2. 82.4  
3. 0.24  
4. 460  
5. 3278  
6. 430  
7. 6.02  
8. 32.06  
9. 0.026  
10. 32.06  
11. 0.026  
12. 0.00374

EXERCISE 5h (p. 85)

1. 2.772  
2. 7.626  
3. 0.000024  
4. 0.014  
5. 2.7  
6. 0.068  
7. 0.026  
8. 0.0158  
9. 0.0426  
10. 0.00063  
11. 0.00374  
12. 0.0092
**EXERCISE 5i (p. 86)**

1. 0.16  
2. 16  
3. 7.8  
4. 0.000 78  
5. 1420  
6. 6.8  
7. 0.0163  
8. 0.002  
9. 0.78  
10. 78 000  
11. 0.24  
12. 63  
13. 3.2  
14. 0.079  
15. 0.078  
16. 0.24  
17. 11 100  
18. 0.000 38  
19. 0.000 38  
20. 380 000  
21. 0.000 24  
22. 0.000 003  
23. 4.1  
24. 10.04  
25. 4.2m  
26. £152  
27. 0.138, 1380  
28. 0.16  
29. 0.000 003  
30. 0.0038

**EXERCISE 5j (p. 86)**

Designed for use without a calculator but some may benefit by using it.

1. 0.2  
2. 1.6  
3. 0.21  
4. 2.6  
5. 0.1  
6. 0.19  
7. 0.224  
8. 3.8  
9. 21.3  
10. 2.51  
11. 1.64  
12. 0.15  
13. 0.019  
14. 0.000 13  
15. 0.002 18  
16. 0.042  
17. 0.002  
18. 0.000 06  
19. 0.81  
20. 1.06  
21. 2.71  
22. 0.000 04  
23. 0.000 06  
24. 0.019  
25. 0.77  
26. 2.107  
27. 34. 0.000 15  
28. 0.62  
29. 0.037  
30. 0.78  
31. 0.23  
32. 3.2  
33. 2.56  
34. 1.85  
35. 1.2  
36. 1.95  
37. 1.01  
38. 0.000 01  
39. 0.019  
40. 0.15  
41. 0.72  
42. 0.000 04  
43. 0.8875  
44. 1.75  
45. 4.55  
46. 0.000 15  
47. 0.62  
48. 0.0124  
49. 0.125  
50. 0.000 01  
51. 0.037  
52. 0.78  
53. 0.000 015  
54. 0.72  
55. 0.0025  
56. 0.6028  
57. 0.853 75  
58. 2.45  
59. 0.575  
60. 0.055 75  
61. 3.65cm  
62. 0.075  
63. 7.15kg  
64. 3.2cm  
65. £4.50

**EXERCISE 5k (p. 89)**

1. 1.1  
2. 0.15  
3. 0.12  
4. 0.45  
5. 0.51  
6. 3.2  
7. 0.0041  
8. 0.3125  
9. 0.036  
10. 0.0057  
11. 0.0453  
12. 0.0019  
13. 0.019  
14. 0.56  
15. 0.7  
16. 0.32  
17. 0.32  
18. 0.43  
19. 0.25  
20. 0.9  
21. 0.56  
22. 0.3  
23. 0.26  
24. 0.25  
25. 0.25  
26. 10  
27. 0.625  
28. 0.03  
29. 0.25  
30. 0.625  
31. 0.5  
32. 0.04  
33. 0.5  
34. 0.000 23  
35. 0.03  
36. 0.25  
37. 0.625  
38. 0.031 25

**EXERCISE 5l (p. 89)**

1. 0.25  
2. 0.375  
3. 0.6  
4. 0.3125  
5. 0.04  
6. 2.8  
7. 0.625  
8. 0.4375  
9. 0.12  
10. 0.031 25

**EXERCISE 5m (p. 90)**

1. $\frac{1}{5}$  
2. $\frac{3}{10}$  
3. $\frac{4}{5}$  
4. $\frac{3}{4}$  
5. $\frac{3}{5}$  
6. $\frac{2}{5}$  
7. $\frac{8}{10}$  
8. $\frac{1}{20}$  
9. 0.9  
10. 0.25  
11. 0.8  
12. 0.375  
13. 0.03  
14. 0.75  
15. 0.625  
16. 0.07
EXERCISE 5n (p. 90)

1. $\frac{1}{36}$  
2. 0.009, 0.091  
3. 36.87  
4. 2.38  
5. 0.0205  
6. 3.01  
7. 0.875  
8. 20.72cm

EXERCISE 5p (p. 91)

1. $\frac{3}{100}$  
2. 0.14  
3. 27.32  
4. 2.38  
5. 0.06  
6. 3.01  
7. 0.1875  
8. $\frac{2}{5}$

EXERCISE 5q (p. 91)

1. $\frac{1}{125}$  
2. 0.8  
3. 27.79  
4. 85.04  
5. 0.0086  
6. £10.58  
7. 0.1875  
8. 4.8cm

EXERCISE 5r (p. 92)

1. 0.125  
2. 6.28  
3. 0.018  
4. 0.000 56  
5. $\frac{9}{100}$  
6. 2.56  
7. 2.8  
8. £2.19

CHAPTER 6 Multiplication and Division of Decimals

EXERCISE 6a (p. 93)

Can be used for discussion.

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EXERCISE 6b (p. 94)

Not intended for use with a calculator but discretion is needed in Nos. 19–40.

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<td>23.</td>
<td>240</td>
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<td>63</td>
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EXERCISE 6c (p. 95)

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<td>8.97</td>
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<td>17.</td>
<td>2.56</td>
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<td>22.96</td>
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</table>
EXERCISE 6d (p. 96)

1. £325  
2. 4.4cm  
3. 3.8kg  
4. 16.8cm  
5. 4216p or £42.16  
6. 0.24  
7. 3.25m  
8. 50.4m

Recurring decimals: not necessary at this stage and can well be omitted with average ability pupils.

EXERCISE 6e (p. 97)
For above average pupils only.

1. 0.233... 0.23  
2. 0.002 727... 0.0027  
3. 0.571 428 571... 0.571 428  
4. 0.143 33... 0.143  
5. 0.004 285 714 28... 0.004 285 71  
6. 0.1222... 0.12  
7. 0.444... 0.4  
8. 0.666... 0.6  
9. 0.1818... 0.18  
10. 0.714 285 714... 0.004 285 71  
11. 0.777... 0.7  
12. 1.142 857 1428... 1.142 857

EXERCISE 6f (p. 99)
Discussion about quantities that can be given exactly, quantities that cannot be given exactly (e.g. measurements), quantities that can be given exactly but often are not (e.g. government statistics) is useful here.

1. 0.33  
2. 0.32  
3. 1.27  
4. 2.35  
5. 0.04  
6. 0.69  
7. 0.84  
8. 3.39  
9. 0.01  
10. 4.00  
12. 6  
13. 27  
14. 3  
15. 4  
16. 7  
17. 110  
18. 6  
19. 74  
20. 4  
21. 0.363  
22. 0.026  
23. 0.007  
24. 0.070  
25. 0.001  
26. 0.084  
27. 0.084  
28. 0.325  
29. 0.033  
30. 4.000  
31. 1.8  
32. 0.007  
33. 1.01  
34. 0.0094  
35. 0.735  
36. 1.64  
37. 1.6  
38. 2  
39. 3.50  
40. 3.5

EXERCISE 6g (p. 100)
Calculators should be used except by the brightest children who should use them only for checking answers. At this point they will need to be shown how to give an answer correct to a specified number of decimal places, by reading the display to one more place than necessary.

1. 0.17 (0.165)  
2. 0.93 (0.927)  
3. 0.35 (0.346)  
4. 2.03 (3)  
5. 2.85 (3)  
6. 0.16 (0.156)  
7. 0.04 (2)  
8. 0.05 (0.047)  
9. 0.24 (0.236)  
10. 0.04 (0.038)  
11. 0.22 (0.216)  
12. 0.95 (0.949)  
13. 4.1 (1)  
14. 57.4 (2)  
15. 2.6 (2.55)  
16. 0.9 (0.88)  
17. 7.3 (7.29)  
18. 1.2 (1.15)  
19. 2.1 (4)  
20. 0.9 (4)  
21. 9.7 (9.68)  
22. 0.6 (4)  
23. 1.7 (3)  
24. 27.3 (1)  
25. 0.006 (0.0057)  
26. 0.018 (0.0175)  
27. 0.417 (0.4166)  
28. 0.021 (0.0209)  
29. 0.038 (0.0375)  
30. 0.001 (0.0009)  
31. 0.028 (4)  
32. 0.031 (0.0306)  
33. 0.016 (1)  
34. 0.019 (0.0188)  
35. 0.039 (3)  
36. 0.037 (0.0366)
EXERCISE 6h (p. 101)
Calculators should be used by all except the most able who can use them for checking.

1. 0.625  7.  0.0625  13.  0.167 (0.1666)  19.  0.333 (3)  25.  0.158 (0.1578)
2.  0.075  8.  1.375  14.  0.667 (0.6666)  20.  0.364 (0.3636)  26.  0.176 (4)
3.  0.1875  9.  0.52  15.  0.818 (1)  21.  0.214 (2)  27.  0.267 (0.2666)
4.  0.6  10.  0.0375  16.  0.857 (1)  22.  0.235 (2)  28.  0.389 (0.3888)
5.  0.36  11.  0.429 (0.4285)  17.  1.143 (1.1428)  23.  0.462 (1)  29.  0.136 (3)
6.  0.14  12.  0.444 (4)  18.  0.111 (1)  24.  0.190 (4)  30.  0.121 (2)

Division by decimals: much class discussion is necessary before pupils are asked to work on their own.

EXERCISE 6i (p. 102)
Nos. 1–24 do not need a calculator. Nos. 25–36: benefit will be obtained from using a calculator but pupils need to be shown how to get an estimate.

1.  0.2  9.  60  16.  0.01  23.  0.004  30.  3.2
2.  0.02  10.  5  17.  100  24.  60  31.  1.2
3.  8  11.  13  18.  2.3  25.  0.8  32.  41
4.  20  12.  120  19.  21  26.  900  33.  7
5.  4500  13.  800  20.  0.012  27.  0.31  34.  1.2
6.  12  14.  360  21.  0.001 71  28.  0.16  35.  9
7.  0.16  15.  0.012  22.  52 000  29.  24.5  36.  0.08
8.  6

EXERCISE 6j (p. 103)
Unless long division practice is required, all pupils should use a calculator.

1.  6.33 (3)  11.  0.02 (0)  21.  36 (35.5)
2.  8.43 (8.428)  12.  2.9 (2.87)  22.  3.9 (3.86)
3.  16.67 (16.666)  13.  8.2 (8.18)  23.  0.167 (0.1666)
4.  28.17 (28.165)  14.  0.087 (0.0866)  24.  1.1 (1.09)
5.  0.72 (3)  15.  1.3333 (3)  25.  2.3 (2.28)
6.  41.67 (41.666)  16.  32.9 (32.85)  26.  4 (3.7)
7.  0.03 (0.026)  17.  20.3 (20.25)  27.  0.72 (3)
8.  0.93 (0.928)  18.  0.032 (3)  28.  0.0042 (0.004 15)
9.  1.03 (1.028)  19.  283.333 (3)  29.  0.57 (1)
10.  0.71 (4)  20.  1.7 (1)  30.  2.5 (2.47)

EXERCISE 6k (p. 104)
Calculators can be used, the brightest pupils using them only for checking.

1.  0.144  6.  5.76  10.  4.2  14.  0.16  18.  0.12
2.  1.6  7.  0.000 126  11.  12.24  15.  4  19.  0.125
3.  0.0512  8.  0.14  12.  84  16.  4  20.  0.7
4.  128  9.  6.72  13.  0.3  17.  10  21.  12
5.  2.88
EXERCISE 6l (p. 105)
Calculations should be used, except possibly by the most able.

1. $0.2, \frac{1}{3}$
2. $\frac{2}{3}, \frac{4}{5}$
3. $\frac{4}{9}, \frac{1}{2}$
4. $\frac{17}{11}, 0.3$
5. $\frac{7}{9}, 0.1$
6. $3, 0.3$
7. $3, 0.35$
8. $9, 0.4$
9. $3, 0.3$
10. $0.35, \frac{25}{11}$

EXERCISE 6m (p. 106)

1. a) $6.8$ b) $680$
2. $0.875$
3. a) $3.13$ b) $0.08$
4. $20.138$
5. $4.48$
6. $1.64$
7. $11.82$
8. $6\frac{2}{3}, (6\frac{2}{3} = 6.666...)$

EXERCISE 6n (p. 106)

1. $\frac{1}{30}$
2. a) $0.0624$ b) $0.52$
3. $1.7$
4. $6.4\text{cm}$
5. $0.048$
6. $0.24$
7. £$55.68$
8. a) $8$ b) $7.8$ c) $7.782$

EXERCISE 6p (p. 107)

1. $0.714285$
2. $0.064, 0.00064$
3. $16.28$
4. $\frac{21}{20}$
5. $7.4437$
6. $2.05$
7. $\frac{2}{7}$

EXERCISE 6q (p. 107)

1. $0.16$
2. $9.186 (9.1857)$
3. $0.0036$
4. $\frac{19}{2000}$
5. $14.63$
6. $59.5p$
7. $2$
8. $0.666…$

CHAPTER 7 Units

Calculators are not necessary for this chapter.

EXERCISE 7a (p. 108)
A good opportunity to point out the importance of eyes being directly over each end of a line when using a ruler to measure its length.

1. a) metres b) centimetres c) metres d) kilometres e) centimetres f) millimetres
2. a) $4$ b) $2$ c) $5$ d) $1$ e) $10$
3. (to the nearest millimetre) a) $20$ b) $10$ c) $4$ d) $16$ e) $24$
4. $40\text{cm}$
5. $12000$
6. $150$
7. $500$
8. $190000$
9. $3000$
10. $3000$
11. $500$
12. $7000$
13. $150$
14. $23$
15. $4600$
16. $3700$
17. $1900$
18. $3500$
19. $270$
20. $190000$

EXERCISE 7b (p. 110)

1. $200$
2. $5000$
3. $30$
4. $400$
5. $12000$
6. $150$
7. $6000$
8. $100000$
9. $3000$
10. $2000000$
11. $500$
12. $7000$
13. $150$
14. $23$
15. $4600$
16. $3700$
17. $1900$
18. $3500$
19. $270$
20. $190000$
EXERCISE 7c (p. 111)

1. 12 000  
2. 3000  
3. 5000  
4. 1 000 000  
5. 1 000 000  
6. 13 000  
7. 6000  
8. 2 000 000  
9. 4000  
10. 2 000 000  
11. 3000  
12. 4000  
13. 1500  
14. 2700  
15. 1800  
16. 700  
17. 5 200 000  
18. 600  
19. 11 300  
20. 2500  
21. 7300  
22. 300 000  
23. 500  
24. 800  

EXERCISE 7d (p. 112)

1. 136  
2. 35  
3. 1050  
4. 48  
5. 1 000 000  
6. 3020  
7. 502  
8. 5500  
9. 202  
10. 8009  
11. 3500  
12. 2008  
13. 5500  
14. 2800  
15. 3250  
16. 1020  
17. 1250  
18. 3550  
19. 2050  
20. 1010  

EXERCISE 7e (p. 112)

1. 30  
2. 6  
3. 1.5  
4. 25  
5. 1.6  
6. 0.072  
7. 0.12  
8. 8.8  
9. 1.25  
10. 2.85  
11. 1.5  
12. 3.68  
13. 1.5  
14. 5.02  
15. 3.8  
16. 0.086  
17. 0.56  
18. 0.028  
19. 0.19  
20. 0.086  
21. 3.45  
22. 8.4  
23. 11.002  
24. 2.042  
25. 4.4  
26. 5.03  
27. 7.005  
28. 4.005  
29. 1.001  
30. 0.000 085  
31. 5.142  
32. 48.171  
33. 9.008  
34. 9.088  
35. 12.019  
36. 4.111  
37. 1.056  
38. 5.003  
39. 0.2505  
40. 0.85055  

EXERCISE 7f (p. 114)

Worth pointing out to those of above average ability that, in the worked examples, part (b)
can be obtained directly from part (a).

1. 5.86  
2. 1.035  
3. 3001.36  
4. 3051  
5. 5.647  
6. 4.65  
7. 440  
8. 55  
9. 1820  
10. 2456  
11. 5059  
12. 1358  
13. 3250  
14. 5115  
15. 15 100  
16. 2550  
17. 1046.68  
18. 308.73  
19. 2580  
20. 2362  
21. 2.22  
22. 1606.4  
23. 1089.6  
24. 5972  
25. 748  
26. 0.922  
27. 1150  
28. 73.6  
29. 2642  
30. 19 850  
31. 35 420  
32. 910  
33. 448.2  
34. 5  

EXERCISE 7g (p. 115)

For the above average.

1. 13 540  
2. 45 792  
3. 13.563  
4. 12.55  
5. 32  
6. 10.6  
7. 15 366  
8. 24.448  
9. 22.77  
10. 16.24
EXERCISE 7h (p. 116)
Those of average ability would benefit from using a calculator.

1.  9.72m  
2.  1840g  
3.  748kg  
4.  4.11g  
5.  1080mm  
6.  4kg  
7.  2.2g  
8.  15m  
9.  33.2cm  
10. 5.3kg

EXERCISE 7i (p. 117)

1.  700c  
2.  600p  
3.  900pf  
4.  1300c  
5.  735c  
6.  4381c  
7.  1103pf  
8.  615p  
9.  210p  
10. 504p  
11. £1.26  
12. $3.50  
13. £1.90  
14. 3.50 marks  
15. $43.07  
16. £2.83  
17. 3.47 marks  
18. £5.80  
19. 11.09f  
20. £6.08  
21. £3.20  
22. $5.05  
23. £9.60  
24. 6 marks  
25. £2.80

EXERCISE 7j (p. 118)
For the above average.

1.  a) 98cm  
2.  2.23km  
3.  9.192kg  
4.  3056m, 3050m  
5.  3.6m  
6.  95t 660kg; 121t 960kg  
7.  76.9kg, 72kg  
8.  13 360m, 13.64km  
9.  a) 6.2, 3.8  
10. £6.75  
11. £1.26  
12. $3.50  
13. £1.90  
14. 3.50 marks  
15. $43.07  
16. £2.83  
17. 3.47 marks  
18. £5.80  
19. 11.09f  
20. £6.08  
21. £3.20  
22. $5.05  
23. £9.60  
24. 6 marks  
25. £2.80

EXERCISE 7k (p. 119)

1.  4000m  
2.  0.03kg  
3.  3.50cm  
4.  0.25kg  
5.  3000cm  
6.  1.25km  
7.  1.5m  
8.  28mm  
9.  0.065kg  
10. £6.75

EXERCISE 7l (p. 120)

1.  2.36m  
2.  20mm  
3.  5000g  
4.  0.5g  
5.  4.25km  
6.  3600kg  
7.  2.35kg  
8.  2000mg  
9.  2.6m

EXERCISE 7m (p. 120)

1.  5780kg  
2.  354p  
3.  0.35t  
4.  0.0155cm  
5.  1.56t  
6.  7.80f  
7.  360mg  
8.  2.05km  
9.  8.598t

EXERCISE 7n (p. 120)

1.  4.2m  
2.  0.35kg  
3.  £1.52  
4.  0.5283km  
5.  3.6cm  
6.  470mm  
7.  0.36m  
8.  1.356g  
9.  £7

CHAPTER 8 Imperial Units

As imperial units are still widely used, knowledge of them and of their rough equivalents in the metric system is desirable.
### EXERCISE 8a (p. 121)

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### EXERCISE 8b (p. 122)

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### EXERCISE 8c (p. 123)

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### EXERCISE 9a (p. 125)

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### EXERCISE 9b (p. 127)

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### EXERCISE 9c (p. 128)

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### CHAPTER 9  Introducing Geometry

In all the geometry chapters there are no instructions as to how the solutions to problems should be written down. An intuitive approach is best at this age and most pupils should be asked only to fill in the sizes of angles in diagrams. The teacher will decide whether or not brighter children should be asked to write down reasoned solutions.

### EXERCISE 9a (p. 125)

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### EXERCISE 9b (p. 127)

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### EXERCISE 9c (p. 128)

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EXERCISE 9d (p. 129)

1. obtuse  4. acute  7. acute  10. acute  13. obtuse
2. acute  5. obtuse  8. acute  11. reflex  14. obtuse
3. reflex  6. reflex  9. obtuse  12. obtuse  15. acute

EXERCISE 9e (p. 130)

Worth discussing the number 360, e.g. how many whole numbers divide exactly into it? Compare it with 100; which is the better number and why? Its origins are interesting: it probably came from the Babylonians who used 60 as a number base. It is also worth noting that 60 is the base used for time (seconds and minutes and hours).

1. 180º  8. 270º  15. 180º  22. 120º  29. 330º
2. 90º  9. 90º  16. 30º  23. 30º  30. 150º
3. 270º  10. 120º  17. 45º  24. 60º  31. 210º
4. 180º  11. 270º  18. 120º  25. 120º  32. 300º
5. 90º  12. 270º  19. 60º  26. 210º  33. 210º
6. 270º  13. 180º  20. 45º  27. 180º  34. 150º
7. 180º  14. 90º  21. 30º  28. 300º  35. 210º

EXERCISE 9f (p. 132)

1. 34º  6. 20º  10. 11º  14. 218º  18. 345º
2. 60º  7. 115º  11. 325º  15. 345º  19. 282º
3. 75º  8. 54º  12. 332º  16. 330º  20. 213º
5. 150º

EXERCISE 9g (p. 136)

Intended to give pupils an idea of what an angle of given size looks like.

1. 30º  6. 180º  11. 5  15. 2  19. 6
2. 60º  7. 3  12. 9  16. 6  20. 8
3. 90º  8. 2  13. 1  17. 3  21. 1
4. 120º  9. 4  14. 10  18. 7  22. 12
5. 150º  10. 12

35. 60º  38. 260º  41. 45º  43. 25º  45. 160º
36. 140º  39. 25º  42. 5º  44. 80º  46. 105º
37. 350º  40. 300º

EXERCISE 9h (p. 138)

If pupils do measure each other’s angles, it is worth pointing out that protractors are not always as accurate as they should be; an angle measured as 51º on one protractor could be measured as 52º on another.

EXERCISE 9i (p. 138)

In No. 3 check that the pupils’ diagrams vary.

4. 150º  6. 35º  7. 65º  8. 140º  9. 160º
5. 20°

**EXERCISE 9j (p. 140)**
No. 1, or a similar one, could be demonstrated by one of the children in front of the class.

1. 180°
2. 180°

**EXERCISE 9k (p. 140)**

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<tr>
<td>5.</td>
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<td>80°</td>
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<tr>
<td>8.</td>
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<td>17.</td>
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<td>9.</td>
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**EXERCISE 9l (p. 144)**

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**EXERCISE 9m (p. 145)**

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**EXERCISE 9n (p. 146)**

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**EXERCISE 9p (p. 146)**

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2. W

**CHAPTER 10  Symmetry**

This chapter can be done earlier, but should be done before Chapter 11.

**EXERCISE 10a (p. 148)**

1, 3, 4 and 6

**EXERCISE 10b (p. 150)**

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2. 1
EXERCISE 10c (p. 152)

1. 6  
2. 6  
3. 0  
4. 3

EXERCISE 10d (p. 153)
It is advisable to point out that the amount of rotation must not be a complete revolution.

2, 3 and 5
9. In Exercise 10c, numbers 1, 2, 3, 4, 7 and 8 have rotational symmetry.

EXERCISE 10e (p. 155)

1. yes  
2. no  
3. yes  
4. yes  
5. yes  
6. yes  
7. no  
8. yes

EXERCISE 10f (p. 156)

EXERCISE 10g (p. 158)

1. yes  
2. no  
3. yes  
4. yes  
5. yes  
6. no  
7. e.g. saucepan, milk bottle

CHAPTER 11  Triangles and Angles

Angles of a triangle: some teachers may prefer to use paper tearing before drawing and measurement of angles. This applies to angles of a quadrilateral later in the chapter.
EXERCISE 11c (p. 163)

1. 60º  
2. 85º  
3. 55º  
4. 110º  
5. 40º  
6. 30º  
7. 55º  
8. 60º  
9. 75º  
10. 25º  
11. 50º  
12. 90º  
13. 120º  
14. 55º  
15. 65º

EXERCISE 11d (p. 164)

1. 60º, 50º  
2. 65º, 45º  
3. 70º  
4. 65º, 115º  
5. 85º, 30º  
6. 45º  
7. 60º  
8. 60º, 30º  
9. 90º, 45º  
10. 90º, 45º

EXERCISE 11e (p. 166)

1. 110º  
2. 60º  
3. 110º  
4. 40º  
5. 70º  
6. 55º  
7. 90º  
8. 35º  
9. 110º  
10. 95º

EXERCISE 11f (p. 168) Some of the remaining measurements of each constructed triangle are given here and in the following exercises to help check pupils’ drawings. Alternatively, pupils could be asked to find them from their own drawings.

1. 4.2cm, 56º, 84º  
2. 4.6cm, 97º, 48º  
3. 6.5cm, 70º, 40º  
4. 8.5cm, 97º, 33º  
5. 3.8cm, 52º, 83º  
6. 4.8cm, 79º, 53º  
7. 4.3cm, 53º, 62º  
8. 5.7cm, 53º, 75º  
9. 6.4cm, 38º, 69º  
10. 6.2cm, 44º, 80º

EXERCISE 11g (p. 169)

1. 34º, 106º  
2. 34º, 98º  
3. 35º, 80º  
4. 37º, 90º  
5. 40º, 84º  
6. 45º, 83º  
7. 37º, 90º  
8. 47º, 75º  
9. 23º, 90º  
10. 52º, 69º

EXERCISE 11h (p. 169)

1. 3.6cm, 5.4cm  
2. 34º, 101º  
3. 4.6cm, 49º  
4. 7.8cm, 50º  
5. 119º, 26º  
6. 13.4cm, 17.8cm  
7. 8.9cm, 30º  
8. 5.9cm, 5cm  
9. 127º, 21º  
10. Equilateral

11. Two possible triangles: Ĉ = 56º, b = 6cm; Ĉ = 124º, b = 2.6cm
12. R = 71º, q = 4.8cm; R = 109º, q = 1.2cm
13. 35º, 2.9cm; no

EXERCISE 11i (p. 171)

1. 50º  
2. 80º  
3. 110º  
4. 50º  
5. 60º  
6. 40º  
7. 90º  
8. 60º  
9. 120º  
10. 90º  
11. 110º  
12. 65º  
13. 60º, 120º  
14. 80º, 70º  
15. 80º, 115º  
16. 50º, 130º

EXERCISE 11j (p. 174)

11. 70º  
19. 60º  
27. 55º, 70º  
30. 50º, 80º
12. 70°  16. 110°  20. 20°  28. 45°, 135°  31. 40°, 140°
13. 65°  17. 45°  21. 75°  29. 80°, 80°  32. 20°, 70°
14. 40°  18. 70°  22. 86°

EXERCISE 11k (p. 177)
In No. 6, two tetrahedra can be stuck together to make a polyhedron with six faces. The nets
for other simple polyhedra are provided in Book 2 but are not included here because at this
stage constructions are rarely accurate enough to give satisfying results.

EXERCISE 11l (p. 178)
1. 65°  2. 70°  3. 80°  4. AC = 3.9cm  5. 10cm

EXERCISE 11m (p. 179)
1. 85°, 45°  2. 45°, 135°  3. 55°, 125°  4. Ĉ = 70°  5. AC = 4.1cm

EXERCISE 11n (p. 180)
1. 60°, 30°  2. 65°, 65°, 60°  3. 80°, 140°  4. 7.1cm (base)  5. 96°, 136°, 58°

CHAPTER 12 Factors and Indices

EXERCISE 12a (p. 181)
1. 1 x 18, 2 x 9, 3 x 6
2. 1 x 20, 2 x 10, 4 x 5
3. 1 x 24, 2 x 12, 3 x 8, 4 x 6
4. 1 x 27, 3 x 9
5. 1 x 30, 2 x 15, 3 x 10, 5 x 6
6. 1 x 36, 2 x 18, 3 x 12, 4 x 9, 6 x 6
7. 1 x 40, 2 x 20, 4 x 10, 5 x 8
8. 1 x 45, 3 x 15, 5 x 9
9. 1 x 48, 2 x 24, 3 x 16, 4 x 12, 6 x 8
10. 1 x 60, 2 x 30, 3 x 20, 4 x 15, 5 x 12, 6 x 10
11. 1 x 64, 2 x 32, 4 x 16, 8 x 8
12. 1 x 72, 2 x 36, 3 x 24, 4 x 18, 6 x 12, 8 x 9
13. 1 x 80, 2 x 40, 4 x 20, 5 x 16, 8 x 10
14. 1 x 96, 2 x 48, 3 x 32, 4 x 24, 6 x 16, 8 x 12
15. 1 x 100, 2 x 50, 4 x 25, 5 x 20, 10 x 10
16. 1 x 108, 2 x 54, 3 x 36, 4 x 27, 6 x 18, 9 x 12
17. 1 x 120, 2 x 60, 3 x 40, 4 x 30, 5 x 24, 6 x 20, 8 x 15, 10 x 12
18. 1 x 135, 3 x 45, 5 x 27, 9 x 15
19. 1 x 144, 2 x 72, 3 x 48, 4 x 36, 6 x 24, 8 x 18, 9 x 16, 12 x 12
20. 1 x 160, 2 x 80, 4 x 40, 5 x 32, 8 x 20, 10 x 16

EXERCISE 12b (p. 181)
Some examples discussed with the class would be useful.
1. 21, 24, 27, 30, 33, 36, 39  3. 28, 35, 42, 49, 56  5. 26, 39, 52, 65
2. 20, 25, 30, 35, 40, 45  4. 55, 66, 77, 88, 99
### EXERCISE 12c (p. 181)

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<td>31, 37, 41, 43, 47</td>
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<td>41, 101, 127</td>
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<td>23, 29</td>
<td>4.</td>
<td>5, 19, 29, 61</td>
<td>6.</td>
<td>a) F  b) F  c) T  d) T  e) F</td>
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### EXERCISE 12d (p. 182)

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### EXERCISE 12e (p. 183)

A calculator should be used for Nos. 11–16.

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### EXERCISE 12f (p. 184)

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### EXERCISE 12g (p. 185)

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### EXERCISE 12h (p. 185)

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### EXERCISE 12i (p. 186)

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### EXERCISE 12j (p. 186)

These problems are difficult and should be approached with caution. They are useful for discussion but only the most able children should be allowed to work through them on their own.
1. £1  
2. £10.80  
3. 120m  
4. 50cm  
5. 2 minutes past midnight  
6. 78s  
7. 13 turns and 6 turns  
8. 30 steps; 2  
9. 3 minutes  
10. 480, 20

CHAPTER 13 Tables and Networks

EXERCISE 13a (p. 188)

1. a) £19.20  b) £18.60  c) £35.30  d) London, Saturday + Alton Towers, weekday, or Birmingham, Sunday + Alton Towers, Saturday  
2. a) £49  b) £61  c) £6000, in Area 3  d) £6000 in Area 1 or £7000 in Area 2  
   e) £6000, in Area 2  f) Martins £7000, Barkers £6000

EXERCISE 13b (p. 190)

Many other questions can be asked about these tables.

1. a) 4  b) 15  c) 22  d) 32  e) Otherwise there is no-one to be in the class  
2. a) 1  b) 15  c) 30  
3. a) 9  b) 1  c) 14  d) 28  e) 23  
4. a) Missing numbers are 4 and 9  b) 9  c) 3

Other tables can be made to show information collected in the class.

EXERCISE 13c (p. 192)

1. a) 14km  b) 17km  c) 22km  d) 21km  e) e.g. A to E to D to C, 24km  f) via F  
2. a) 550m  b) 440m  c) 705m  
3. a) 790m  b) yes, between church and school and between Post Office and school  
4. a) Post Office, shop, school, Daisy’s house, school, Post Office; 560m  
   b) Post Office, school, Daisy’s house, school, Post Office, Pete’s house, Post Office or this route in reverse; 820m  
5. a) 12m  b) 33m  c) 60m  d) A to C to D, 32m  e) A to B to D, 33m  
6. a) 10m  b) 35min  c) A to D to E to B, 30min  d) B to E to D, 25min

EXERCISE 13d (p. 194)

1. drawing is possible starting at B but not at C.  
3. (a) and (b) are not possible.  
4. a) B, F, I, K, L M  b) points other than those in (a)  
6. Diagrams with only even numbers can be drawn starting at any point.  
   Diagrams with two odd numbers can be drawn starting from one of the odd points.  
   Other diagrams cannot be drawn.

EXERCISE 13e (p. 196)

1. a) AEI 6, ADGHEI 24, ADEFI 17, ABCEFI 17, ABEI 8, ADGHEFI 28, ADGEFI 23  
   b) ADGHEFI  
2. a) ABC, 10min  b) ABEADC, 38min  c) 24min
3. a) Yes, from P, finishing at C  
   Yes from C, finishing at P. Not possible from any other point.  
b) no
4. a) yes  b) yes  c) no

EXERCISE 13f (p. 198)
1.  
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2 a)  
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3. The table is symmetrical about the leading diagonal (i.e. top left to bottom right).

4. a)  
<table>
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<tr>
<td>B</td>
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</table>
EXERCISE 13g (p. 200)

1. a) David   b) no, son   c) sister   d) grandfather

2. a) Sally   d) Sally
    b) older lan
    c) we do not know lan

3. a) 2, 3, 4, 6   c) 2, 3, 4, 6
    b) yes, 2

4. a) the relationship works both ways   b) yes

5. a) Philip and Martin are cousins   b) Sarah is not a cousin of either Philip or Martin
    c)

CHAPTER 14 Area

Plenty of class discussion is advisable before finding areas of specific objects: e.g. What is “area”? Why is area counted in squares and not in triangles? The number of squares may vary because it is not always easy to say whether more than half a square is included.

EXERCISE 14a (p. 202)

1. 11   5. 26   8. a) A   b) B   11. 50   14. 76
2. 16   6. 20   9. 45   12. 40   15. 62
3. 11   7. 21   10. 43  13. 37   16. 26
4. 20

EXERCISE 14b (p. 206)

1. 4cm²   5. 2.25cm²   9. $\frac{1}{4}$ km²   13. 27m²   17. 2.85m²
2. 64cm²   6. 6.25cm²   10. $\frac{9}{16}$ m²   14. 280cm²   18. 30.24cm²
3. 100cm²   7. 0.49m²   11. 30cm²   15. 3.96mm²   19. 22 800cm²
4. 25cm²  8. 1.44cm²  12. 48cm²  16. 1470km²  20. 36 000mm²

EXERCISE 14c (p. 207)

1. 120cm²  3. 149m²  5. 52m²  7. 544mm²  9. 43m²
2. 36m²  4. 208mm²  6. 87cm²  8. 90cm²  10. 228cm²

EXERCISE 14d (p. 209)

1. 8cm  5. 6cm  9. 2km  13. 24m  17. 6.8m
2. 32cm  6. 10cm  10. 3m  14. 68cm  18. 22.2cm
3. 40cm  7. 2.8m  11. 22cm  15. 8mm  19. 670cm
4. 20cm  8. 4.8cm  12. 28cm  16. 154km  20. 780mm

EXERCISE 14e (p. 209)

1. 2cm, 8cm²  3. 5m, 15m²  5. 5cm, 22cm  7. 9km, 26km  9. 25cm, 125cm²
2. 2cm, 10cm²  4. 9mm, 54mm²  6. 12m, 44m  8. 9mm, 32mm  10. 80cm, 202cm

EXERCISE 14f (p. 210)

Intended for the above average.

1. 28cm², 24cm  3. 80mm², 48cm  5. 1664 cm², 272cm  7. 91cm²  9. 432cm²
2. 24cm², 24cm  4. 15m², 32cm  6. 184 cm²  8. 198cm²  10. 4.84cm²

EXERCISE 14g (p. 212)

1. 4  3. 6  4. 6  5. 45  6. 500  2. 9

EXERCISE 14h (p. 213)

1. a) 30 000  b) 120 000  c) 75 000  d) 820 000  e) 85 000
2. a) 1400  b) 300  c) 750  d) 2600  e) 3250
3. a) 560  b) 56 000
4. a) 4  b) 25  c) 0.5  d) 0.25  e) 7.34
5. a) 0.55  b) 14  c) 0.076  d) 1.86  e) 2970
6. a) 7.5  b) 0.43  c) 0.05  d) 0.245  e) 176

EXERCISE 14i (p. 215)
Pupils will benefit from using a calculator.

1. 50 000cm²  3. 175 000cm²  5. 8m²  7. 37 500cm²  9. 120 000m²
2. 1800mm²  4. 14 000cm²  6. 15 000cm²  8. 180mm²  10. 22 500m²

EXERCISE 14j (p. 215)
Average ability children should be encouraged to try some of these with the help of a calculator.

1. 8250m², 370m  3. 8400m², 380m  5. 5m²  7. £9  9. 100
CHAPTER 15 Parallel Lines and Angles

EXERCISE 15a (p. 217)
Can be used for discussion.

EXERCISE 15b (p. 219)

1. g  
2. e  
3. d  
4. e  
5. f  
6. f  
7. d  
8. g  
9. e  
10. d

EXERCISE 15d (p. 222)

1. 60°  
2. 110°  
3. 75°  
4. 110°  
5. 60°  
6. 120°  
7. 110°  
8. 60°  
9. 30°  
10. 130°

EXERCISE 15e (p. 224)

1. 50°  
2. 130°, 130°, 50°  
3. 60°, 60°, 60°, 120°, 60°  
4. 50°, 80°, 50°  
5. 70°, 80°, 30°  
6. 115°, 115°  
7. 140°, 40°, 40°  
8. 70°, 110°, 70°, 70°  
9. 50°, 130°  
10. 55°, 125°, 55°  
11. 110°, 70°, 130°, 130°  
12. 40°, 100°  
13. 80°  
14. 90°, 90°, 50°  
15. 120°  
16. 40°  
17. 70°  
18. 60°  
19. 135°  
20. 55°  
21. 55°  
22. 120°  
23. 120°  
24. 45°

EXERCISE 15f (p. 227)

1. e  
2. e  
3. d  
4. d  
5. d  
6. g  
7. g  
8. e  
9. d  
10. g

EXERCISE 15g (p. 229)

1. 50°, 130°  
2. 130°, 50°  
3. 50°, 70°  
4. 260°, 40°, 60°  
5. 70°, 70°, 70°  
6. 60°  
7. 55°, 65°  
8. 60°  
9. 90°  
10. 90°  
11. 30°  
12. 45°

EXERCISE 15h (p. 230)

1. e, g  
2. e, d  
3. e, g  
4. e, d  
5. h, f  
6. d, g  
7. 70°, 110°, 180°  
8. 130°, 50°, 180°  
9. 40°, 40°, 80°  
10. 120°, 60°, 180°

EXERCISE 15i (p. 232)

1. 120°  
2. 130°, 50°  
3. 85°  
4. 40°, 100°, 60°  
5. 55°, 125°  
6. 40°  
7. 80°, 80°  
8. 130°, 130°, 50°  
9. 80°, 100°, 80°, 100°  
10. 70°, 110°
### EXERCISE 15j (p. 233)

1. $65^\circ$  
2. $140^\circ$  
3. $55^\circ$  
4. $110^\circ$  
5. $70^\circ$  
6. $70^\circ$  
7. $45^\circ$  
8. $75^\circ$  
9. parallel

### EXERCISE 15k (p. 234)

1. $80^\circ$  
2. $60^\circ$  
3. $110^\circ$  
4. $40^\circ$  
5. $25^\circ$  
6. $50^\circ$  
7. $40^\circ$  
8. $40^\circ$

### EXERCISE 15l (p. 235)

1. $60^\circ$  
2. $110^\circ$  
3. $90^\circ$  
4. $130^\circ$

### CHAPTER 16 Coordinates

Negative numbers as coordinates are introduced in this chapter. Some teachers may prefer first to introduce negative numbers in general, in which case Chapter 17 should be taken before this one.

### EXERCISE 16a (p. 237)

Nos. 10–21 can be used for discussion.

1. A (2,2), B (5,2), C (7,6), D (4,5), E (7,0), F (9,4), G (0,8), H (5,8)
4. square  
5. isosceles triangle  
6. rectangle  
7. square  
8. isosceles triangle

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<td>18. 1</td>
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<tr>
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<td>14. 14</td>
<td>17. 4</td>
<td>19. 6</td>
<td>21. 0</td>
<td></td>
</tr>
<tr>
<td>12. 0</td>
<td>15. 0</td>
<td></td>
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</tbody>
</table>

22. (9,12), (9,9), (13,6)  
23. (3,11), (3,7), (7,7); 4  
24. (1,1), (6,1), (8,4), (3,4); 5,5  
25. (13,3); 4  
26. (2,5)  
27. (7,1)  
28. (4,1)  
29. (5,4)  
30. (3,7)  
31. (2,3)

### EXERCISE 16b (p. 241)

This and the next exercise use positive coordinates to investigate some of the properties of the special quadrilaterals. The questions are not difficult but this section can be omitted at a first reading.

1. a) 8, 8, 8, 8, b) DC, yes  c) $90^\circ$  
2. a) AB and DC, BC and AD  b) AB and DC, BC and AD  c) $90^\circ$  
3. a) all equal  b) AB and DC, BC and AD  c) A = C, B = D  
4. a) AB and DC, BC and AD  b) AB and DC, BC and AD  c) A = C, B = D  
5. a) none  b) AB and DC  c) none

### EXERCISE 16c (p. 243)
1. parallelogram  3. trapezium  5. trapezium  7. square  9. parallelogram
2. rectangle  4. square  6. rhombus  8. rectangle  10. rhombus

EXERCISE 16d (p. 244)

1. 2, 3, 6, 1, –5, –3, 5, –3, –5, 5, 0  2. 2, –2, 5, –4, 2, 5, –5, 0
3. 5 below  6. 10 above  9. 3 right  11. 2 right  13. on y-axis
4. 3 above  7. on x-axis  10. 5 left  12. 7 left  14. 9 left
5. 1 below  8. 4 below

15. A (–2,3), B (3,1), C (2,–2), D (–3,1), E (1,–4) F (–4,–4), G (1,2), H (4,–4), I (–4,–4), J (–4,3)

18. square  19. isosceles triangle  20. rectangle  21. right-angled

EXERCISE 16e (p. 247)

1. 6  7. 5  13. (–1,3)  19. (–1,3)  25. (–5,–2)
2. 8  8. 7  14. (–6,–1)  20. (1,0)  26. (4, 3/2)
3. 6  9. 11  15. (–5,1)  21. (4,2)  27. (–1,3)
4. 2  10. 11  16. (0,–1)  22. (2,–1)  28. (–1,0)
5. 2  11. (–1,1)  17. (3,2)  23. (–7/2,3)  29. (0,0)
6. 7  12. (1,–2)  18. (–1,2)  24. (–3,–1)  30. (–1,0)

EXERCISE 16f (p. 248)

Suitable for the above average only.

1. a) (1,2), (3,6), (–3,–6), (–2,–4), (2,4)  b) 10  c) 16, 20, –8, 6, 9, –5, 2a
2. a) (2,2), (4,3), (6,4), (10,6), (–4,–1), (–8,–3), (0,1)  
   b) y-coordinate = 1/2 (x-coordinate)+1  c) 5
   d) 7, 11, 16, –5, 16, 1/2a+1
3. a) (3,–1), (5,–3), (6,–4), (8,–6), (–2,4), (–4,6), (1,1)  
   b) –5, –8, –10, –18, 9, 11, –8, 10, –10

EXERCISE 16g (p. 250)

Omit this exercise if Exercise 16b and Exercise 16c were not covered. This exercise investigates the properties of the diagonals of the special quadrilaterals and can be omitted, although the questions are not difficult.

1. a) parallelogram  c) no  d) both  e) no
2. a) square  c) yes  d) both  e) yes
3. a) trapezium  c) no  d) neither  e) no
4. a) rhombus  c) no  d) both  e) yes
5. a) rectangle  c) yes  d) both  e) no
6. rectangle, square
7. rhombus, square
8. parallelogram, rectangle, rhombus, square
EXERCISE 16h (p. 250)

1. \((-4, 16)\)  
2. \((-3, 9)\)  
3. \((1, 1)\)  
4. \((0, 0)\)  
5. \((2, 4)\)  
6. \((4, 16)\)  

7. ignoring the minus sign, the \(y\) coordinate is the square of the \(x\) coordinate.

8. 9  
9. 4  
10. 6.25  
11. 2.25  
12. 6.25  

CHAPTER 17 Directed Numbers

EXERCISE 17a (p. 253)

1. \(+10^\circ\)  
2. \(–7^\circ\)  
3. \(–3^\circ\)  
4. \(+5^\circ\)  
5. \(–8^\circ\)  
6. \(0^\circ\)  
7. \(–3^\circ\)  
8. \(–2^\circ\)  
9. \(–3^\circ\)  
10. \(–3^\circ\)  
11. \(–5^\circ\)  
12. \(–3^\circ\)  
13. \(–3^\circ\)  
14. \(–3^\circ\)  
15. \(–2^\circ\)  
16. \(0^\circ\)  
17. \(0^\circ\)  
18. \(0^\circ\)  
19. \(–3^\circ\)  
20. \(–3^\circ\)  
21. \(–3^\circ\)  
22. \(–3^\circ\)  
23. \(–3^\circ\)  
24. \(–3^\circ\)  
25. \(–3^\circ\)  
26. \(–3^\circ\)  
27. \(–3^\circ\)  
28. \(–3^\circ\)  
29. \(–3^\circ\)  
30. \(–3^\circ\)  
31. \(–3^\circ\)  
32. \(–3^\circ\)  
33. \(–3^\circ\)  
34. \(–3^\circ\)  
35. \(–3^\circ\)  
36. \(–3^\circ\)  
37. \(–3^\circ\)  
38. \(–3^\circ\)  
39. \(–3^\circ\)  
40. \(–3^\circ\)  

EXERCISE 17b (p. 256)

1. \(\text{>}\)  
2. \(\text{>}\)  
3. \(\text{>}\)  
4. \(\text{<}\)  
5. \(\text{<}\)  
6. \(\text{<}\)  
7. \(\text{<}\)  
8. \(\text{<}\)  
9. \(\text{<}\)  
10. \(\text{<}\)  
11. \(\text{<}\)  
12. \(\text{<}\)  
13. \(\text{<}\)  
14. \(\text{<}\)  
15. \(\text{<}\)  
16. \(\text{<}\)  
17. \(\text{<}\)  
18. \(\text{<}\)  
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32. \(\text{<}\)  
33. \(\text{<}\)  
34. \(\text{<}\)  
35. \(\text{<}\)  
36. \(\text{<}\)  
37. \(\text{<}\)  
38. \(\text{<}\)  
39. \(\text{<}\)  
40. \(\text{<}\)  

EXERCISE 17c (p. 257)

1. \(–3\)  
2. \(3\)  
3. \(–2\)  
4. \(–2\)  
5. \(2\)  
6. \(7\)  
7. \(1\)  
8. \(2\)  
9. \(–12\)  
10. \(–1\)  
11. \(5\)  
12. \(–2\)  
13. \(10, 12\)  
14. \(–10, –12\)  
15. \(–1\)  
16. \(3\)  
17. \(2\)  
18. \(–3\)  
19. \(–3\)  
20. \(–1\)  
21. \(3\)  
22. \(–1\)  
23. \(3\)  
24. \(–6\)  
25. \(–5\)  
26. \(4\)  
27. \(6\)  
28. \(0\)  
29. \(–3\)  
30. \(–5\)  
31. \(1\)  
32. \(2\)  
33. \(2\)  
34. \(–2\)  
35. \(–1\)  
36. \(–2\)  
37. \(1\)  
38. \(2\)  
39. \(5\)  
40. \(16\)  

Addition and subtraction of negative numbers: discussion using many different examples is advisable.

EXERCISE 17d (p. 259)

1. \(2\)  
2. \(–3\)  
3. \(7\)  
4. \(3\)  
5. \(6.3\)  
6. \(0\)  
7. \(14\)  
8. \(6\)  
9. \(–14\)  
10. \(7\)  
11. \(0\)  
12. \(0\)  
13. \(6\)  
14. \(6\)  
15. \(–4\)  
16. \(7\)  
17. \(–3\)  
18. \(2\)  
19. \(–4\)  
20. \(13\)  
21. \(13\)  
22. \(13\)  
23. \(–6\)  
24. \(8\)  
25. \(4\)  
26. \(6\)  
27. \(3\)  
28. \(0\)  
29. \(–3\)  
30. \(–5\)  
31. \(1\)  
32. \(2\)  
33. \(2\)  
34. \(–2\)  
35. \(–1\)  
36. \(–2\)  
37. \(1\)  
38. \(2\)  
39. \(5\)  
40. \(16\)
EXERCISE 17e (p. 260)

1. 1  
2. –5  
3. 9  
4. 8  
5. –12  
6. 7  
7. 4  
8. 10  
9. 5  
10. 2  
11. 5  
12. –12  
13. 5  
14. –9  
15. 1  
16. 9  
17. –1  
18. 0  
19. 2  
20. 16  
21. 5  
22. –4  

23. –8  
24. 19  
25. –4  
26. –4  
27. 4  
28. –3  
29. –3  
30. –19  
31. 2  
32. 3  

33. 0  
34. 0  
35. –1  
36. 0  
37. 9  
38. –7  
39. –4  
40. 3  
41. –10  
42. –3  

43. –2  
44. 1  
45. 2  
46. –12  
47. 3  
48. 18  
49. –2  
50. 1  
51. 2  
52. –15  
53. –9  

54. –6  
55. –8

EXERCISE 17f (p. 261)

1. –24  
2. –14  
3. –24  
4. –12  
5. –27  
6. –12  

7. –48  
8. –5  
9. –6  
10. –5  
11. –16  
12. –36  

13. –42  
14. –5  
15. –12.5

EXERCISE 17g (p. 262)

1. –3  
2. –2  
3. –5  
4. –4  
5. –4  
6. –2  
7. –10  
8. –3  

9. –5  
10. –4  
11. –1  
12. –2  

13. –2  
14. –2  
15. –4  
17. –4  
18. –2

EXERCISE 17h (p. 263)

1. –5º  
2. a) < b) >

3. 2  
4. –5  
5. –2  
6. 4  
7. 0  

9. –24  
10. –12

EXERCISE 18a (p. 264)

1. x – 3 = 4  
2. x + 1 = 3

3. 3 + x = 9  
4. x – 5 = 2

5. 2x = 8  
6. 7x = 14

7. 3x = 15  
8. 6x = 24

CHAPTER 18 Introducing Algebra

The two algebra chapters should be done in their entirety only by above average ability groups, but all pupils can have some introduction to equations at this stage. We have suggested some convenient stopping places. Equations are dealt with again in Book 2A.

EXERCISE 18a (p. 264)

Can be used for discussion.

1. x – 3 = 4, 7  
2. x + 1 = 3, 2

3. 3 + x = 9, 6  
4. x – 5 = 2, 7

5. 2x = 8, 4  
6. 7x = 14, 2

7. 3x = 15, 5  
8. 6x = 24, 4
EXERCISE 18b (p. 266)
Useful to point out here that any letter can be used.

1. 8  7. 6  13. –2  19. 10  25. 5
2. 9  8. 6  14. –5  20. 3  26.12
3. 2  9. 5  15. –1  21. 8  27.12
4. 7  10. 7  16. –1  22. 10  28.3
5. 4  11. 3  17. –2  23. 9  29.2
6. 5  12. 1  18. –4  24. 12  30.9

EXERCISE 18c (p. 267)

1. 2  10. 1  19. 10  27. 9  35. –7
2. 9  11. 4  20. 6  28. 17  36. 9
3. 3  12. –3  21. 11  29. 5  37. 4
4. 13  13. 4  22. 5  30. 16  38. 4
5. 3  14. 8  23. 11  31. 23  39. 4
6. 3  15. –1  24. 16  32. 4  40. –2
7. 7  16. 12  25. 12  33. 7  41. –2
8. –5  17. 10  26. 10  34. 9  42. 2
9. 0  18. 11

EXERCISE 18d (p. 268)

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

EXERCISE 18e (p. 269)

1. 4  7. 8  13. 6  19. 2 \frac{2}{3}  25. 0
2. 12  8. 16  14. 3 \frac{1}{3}  20. –5  26. 5
3. 2  9. 5 \frac{1}{2}  15. 5  21. 7  27. 20
4. 1  10. 13  16. –1  22. 2  28. 30
5. 1 \frac{1}{5}  11. 8  17. \frac{2}{7}  23. 1 \frac{2}{7}  29. 30
6. 3  12. 16  18. –1  24. 11  30. \frac{1}{5}

EXERCISE 18f (p. 270)

1. 4  10. 2 \frac{2}{3}  19. –1  27. –1  35. \frac{1}{3}
2. 3  11. 7  20. 1 \frac{4}{7}  28. 0  36. 6
3. 2  12. 5  21. 2  29. 2  37. –1
4. 6  13. 3  22. 2  30. 3 \frac{1}{3}  38. \frac{1}{4}
This is a convenient stopping place for average ability groups.

**EXERCISE 18g (p. 271)**

Good questions to discuss with above average ability groups but only the most able children should be allowed to work through these on their own.

1. \(4x-8 = 20, 7\)  
3. \(3x+6 = 21, 5\)  
5. \(3x+7 = 28, 7\)  
7. \(2x+6 = 20, 7\)  
9. \(3x-9 = 18, 9\)

2. \(6x-12 = 30, 7\)  
4. \(x+8 = 10, 2\)  
6. \(2x+6 = 24, 9\)  
8. \(2x+10 = 24, 7\)  
10. \(2x+9 = 31, 11\text{cm}\)

**EXERCISE 18h (p. 273)**

<p>| | | | | |</p>
<table>
<thead>
<tr>
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<td>4</td>
<td>11</td>
<td>1. 4</td>
<td>38</td>
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<td>1</td>
<td>12</td>
<td>2. 1</td>
<td>39</td>
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<tr>
<td>3</td>
<td>3</td>
<td>13</td>
<td>3. 3</td>
<td>40</td>
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<tr>
<td>4</td>
<td>5</td>
<td>14</td>
<td>4. 5</td>
<td>41</td>
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<td>5</td>
<td>7</td>
<td>15</td>
<td>5. 7</td>
<td>42</td>
</tr>
<tr>
<td>6</td>
<td>(-\frac{3}{4})</td>
<td>16</td>
<td>6. (-\frac{3}{4})</td>
<td>43</td>
</tr>
<tr>
<td>7</td>
<td>6</td>
<td>17</td>
<td>7. 6</td>
<td>44</td>
</tr>
<tr>
<td>8</td>
<td>5</td>
<td>18</td>
<td>8. 5</td>
<td>45</td>
</tr>
<tr>
<td>9</td>
<td>7</td>
<td>19</td>
<td>9. 7</td>
<td>46</td>
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<tr>
<td>10</td>
<td>2</td>
<td></td>
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</table>

**EXERCISE 18i (p. 275)**

A lot of discussion is necessary to get over the idea of “a term of an expression” and what is meant by “like terms” and “unlike terms”.

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>1</td>
<td>10x</td>
<td>3</td>
<td>2x</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4x</td>
<td>4</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>7</td>
<td>9</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td></td>
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</table>

**EXERCISE 18j (p. 275)**

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<tbody>
<tr>
<td>1</td>
<td>7x+7</td>
<td>6</td>
<td>8x+8y</td>
<td>11</td>
<td>3x-12</td>
<td>15</td>
<td>7-5x</td>
<td>19</td>
<td>15x</td>
</tr>
<tr>
<td>2</td>
<td>5x+5</td>
<td>7</td>
<td>8x+2y</td>
<td>12</td>
<td>3y-x</td>
<td>16</td>
<td>3-2x</td>
<td>20</td>
<td>4x-7y+4z</td>
</tr>
<tr>
<td>3</td>
<td>4x-5</td>
<td>8</td>
<td>4x+8y</td>
<td>13</td>
<td>(-6x-6y)</td>
<td>17</td>
<td>10x-2y</td>
<td>21</td>
<td>9x+y-11</td>
</tr>
<tr>
<td>4</td>
<td>5c-2a</td>
<td>9</td>
<td>8x+3</td>
<td>14</td>
<td>1-4x</td>
<td>18</td>
<td>11x-9y</td>
<td>22</td>
<td>-1</td>
</tr>
<tr>
<td>5</td>
<td>8x-2y</td>
<td>10</td>
<td>8x-8</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

**EXERCISE 18k (p. 276)**

<p>| | | | | | | |</p>
<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>13</td>
<td>(1\frac{1}{2})</td>
<td>19</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>8</td>
<td>4\frac{1}{2}</td>
<td>14</td>
<td>-6</td>
<td>20</td>
</tr>
<tr>
<td>25</td>
<td>1</td>
<td>26</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---
3. $ \frac{4}{7} $  
4. $ -1 \frac{1}{3} $  
5. $ \frac{1}{4} $  
6. $ 12.2 $  

EXERCISE 18l (p. 277)

1. $ \frac{2}{3} $  
2. $ x + 4 = 10, 6 $  

EXERCISE 18m (p. 277)

1. $ 2 $  
2. $ 7c $  

EXERCISE 18n (p. 277)

1. $ 5 \frac{1}{2} $  
2. $ 0 $  

EXERCISE 18p (p. 278)

1. $ 4 $  
2. $ -x $  

CHAPTER 19 Volume

Calculators should be used for most numerical work in this chapter.

EXERCISE 19a (p. 280)

1. $ 48cm^3 $  
2. $ 1600mm^3 $  
3. $ 5400mm^3 $  
4. $ 16mm^3 $  
5. $ 31.72m^3 $  

EXERCISE 19b (p. 281)

1. $ 8 $  
2. $ 6 $  
3. $ 8 $  
4. $ 12 $  
5. $ 64 $  

6. a) $ 128 $  
b) $ 16 $  
c) $ 2 $  

The remainder of this chapter is suitable only for above average ability groups, except for the first few problems in Exercise 19f.

EXERCISE 19c (p. 283)
1. 8000mm³  
2. 14 000mm³  
3. 6 200mm³  

4. 430mm³  
5. 92 000 000mm³  
6. 40mm³

7. 3 000 000cm³  
8. 2 500 000cm³  

9. 420 000cm³  
10. 6 300cm³  
11. 0.022cm³  
12. 0.731cm³

**EXERCISE 19d (p. 284)**

1. 2500cm³  
2. 1760cm³  
3. 540cm³

4. 7.5cm³  
5. 35 000cm³  
6. 28cm³

7. 7 litres  
8. 4 litres  
9. 24 litres  
10. 5000 litres  
11. 12 000 litres  
12. 4600 litres

**EXERCISE 19e (p. 284)**

1. 30cm³  
2. 2m³  
3. 540cm³

4. 600cm³  
5. 5760mm³  
6. 40 000cm³

7. 28cm³  
8. 8m³  
9. 17.5cm³  
10. 180cm³

**EXERCISE 19f (p. 285)**

The first three problems are suitable for everybody to try.

1. 60m³  
2. 7776cm³

3. 6480m³  
4. 125  
5. 48  
6. 300m³; 300 000  
7. 60  
8. 9000  
9. 64  
10. 1600

**EXERCISE 19g (p. 287)**

1. a) 3 200 000cm³  
2. 1600cm³

b) 3 200 000 000mm³  
3. 64cm³  
4. 50 000cm³

5. 13 500mm³

**EXERCISE 19h (p. 287)**

1. a) 8000mm³  
2. 3.5 litres

b) 0.000 008m³  
3. 300cm³  
4. 0.512cm³

5. 120 000cm³

**EXERCISE 19i (p. 287)**

1. a) 9000cm³  
2. 440cm³

b) 9 000 000mm³  
3. 216cm³  
4. 288cm³

5. 2400 litres

**EXERCISE 19j (p. 287)**

1. 0.0009m³  
2. 10.8 litres  
3. 75 litres  
4. 8cm³

5. 1.2m³

**EXERCISE 19k (p. 288)**

1. a) no  
2. Yes, measurements needed. Lengths on the drawing are not correct.  
3. no

**EXERCISE 19l (p. 289)**

1. and 2. lines are the correct length

3. a) lines are the correct length  
   c) no  
   d)one vertex is hidden behind another

4. a) and b) lines are the correct length
EXERCISE 19m (p. 291)

2. a) (i) 2 (ii) 2 (iii) 4cm by 3cm  
b) e.g.

3. a) 6  
b) two faces 1cm by 4cm, two 2cm by 1cm, two 4cm by 2cm
4. b) IJ  
c) K and G
5. a) IH  
b) B and D

6.

7. There are a large number of arrangements of six squares and of these, 11 will make cubes. (Count reflections as the same.)

CHAPTER 20 Vectors

This unit is optional. It can be done later (it is repeated with different exercises in Book 3) or omitted completely. If a brief introduction is thought appropriate, Exercise 20a and Exercise 20b form a good start.

Some pupils may suggest the need to state a time in the initial paragraph (p. 294); this can be dealt with if it arises but need not be introduced otherwise.

EXERCISE 20a (p. 294)

1. scalar  
2. vector  
3. scalar  
4. scalar  
5. vector

EXERCISE 20b (p. 295)
### EXERCISE 20c (P. 297)

1. \(\begin{pmatrix} 3 \\ 2 \end{pmatrix}\)  
2. \(\begin{pmatrix} 4 \\ 1 \end{pmatrix}\)  
3. \(\begin{pmatrix} 4 \\ 0 \end{pmatrix}\)  
4. \(\begin{pmatrix} -2 \\ 2 \end{pmatrix}\)  
5. \(\begin{pmatrix} -3 \\ 4 \end{pmatrix}\)  
6. \(\begin{pmatrix} -5 \\ -3 \end{pmatrix}\)  
7. \(g = \begin{pmatrix} 5 \\ 0 \end{pmatrix}\)  
8. \(j = \begin{pmatrix} -6 \\ 7 \end{pmatrix}\)  
9. \(k = \begin{pmatrix} -6 \\ -2 \end{pmatrix}\)  
10. \(l = \begin{pmatrix} 3 \\ -1 \end{pmatrix}\)  
11. \(h = \begin{pmatrix} -4 \\ 0 \end{pmatrix}\)  
12. \(i = \begin{pmatrix} 6 \\ 2 \end{pmatrix}\)  
13. \(m = \begin{pmatrix} 0 \\ -4 \end{pmatrix}\)  
14. \(n = \begin{pmatrix} 4 \\ 2 \end{pmatrix}\)  

1. \((7,4)\)  
2. \((-1,2)\)  
3. \((-3,7)\)  
4. \((-1,5)\)  
5. \((8,1)\)  
6. \((8,0)\)  
7. \((-9,-1)\)  
8. \((-7,3)\)  
9. \((-6,-1)\)  
10. \((-2,0)\)  
11. \((-2,-3)\)  
12. \((-1,-3)\)  
13. \((-1,-10)\)  
14. \((-2,-3)\)  
15. \((3,-2)\)  
16. \((-2,-3)\)  
17. \((1,3)\)  
18. \((-2,-3)\)  
19. \((-7,4)\)  
20. \((-1,-10)\)  

### EXERCISE 20d (p. 299)

1. \(\begin{pmatrix} 6 \\ 2 \end{pmatrix}\)  
2. \(\begin{pmatrix} 5 \\ -1 \end{pmatrix}\)  
3. \(\begin{pmatrix} -6 \\ -1 \end{pmatrix}\)  
4. \(\begin{pmatrix} 6 \\ 5 \end{pmatrix}\)  
5. \(\begin{pmatrix} -5 \\ 3 \end{pmatrix}\)  
6. \(\begin{pmatrix} 2 \\ -2 \end{pmatrix}\)  
7. \(\begin{pmatrix} -2 \\ -6 \end{pmatrix}\)  
8. \(\begin{pmatrix} -4 \\ -5 \end{pmatrix}\)  
9. \(\begin{pmatrix} 0 \\ -12 \end{pmatrix}\)  
10. \(\begin{pmatrix} 2 \\ 8 \end{pmatrix}\)  

### EXERCISE 20e (p. 301)

1. a) \(b = 2a\)  
   b) \(c = -a\)  
   c) \(d = 3a\)  
   d) \(e = a\)  
   e) \(b = 2e\)  
   f) \(d = -3c\)  
   
2. \(a = \begin{pmatrix} 4 \\ -2 \end{pmatrix}\)  
   b) \(\begin{pmatrix} -2 \\ -3 \end{pmatrix}\)  
   c) \(\begin{pmatrix} -4 \\ -6 \end{pmatrix}\)  
   d) \(\begin{pmatrix} 2 \\ 3 \end{pmatrix}\)  
   e) \(\begin{pmatrix} 8 \\ -4 \end{pmatrix}\)  
   f) \(\begin{pmatrix} -4 \\ 2 \end{pmatrix}\)  
   g) \(\begin{pmatrix} 6 \\ 9 \end{pmatrix}\)  
   h) \(\begin{pmatrix} 0 \\ -8 \end{pmatrix}\)  
   
   e = \(2a, f = -a, h = -2a, c = 2b, d = -b, g = -3b, h = -e, g = 3d, h = 2f, \ldots\)  

3. \(\begin{pmatrix} 8 \\ 12 \\ -6 \\ 3 \end{pmatrix}\)  
   4. \(\begin{pmatrix} 2 \\ -4 \\ -4 \\ 8 \end{pmatrix}\)  
   5. \(\begin{pmatrix} 10 \\ -8 \\ -5 \\ 4 \end{pmatrix}\)  
   6. \(\begin{pmatrix} 3 \\ 6 \\ -6 \\ 12 \end{pmatrix}\)  
   7. \(\begin{pmatrix} 10 \\ 15 \\ -20 \\ 3 \end{pmatrix}\)  
   8. \(\begin{pmatrix} -6 \\ 0 \\ 4 \\ -10 \end{pmatrix}\)  
   9. \(\begin{pmatrix} -6 \\ 4 \\ -18 \\ 8 \end{pmatrix}\)  
   10. \(\begin{pmatrix} -18 \\ -60 \\ 24 \\ -10 \end{pmatrix}\)  
   
### EXERCISE 20f (p. 303)

1. \(\begin{pmatrix} 7 \\ -1 \end{pmatrix}\)  
2. \(\begin{pmatrix} -8 \end{pmatrix}\)  
3. \(\begin{pmatrix} 10 \\ 0 \end{pmatrix}\)  
4. \(\begin{pmatrix} 4 \\ 3 \end{pmatrix}\)  
5. \(\begin{pmatrix} 10 \\ -4 \end{pmatrix}\)  
6. \(\begin{pmatrix} 0 \end{pmatrix}\)  
7. \(\begin{pmatrix} 7 \\ 8 \end{pmatrix}\)  
8. \(\begin{pmatrix} 10 \\ 0 \end{pmatrix}\)  
9. \(\begin{pmatrix} 7 \\ 8 \end{pmatrix}\)  
10. \(\begin{pmatrix} 6 \\ -4 \end{pmatrix}\)  
11. \(\begin{pmatrix} -2 \\ -4 \end{pmatrix}\)  
12. \(\begin{pmatrix} -5 \\ -2 \end{pmatrix}\)
EXERCISE 20g (p. 306)

1. a) \( \begin{pmatrix} 7 \\ 5 \end{pmatrix} \) b) \( \begin{pmatrix} 7 \\ 5 \end{pmatrix} \) c) \( \begin{pmatrix} 8 \\ 6 \end{pmatrix} \) d) \( \begin{pmatrix} 8 \\ 6 \end{pmatrix} \) e) \( \begin{pmatrix} 4 \\ 6 \end{pmatrix} \) f) \( \begin{pmatrix} 6 \\ 9 \end{pmatrix} \) g) \( \begin{pmatrix} 10 \\ 9 \end{pmatrix} \) h) \( \begin{pmatrix} 10 \\ 9 \end{pmatrix} \)

2. a) \( \begin{pmatrix} 3 \\ 2 \end{pmatrix} \) b) \( \begin{pmatrix} 3 \\ 2 \end{pmatrix} \) c) \( \begin{pmatrix} 0 \\ -5 \end{pmatrix} \) d) \( \begin{pmatrix} 0 \\ -5 \end{pmatrix} \) e) \( \begin{pmatrix} -6 \\ 12 \end{pmatrix} \) f) \( \begin{pmatrix} -20 \\ -12 \end{pmatrix} \)

3. a) \( \begin{pmatrix} 5 \\ 10 \end{pmatrix} \) b) \( \begin{pmatrix} 18 \\ 24 \end{pmatrix} \) c) \( \begin{pmatrix} 12 \\ 24 \end{pmatrix} \)

4. a) \( \begin{pmatrix} -19 \\ -1 \end{pmatrix} \) b) \( \begin{pmatrix} 4 \\ -11 \end{pmatrix} \)

EXERCISE 20h (p. 307)

1. \( \begin{pmatrix} 5 \\ 3 \end{pmatrix} \) 5. \( \begin{pmatrix} 2 \\ 1 \end{pmatrix} \) 9. \( \begin{pmatrix} -3 \\ -2 \end{pmatrix} \) 13. \( \begin{pmatrix} 5 \\ 10 \end{pmatrix} \) 16. \( \begin{pmatrix} 2 \\ 3 \end{pmatrix} \)

2. \( \begin{pmatrix} 0 \\ 6 \end{pmatrix} \) 6. \( \begin{pmatrix} 3 \\ 2 \end{pmatrix} \) 10. \( \begin{pmatrix} -7 \\ 3 \end{pmatrix} \) 14. \( \begin{pmatrix} 4 \\ -5 \end{pmatrix} \) 17. \( \begin{pmatrix} -3 \\ 11 \end{pmatrix} \)

3. \( \begin{pmatrix} 2 \\ 4 \end{pmatrix} \) 7. \( \begin{pmatrix} 11 \\ 9 \end{pmatrix} \) 11. \( \begin{pmatrix} 2 \\ 4 \end{pmatrix} \) 15. \( \begin{pmatrix} 4 \\ -1 \end{pmatrix} \) 18. \( \begin{pmatrix} -11 \\ 7 \end{pmatrix} \)

4. \( \begin{pmatrix} -5 \\ 1 \end{pmatrix} \) 8. \( \begin{pmatrix} 5 \\ 8 \end{pmatrix} \) 12. \( \begin{pmatrix} 1 \\ -1 \end{pmatrix} \)

19. a) \( \begin{pmatrix} 1 \\ 2 \end{pmatrix} \) b) \( \begin{pmatrix} -1 \\ -2 \end{pmatrix} \)

20. a) \( \begin{pmatrix} -6 \\ -4 \end{pmatrix} \) b) \( \begin{pmatrix} -3 \\ -3 \end{pmatrix} \) c) \( \begin{pmatrix} 3 \\ 3 \end{pmatrix} \)

21. a) \( \begin{pmatrix} 8 \\ 2 \end{pmatrix} \) b) \( \begin{pmatrix} 9 \\ 19 \end{pmatrix} \) c) \( \begin{pmatrix} 0 \\ -22 \end{pmatrix} \) d) \( \begin{pmatrix} 10 \\ 11 \end{pmatrix} \) e) \( \begin{pmatrix} 0 \\ 3 \end{pmatrix} \)

22. a) \( \begin{pmatrix} -3 \\ 18 \end{pmatrix} \) b) \( \begin{pmatrix} -3 \\ 0 \end{pmatrix} \) c) \( \begin{pmatrix} 3 \\ 8 \end{pmatrix} \) d) \( \begin{pmatrix} 0 \\ -23 \end{pmatrix} \) e) \( \begin{pmatrix} -4 \\ 22 \end{pmatrix} \)

23. a) \( \begin{pmatrix} 5 \\ -10 \end{pmatrix} \) b) \( \begin{pmatrix} -17 \\ 14 \end{pmatrix} \) c) \( \begin{pmatrix} 20 \\ -14 \end{pmatrix} \)

CHAPTER 21 More Algebra

This work should be done only with above average ability children and even then it can be left until alter. The work in this chapter is repeated in Book 2A.
EXERCISE 21a (p. 309)

1. 2x + 2  
2. 9x – 6  
3. 5x + 30

4. 12x – 12  
5. 8 + 10x  
6. 12 + 10a

7. 5a + 5b  
8. 16x – 12  
9. 18 – 12x

10. 5x – 5  
11. 14 – 7x  
12. 24 – 16x

EXERCISE 21b (p. 309)

1. 6x + 4  
2. 10x + 18  
3. 3x + 7

4. 14x – 18  
5. 8 + 10  
6. 16

7. 5x – 3  
8. 12 + 10  
9. 16

10. 5x – 5  
11. 14 – 7x  
12. 24 – 16x

EXERCISE 21c (p. 311)

Multiplication of directed numbers: can be introduced in many ways. When this work is done with average ability children they will probably benefit from a more practical approach.

EXERCISE 21d (p. 312)

EXERCISE 21e (p. 313)

EXERCISE 21f (P. 314)
EXERCISE 21g (p. 315)
Should be used for discussion. Only the most able pupils should be allowed to work on their own.

1. 11  4. 12  7. 20p  10. 80º  12. 45º
2. 6   5. 22p  8. 4    11. 6   13. 4
3. 9cm  6.16  9. 18p

The remainder of this chapter can be omitted. The work is repeated in later books.

EXERCISE 21h (p. 317)

1. \(z^3\)  15. \(12a\)  29. \(2a^3bc\)
2. \(a^5\)   16. \(a^2b\)  30. \(24x^2y\)
3. \(b^5\)   17. \(15xz^2\)  31. \(z^4\)
4. \(y^5\)   18. \(5a^2b^2\)  32. \(6z^2\)
5. \(s^3\)   19. \(3xz\)  33. \(24x^3\)
6. \(z^6\)   20. \(2a \times b \times c\)  34. \(16x\)
7. \(a \times a \times a\)  21. \(4xyz\)  35. \(4y^3\)
8. \(x \times x \times x \times x\)  22. \(6a \times a \times b\)  36. \(x^6\)
9. \(b \times b\)  23. \(2x \times x \times x\)  37. \(y^2z^2\)
10. \(a \times a \times a \times a \times a\)  24. \(3a \times a \times a \times a \times b \times b\)  38. \(10xyz\)
11. \(x \times x \times x \times x \times x\)  25. \(6xz\)  39. \(a^7\)
12. \(z \times z \times z \times z\)  26. \(6x^3\)  40. \(8x^4\)
13. \(2a\)  27. \(12a^2\)  41. \(axyz\)
14. \(4x^2\)  28. \(6a^3\)  42. \(s^7\)

EXERCISE 21i (p. 318)

1. 2  8. \(\frac{\sqrt{2}}{\sqrt{3}}\)  15. \(\frac{9}{7}\) or \(1\frac{2}{7}\)  21. \(\frac{\sqrt{2}}{\sqrt{3}}\)  27. \(\frac{20}{37}\)
2. \(\frac{\sqrt{2}}{3}\) or \(4\frac{2}{3}\)  9. \(\frac{\sqrt{3}}{10}\)  16. 2   22. \(\frac{\sqrt{2}}{2}\)  28. 1
3. \(\frac{\sqrt{5}}{\sqrt{7}}\)  10. 6   17. 4   23. \(\frac{\sqrt{2}}{\sqrt{3}}\)  29. \(\frac{\sqrt{2}}{4}\)
4. \(\frac{\sqrt{3}}{\sqrt{5}}\)  11. \(\frac{\sqrt{5}}{\sqrt{7}}\)  18. \(\frac{\sqrt{2}}{3}\)  24. 1  30. \(\frac{\sqrt{2}}{\sqrt{3}}\)
5. \(\frac{\sqrt{3}}{\sqrt{5}}\)  12. \(\frac{\sqrt{5}}{\sqrt{7}}\)  19. \(\frac{\sqrt{5}}{\sqrt{7}}\)  25. \(\frac{\sqrt{2}}{\sqrt{3}}\)  31. \(\frac{\sqrt{2}}{\sqrt{3}}\)
6. \(\frac{\sqrt{3}}{\sqrt{5}}\) or \(1\frac{1}{3}\)  13. \(\frac{\sqrt{2}}{\sqrt{3}}\)  20. \(\frac{\sqrt{2}}{\sqrt{3}}\)  26. \(\frac{\sqrt{2}}{\sqrt{3}}\) or \(1\frac{1}{3}\)  32. \(\frac{\sqrt{2}}{\sqrt{3}}\)
7. 3   14. \(\frac{\sqrt{2}}{\sqrt{3}}\) or \(1\frac{1}{3}\)

EXERCISE 21j (p. 320)

1. \(x = 5\)  3. \(13\)  5. \(4 \times a \times a\)  7. \(2x - 1\)  8. \(x = 0\)
2. \(4x - 11\)  4. \(x = -4\)  6. \(x = 1\frac{1}{3}\)

EXERCISE 21k (p. 320)
1. \( x = -\frac{1}{2} \)  
2. \(-2x + 15\)  
3. 12  
4. 60abc  
5. 12  
6. 1  

EXERCISE 21I (p. 320)

1. \( x = 2 \)  
2. \(-2x + 15\)  
3. \( 6 + x + 12 = 4x; x = 6 \)  
4. \( x = -3 \)  
5. \( 4 - x \)  
6. \( \frac{4}{5} \)  
7. \( 6x + 4 \)  
8. \(-2x + 10\)

EXERCISE 21m (p. 321)

1. \( x = -3 \)  
2. \( \frac{8}{3} \) or \( 1\frac{5}{3} \)  
3. \( x = 1 \)  
4. \( x + x + 2 + 8 = 18; \) £4  
5. \( x \times x \times x \times x \times x \)  
6. \( 4x - 6 \)  
7. \( 5 - x \)  
8. We get \( 3 = 0 \) which cannot be true (This problem can be used to discuss \( \infty \).)

CHAPTER 22  Statistics

EXERCISE 22a (p. 322)

If a copy of the table is made then each item in the table can be crossed out once it has been “counted”. The answers give the frequencies in each group.

1. 7, 14, 17, 22, 12  
2. 4, 22, 18, 17, 2, 1, 1  
3. 1, 2, 10, 15, 16, 20, 10, 6, 2

EXERCISE 22b (p. 323)

1.  

<table>
<thead>
<tr>
<th></th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>7</td>
<td>15</td>
<td>4</td>
<td>3</td>
<td>1</td>
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</tbody>
</table>

2.  

<table>
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<th>S</th>
<th>V</th>
<th>C</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>14</td>
<td>7</td>
<td>7</td>
<td>8</td>
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</tbody>
</table>

3.  

<table>
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<th>R</th>
<th>G</th>
<th>B</th>
<th>Y</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>17</td>
<td>3</td>
<td>4</td>
<td>14</td>
<td>6</td>
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</table>

4.  

<table>
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<tr>
<th></th>
<th>22</th>
<th>23</th>
<th>24</th>
<th>25</th>
<th>26</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency</td>
<td>1</td>
<td>10</td>
<td>15</td>
<td>11</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

EXERCISE 22c (p. 325)

1. a) 55  b) car  
2. a) 52  
3. a) plain salted  
4. a) red

EXERCISE 22d (p. 326)
1. a) a cat  b) 8  c) 28
2. a) 8  b) 1 mark, 1 pupil  c) 8  d) 28
3. a) 6  b) Art  c) French
4. a) Castle Hill  b) 10 000  c) Brotton, with 6500

EXERCISE 22e (p. 329)

1. a) 47  b)

<table>
<thead>
<tr>
<th>1–3</th>
<th>4–6</th>
<th>7–9</th>
<th>10–12</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>25</td>
<td>3</td>
<td>3</td>
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</table>

2.

<table>
<thead>
<tr>
<th>1–3</th>
<th>4–6</th>
<th>7–9</th>
<th>10–12</th>
</tr>
</thead>
<tbody>
<tr>
<td>34</td>
<td>34</td>
<td>8</td>
<td>3</td>
</tr>
</tbody>
</table>

3. a) 19  b) 11  c) 16  d) not possible to say
4. a) 153  b) 128  c) not possible to say
6. a) 12  b) 3  c) number given includes those who read five books

EXERCISE 22f (p. 331)

1. a) seven car lengths  b) one car length per 10mph  c) weather, light, amount of traffic, type and straightness of road
2. a) all electric  b) all gas  c) solid fuel  d) gas
3. a) Margate  b) June  c) December in Aberdeen, January in Margate

EXERCISE 22g (p. 334)
The answers are the angles for each slice.

1. 96°, 132°, 60°, 42°, 30°  7. 96°, 120°, 36°, 72°, 36°
2. 128°, 152°, 48°, 24°, 8°  8. 108°, 180°, 40°, 18°, 14°
3. 303°, 3°, 30°, 24°  9. 72°, 13.5°, 85.5°, 94.5°, 54°, 40.5°
4. 84°, 204°, 48°, 24°  10. 62°, 82°, 82°, 21°, 10°, 103°
5. 144°, 48°, 80°, 88°  11. 223°, 40°, 54°, 36°, 7°
6. 140°, 70°, 70°, 80°  12. 35°, 116°, 128°, 58°, 23°

EXERCISE 22h (p. 337)

1. a) business and professional  b) i) \(\frac{1}{12}\)  ii) \(\frac{7}{30}\)
2. a) heating  b) a little less
3. a) i) \(\frac{1}{8}\)  ii) \(\frac{1}{7}\)  b) under 10 and 10–19

EXERCISE 22i (p. 338)

1. a) 10, 14, 10, 22  b) danger  c) very effective (open to discussion)
2. a) French  b) 18, 15, 11, 12, 16: total 72  c) this is not a good way to present the information because it is not clear how many pupils part of a body represents (open to discussion).
3. a) consumption is rising each year
b) impression is given by the volume of the bottle which goes up more quickly than the height of the bottle

EXERCISE 22j (p. 340)

1. 6  
2. 25p  
3. a) £40  b) £8  c) £8  
4. 10  
5. a) 5  b) 15  c) 33  d) 2.6  
6. 12  
7. 13.5p  
8. 7.2  
9. 308.8p  
10. 329

EXERCISE 22k (p. 342)

1. 40cm  
2. 27p  
3. a) 12p  b) 0.4kg  c) 10mm  d) £3.25  
4. a) 44cm  b) 147.3cm  
5. a) 12  b) 10.3  
6. a) 48p  b) 25p

CHAPTER 23 Decision Trees

EXERCISE 23a  1. (p. 344)
2 a)

- Mixed buttons
- Is it small?
  - Yes
  - Has it two holes?
    - Yes
      - These are small with two holes
    - No
      - These are small with four holes
  - No
    - Has it two holes?
      - Yes
        - These are large with two holes
      - No
        - These are large with four holes

b)

- Mixed buttons
- Has it two holes?
  - Yes
    - Is it small?
      - Yes
        - These are small with two holes
      - No
        - These are large with two holes
  - No
    - Is it small?
      - Yes
        - These are small with four holes
      - No
        - These are large with four holes
3 a) separate knives from forks first; separate stainless steel from silver-plated first
b) i)
Mixed cutlery

Is it silver-plated?

Yes

Is it a fork?

Yes

These are silver-plated forks

No

These are silver-plated knives

No

Is it a fork?

Yes

These are stainless steel forks

No

These are stainless steel knives
5. a) 6
   b) 3-4 inch goldfish; 5-6 inch goldfish; 3-4 inch orfe; 5-6 inch orfe; 3-4 inch rudd; 5-6 inch rudd.
6. Contents of cupboard
   Is it a tin?
   Yes
   Is it fruit?
   Yes
   These are large bottles of fruit
   No
   These are small bottles of fruit
   No
   Is it large?
   Yes
   These are large tins of vegetables
   No
   These are small tins of vegetables
   No
   Is it fruit?
   Yes
   These are large bottles of vegetables
   No
   These are small bottles of vegetables
   No
   Is it large?
   Yes
   These are large bottles of fruit
   No
   These are small bottles of fruit
   Yes
   These are large bottles of fruit
7. a) Carpet samples

- Is it Wilton? (Yes)
  - Is it plain? (Yes)
    - Is it standard? (Yes)
      - Top quality patterned Wilton
    - Is it standard? (No)
      - Standard plain Wilton
  - Is it plain? (No)
    - Is it standard? (Yes)
      - Top quality patterned Axminster
    - Is it standard? (No)
      - Standard plain Axminster

- Is it Wilton? (No)
  - Is it plain? (Yes)
    - Is it standard? (Yes)
      - Top quality patterned Axminster
    - Is it standard? (No)
      - Standard plain Axminster
  - Is it plain? (No)
    - Is it standard? (Yes)
      - Top quality plain Wilton
    - Is it standard? (No)
      - Plain standard Wilton
8. a) 8

Pupils

Is it a girl?

Yes

Under 12?

Yes

Wearing school uniform?

Yes

Girls under 12 in uniform

No

Girls under 12 not in uniform

No

Under 12?

Yes

Wearing school uniform?

Yes

Boys under 12 in uniform

No

Boys under 12 not in uniform

No

Wearing school uniform?

Yes

Boys over 12 in uniform

No

Boys over 12 not in uniform

No

Wearing school uniform?

Yes

Boys over 12 in uniform

No

Boys over 12 not in uniform
b) 

Yes

Girls under 12 in uniform

Under 12?

No

Girls over 12 in uniform

Wearing school uniform?

Yes

Girls under 12 not in uniform

Under 12?

No

Girls over 12 not in uniform

Is it a girl?

No

Yes

Boys under 12 in uniform

Under 12?

No

Boys over 12 in uniform

Wearing school uniform?

Yes

Boys under 12 not in uniform

Under 12?

No

Boys over 12 not in uniform

c) Yes