



NATIONAL CURRICULUM  
**MATHEMATICS**

**9B**

**ANSWERS**

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**A SHEPHERD   E SMITH**

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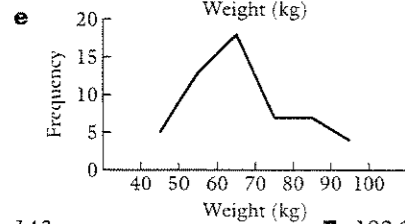
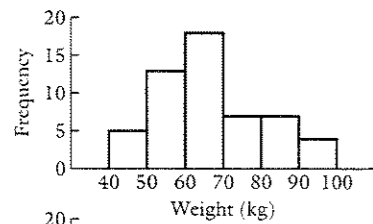
5. a 395 m    b i 317°    ii 291°    iii 111°  
 6. 6.8 cm  
 7. a 0.0982 litres    b 0.292 litres  
 8. a 222 cm<sup>2</sup>    b i 44 400 cm<sup>3</sup>    ii 0.0444 m<sup>3</sup>  
 9. 75.4 cubic inches  
 10. a 276 000 cm<sup>3</sup>    b 385 000 cm<sup>3</sup> (both to 3 s.f.)

**Revision Exercise 5.2 (p. 433)**

1. 7.21 cm    2. 7.14 cm    3. 4.03 m  
 4. No, the largest angle is B but it is less than 90° since  $2.2^2 + 8^2 > 8.2^2$   
 5. a 19.8 cm    b i  $2x^2 = 15^2$     ii cm  
 6. a  $x = 9, y = 5$     b  $x = 6, y = 4$   
 7. a  $x = 2, y = 3$     b  $x = 4, y = 2$   
 8. a  $a = 5, b = -2$     b  $a = 5, b = 3$   
 9.  $x + y = 22, x - y = 4, x = 13, y = 9$   
 10.  $x = 1.8, y = 4.3$

**Revision Exercise 5.3 (p. 434)**

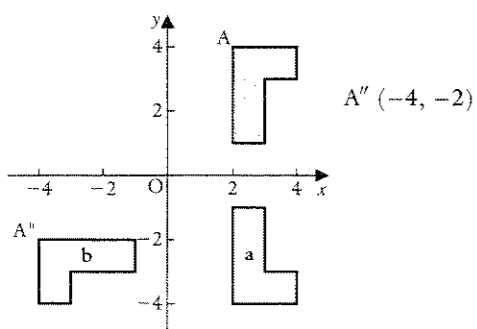
1. a discrete    c continuous    e continuous  
 b continuous    d discrete  
 2. a 54    b i 5    ii 18    c  $60 \leq w < 70$



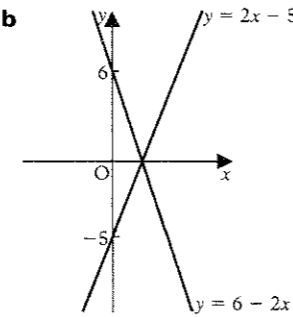
3. 143 m    7. 183.2 cm  
 4. b 10 cm, 53°    8. a 6.14 cm    b 8.77 cm  
 5. a 480 cm<sup>3</sup>    b 33.7 cm<sup>3</sup>    9.  $p = 3, q = 4$   
 6. a 96 cm<sup>2</sup>    b 2688 cm<sup>3</sup>  
 10. a  $105 + x + y = 180$     c  $x = 43.5, y = 31.5$   
 b  $x + y = 75, x - y = 12$

**Revision Exercise 5.4 (p. 436)**

1. a i 6.7    ii 5.6    iii 0.027    iv 0.071  
 b i  $\frac{420}{20} = 21$     iii  $2 \times 3 = 6$   
 ii  $10 + 2 = 12$     iv  $50 - 20 = 30$   
 2. a i £26    ii  $\frac{5}{6}$     iii  $2\frac{1}{18}$     iv  $5\frac{3}{10}$   
 b A true, B true, C false, D false  
 3. a  $C = nx$     c i 6    ii 16.5  
 b 14, 10, 6, 2,  $18 - 4n$   
 4.



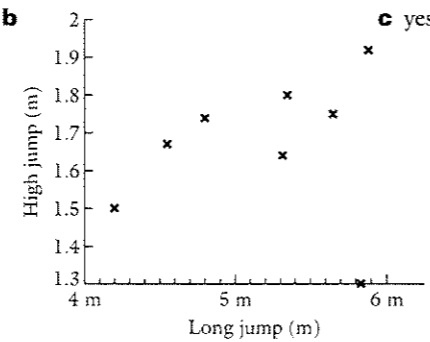
5. a 113.1 cm<sup>2</sup>    b 30.9 cm<sup>2</sup>  
 6. a  $x = 28$     b 44 kg  
 7. a i  $m = -4, c = 6$     ii  $m = -1, c = 3$



- b  
 8. a 40 min    c 64 min  
 b 2 km, 24 min    d  $11\frac{1}{4}$  km/hr  
 9. a i AC = 100 mm    ii BC = 58 mm  
 b 41 m  
 10. a 8.57 cm    b 11.9 cm

**Revision Exercise 5.5 (p. 438)**

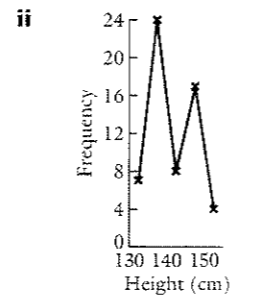
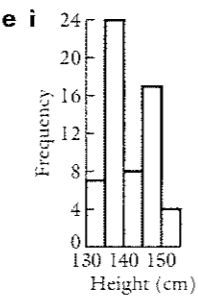
1. a  $d = 100, e = 45, f = 35$     b  $d = 105, e = f = 70$   
 2. a  $\frac{5}{18}$     b  $\frac{1}{6}$     c  $\frac{5}{12}$     d  $\frac{1}{3}$   
 3. a Yes, 10 sides    b Yes, 15 sides  
 4. a A positive correlation



5. a 52.7 cm<sup>2</sup>    b 48.1 cm<sup>2</sup>    c 20.25 cm<sup>2</sup>  
 6. a i  $12x - 6$     ii  $11x + 12$     iii  $26 - 4x$     iv  $x + x^2$   
 b i 3    ii 40  
 7. a 14 m or 36 m    b 1250 m<sup>2</sup>, 25 m    c 1200 m<sup>2</sup>  
 8. a i 154 cm    ii 132 cm

Frequency
7
24
8
17
4

- c i 29    ii 39



9. a i 540 000 cm<sup>3</sup>    ii 0.54 m<sup>3</sup>  
 b i 956 litre    ii 637 litre  
 10. a  $x = -1, y = 3$     b  $x = 6, y = 1$   
 11. BCDA, BDCA, CBDA, CDBA, DBCA, DCBA; 2

Answers are supplied to questions asking for estimates but there is no 'correct' estimate; we have given a likely value. Allow a reasonable margin of error for answers read from graphs. Possible answers are given to questions asking for opinions or reasons or interpretation; any reasonable alternative is also valid.

**Summary 1**

**Revision Exercise 1.1 (p. 14)**

1. a i four hundred    ii forty thousand  
 b three thousand, five hundred and ninety-two  
 c 2708  
 2. a 709, 794, 799, 917, 970  
 b i 1580    ii 1600  
 3. a 1120    d 442    g 1405  
 b 1364    e 188    h 227  
 c 1261    f 493    i 3587  
 4. a 576    g 3200    m 16 200  
 b 294    h 2660    n 2674  
 c 550    i 5220    p 5049  
 d 190    j 730    q 3384  
 e 3800    k 25 200    r 4572  
 f 203    l 233 600    s 2872  
 5. a 25    g 26    m 76  
 b 46    h 6    n 87  
 c 52    i 8    p 72  
 d 59    j 25    q 49  
 e 36    k 32    r 53  
 f 89    l 85    s 78  
 6. a 452    c 12    e 10r16  
 b 1729    d 61    f 26r25  
 7. a i 5<sup>4</sup>    ii 7<sup>3</sup>  
 b i 81    iii 36    iv 1125  
 ii 72    iv 392    vi 200  
 c i 2<sup>5</sup>    iii 2<sup>3</sup> × 3<sup>2</sup>  
 ii 5<sup>3</sup>    iv 2<sup>3</sup> × 3<sup>2</sup> × 5  
 8. a i 9    ii 14    iii 8  
 b i 60    ii 18  
 9. a i 49    ii 121  
 b 31, 37, 41, 43, 47  
 c i 11  
 ii 8, 15, 22, 28, 30, 35, 36, 42, 45  
 iii 15, 28, 45  
 iv 36  
 10. a i 25 016    ii 8631    iii 81 872    iv 12 576  
 b i 16    ii 45    iii 2    iv 13

**Revision Exercise 1.2 (p. 15)**

1. a 21    b 80    c 65    d 48  
 2. a >    b >    c >    d <  
 3. a  $\frac{26}{7}$     c  $\frac{31}{4}$     e  $\frac{13}{5}$     g  $\frac{28}{3}$     i  $\frac{17}{3}$   
 b  $\frac{22}{5}$     d  $\frac{26}{5}$     f  $\frac{19}{5}$     h  $\frac{53}{7}$     j  $\frac{44}{9}$   
 4. a  $7\frac{3}{5}$     c  $4\frac{2}{3}$     e  $2\frac{4}{5}$     g  $5\frac{1}{6}$     i  $7\frac{1}{4}$   
 b  $2\frac{4}{7}$     d  $7\frac{1}{2}$     f  $6\frac{3}{4}$     h  $6\frac{1}{9}$     j  $6\frac{3}{8}$   
 5. a  $\frac{5}{7}$     g  $1\frac{1}{12}$     m  $\frac{1}{12}$   
 b  $\frac{7}{10}$     h  $1\frac{1}{4}$     n  $\frac{5}{24}$   
 c 1    i  $\frac{29}{30}$     p  $\frac{3}{50}$   
 d  $\frac{33}{35}$     j  $\frac{9}{13}$     q  $\frac{3}{8}$   
 e  $\frac{53}{63}$     k  $\frac{1}{6}$     r  $\frac{1}{6}$   
 f  $\frac{7}{12}$     l  $\frac{1}{4}$     s  $\frac{5}{18}$

6. a  $4\frac{7}{20}$     d  $9\frac{1}{2}$     g  $12\frac{9}{56}$   
 b  $3\frac{5}{12}$     e  $4\frac{17}{28}$     h  $3\frac{37}{40}$   
 c  $1\frac{1}{2}$     f  $7\frac{23}{24}$     i  $2\frac{8}{15}$   
 7. a  $\frac{1}{5}$     d  $\frac{3}{5}$     g  $4\frac{1}{2}$     j 1  
 b  $\frac{1}{6}$     e 4    h  $1\frac{1}{3}$     k  $1\frac{7}{8}$   
 c  $\frac{2}{15}$     f  $11\frac{1}{4}$     i  $\frac{1}{2}$     l  $4\frac{1}{5}$   
 8. a i 18    iii 24    v 60  
 ii 36    iv 50    vi 48  
 b  $\frac{3}{5}$  of  $\frac{7}{12}$   
 9. a 18 miles    c 27 gal    e 250 p    g 133 ft  
 b 10 days    d £45    f 120 cm    h 126 min  
 10. a i  $\frac{50}{3}$     ii  $\frac{44}{3}$     iii  $\frac{77}{2}$     c  $\frac{7}{9}$   
 b i  $\frac{9}{25}$     ii  $\frac{21}{100}$     d i  $\frac{1}{4}$     ii  $\frac{6}{125}$

**Revision Exercise 1.3 (p. 17)**

1. a 8.5    d 18.69    g 8.93    j 5.11  
 b 8.67    e 3.226    h 28.71    k 5.658  
 c 2.31    f 0.54    i 2.56    l 6.556  
 2. a 6.5    b 0.09    c 34.709    d 2.01  
 3. a 0.3    h 1850    p 2.688  
 b 0.204    i 45.2    q 80  
 c 180    j 0.0315    r 16.8  
 d 140    k 225    s 30  
 e 0.003    l 0.02    t 23 500  
 f 11.7    m 0.104    u 0.194  
 g 0.32    n 0.6    v 0.1304  
 4. a 0.68    h 5.7    p 1.6  
 b 2.5    i 73.18    q 1.89  
 c 271.67    j 0.53    r 5.6  
 d 0.12    k 0.13    s 0.99  
 e 0.19    l 2.7    t 8.4  
 f 0.01    m 0.11    u 28  
 g 0.05    n 166.67    v 0.78  
 5. a 3.08, 3.6, 3.61    b 8.09, 8.2, 8.28  
 6. a  $4.67 \times 5$     c  $4.5 \div 0.03$   
 b  $8.29 \times 1.3$     d  $142 \div 0.009$   
 7. a  $4.78 \div 1.2 (0.14)$     b  $9.004 \div 0.56 (3.03)$   
 8. a 0.6    c 0.18    e 0.94    g 0.09    i 0.42  
 b 0.36    d 0.45    f 0.22    h 0.27    j 0.63  
 9. a  $\frac{7}{20}$     e  $\frac{1}{8}$     i  $\frac{7}{40}$     m  $2\frac{3}{5}$   
 b  $\frac{33}{50}$     f  $\frac{3}{8}$     j  $\frac{19}{200}$     n  $6\frac{1}{4}$   
 c  $\frac{9}{20}$     g  $\frac{3}{4}$     k  $\frac{41}{400}$     p  $3\frac{3}{50}$   
 d  $\frac{3}{50}$     h  $\frac{11}{20}$     l  $1\frac{4}{5}$     q  $2\frac{3}{8}$   
 10. a 0.47    b 2.97    c 14.68    d 7.12

**Revision Exercise 1.4 (p. 18)**

1. a  $1\frac{1}{2}$     c  $\frac{47}{100}$     e  $1\frac{1}{5}$     g  $\frac{3}{25}$   
 b  $\frac{3}{4}$     d  $\frac{16}{25}$     f  $3\frac{2}{5}$     h  $\frac{2}{5}$   
 2. a  $\frac{5}{8}$     b  $\frac{3}{40}$     c  $\frac{9}{250}$     d  $\frac{19}{400}$   
 3. a 0.8    c 0.17    e 0.045    g 0.054  
 b 1.26    d 3.35    f 4.75    h 23.45  
 4. a 0.068    c 0.033    e 0.098    g 0.10  
 b 0.175    d 0.076    f 0.153    h 0.096  
 5. a 70%    c 25.5%    e 36%    g 3.5%  
 b 65%    d 175%    f 117.5%    h 0.5%  
 6. a 60%    c 1400%    e 154%    g 244.44%  
 b 70%    d 37.5%    f 41.07%    h 291.53%  
 7. a £150    d 7.5 m    g 6.8 cm  
 b 4860 cm<sup>2</sup>    e 296 kg    h £3.15  
 c 51 g    f 128 litres    i 258 litres

**Revision Exercise 1.5 (p. 19)**

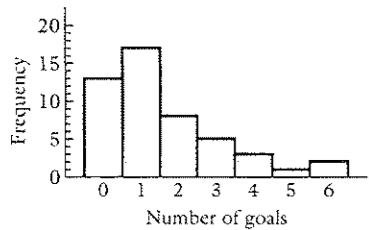
- |             |                |              |
|-------------|----------------|--------------|
| 1. 7.24 km  | 12. 14 ft      | 23. 3 m      |
| 2. 0.5 kg   | 13. 4 ft       | 24. 10 oz    |
| 3. 34 cm    | 14. 5 ft 5 in  | 25. 5 cm     |
| 4. 0.87 m   | 15. 50 yd      | 26. 12 mm    |
| 5. 40 g     | 16. 52 oz      | 27. 8 in     |
| 6. 109 cm   | 17. 171 lb     | 28. 3.6 m    |
| 7. 245 cm   | 18. 13 st 4 lb | 29. 5.5 kg   |
| 8. 6.45 m   | 19. 11 lb      | 30. 159.94 g |
| 9. 42.6 mm  | 20. 4 kg       | 31. 298.2 cm |
| 10. 2400 mg | 21. 80 km      | 32. 1110 kg  |
| 11. 40 in   | 22. 30 miles   | 33. 47.4 cm  |
34. a mg    b cm    c litres  
35. a 2    b 50    c 2

**Revision Exercise 1.6 (p. 20)**

1. a obtuse    c acute    e reflex  
b reflex    d reflex    f acute
2. a  $p = 137$     d  $t = 53$   
b  $q = 134$     e  $u = 125, v = 80$   
c  $r = 45, s = 135$     f  $w = 58, x = 122$
3. a i  $132^\circ$     ii  $54^\circ$   
b  $68^\circ$   
c  $90^\circ$
4. south
5. a  $85^\circ$     e  $j = 67, k = 113, l = 131$   
b  $b = c = 74$     f  $m = 60$   
c  $d = e = f = 60$     g  $p = 46, q = 134, n = 67$   
d  $g = 45$     h  $r = 43, s = 317$
6. a rhombus    c parallelogram  
b trapezium    d rectangle
7. a i 4    ii 2    iii 4    iv 1  
b i yes    ii yes    iii yes    iv no
8. a C    b D    c B, A    d E
9. A, C and E; D and F

**Exercise 1.7 (p. 22)**

1. range 12 cm, mode 10 cm, median 12 cm, mean 11 cm  
2. range 12 kg, mode 62 kg, median 61 kg, mean 60 kg
3. a  $\frac{1}{2}$     b  $\frac{1}{4}$     c  $\frac{1}{13}$     d  $\frac{1}{52}$   
4. a  $\frac{1}{6}$     b  $\frac{1}{2}$     c  $\frac{1}{2}$     d  $\frac{1}{3}$   
5. a  $\frac{2}{7}$     b  $\frac{5}{7}$     c  $\frac{11}{14}$   
6. a 25    b 4    c 4    d 3.36  
7. a 49  
b i 1    ii 1    iii 1.57  
c 6  
d



8. a 75%    b 25%    c 25%    d 8%

**Revision Exercise 1.8 (p. 24)**

1. a 16 in, 16 sq in    d 56 cm, 192 cm<sup>2</sup>  
b 10 ft, 6 sq ft    e 60 cm, 225 cm<sup>2</sup>  
c 800 mm, 400 cm<sup>2</sup>    f 8.2 m, 4.08 m<sup>2</sup>

2. a 144 cm<sup>3</sup>    d 280 000 mm<sup>3</sup>  
b 4480 cm<sup>3</sup>    e 145.8 cm<sup>3</sup>  
c 4.5 m<sup>3</sup>
3. a 343 cm<sup>3</sup>    d 3.375 cm<sup>3</sup>  
b 0.422 m<sup>3</sup>    e 0.027 m<sup>3</sup>  
c 0.244 in<sup>3</sup>
4. a 300 mm<sup>2</sup>    d 2 000 000 m<sup>2</sup>    g 8 cm<sup>3</sup>  
b 0.3 m<sup>2</sup>    e 12 000 mm<sup>3</sup>    h 1500 cm<sup>3</sup>  
c 4000 cm<sup>2</sup>    f 3000 cm<sup>3</sup>    i 3000 litres
5. a 18 pints    c 3 litres  
b 11 litres    d 36 litres

**Revision Exercise 1.9 (p. 24)**

1. a 6a    d 8c    g 10a - 11    j 5b - 8c  
b 5b    e 2c - 12    h 3x - 3y    k x + 2y  
c 7b - 13    f 12a - b    i 9y - x    l 8x - 3y
2. a 6    f 1.8    k 9    q  $\frac{8}{3}$   
b 20    g 5    l 13    r 5  
c 6    h 3    m 17    s 2.4  
d 4    i  $\frac{2}{3}$     n 7    t  $\frac{25}{7}$   
e 4    j 4    p  $\frac{2}{5}$     u 3
3. a >    c >    e <  
b <    d >    f <
4. a 2    e -8    i -15    m -5  
b -3    f -2    j 8    n 3  
c -6    g 5    k -9    p 7  
d 10    h 0    l 10    q 1
5. a -14    e -7    i -3    m -4  
b -4    f -24    j -75    n  $-\frac{3}{5}$   
c -16    g 2    k 12    p  $\frac{1}{8}$   
d -6    h 5    l -3    q -3  
6. a -2    b 5    c 5    d -24

**Revision Exercise 1.10 (p. 26)**

1. A(-2, -2), B(-2, 4), C(2, 4), D(2, -2)  
2. rectangle  
3. (6, 4)  
4. a (2, 1)    b (2, 1)    c They are the same.  
5. trapezium  
6. a A(-2, 7)    B(1, 1)    C(3, -3)  
b -1, 5, -3, 4  
7. a i 6    ii 15    iii -15  
b i 4    ii -3    iii 8  
c No, the y-value is not equal to three times the x-value.  
8. i \$125    ii £77    iii £41    iv \$101

**Chapter 1**

**Exercise 1B (p. 31)**

- |               |             |              |
|---------------|-------------|--------------|
| 1. 3          | 14. 80 000  | 27. 890 000  |
| 2. 8          | 15. 500     | 28. 50 000   |
| 3. 6          | 16. 50 000  | 29. 54 000   |
| 4. 8          | 17. 4000    | 30. 7000     |
| 5. 7          | 18. 700 000 | 31. 10 000   |
| 6. 8          | 19. 900     | 32. 480      |
| 7. 0          | 20. 30      | 33. 600      |
| 8. 0          | 21. 1000    | 34. 0.008 46 |
| 9. 0          | 22. 4700    | 35. 0.826    |
| 10. 60 000    | 23. 57 000  | 36. 5.84     |
| 11. 4000      | 24. 73 000  | 37. 78.5     |
| 12. 4 000 000 | 25. 440     | 38. 46.8     |
| 13. 600 000   | 26. 60 000  | 39. 0.007 85 |

**Exercise 19F (p. 412)**

1. 2.71 cm    2. 4.69 cm    3. 11.8 mm  
4. a 2.24 m    b 5.24 m  
5. a 5.97 m    b 13.6 m  
6. a 6 m    b 8 m    c 16 m

**Exercise 19G (p. 414)**

1. No,  $9^2 < 6^2 + 7^2$     4. Yes,  $6.5^2 = 3.9^2 + 5.2^2$   
2. Yes,  $75^2 = 21^2 + 72^2$     5. No,  $40^2 < 9^2 + 39^2$   
3. No,  $7.5^2 < 4.7^2 + 5.9^2$     6. Yes,  $39^2 = 15^2 + 36^2$   
7. It should be the same length:  
 $35^2 + 45^2 = 57.0^2$  m (3 s.f.)  
8. The doors should fit:  $2000^2 + 900^2 = 2193^2$ , so they are right-angled.  
9. The frame is not square:  $20^2 + 30^2 < 36.3^2$   
10. The window is square:  $\sqrt{4^2 + 5^2} = 6.40313\dots$  ft, or 6 ft 4.8 in

**Exercise 19H (p. 416)**

1. 6.71 cm    2. 8.87 cm    3. 9 cm    4. 8.15 m  
5. No,  $8.4^2 > 8^2 + 1.8^2$   
6. Yes,  $\hat{E} = 90^\circ$ ;  $70^2 = 42^2 + 56^2$   
7. a 14.1 cm    b 7.07 cm  
8. 74.3 cm    10. 2.82 in    12. 85.9 ft  
9. 1.63 m    11. 11.1 cm

**Chapter 20**

**Exercise 20B (p. 419)**

1. Cost of 1 small frame + cost of 1 large frame = £65  
Cost of 4 small frames + cost of 2 large frames = £170  
2. Cost of 3 trays at lower price + cost of 3 trays at higher price = £8.25  
Cost of 3 trays at lower price + cost of 5 trays at higher price = £11.25  
3. Large number + smaller number = 27  
Large number - smaller number = 13  
4. Large number + smaller number = 32  
Large number = smaller number  $\times 3$   
5. Cost of 1 protractor + cost of 1 set square = 120 p  
Cost of 1 protractor + cost of 2 set squares = 185 p  
6. Cost for Mr Holder + cost for one child = £30  
Cost for Mr Holder + cost for two children = £42  
7. Cost of 1 tabloid newspaper + cost of 1 broadsheet newspaper = 60 p  
Cost of 5 tabloid newspapers + cost of 4 broadsheet newspapers = 265 p

**Exercise 20C (p. 421)**

1.  $x = 3, y = 2$     6.  $x = 4, y = -3$   
2.  $x = 2, y = 5$     7.  $p = -2, q = 1$   
3.  $a = 3, b = 5$     8.  $x = 5, y = 1$   
4.  $x = 1, y = 7$     9.  $x = 0, y = 9$   
5.  $c = 6, d = 0$

**Exercise 20D (p. 422)**

1.  $x = 3, y = 1$     6.  $p = 1, q = 0$   
2.  $a = 3, b = -1$     7.  $x = 0, y = 6$   
3.  $x = 3, y = \frac{1}{2}$     8.  $x = 2, y = 3$   
4.  $x = 9, y = 1$     9.  $x = 4, y = -1$   
5.  $x = 4, y = 2$     10.  $x = 6, y = 2$

11.  $x = \frac{1}{2}, y = 4$     20.  $x = 1\frac{1}{2}, y = 2$   
12.  $x = 4, y = -2$     21.  $x = -3, y = 2$   
13.  $x = -3, y = 1$     22.  $x = 4, y = -2$   
14.  $x = 3, y = 2$     23.  $p = -35, q = -28$   
15.  $p = 4, q = 5$     24.  $x = 6, y = -8$   
16.  $x = 3, y = 0$     25. 12 and 8  
17.  $p = 4, q = 3$     26. 3 and 8  
18.  $p = -1, q = 4$     27. 12 and 6  
19.  $a = 3, b = -2$     28. 7 and 11
29. a  $x + y = 315$     b  $x + 2y = 450$   
c  $x = 180, y = 135$ ; cup, £1.80, saucer, £1.35  
30. a  $x + y = 42$     b  $x + 2y = 52$   
c  $x = 32, y = 10$ ; Harry, 32; Adam, 10; Sam, 20  
31. a They add up to 90.    c  $x = 54, y = 36$   
b  $x - y = 18; x + y = 90$   
32. £1.25 and £1.50  
33. a  $y = x + 2$     b  $3x + y = 14$     c  $x = 3, y = 5$   
34.  $m + c = 6$  and  $3m + c = 10$ ;  $m = 2, c = 4$ ;  $y = 2x + 4$   
35. AB =  $9\frac{1}{2}$  cm, BC = 6 cm

**Exercise 20E (p. 426)**

1.  $x = 1.5; y = 4.5$     3.  $x = -0.5; y = 1.5$   
2.  $x = 1.3; y = 3.7$     4.  $x = \frac{1}{3}, y = -\frac{2}{3}$   
5.  $x = \frac{1}{2}, y = 2$   
6. a  $x + y = 30$  and  $x - y = 6$     d i 18    ii 12  
e Each age is corrected down to the last birthday.  
7. a  $y - x = 130$  and  $2x - y = 140$   
c i 400 ml    ii 270 ml  
8. a If  $x$  = no. of single rooms and  $y$  = no. of double rooms,  $x + y = 134$  and  $x + 2y = 253$ .  
c  $x = 15, y = 119$ ; 15 single rooms, 119 double rooms

**Exercise 20F (p. 427)**

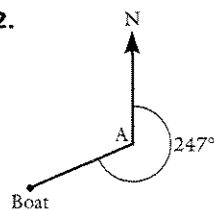
1. If  $\pounds c$  = cost of 1 chair and  $\pounds d$  = cost of 1 dining table,  $c + d = 310$  and  $6c + d = 660$   
2.  $x = 2, y = 5$     6.  $x = 3, y = 4$     10.  $x = 5, y = 2$   
3.  $x = 3, y = 5$     7.  $x = 7, y = 4$     11. 1.4 kg and 1.9 kg  
4.  $x = 5, y = 2$     8.  $x = 8, y = 5$     12.  $x = 1.5, y = 3.5$   
5.  $x = 4, y = 3$     9.  $x = 2, y = 1$     13.  $x = 1.2, y = 1.6$

**Summary 5**

**Revision Exercise 5.1 (p. 431)**

1. a 90    b
- 
2. a 244    b £44 500 000    3. a  $90^\circ$     b  $39^\circ$   
4. a values for frequency are 6, 14, 19, 3  
b i 22    ii 39    c 42  
d
-

16. a  $073^\circ$       b  $253^\circ$   
 17. a  $144^\circ$       b  $324^\circ$   
 18. a  $234^\circ$       b  $054^\circ$   
 19. a  $326^\circ$       b  $146^\circ$   
 20. a  $323^\circ$       d  $066^\circ$   
     b  $143^\circ$       e  $111^\circ$   
     c  $246^\circ$       f  $291^\circ$   
 21. a  $049^\circ$       c  $060^\circ$   
     b  $285^\circ$       d  $035^\circ$

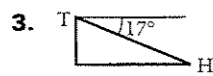


**Exercise 17H (p. 383)**

1. a  $\triangle ABC: \hat{A} = 30^\circ, \hat{B} = 60^\circ, \hat{C} = 90^\circ$   
 b 87 m  
 2. a  $\triangle ABC: \hat{A} = 50^\circ, \hat{B} = 60^\circ, \hat{C} = 70^\circ$   
 b 160 m  
 3. a  $\triangle ABT: \hat{A} = 30^\circ, \hat{B} = 40^\circ, \hat{T} = 110^\circ$   
 b 274 m  
 4. a  $\triangle ABM: \hat{A} = 30^\circ, \hat{B} = 100^\circ, \hat{M} = 50^\circ$   
 b 51 m  
 5. PS = 1230 m  
 6. a i 550 m      ii 1700 m  
     b i  $020^\circ$       ii  $200^\circ$       iii  $230^\circ$

**Exercise 17I (p. 386)**

1. AC = 54 mm  
 4. 2380 m  
 5. a  $\triangle BCF: \hat{B} = 93^\circ, \hat{C} = 60^\circ, \hat{F} = 27^\circ$   
 b i 740 m      ii 390 m



**Chapter 18**

**Exercise 18B (p. 389)**

1. ml ( $\text{cm}^3$ )      2. 10      3. gallons      4. ml ( $\text{cm}^3$ )

**Exercise 18C (p. 390)**

1.  $216 \text{ cm}^3$       6.  $58.5 \text{ cm}^3$       11.  $768 \text{ cm}^3$   
 2. 432 cu in      7.  $49.7 \text{ m}^3$       12.  $142.7 \text{ litre}$   
 3.  $180\,000 \text{ mm}^3$       8.  $39\,680 \text{ cm}^3$       13.  $0.576 \text{ litre}$   
 4.  $105.4 \text{ cm}^3$       9.  $400 \text{ cm}^3$   
 5.  $1600 \text{ mm}^3$       10.  $840 \text{ cm}^3$

**Exercise 18D (p. 393)**

1.  $1344 \text{ cm}^3$   
 2. a  $150 \text{ cm}^3$       b  $1000 \text{ mm}^3$       c  $4.5 \text{ m}^3$   
 3. a  $48 \text{ cm}^2$       b  $720 \text{ cm}^3$   
 4. a 120 sq ft      b 2160 cu ft  
 5. a  $56 \text{ cm}^2$       b  $1120 \text{ cm}^3$   
 6. a 960 sq in      b 67200 cu in  
 7. a 90 sq ft      b 1350 cu ft  
 8. a  $64 \text{ cm}^2$       b  $128 \text{ cm}^3$   
 9.  $660 \text{ cm}^3$       14.  $690 \text{ cm}^3$   
 10.  $192 \text{ cm}^3$       15.  $5.184 \text{ m}^3$   
 11.  $2400 \text{ cm}^3$       16.  $21.6 \text{ m}^3$   
 12.  $66\,000 \text{ mm}^3$       17.  $624 \text{ m}^3$   
 13.  $450 \text{ cm}^3$

18. a  $32 \text{ cm}^2$       b  $38\,000 \text{ cm}^3$       c 38 litre  
 19. a  $126 \frac{1}{4} \text{ ft}^3$       b  $5050 \text{ ft}^3$

**Exercise 18E (p. 396)**

1.  $126 \text{ cm}^3$       9.  $322 \text{ cm}^3$       17.  $402 \text{ cm}^3$   
 2.  $113 \text{ cm}^3$       10.  $3300 \text{ cm}^3$       18.  $34.5 \text{ cm}^3$   
 3. 70.7 cu in      11. 941 mm<sup>3</sup>      19.  $204 \text{ cm}^3$   
 4.  $3.14 \text{ cm}^3$       12.  $885 \text{ cm}^3$       20.  $628 \text{ cm}^3$   
 5.  $15.1 \text{ cm}^3$       13.  $28.0 \text{ cm}^3$       21.  $2160 \text{ cm}^3$   
 6. 151 cu in      14.  $407 \text{ cm}^3$       22.  $1010 \text{ cm}^3$   
 7.  $814 \text{ cm}^3$       15.  $824 \text{ cm}^3$   
 8.  $1390 \text{ cm}^3$       16.  $10.5 \text{ cm}^3$   
 23. a  $277 \text{ cm}^3$  (or 277 ml)  
     b  $15\,300 \text{ cm}^3$       c 123 kg  
 24. a  $26.1 \text{ cm}^3$       b 49.4 ml      c 23.4 g  
 25. The one with the square cross-section;  $4700 \text{ cm}^3$   
 26. Pack C; the bin has a capacity of 17.2 litres

**Exercise 18F (p. 399)**

1. 53 800  $\text{cm}^3$   
 2. a  $144 \text{ cm}^2$       b  $2880 \text{ cm}^3$   
 3. a  $52 \text{ cm}^2$       b  $624 \text{ cm}^3$   
 4. a  $184 \text{ cm}^3$       b 201 cubic inches  
 5. a i  $39 \text{ cm}^2$       ii  $371 \text{ cm}^3$       b 3150 g

**Chapter 19**

**Exercise 19A (p. 402)**

1. 10 cm      2. 11.7 cm      3. 13 cm      4. 13.9 cm  
 5. 

36	64	100
36	100	136
25	144	169
49	144	193

 The number in the third column is equal to the sum of the numbers in the first two columns.

**Exercise 19B (p. 403)**

1. 10 cm      7. 12.6 cm      13. 44.7 m  
 2. 13 cm      8. 10.4 ft      14. 11.7 cm  
 3. 12.1 cm      9. 5.40 cm      15. 105 m  
 4. 5.83 m      10. 121 cm      16. 7.81 cm  
 5. 20 cm      11. 3.14 m      17. 6 ft 10.5 in  
 6. 9.85 m      12. 3.31 cm      18. 7.07 cm

**Exercise 19C (p. 406)**

1. 30 cm      3. 32 cm      5. 5.5 cm  
 2. 130 mm      4. 2.5 cm      6. 350 mm

**Exercise 19D (p. 407)**

1. 12 cm      5. 10 m      9. 7.48 m      13. 7.55 m  
 2. 48 cm      6. 7.94 cm      10. 6.24 in      14. 83.1 m  
 3. 4.90 cm      7. 2.65 cm      11. 6.71 cm      15. 14.1 cm  
 4. 24 cm      8. 4.58 ft      12. 13.7 m      16. 5.81 m  
 17. a 1.21 m      b  $3.27 \text{ m}^2$       c i  $5.40 \text{ m}^3$       ii 5400 litres  
 18. b greater      c less      d i angle B  $< 90^\circ$       ii angle B  $> 90^\circ$

**Exercise 19E (p. 410)**

1. 137 cm      3. 2.18 m      5. 11.3 cm  
 2. 8.49 m      4. 4.25 cm  
 6. No; the total height of the float is 14.4 ft  
 7. a 19.1 cm      b 32 cm      c 46.8 cm

40. 7.51      48. 7.82      56. 13  
 41. 370      49. 5000      57. 13  
 42. 0.990      50. 37.9      58. 14  
 43. 54.0      51. 7000      59. 29  
 44. 47      52. 0.0709      60. 0.23  
 45. 0.006 845      53. 0.07      61. 0.026  
 46. 600 000      54. 3.3      62. 0.000 19  
 47. 500      55. 1.7

**Exercise 1C (p. 33)**

1. 1550      5. 3000      9. 4.06      13. 3  
 2. 3      6. 55.6      10. 2020      14. 2  
 3. 74      7. 20      11. 0.0004  
 4. 8.90      8. 0.053      12. 37 000  
 15. 160 cm is to the nearest 10 cm. She is 156 cm tall to the nearest cm.  
 16. Peter has given his time to the nearest whole number i.e. to 2 s.f.  
 17. 1550 m, 1.5 km to the nearest  $\frac{1}{10}$  of a km.  
 18. 1.43 m  
 19. 254 cm, rooms are unlikely to be of the same length at every part. Correct to the nearest cm is probably too accurate.  
 20.  $4.1 \text{ m}^2$ ; each dimension could be larger than as given correct to 1 d.p.  
 21. The space may be slightly less than 45 cm wide and the unit slightly more.  
 22. C, because most trains are timetabled to take  $1 \frac{3}{4}$  hours.

**Exercise 1D (p. 35)**

1. 54, 45      4. £2 500 000  
 2. 45 499, 44 500      5. 1950  
 3. 1549, 1450      6. 11.5 m  
 7. a 9.5 cm (2 s.f.)      b 0.5 cm  
 8. a 590 m      b 10 m

**Exercise 1E (p. 37)**

1. 4      19. 12 000      37. 25  
 2. 2      20. 8600      38. 0.04  
 3. 2      21. 240      39. 30  
 4. 3.5      22. 4      40. 600  
 5. 7      23. 450      41. 1700  
 6. 4      24. 100      42. 0.0016  
 7. 11      25. 0.04      43. 300  
 8. 17      26. 4      44. 20  
 9. 48      27. 20      45. 0.25  
 10. 16      28. 60      46. 0.9  
 11. 63      29. 0.7      47. 1000  
 12. 1      30. 2      48. 0.4  
 13. 200      31. 3 or 4      49. A, C, D  
 14. 20      32. 23      50. A, B, C  
 15. 500      33. 100      51. B, C, D  
 16. 4000      34. 0.12      52. A, C, D  
 17. 60      35. 0.06      53. B, C, D  
 18. 700      36. 100

**Exercise 1F (p. 40)**

1. a  $200 \text{ m}^2$   
 b Less, both figures were rounded down.  
 c No. Since 0.5 and 0.6 are both about a half, round one up and one down.  $25 \times 12 = 300$  is easier to calculate mentally than  $24 \times 13 = 312$ . Either gives a fairly good estimate – the exact answer being 308.7

2. e.g.  $\pounds 1.50 \times 50 = \pounds 75$ , then subtract  $50 \times 2p = \pounds 1$  and add  $\pounds 1.48 \times 2$  for the last two weeks to give an accurate answer of  $\pounds 76.96$   
 3. a  $\frac{\pounds 2000}{30} \approx \pounds 67$   
 b Too small – the effect of rounding up the number of weeks is greater than the effect of rounding up the amount.  $\pounds \frac{1800}{25} = \pounds 72$  is quite accurate and safer since the time is rounded down slightly.  
 c The second estimate would suggest ‘Yes’, particularly as he has an extra week.  
 4. a £80  
 b Greater, the amount was rounded up significantly and the number of weeks was rounded down, both would tend to make the estimate too big.  
 c Round the amount down slightly to £3500, keeping 2 s.f.  
 5. Working to 1 s.f. – Option 1: £4000, Option 2: £8000 – very misleading.  
 True answers £5996.40 and £6096.96

**Exercise 1G (p. 41)**

1. 1937      9. 27      17. 25 cm  
 2. 112 156      10. 69 896      18. £1512  
 3. 6237      11. 3716      19. 18p  
 4. 34      12. 5133      20.  $x = 9$   
 5. 31      13. 62 049      21. £45  
 6. 50      14. 45      22. 4.6 kg  
 7. 8025      15. 45      23. £12.74  
 8. 17      16. £17.69      24. £214

**Chapter 2**

**Exercise 2B (p. 46)**

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

**Exercise 2D (p. 49)**

- All answers in degrees  
 1. 60      3. 110      5. 60      7. 110      9. 45      11. 130  
 2. 80      4. 60      6. 75      8. 30      10. 120      12. 130  
 13.  $w = 130, x = 130, y = 50$   
 14.  $p = 50, q = 50$   
 15.  $d = e = f = h = 60, g = 120$   
 16.  $d = f = 50, e = 80$   
 17.  $p = 70, q = 80, r = 30$   
 18.  $p = q = 115$   
 19.  $d = 140, e = f = 40$   
 20.  $l = n = p = 70, m = 110$   
 21.  $d = f = 50, e = 45$   
 22.  $x = z = 55, y = 125$   
 23.  $k = 110, l = 70, m = n = 130$   
 24.  $d = e = 90, f = 50$   
 25.  $d = 80, e = 70$   
 26.  $p = 120$   
 27.  $a = 40$   
 28. 70  
 29. 135  
 30. 45  
 31. 60  
 32. 120

**Exercise 2E (p. 54)**

1.  $e^\circ$     3.  $d^\circ$     5.  $d^\circ$     7.  $g^\circ$     9.  $d^\circ$   
 2.  $e^\circ$     4.  $d^\circ$     6.  $g^\circ$     8.  $e^\circ$     10.  $g^\circ$

**Exercise 2F (p. 55)**

All answers in degrees

1.  $p = 50, q = 130$     14.  $x = 90$   
 2.  $s = 130, t = 50$     15.  $p = 140, q = 40$   
 3.  $d = 50, e = 70$     16.  $p = 120, q = 60$   
 4.  $r = 260, s = 40, t = 60$     17.  $d = 120$   
 5.  $w = x = y = 70$     18.  $d = 130, e = 50$   
 6.  $u = 45, v = 90$     19.  $d = 85$   
 7.  $p = 55, q = 65$     20.  $d = 40, e = 100, f = 60$   
 8.  $d = 100$     21.  $d = 55, e = 125$   
 9.  $d = 30$     22.  $d = 40$   
 10.  $p = 70, q = 110$     23.  $d = e = 80$   
 11.  $v = 45$     24.  $d = e = 130, f = 50$   
 12.  $p = 130, q = 50$     25.  $d = f = 80, e = g = 100$   
 13.  $x = 60$     26.  $d = 70, e = 110$

**Exercise 2G (p. 58)**

All answers in degrees

1. 65    4. 75    7. 45    10. 50  
 2. 140    5. 70    8. 110    11. 40  
 3. 55    6. 70    9. 25    12. 60  
 13. Both angles are the same (nearly  $56^\circ$ ). DE and BC are parallel.

**Chapter 3**

**Exercise 3A (p. 62)**

1. 14    13. 49    25.  $\frac{2}{3}$     37.  $2\frac{8}{11}$   
 2. 20    14. 99    26.  $1\frac{1}{2}$     38.  $1\frac{4}{5}$   
 3. 21    15. 39    27.  $1\frac{2}{5}$     39. 4  
 4. 15    16. 63    28.  $\frac{2}{3}$     40. 6  
 5. 12    17. 38    29.  $\frac{3}{8}$     41.  $2\frac{2}{3}$   
 6. 10    18.  $\frac{3}{4}$     30.  $10\frac{1}{2}$     42. 6  
 7. 21    19.  $1\frac{1}{5}$     31.  $\frac{5}{6}$     43.  $1\frac{3}{7}$   
 8. 45    20.  $\frac{1}{12}$     32.  $5\frac{1}{3}$     44. 12  
 9. 99    21.  $1\frac{1}{2}$     33.  $6\frac{2}{3}$     45. 6  
 10. 30    22.  $\frac{2}{5}$     34.  $\frac{9}{10}$     46.  $3\frac{1}{3}$   
 11. 18    23. 1    35.  $4\frac{5}{6}$     47.  $1\frac{1}{2}$   
 12. 16    24.  $2\frac{1}{3}$     36. 6    48. 8

49. no;  $6\frac{1}{2} \div \frac{3}{8} = 17\frac{1}{3}$  so 17 is the most.

50. 64p    55. 4 inches  
 51. a 12    b 24p    56.  $\frac{51}{200}$  mm  
 52. a  $\frac{1}{40}$  h    b  $1\frac{1}{2}$  min    57. a x    b  $\frac{2x}{9}$   
 53. A, B  
 54. a  $1\frac{1}{2}$     b Angelino's are more expensive.

**Exercise 3B (p. 66)**

1. 1    10.  $\frac{3}{5}$     19.  $\frac{1}{3}$     28.  $\frac{2}{33}$   
 2.  $2\frac{1}{2}$     11.  $\frac{7}{12}$     20.  $\frac{2}{21}$     29.  $1\frac{2}{25}$   
 3.  $1\frac{2}{3}$     12.  $\frac{1}{5}$     21.  $\frac{7}{10}$     30. true  
 4.  $\frac{8}{15}$     13.  $\frac{3}{14}$     22.  $\frac{21}{34}$     31. false  
 5.  $2\frac{2}{3}$     14.  $\frac{13}{15}$     23.  $1\frac{1}{2}$     32.  $1\frac{3}{4}$   
 6.  $5\frac{1}{10}$     15.  $\frac{5}{24}$     24.  $\frac{1}{22}$     33. 127 g  
 7.  $1\frac{1}{2}$     16.  $1\frac{5}{8}$     25.  $\frac{9}{22}$     34.  $9\frac{3}{8}$  km  
 8.  $\frac{9}{32}$     17.  $\frac{41}{42}$     26.  $\frac{5}{21}$   
 9.  $\frac{9}{20}$     18.  $\frac{1}{16}$     27.  $\frac{5}{18}$

35. a  $\div$     b  $\times$     c  $+$

36. a  $<$     b  $<$

37. a  $\frac{32}{243}, \frac{64}{729}$   
 b starting with  $\frac{2}{3}$ , multiply each term by  $\frac{2}{3}$  to get the next term.

**Exercise 3C (p. 69)**

1. b  $\frac{1}{3}$   
 2. a 10 ml    b  $\frac{1}{5}$     c i  $\frac{1}{5}$     ii  $1\frac{1}{5}$   
 3. a £7    b  $\frac{1}{6}$     c i 16.7%    ii 83.3%  
 4. a 1.2 m    b 1.2  
 5. a i 0.9 p    ii 1 p    b  $\frac{9}{10}$     c 111%  
 6. a  $\frac{1}{4}$     b 25%  
 7. a 0.9    b  $\frac{1}{10}$   
 8. Each ticket is only eligible for one reduction of 30%.  
 9. a He forgot that it is a percentage.  
 b Replace 20 by 0.02.

**Exercise 3D (p. 72)**

1. 150%    15. 1.37    29. 2768 cars  
 2. 125%    16. 2    30. 849.3 cm<sup>2</sup>  
 3. 120%    17. 1.355    31. £104  
 4. 160%    18. 1.065    32. 185 boxes  
 5. 108%    19. 1.25    33. 319 litres  
 6. 200%    20. 3.5    34. 2415 shops  
 7. 148%    21. 1.025    35. 63.25 kg  
 8. 400%    22. 1.43    36. £226.80  
 9. 112.5%    23. 1.115    37. 840  
 10. 275%    24. 5    38. 180 cm  
 11. 157%    25. £140    39. 253  
 12. 103%    26. 370 employees    40. £24.50  
 13. 1.4    27. £493    41. 4.04%  
 14. 1.08    28. 682.5 m

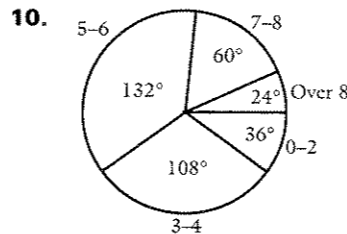
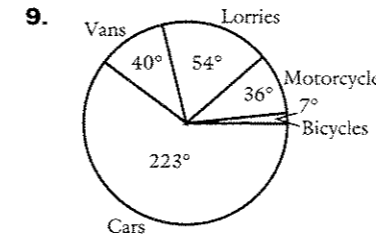
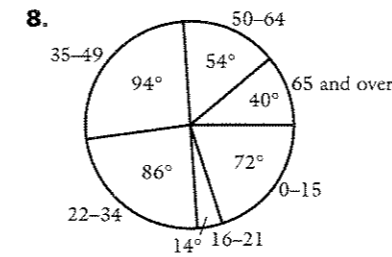
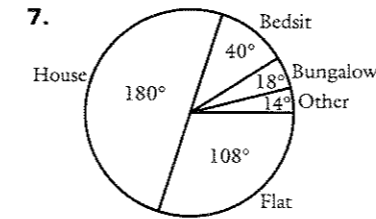
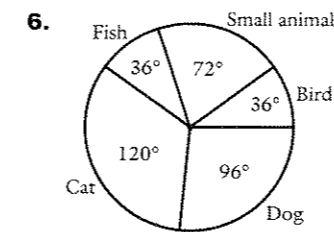
**Exercise 3E (p. 74)**

1. 50%    14. 0.25    27. 189 litres  
 2. 75%    15. 0.8    28. £26  
 3. 30%    16. 0.88    29. £3128  
 4. 15%    17. 0.97    30. 3312  
 5. 96%    18. 0.945    31. 62 cm  
 6. 87.5%    19. 0.66    32. 191  
 7. 65%    20. 0.842    33. 653  
 8. 57.8%    21. 0.935    34. 155  
 9. 37.5%    22. 0.55    35. £96  
 10. 66.7%    23. 0.47    36. £132  
 11. 47%    24. 0.825    37. £800  
 12. 93.75%    25. 70 m    38. 414  
 13. 0.6    26. 170    39. £110

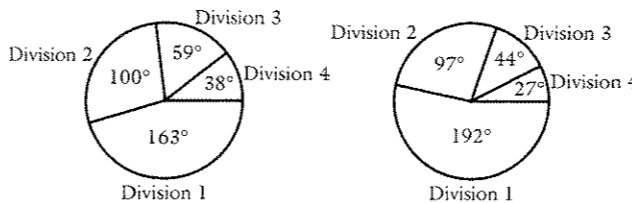
40. a expected the extra discount to be calculated on the original price  
 b extra discount was calculated on the already discounted price i.e. 10% of £90

**Exercise 3F (p. 76)**

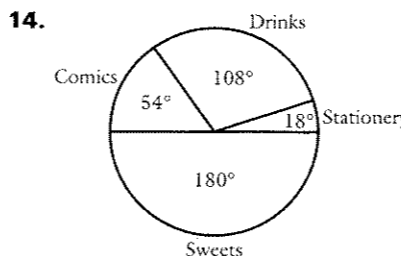
1. £763.75    2. £8.40    3. a £36    b £8.50  
 4. a 63    b 12  
 5. a 10200    b 8700    c 7400  
 6. b Patersons £186.75, Mullards £188, Deighton £184, Billows £189  
 c £5



11. a 60%    b 40%  
 c Pie chart showing about 50% carpeted.  
 12. They played the same number of away matches as home matches.  
 13. a and b



c The proportion of attendances at Division 1 matches has risen while Division 3 and Division 4 matches are proportionately down; the proportion of attendances at Division 2 matches is almost unchanged.



**Chapter 17**

**Exercise 17B (p. 366)**

1. AG = 46 mm  
 2.  $\hat{X} = 80^\circ; \hat{Z} = 32^\circ$   
 3.  $\hat{D} = 53^\circ; \hat{E} = 37^\circ; \hat{F} = 90^\circ$   
 4. BC = 72 mm; DC = 74 mm;  $\hat{C} = 73^\circ$

**Exercise 17C (p. 368)**

1. a  $60^\circ, 30^\circ$     2. a  $90^\circ$   
 6. It divides triangle LMN into two identical triangles.

**Exercise 17D (p. 370)**

5. 500 m    6. 2.3 m

**Exercise 17E (p. 373)**

1. 23 m    3. 50 m    5. 58 m    7. 300 m    9. 90 m  
 2. 22 m    4. 38 m    6. 9 m    8. 180 m

**Exercise 17F (p. 376)**

1. BC = 86 m    5. 820 m    9. 8700 m  
 2. MN = 77 m    6. 340 m    10. 130 m  
 3. RQ = 71 m    7. 920 m    11. 580 m  
 4. 100 m    8. 530 m

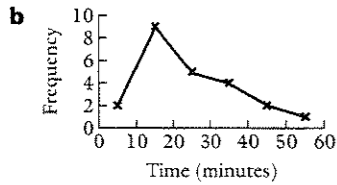
**Exercise 17G (p. 380)**

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

**Exercise 16F (p. 355)**

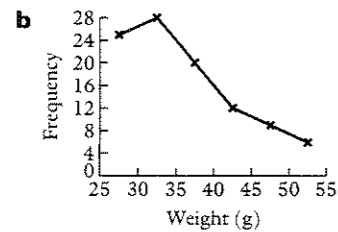
1. a

Frequency	Mid-class value
2	5
9	15
5	25
4	35
2	45
1	55

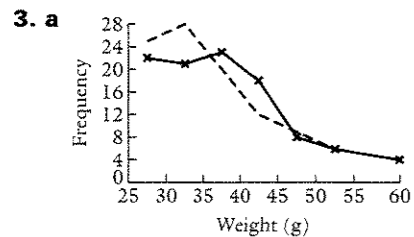


2. a

Mid-class value
27.5
32.5
37.5
42.5
47.5
52.5

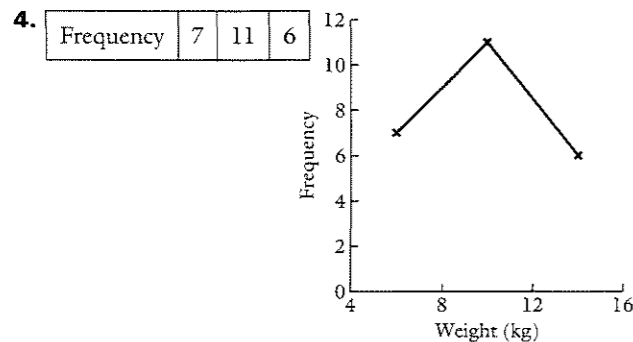


c Modal group, 30–; Estimated range, 30 g



b The range of weights of the second set is larger; the modal group of the first set is 30– compared with 35– for the second set.

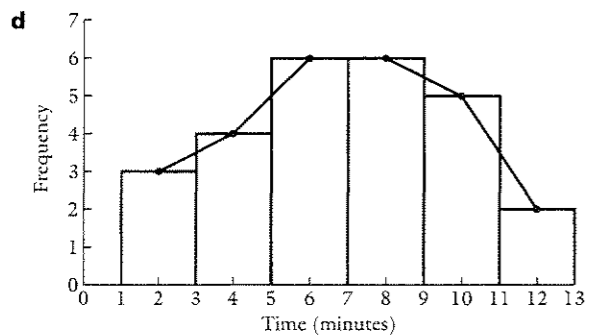
c It is much easier to compare directly one set with the other.



5. a 2, 4, 6, 8, 10, 12

b From 1 to 3 minutes

c From 11 to 13 minutes



e

Time, $t$ minutes	Frequency
$1 \leq t < 3$	3
$3 \leq t < 5$	4
$5 \leq t < 7$	6
$7 \leq t < 9$	6
$9 \leq t < 11$	5
$11 \leq t < 13$	2

f 12 minutes

g there are two;  $5 \leq t < 7$  and  $7 \leq t < 9$

h 26

6. b Estimated range, 12; modal group, 5 to 7 minutes

c 28

d Yes, the pupils changed for games more quickly on average after the lecture; the modal group has moved back and has more pupils in it.

7. a 30

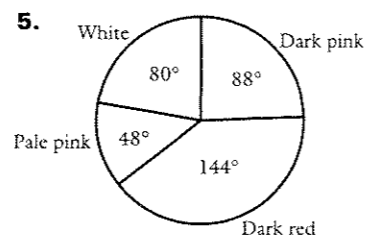
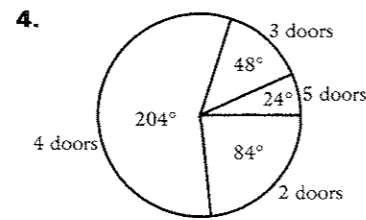
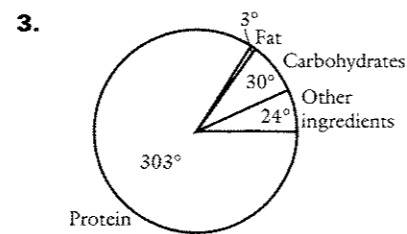
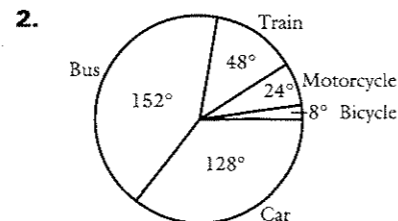
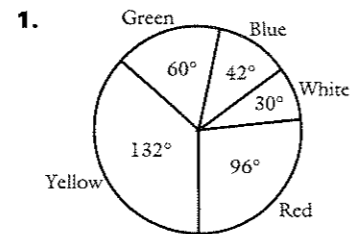
b We cannot tell; some seeds may not have developed.

c 20

d We cannot tell; it lies somewhere between 10 cm and 14 cm.

e 13 cm

**Exercise 16G (p. 360)**



7. a £3750    b £3187.50    c £705    d £15.57

8. a £6400    b £5440    c £4624    d £3376

9. 94.3 kg    10. £1458    11. 27

12. a 56 p    b 616 litres    c i £5.04    ii 1.4%

**Exercise 3G (p. 78)**

1. a  $\frac{2}{3}$     b  $\frac{7}{9}$

2. a 15    b  $1\frac{7}{20}$

3. a  $1\frac{1}{12}$     b 9

4. a  $6\frac{1}{4}$     b  $2\frac{6}{11}$

5. 125%    6. 98 g    7. £960    8. 2.97 kg

**Chapter 4**

**Exercise 4A (p. 81)**

1. a  $\frac{1}{13}$     b  $\frac{12}{13}$     c They add up to 1

2.  $\frac{1}{6} + \frac{5}{6} = 1$

3. a  $\frac{1}{4}$     b  $\frac{3}{4}$     c They add up to 1

4. a  $\frac{1}{11}$     b  $\frac{10}{11}$     c They add up to 1

**Exercise 4B (p. 83)**

1. 0.6

2. a  $\frac{1}{10}$     b  $\frac{9}{10}$

3.  $\frac{3}{5}$     6.  $\frac{5}{6}$     9.  $\frac{24}{25}$     12.  $\frac{4}{5}$

4.  $\frac{12}{13}$     7.  $\frac{7}{10}$     10.  $\frac{2}{3}$     13.  $\frac{10}{13}$

5.  $\frac{21}{26}$     8.  $\frac{5}{8}$     11.  $\frac{39}{40}$

14. a No, there is no guarantee that he has seen every sweet, he may have seen some several times and others not at all.

b The results would suggest that about  $\frac{1}{4}$  of the sweets are green so can be used as an estimate.

15. a  $\frac{1}{10}$     b  $\frac{3}{10}$     c  $\frac{2}{5}$     d  $\frac{7}{10}$

16. a  $\frac{1}{13}$     b  $\frac{1}{4}$     c  $\frac{3}{4}$     d  $\frac{11}{13}$

17. a  $\frac{15}{22}$     b  $\frac{7}{22}$     c  $\frac{1}{22}$     d  $\frac{3}{11}$

18. a  $\frac{2}{5}$     b  $\frac{19}{30}$     c  $\frac{7}{30}$     d 0

19. a  $\frac{9}{10}$     b  $\frac{9}{100}$     c  $\frac{9}{10}$

20. a  $\frac{7}{10}$   
b No. Jane has not allowed for the trains which arrive on time.

c The 7 in 10 probability is an average for a whole year and can only be a rough guide for any particular train journey.

21. a Eddy needs to know how many cars of each make are insured by the company.

b We need information about how each car withstands impacts.

**Exercise 4C (p. 87)**

1. a  $\frac{1}{2}$     b 50

c It is unlikely that 50 heads will come up: probability only gives a rough guide.

d The coin would probably be defective and biased towards tails.

2. 4

3. 20

4. a 4

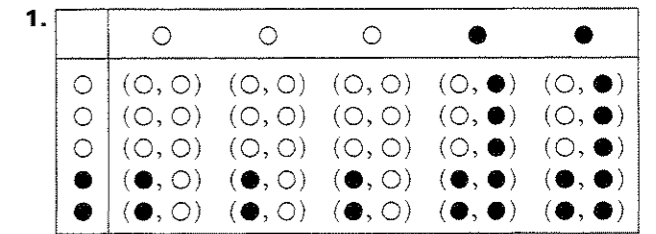
b Not guaranteed – any number from 0 to 24 is possible.

5. 5 is the expected number of heads but any number from 0 to 10 is possible.

6. a 2

b It is quite likely that the machine will not pay out at all, or he could make a profit!

**Exercise 4D (p. 89)**



2.

	1	2	3	4	5	6
H	(H, 1)	(H, 2)	(H, 3)	(H, 4)	(H, 5)	(H, 6)
T	(T, 1)	(T, 2)	(T, 3)	(T, 4)	(T, 5)	(T, 6)

3.

	R	R	Y	B
R	(R, R)	(R, R)	(R, Y)	(R, B)
Y	(Y, R)	(Y, R)	(Y, Y)	(Y, B)
Y	(Y, R)	(Y, R)	(Y, Y)	(Y, B)
B	(B, R)	(B, R)	(B, Y)	(B, B)

4.

	1	2	3
1	(1, 1)	(1, 2)	(1, 3)
2	(2, 1)	(2, 2)	(2, 3)
3	(3, 1)	(3, 2)	(3, 3)

5.

	Red	Green	Yellow
Round	(R, Ro)	(G, Ro)	(Y, Ro)
Square	(R, Sq)	(G, Sq)	(Y, Sq)
Triangle	(R, Tr)	(G, Tr)	(Y, Tr)

6. a  $\frac{1}{6}$     b  $\frac{1}{9}$     c  $\frac{1}{6}$     d  $\frac{1}{36}$

7. a  $\frac{4}{25}$     b  $\frac{16}{25}$

8.  $\frac{1}{6}$

9. a  $\frac{1}{16}$     b  $\frac{1}{8}$     c  $\frac{3}{16}$     d  $\frac{5}{8}$

10.  $\frac{1}{4}$

11.

	10p	10p	10p	50p	50p
10p	(10, 10)	(10, 10)	(10, 10)	(10, 50)	(10, 50)
50p	(50, 10)	(50, 10)	(50, 10)	(50, 50)	(50, 50)

Probability:  $\frac{1}{5}$

12.

	S	S	T	T	T
S	(S, S)	(S, S)	(S, T)	(S, T)	(S, T)
S	(S, S)	(S, S)	(S, T)	(S, T)	(S, T)
S	(S, S)	(S, S)	(S, T)	(S, T)	(S, T)
T	(T, S)	(T, S)	(T, T)	(T, T)	(T, T)

a  $\frac{3}{10}$     b  $\frac{3}{20}$

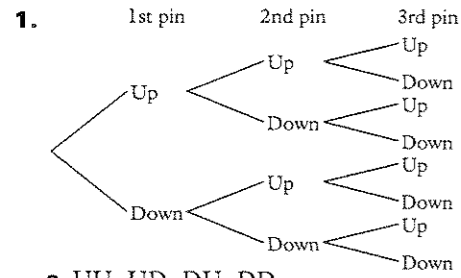
13. a  $\frac{1}{4}$     b  $\frac{1}{16}$     c  $\frac{3}{4}$     d  $\frac{1}{4}$

14.

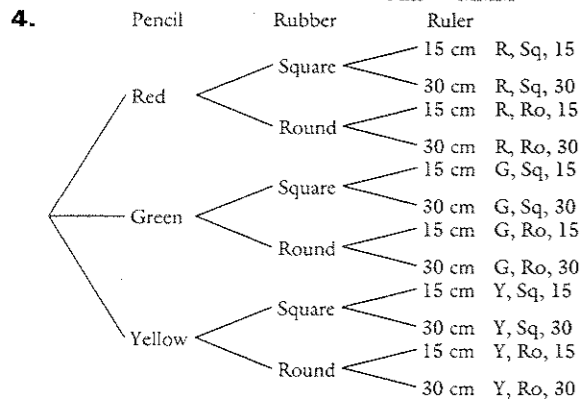
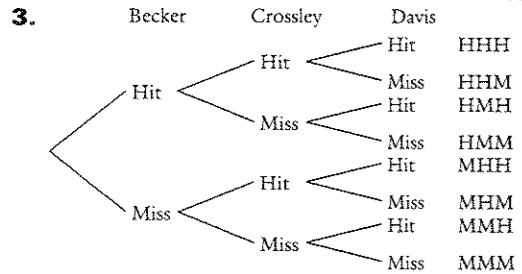
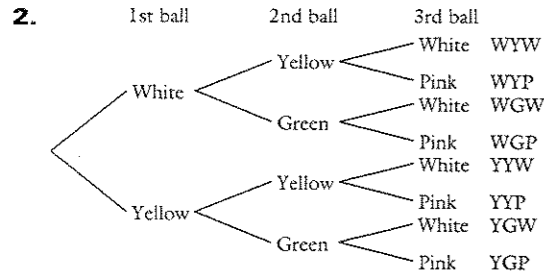
	B	B	1	3	4	6
1	(1, B)	(1, B)	(1, 1)	(1, 3)	(1, 4)	(1, 6)
2	(2, B)	(2, B)	(2, 1)	(2, 3)	(2, 4)	(2, 6)
3	(3, B)	(3, B)	(3, 1)	(3, 3)	(3, 4)	(3, 6)
4	(4, B)	(4, B)	(4, 1)	(4, 3)	(4, 4)	(4, 6)
5	(5, B)	(5, B)	(5, 1)	(5, 3)	(5, 4)	(5, 6)
6	(6, B)	(6, B)	(6, 1)	(6, 3)	(6, 4)	(6, 6)

a  $\frac{5}{36}$     b  $\frac{1}{18}$     c  $\frac{1}{18}$     d  $\frac{19}{36}$

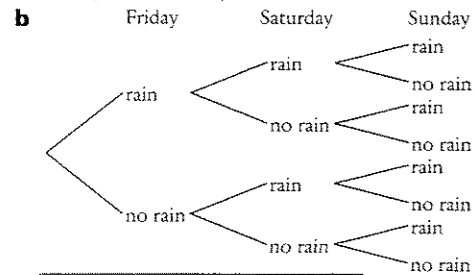
**Exercise 4E (p. 93)**



- a UU, UD, DU, DD  
 b UUU, UUD, UDU, UDD, DUU, DUD, DDU, DDD



5. a The probability that it will rain on Sunday is 0.11, which is higher than the probability of rain on either Friday or Saturday.



Friday	Saturday	Sunday
rain	rain	rain
rain	rain	no rain
rain	no rain	rain
rain	no rain	no rain
no rain	rain	rain
no rain	rain	no rain
no rain	no rain	rain
no rain	no rain	no rain

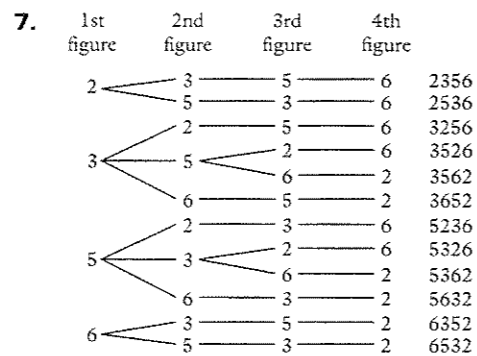
**Exercise 4F (p. 96)**

1. YRB, BRY, BYR, RYB, RBY  
 2. a 1324, 1342, 2314, 2341, 4312, 4321  
    b 3124, 3142, 3214, 3241, 3412, 3421  
    c 1234, 1243, 1324, 1342, 1423, 1432, 2134, 2143, 2314, 2341, 2413, 2431, 3124, 3142, 3214, 3241, 3412, 3421, 4123, 4132, 4213, 4231, 4312, 4321  
 3. Jan, David, Mustafa or Jan, Mustafa, David  
 4. a 48  
    b 1st digit, 0, 1, 2 or 3; 2nd digit 0, 1, 2 or 3; 3rd digit 0, 1, 2 or 3; 4th digit 0

5. 24, 6

6.

Anne	Jim	Solly	Gita
Orange	Apple	Peach	Pear
Orange	Peach	Apple	Pear
Apple	Orange	Peach	Pear
Apple	Peach	Orange	Pear
Peach	Orange	Apple	Pear
Peach	Apple	Orange	Pear

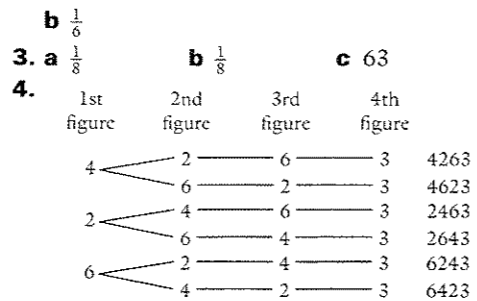


**Exercise 4G (p. 98)**

1.  $\frac{5}{7}$

2. a

	Blue dice					
	1	1	2	2	3	3
0	(1, 0)	(1, 0)	(2, 0)	(2, 0)	(3, 0)	(3, 0)
Red 1	(1, 1)	(1, 1)	(2, 1)	(2, 1)	(3, 1)	(3, 1)
dice 2	(1, 2)	(1, 2)	(2, 2)	(2, 2)	(3, 2)	(3, 2)
3	(1, 3)	(1, 3)	(2, 3)	(2, 3)	(3, 3)	(3, 3)
4	(1, 4)	(1, 4)	(2, 4)	(2, 4)	(3, 4)	(3, 4)
5	(1, 5)	(1, 5)	(2, 5)	(2, 5)	(3, 5)	(3, 5)

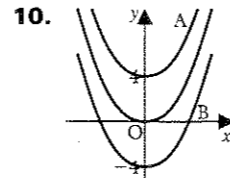


**Chapter 5**

**Exercise 5B (p. 101)**

1. 10    6. 204    11. 25  
 2. 100    7. 9.6    12. 7.5  
 3. 30    8. 1.4    13.  $\frac{7}{10}$   
 4. 2    9. 1.52    14.  $2\frac{2}{9}$   
 5. 20    10. 15

9. a i  $3p^2$     ii  $2x^3$   
 b i  $7x - 21$     ii  $-6 - 4x$     iii  $3x + 18$   
 c  $A = 54$



**Chapter 16**

**Exercise 16B (p. 343)**

1. discrete    6. continuous    11. discrete  
 2. continuous    7. discrete    12. continuous  
 3. discrete    8. continuous    13. discrete  
 4. continuous    9. discrete    14. discrete  
 5. continuous    10. continuous

**Exercise 16C (p. 345)**

1. a 8    c  $140 \leq x < 145$   
 b 4    d i  $150 \leq x < 155$     ii  $140 \leq x < 145$   
 2. a 47 kg    d 5  
 b 6    e 86  
 c 

Frequency
22
64
9
5
100

    f  $60 < w \leq 80$

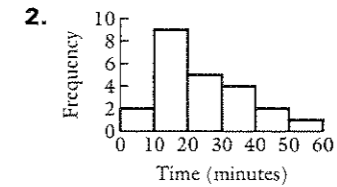
Frequency
22
64
9
5
100

3. a  $5 < t \leq 10$     b 1    c 7    d 20  
 e Emma had to wait for between 15 minutes and 20 minutes on one morning, but we do not know exactly how many minutes she waited.  
 4. a  $91.5 \leq w < 93.5$   
 b 133  
 c No; we only know that 45 apples weighed between 89.5 g and 91.5 g.  
 d  $89 \leq w < 91$   
 e  $88.5 \leq w < 89.5$   
 f Nigel would not know where to place the apple in his tally because the range in which it lies overlaps two of his groups. Eddie would be able to place the apple in his range of  $87.5 \leq w < 89.5$ .  
 5. a  $5.5 < t \leq 10.5$   
 b We cannot tell: the range  $5.5 < t \leq 10.5$  could include pupils who spent 10 minutes or a bit longer on their homework.  
 c None  
 d We cannot tell: at least 4, but some pupils in the range  $10.5 < t \leq 15.5$  may have spent more than 15 minutes on their homework.  
 e We do not know: we only know he/she spent between 20.5 min and 25.5 min on homework.

**Exercise 16D (p. 349)**

1. a 68    b 170    c 30  
 d 7 is a better estimate: 14 pupils took between 1 and 3 hours and some of these are likely to have spent 2 hours or longer.  
 e No: only 32 out of the 170 pupils took between 5 and 7 hours.

- f We do not know: we only know that more people spent between 5 and 7 hours than any other range of time.

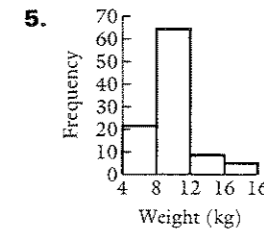
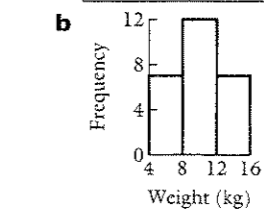


3. a 45    b 28    c the second group  
 d We cannot know the height of the shortest pupil; his height lies between 150.5 cm and 155.5 cm.  
 e 10; 6 pupils are at least 170.5 cm tall; 9 other pupils are between 165.5 cm and 170.5 cm tall and less than half of these (about 4) are likely to be taller than 168 cm.  
 f About 10 pupils are in this range.

g No

4. a 

Frequency	7	12	7
-----------	---	----	---



7. a Sally worked in units of 10 kg, from  $50 < w \leq 60$  to  $70 < w \leq 80$   
 b Tom worked in units of 5 kg, from  $50 < w \leq 55$  to  $75 < w \leq 80$   
 c Sally's chart is quicker to construct, but gives less detailed information.  
 d Tom's chart takes longer to draw up, but gives more information.  
 8. a The second set gives a more even distribution of times; the average time taken on the second set was less.  
 b Jenny was right; they discussed the problems they encountered on the first test before attempting the second. The second test may have been easier.  
 c Yes; no one took as long as 13 minutes on the second test.  
 d Nothing; we can only be sure that Stephen took no more than 12 minutes.  
 e i This chart clearly separates and displays the two sets of data but it is not easy to compare them with one another.  
    ii This one enables the heights of corresponding bars to be compared, but the second set cannot be easily pictured because the bars are displaced.

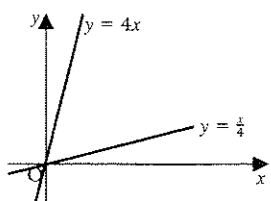
**Exercise 16E (p. 354)**

1. Modal group,  $5 \leq t < 7$ ; estimated range, 16 hours  
 2. Modal group,  $10 \leq t < 20$ ; estimated range, 60 minutes  
 3. Modal group,  $160.5 \leq \text{height} < 165.5$ ; estimated range, 30 cm  
 4. a  $6 \leq \text{time} < 8$ ; estimated range, 14 minutes  
    b  $4 \leq \text{time} < 8$ ; estimated range, 12 minutes

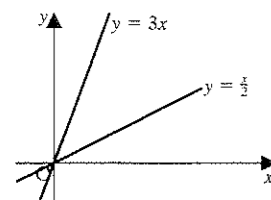
Revision Exercise 4.2 (p. 334)

1. a i -6 ii 8 iii -1 iv  $1\frac{1}{2}$   
 b i  $\frac{2}{3}$  ii  $-1\frac{2}{3}$  iii  $\frac{5}{6}$  iv 1.2

2. a  $y = 4x$  is steeper

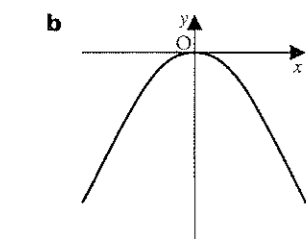
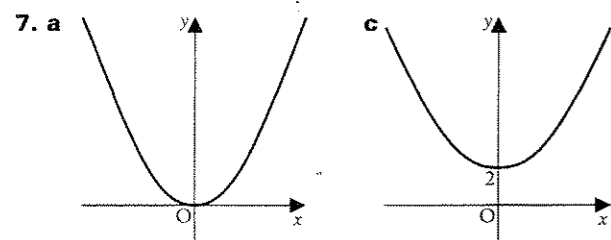


- b i  $m = 7, c = -5$  ii  $m = -5, c = 4$   
 3.  $x = y = 4$   
 4. a  $y = 3x$  is steeper



- b i obtuse ii acute iii acute iv obtuse  
 5. a  $839 \text{ cm}^3$  b 15.5 cm

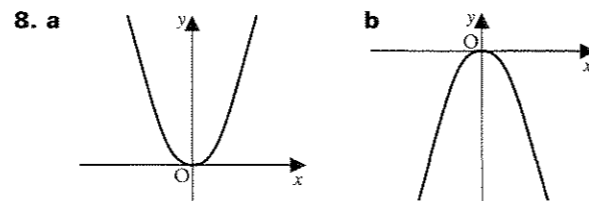
6. Curve must pass through the origin - so not A or D  
 Coefficient of  $x^2$  is positive - so curve is U-shaped - not C or D



8. a 28 km b  $4\frac{1}{2}$  h c 6.2 km  
 9. a i 30 km from Amberley ii 100 km from Amberley  
 b i 60 km/h ii 40 km/h  
 c 15 min  
 d  $2\frac{3}{4}$  h  
 e 44 km/h

Revision Exercise 4.3 (p. 336)

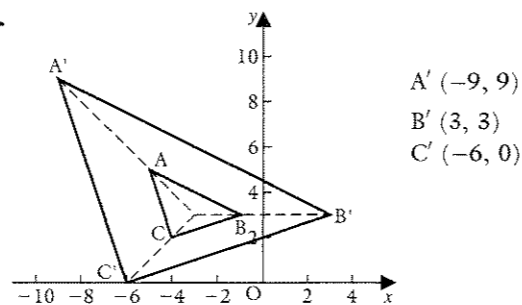
1. a i 14 : 3 ii 4 : 6 : 7 b  $x = 2$   
 2. a £12, £15 and £18 b 8 km  
 3. a  $5x - 15$  c  $23 - 2x$  e  $8 - 4a$   
 b  $10x - 2$  d  $x - 3$  f  $-x - 18$   
 4. a  $x = 2.44$  b  $x < -4$  c  $x = \pm 4.63$   
 5. a i obtuse ii acute iii obtuse iv acute  
 b i -1 ii  $y = 5$  iii  $y = 5 - x$   
 6.  $y = -\frac{4x}{3}$   
 7. C: Equation has no  $x$  term - so it is symmetrical about the  $y$ -axis - not A or D  
 Coefficient of  $x^2$  is negative - so not U-shaped - not B

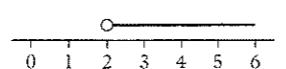
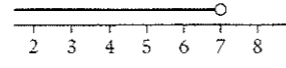


9. a 450 km  
 b 3 hours 30 minutes  
 c 12 km/h  
 10. a Betty, Chris, Audrey  
 b i 10 km/h ii 15 km/h iii 20 km/h  
 c 25 km from the village at 2.30 pm  
 d Audrey: 10 km, Betty: 9 km, Chris: 15 km  
 e 5 km

Revision Exercise 4.4 (p. 338)

1. a i 807 ii 0.02 iii 0.13 iv 0.206  
 b i 105 618 ii 27 iii 8694 iv 3967  
 2. a  $\frac{1}{5}$  b  $5\frac{1}{3}$   
 c i  $2\frac{1}{2}$  ii  $\frac{2}{3}$  iii  $6\frac{3}{4}$   
 3. a  $W = 2x + y$  b  $P = 1$  c  $Q = 36$   
 4.



5. a i  $87\,500 \text{ m}^2$  ii 8.75 ha  
 b 21.6 acres  
 6. a 80 m b 17.2 m  
 7. a 3 : 1 b  $x = 3$   
 8. a 12  
 b i  $x > 2$   
  
 ii  $x < 7$   
  
 c  $x = 1.71$   
 9. a  $m = -3$  b  $c = -3$  c  $y = -3x - 3$   
 10. a 72 miles b 81 miles c 18 miles

Revision Exercise 4.5 (p. 339)

1. a  $d = 35, e = 65, f = 80$  b  $d = 115$   
 2. a i 0.88 cm ii 25.6 mm  
 b 266  
 c i 243 g ii 81  $\text{cm}^2$   
 3. a  $\frac{2}{9}$  b  $\frac{2}{3}$  c  $\frac{7}{9}$   
 4. a  $A = 3a^2$  b  $X = 34$  c  $n$ th term =  $3n$   
 5. a i No ii Yes; 24 sides  
 b  $p = 66$   
 6. a 8.37 cm b 0.5 m c  $51 \text{ m}^2$   
 7. a 30 cm and 90 cm  
 b i 9.55 cm and 28.6 cm ii  $71.6 \text{ cm}^2$  and  $645 \text{ cm}^2$   
 c i 3 ii  $9, 9 = 3^2$   
 8. a There is a negative correlation.  
 b There is a positive correlation.  
 c There is no correlation.  
 d Yes, from the correlation shown in graph B.

Exercise 5C (p. 102)

1. -4 10. 20 19. 33  
 2. 3 11. -4 20. 50  
 3. -2 12. 21 21. 19  
 4. -12 13. 2 22. 16  
 5. 1 14. -4 23. 2  
 6. -30 15.  $\frac{1}{4}$  24. 105  
 7. -2 16. -1 25.  $3\frac{1}{3}$   
 8. 2 17. -12 26. 4.1  
 9. -12 18. 5 27. 6.98  
 28. a 4 b 20  
 29. a  $1\frac{1}{4}$  b  $4\frac{7}{8}$   
 30. a 12.5 b -14.15

31.

x	-2	-1	0	1	4
y	8	6	4	2	-4

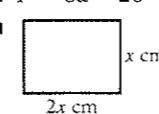
32.

R	-1	0	1	3
P	-80	-30	20	120

33.

n	1	2	3	4	5	6
n	7	4	1	-2	-5	-8

Exercise 5D (p. 105)

1.  $P = 2(l + w)$  11.  $P = 6b$   
 2.  $P = 3l$  12.  $A = 2b^2$   
 3.  $P = 2l + d$  13.  $W = T + S$   
 4.  $P = 2l + s + d$  14.  $r = p - q$   
 5.  $P = 6l$  15.  $d = b - a$   
 6.  $P = 4a + 6b$  16.  $y = x + 1$   
 7.  $W = x + y$  17.  $L = \frac{ny}{100}$   
 8.  $T = N - L$  18.  $A = 100 \text{ lb}$   
 9.  $C = nx$  19.  $T = t + \frac{s}{60}$   
 10.  $L = l - d$   
 20. a  $C = \frac{n}{2}$  b £6.00  
 21. a  $V = pqr$  b  $125 \text{ cm}^3$   
 22. a  $P = 6a - 20$  b 21.4 cm c 6  
 23. a  b  $P = 6x$  c 6 cm  
 24.  $P = L - Nr; 5 \text{ m}$

Exercise 5E (p. 108)

1.  $n$ th term =  $2n$  3.  $n$ th term =  $10n$  5.  $n$ th term =  $\frac{n}{5}$   
 2.  $n$ th term =  $5n$  4.  $n$ th term =  $\frac{n}{2}$  6.  $n$ th term =  $\frac{n}{10}$   
 7. Question 1: Double the position number  
 Question 2: Multiply the position number by 5  
 Question 3: Multiply the position number by 10  
 Question 4: Half the position number  
 Question 5: Divide the position number by 5  
 Question 6: Divide the position number by 10  
 8. a 

n	1	2	3	4	5
n	3	5	7	9	11

  
 b  $n$ th term =  $2n + 1$   
 9. a 

n	1	2	3	4	5
n	9	14	19	24	29

  
 b  $n$ th term =  $5n + 4$

10. a

n	1	2	3	4	5
n	1	4	7	10	13

b  $n$ th term =  $3n - 2$

11. a

n	1	2	3	4	5
n	5	9	13	17	21

b  $n$ th term =  $4n + 1$

12. 5, 8, 11, 14, ... 26 15. 1, 7, 13, 19, ... 43  
 13. 2, 6, 10, 14, ... 30 16. 3.5, 4, 4.5, 5, ... 7  
 14. 8, 13, 18, 23, ... 43 17. 2.1, 2.2, 2.3, 2.4, ... 2.8  
 18.  $2n + 5$  20.  $5n + 2$  22.  $9n + 2$   
 19.  $3n + 1$  21.  $4n - 3$  23.  $7n - 4$

24.

n	1	2	3	4	5
n	1	4	9	16	25

a number of squares =  $n^2$  b  $N = 100$

25. a

n	1	2	3	4	5	6
n	1	3	5	7	9	11

b number of tiles =  $2n - 1$   
 c 23  
 d  $N = 14$

26. a

n	1	2	3	4
n	6	10	14	18

b  $N = 4n + 2$  d 7  
 c 50 e 10, yes, 2

27. a

n	1	2	3	4	5
n	5	9	13	17	21

b number of matchsticks =  $4n + 1$   
 c 81  
 d  $N = 16$   
 28.  $14 - 2n$  30.  $6 - 2n$  32.  $n^2$  34.  $n^2 + 2$   
 29.  $20 - 3n$  31.  $10 - 5n$  33.  $n^2 + 5$  35.  $n^2 - 1$

Exercise 5F (p. 113)

1. a  $P = 36$  b  $R = \frac{1}{4}$   
 2. a -10 d -6 g 5  
 b 7 e -24 h 3  
 c 18 f -21 i -5  
 3. a  $A = 27$  b  $A = 10$  c  $A = -40$   
 4.  $Q = 1000 - p$  6. 2, 7, 12, 17, ... 97  
 5.  $Z = x - y + 48$  7.  $7n - 3$

Summary 2

Revision Exercise 2.1 (p. 117)

1. a 7 b 2 c 2 d 0  
 2. a 40 b 2500 c 84 400 d 0.350  
 3. a i 9 ii 7 iii 170 iv 37  
 b A, B and D  
 4. a  $d = 135$  b  $e = 138, f = 140, g = 82$   
 5. a  $d, h$  b  $d, c$  c  $e$  and  $c$   
 6. a  $13\frac{1}{2}$  b 20 c  $\frac{11}{18}$   
 7. a  $\frac{1}{8}$  b  $12\frac{1}{2}\%$  c 0.125  
 8. a 50 g b  $\frac{1}{10}$  c i 10% ii 110%  
 9. a 2 b  $1\frac{1}{6}$  c  $\frac{2}{3}$   
 10. a 155% b i £756 ii £494

**Revision Exercise 2.2 (p. 119)**

- 0.8
- a**  $\frac{1}{5}$       **b**  $\frac{4}{5}$       **c**  $\frac{5}{12}$       **d**  $\frac{3}{4}$
- a**  $\frac{1}{4}$       **b**  $\frac{3}{4}$       **c**  $\frac{1}{16}$       **d**  $\frac{3}{4}$
- 10
- a** BWM, BMW, WBM, WMB, MBW, MWB  
**b** BWCM, BMCW, WBCM, WMCB, MBCW, MWCB
- a i** -10    **ii** 24    **iii** -15    **iv** -3      **b**  $N = 5n$
- a** -2      **b**  $V = abc$
- a**  $P = 2(l + b)$       **b**  $n$ th term =  $n + 3$
- a**  $P = 3(l + 1)$       **b**  $P = 6a + 5$
- a** 5, 8, 11, 14;  $3n + 2$   
**b i** 10, 13, 16, 19, 37    **ii** 28, 26, 24, 22, 10

**Revision Exercise 2.3 (p. 120)**

- a i** 90 000    **ii** 17.4    **iii** 3.1    **iv** 80 100  
**b i** 28 000    **ii** 5.88    **iii** 4000    **iv** 5.03
- a i** 12    **ii** 6    **iii** 9    **iv** 60  
**b** 66 499, 65 500
- a** sum      **b** equal      **c**  $124^\circ$
- a**  $70^\circ$       **b**  $d = 80, e = 100$
- a i**  $5\frac{3}{5}$     **ii**  $1\frac{3}{32}$     **iii**  $1\frac{4}{5}$     **b** 10    **c** 4
- a** 1.2      **b** 0.7      **c** £140    **d** 468
- a**  $\frac{1}{3}$       **b**  $\frac{2}{3}$
- 20
- a** 7      **b**  $204^\circ\text{C}$  (nearest degree)    **c** 54
- a i** 1, 6, 11, 16; 56    **ii** 7, 4, 1, -2; -26  
**b i**  $3n + 5$       **ii**  $15 - 2n$

**Revision Exercise 2.4 (p. 122)**

- a** 4.3, 20, 0.049, 0.000 33  
**b** 1449, 1350
- a** A, C and D  
**b i** 7600,    **ii** 7.7,    **iii** 54 000,    **iv** 1.08
- a**  $d = e = f = h = 125, g = 55$   
**b**  $p = 115, q = 65, r = s = 125$
- a** equal  
**b** supplementary
- a i**  $7\frac{7}{8}$     **ii**  $1\frac{13}{27}$     **iii**  $\frac{2}{3}$     **iv**  $1\frac{1}{2}$   
**b**  $2\frac{1}{2} \div \frac{2}{3}$  by  $2\frac{1}{12}$
- a** 140%    **b** 75%
- a**  $\frac{1}{13}$     **b**  $\frac{1}{26}$     **c**  $\frac{1}{52}$     **d**  $\frac{25}{26}$
- a**  $\frac{1}{2}$     **b**  $\frac{1}{4}$     **c**  $\frac{3}{4}$
- a**  $a = 11$     **b**  $N = 30$     **c**  $Q = 4$
- a**  $P = 4$     **b**  $n$ th term =  $n - 2$

**Chapter 6**

**Exercise 6A (p. 126)**

- no, the angles are not all equal
- yes, all sides are equal, all angles are  $90^\circ$
- no, the sides are not all equal
- no, the sides are not all equal, the angles are not all equal
- no, only two angles and two sides are equal
- no, the sides are not all equal, the angles are not all equal
- yes, all sides are equal, all angles are  $60^\circ$
- no, it is not a polygon

**Exercise 6B (p. 127)**

- all answers in degrees
- 180
  - 360
  - a**  $p = 100, q = 125, r = 135, x = 55$   
**b** 360
  - a**  $w = 120, x = 60, y = 120, z = 60$   
**b** 360
  - a**  $w = 110, x = 70, y = 50, z = 130$   
**b** 360
  - 360
  - a** equilateral    **c** 120      **e** 360  
**b** 60      **d** 60

**Exercise 6C (p. 129)**

- all answers in degrees
- 60      **6.**  $m = 90, p = 90$
  - 90      **7.** 95
  - 50      **8.** 125
  - 50      **9.** 50
  - 30      **10.** 30
  - a** 5 sides    **b** 8 sides

**Exercise 6D (p. 131)**

- all answers in degrees
- 36      **4.** 60      **7.** 40
  - 45      **5.** 24      **8.** 22.5
  - 30      **6.** 20      **9.** 18

**Exercise 6E (p. 132)**

- all answers in degrees
- 720      **6.** 1800
  - 540      **7.** 2880
  - 1440    **8.** 1260
  - 360      **9.** 2340
  - 900      **10.**  $180n - 360$

**Exercise 6F (p. 133)**

- all answers in degrees
- a** 3240    **b** 2520    **c** 1620
  - 80    **4.** 105    **6.** 130    **8.** 108    **10.** 144
  - 110    **5.** 85    **7.** 125    **9.** 120    **11.** 150
  - a** 18 sides    **b** 24 sides
  - a** 12 sides    **b** 20 sides
  - a** yes, 12 sides    **d** yes, 6 sides  
**b** yes, 9 sides    **e** no  
**c** no    **f** yes, 4 sides
  - a** yes, 4 sides    **d** yes, 72 sides  
**b** yes, 6 sides    **e** yes, 36 sides  
**c** no    **f** yes, 8 sides
  - 36      **21.** 36
  - 45      **22.**  $p = 115, q = 130, r = 115$
  - 31      **23.**  $\hat{C} = \hat{D} = 130, \hat{E} = \hat{B} = 50^\circ$
  - a** 72      **b**  $p = 90, q = 108, r = 72$
  - a** 60      **b**  $p = 90, q = 120, r = 60$
  - $x = 55, y = 125$
  - $p = q = 90, r = 145, s = 125$
  - a**  $55^\circ$     **b**  $100^\circ$     **c**  $105^\circ$
  - $p = s = 65, q = 115, r = 20$
  - 22.5
  - 45

**Exercise 15C (p. 311)**

- a** 2 hours      **b** 3 hours
- a** 5 hours      **b**  $3\frac{1}{4}$  hours
- a**  $\frac{1}{2}$  an hour    **b**  $1\frac{1}{4}$  h
- a**  $2\frac{1}{2}$  h      **b**  $5\frac{1}{3}$  h
- a**  $1\frac{1}{2}$  h      **b** 5 h
- a**  $1\frac{1}{2}$  h      **b**  $4\frac{1}{2}$  h
- a** 25 s      **b** 200 s
- a** 24 min      **b** 54 min
- a** 216 h (9 days)    **b** 126 h (5 days 6 h)
- a**  $1\frac{1}{4}$  h      **b**  $2\frac{3}{4}$  h
- a**  $2\frac{1}{2}$  h      **b**  $5\frac{1}{3}$  h
- a** 45 min      **b**  $3\frac{1}{4}$  h

**Exercise 15D (p. 312)**

- 80 km/h    **12.** 17 m/s    **23.** 60 mph
- 60 km/h    **13.** 80 km/h    **24.** 105 mph
- 60 mph    **14.** 90 km/h    **25.** 51.7 km/h
- 120 mph    **15.** 64 km/h    **26.** 43 km/h
- 20 m/s    **16.** 120 km/h    **27.** 80 km/h
- 45 m/s    **17.** 12 km/h    **28.** 42.7 km/h
- 50 km/h    **18.** 8 km/h    **29.** 80 km/h
- 65 km/h    **19.** 18 km/h    **30.** 90 km/h
- 35 mph    **20.** 18 km/h    **31.** 50 km/h
- 8 mph    **21.** 54 mph
- 36 m/s    **22.** 54 mph

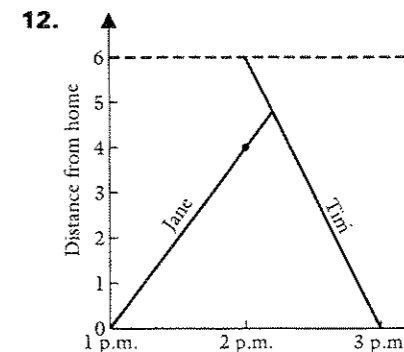
**Exercise 15E (p. 316)**

- 9 km/h    **4.** 7 mph    **7.** 3 knots
- 10 mph    **5.** 75 km/h
- 7 mph    **6.** 125.5 mph

**Exercise 15F (p. 317)**

- a i** 1215    **ii** 1348    **iii** 1445  
**b**  $2\frac{1}{2}$  hours  
**c i** 1 h 15 min    **ii** 1 h 15 min  
**d** 64 km/h
- a i** 175 km    **ii** 125 km    **iii** 60 km  
**b i** 4 h 45 min    **ii** 1 h 39 min  
**c** 75.8 mph  
**d** 210 miles from A  
**e** 1157
- a i** 90 km    **ii** 50 km  
**b** 5 hours  
**c** 28 km/h  
**d** 28 km  
**e i** 42 km    **ii** 48 km
- a** 45 km    **c** 30 km/h    **e** 45 km/h  
**b** 1 h 30 min    **d** 1 hour    **f** 36 km/h
- a i** At B    **ii** At B  
**b i** 80 km/h    **ii** 56 km/h  
**c** 30 min  
**d** 2 h 55 min from A to C  
**e** 54.9 km/h (including the stop)
- a**  $7\frac{1}{2}$  miles    **e** 2 h 30 min  
**b** 3    **f** 3 mph  
**c** 45 min    **g** the third stage  
**d** 1 h 45 min    **h** first and last

- a** 150 miles    **d** 1 hour  
**b** 2 hours    **e** 1330;  $2\frac{1}{2}$  h  
**c** 75 mph    **f** 60 mph
- a** 56 miles    **c** 56 mph  
**b** 45 min    **d**  $37\frac{1}{3}$  mph
- a i** 0830    **ii** 1330  
**b** 5 hours    **d** 4 km/h  
**c** 1 h 30 min    **e** 7 hours
- a** 78.3 km/h; 1430    **c** 1410; 26 km from B  
**b** 100 km/h; 1354    **d** 42 km
- a** Andrew    **e** Tom  
**b** Andrew    **f** Kate set off for home straight away.  
**c** Kate    **g** Stayed for over 1 hour  
**d** Kate



- 1.3 miles from Cornforth at 2:12 p.m.
- about 0.3 miles
- 8:35 a.m.; 8:47 a.m.; 4 min; 8 min

**Exercise 15G (p. 327)**

- a** 21.9 km    **b** 1 h 36 min
- a** 14 hours    **b** 57 hours
- 80 km/h
- a** 20 km    **b** 2 h 30 min    **c** 8 km/h
- 57.3 mph
- 5 mph
- a** 15 km    **c** 10 min    **e** 45 km/h  
**b** 1 h 40 min    **d** 9 km/h    **f** 11 miles

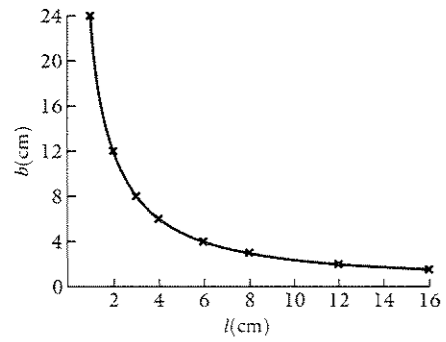
**Summary 4**

**Revision Exercise 4.1 (p. 333)**

- a i** 2 : 5    **ii** 6 : 9 : 10  
**b** £30 and £36
  - a**  $x = 10$     **b** 1.5 m
  - a** 1 : 20 000    **b** 6 cm
  - a** 5 : 4    **b** 21 cm
  - a** 2 : 1    **b** 3.33 cm
  - a i** 10    **ii** 35    **iii** -28    **iv** -10  
**b i**  $8x - 12$     **ii**  $x + 16$     **iii**  $x + 13$     **iv**  $6x - 24$   
**c i**  $P = 18$     **ii**  $P = 3$
  - a i**  $x = 2$     **ii** 4.76  
**b i**  $x < 2$     **ii**  $x < 8$     **iii**  $x > 9$
- 
- a i**  $5a^2$     **ii**  $3b^3$   
**b i**  $5x - 1$     **ii** -9
  - a i**  $x = 14$     **ii**  $x = 3$   
**b**  $x = \pm 0.812$
  - $x = 1.4$

9. 

b	24	12	8	6	4	3	2	1.5
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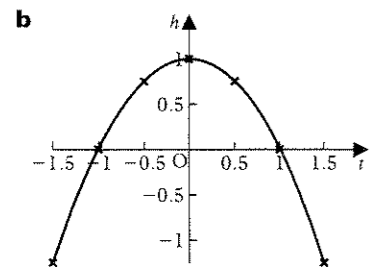


a i 1.7 ii 10 b i 2.4 ii 8.6

Exercise 14C (p. 300)

1. a 

$t^2$	2.25	1	0.25	0	0.25	1	2.25
$h$	-1.25	0	0.75	1	0.75	0	-1.25

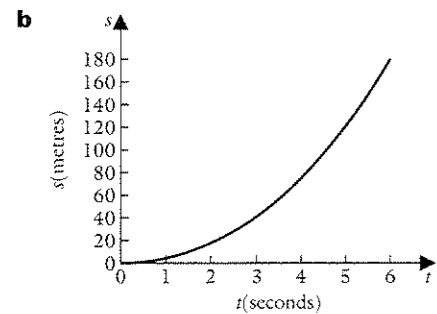


c i 0.75 m above normal ii 0.75 m above normal  
d 1.4; 1.4 s before or after water level at highest point  
e 0.4 m below normal

2. a 

$t$	0	0.5	1	1.5	2	2.5	3	3.5
$t^2$	0	0.25	1	2.25	4	6.25	9	12.25
$s$	0	1.25	5	11.25	20	31.25	45	61.25

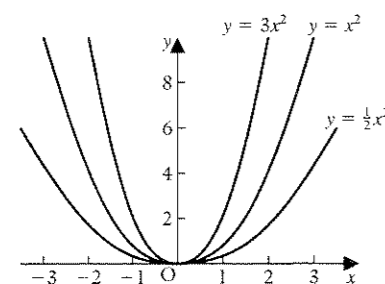
$t$	4	4.5	5	5.5	6
$t^2$	16	20.25	25	30.25	36
$s$	80	101.25	125	151.25	180



c 58 m d 4.5 seconds.

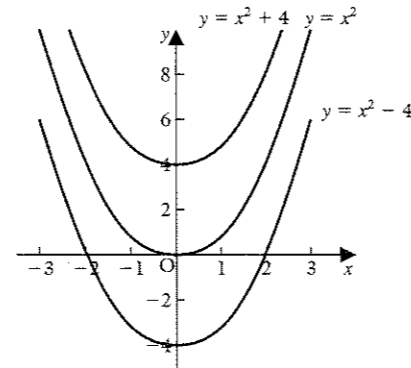
Exercise 14D (p. 302)

1. Parts a, b and c



d The formula  $y = ax^2$  produces a U-shaped curve; the curve becomes steeper as  $a$  increases.

2. Parts a and b

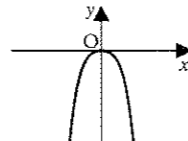


c All the same shape;  $a$  gives the intercept value on the  $y$ -axis

3. These curves are 'upside down', i.e. inverted U-shapes.  
4. a  $y = -4; x = 1$   
b i -1.2 and 3.2 ii 4.5 and -2.5  
5. a  $y = 6.25; x = 0.5$   
b i -2.4 and 3.4 ii -1 and 2

Exercise 14E (p. 305)

1. B  
2. The curves in A and D do not turn at O; C is inverted.  
3.



4. e.g.  
a  $y = x^2 - 2$  b  $y = x^2 + 1$  c  $y = -x^2$   
d  $y = x^2 + bx + c$ , where  $b$  is negative and  $c$  is positive

Chapter 15

Exercise 15A (p. 307)

1. a 90 km b 2 h c 45 km  
2. a 160 km b 5.7 h c 28 km  
3. a 30 km b 3 h c 10 km  
4. a 16 m b 6 s c 2.67 m  
5. a 10 m b 8 s c 1.25 m

Exercise 15B (p. 309)

6. a  $7\frac{1}{2}$  km b  $11\frac{1}{4}$  km c 54 km  
7. a  $7\frac{1}{2}$  km b  $12\frac{1}{2}$  km  
8. a 105 miles b 44 miles  
9. a 2 miles b 14 miles  
10. a 800 km b 1100 km  
11. a 48 km b 84 km  
12. a 1200 miles b 1650 miles  
13. a 90 km b 135 km  
14. a 9 miles b 15 miles  
15. a 52.5 m b 89.25 m  
16. a 32 miles b 38 miles  
17. a 1755 miles b 4185 miles  
18. a 30 b 72

Exercise 6G (p. 139)

1. 1, 2

2. Every parallelogram tessellates. Since any triangle plus an identical triangle can be placed together to form a parallelogram it follows that every triangle tessellates.  
3. The interior angle of a pentagon is  $108^\circ$  which does not divide exactly into  $360^\circ$ , i.e. it takes  $3\frac{1}{3}$  tiles to surround a point.  
4. a Interior angle  $135^\circ$  which does not divide exactly into  $360^\circ$   
b A square  
5. An equilateral triangle; two equilateral triangles can be arranged to give a parallelogram and all parallelograms tessellate. A square  $- 4 \times 90^\circ = 360^\circ$

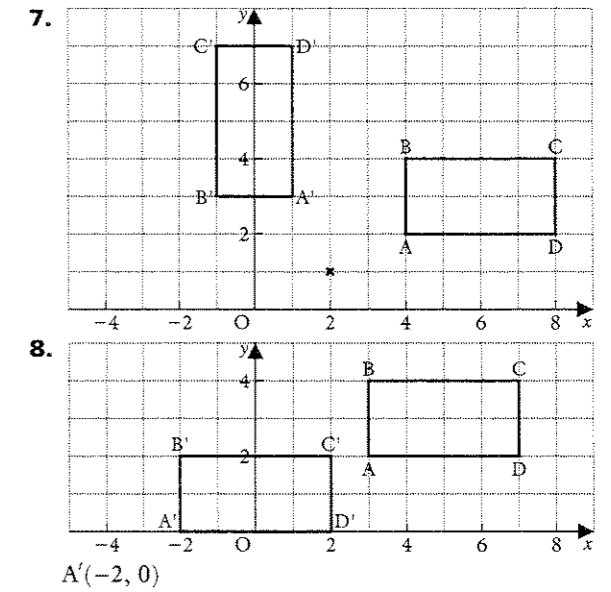
Exercise 6H (p. 140)

1.  $p = 60, m = 120$   
2.  $30^\circ, 150^\circ$   
3.  $127^\circ$   
4. 30  
5. a yes;  $45^\circ$  divides exactly into  $360^\circ$   
b no;  $75^\circ$  does not divide exactly into  $360^\circ$ .  
6.  $x = 100$   
7. a true c false e false  
b true d true f true

Chapter 7

Exercise 7B (p. 146)

1. a b c
2.   
3. a D b A, C and E c None  
4. a C and D b A and D c B  
5. a b c
- b
6.  $90^\circ$  clockwise



Exercise 7C (p. 149)

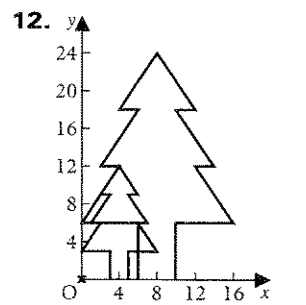
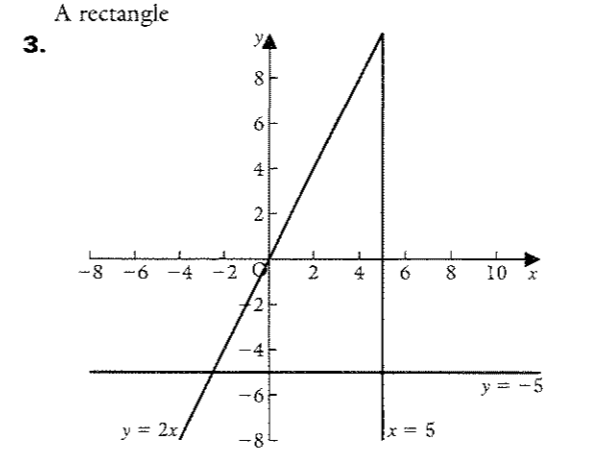
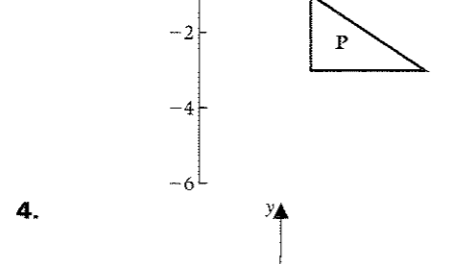
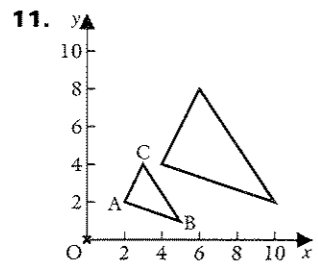
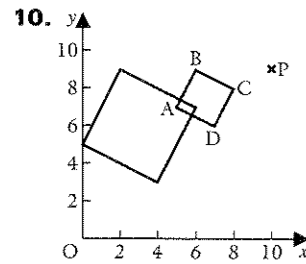
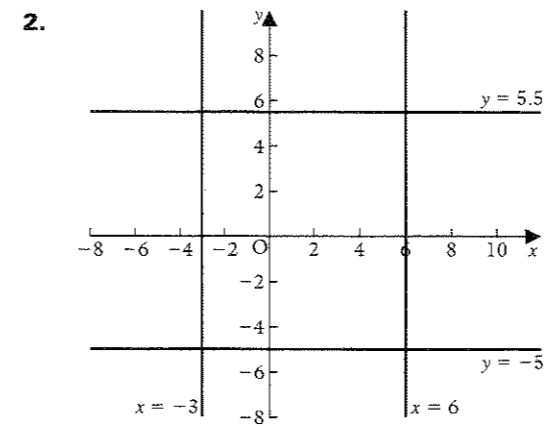
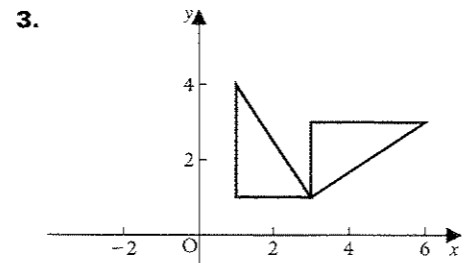
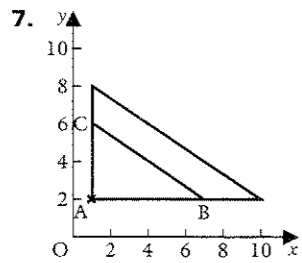
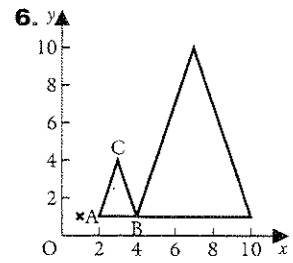
1. (0, 0),  $180^\circ$  5. (1, 0),  $180^\circ$   
2. (2, 0),  $180^\circ$  6. (1, 0),  $90^\circ$  anticlockwise  
3. (2, 1),  $90^\circ$  clockwise 7. (3, 1),  $180^\circ$   
4. (4, 2),  $180^\circ$  8. (4, 0),  $180^\circ$

Exercise 7E (p. 151)

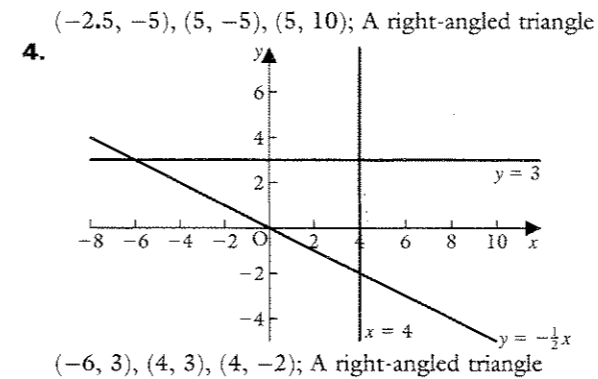
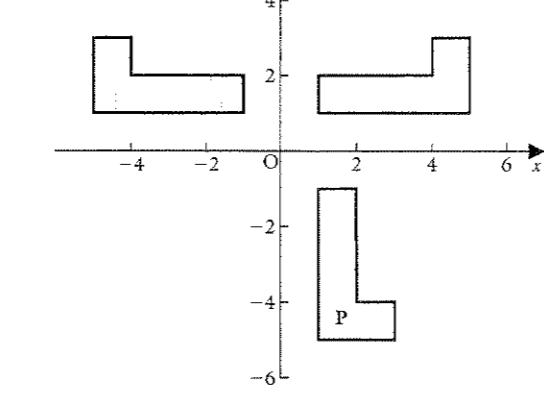
1. a (7, 2)  
b  $A'B'C'D'$  has sides twice as long as those of ABCD, angles unchanged  
2. a (0, 0)  
b  $A'B'C'D'$  has sides four times as long as those of ABCD, angles unchanged  
3. (6, 0) 4. (-2, 4) 5. (8, 4)  
6. a Parallels in all three questions: PQ and  $P'Q'$ , PR and  $P'R'$ , QR and  $Q'R'$   
b i equal ii equal iii equal  
7. a (2, 1)  
b The angles are unchanged; the sides of  $\triangle P'Q'R'$  are twice as long as those of  $\triangle PQR$ .  
8.  $P(10, 2); PX' = 2PX, PY' = 2PY, PZ' = 2PZ$   
9. (4, 6) 11. (2, 4) 13. (3, 2)  
10. (3, 9) 12. (2, 2)

Exercise 7F (p. 155)

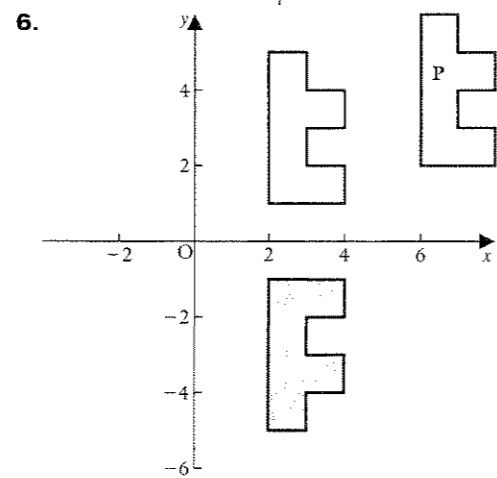
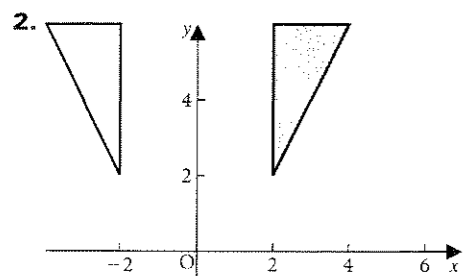
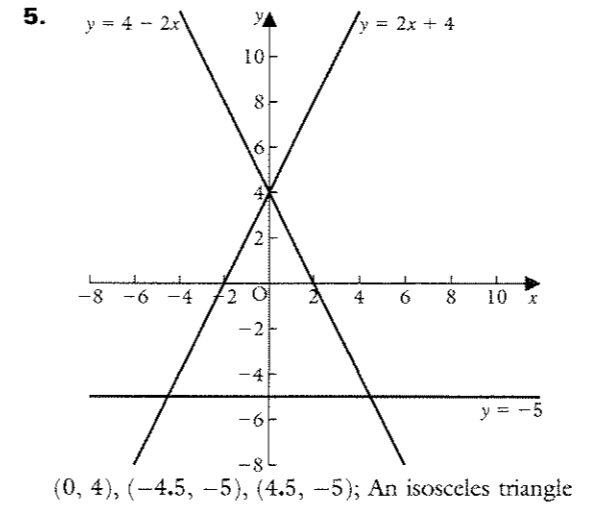
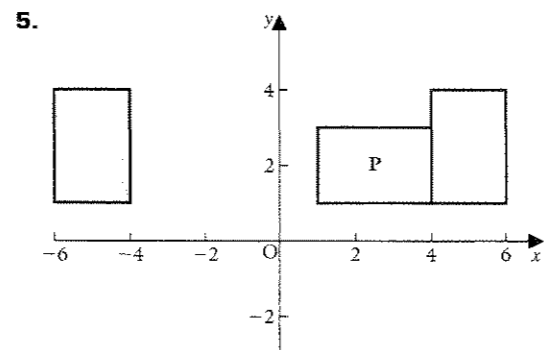
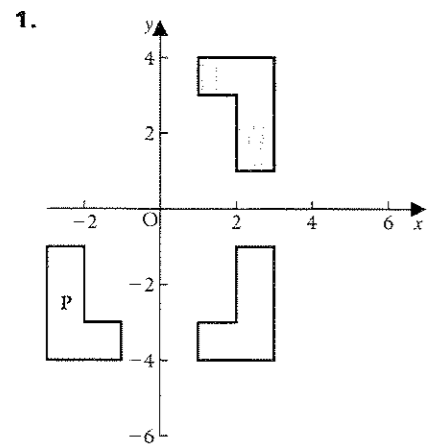
1. Scale factors: 2, 4, 2, 2,  $1\frac{1}{2}$   
2.   
3.   
4.   
5.



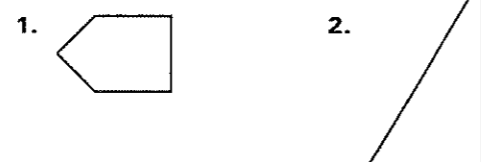
A Christmas tree; all coordinates in the image are twice the corresponding coordinates in the object.



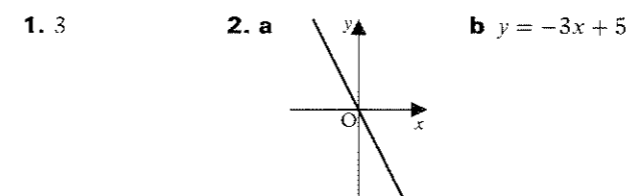
Exercise 7G (p. 158)



Exercise 7H (p. 159)



Exercise 13G (p. 291)

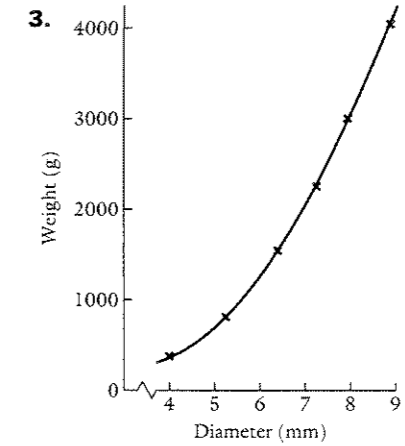


3. -2  
5. a  $-\frac{3}{5}$       b 3      c  $y = 3 - \frac{3}{5}x$   
4.  $y = x + 1$

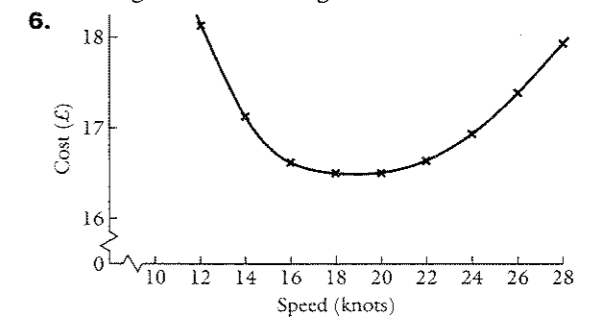
Chapter 14

Exercise 14B (p. 295)

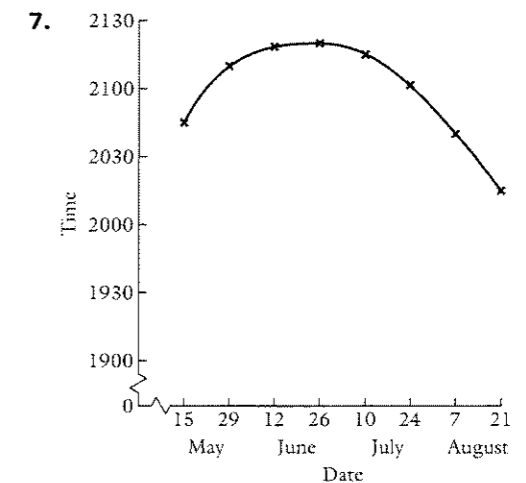
1. It is not possible to read a value more accurately with certainty.  
2. a i 160.5 cm    ii 147 cm  
b 17.4 years  
c Little growth  
d 15 and 16; the curve is at its steepest here  
e No, a smaller scale would be needed to fit an A4 sheet so values could not be read as accurately.



- a 1270 g    b 6.95 mm  
4. a i 8.7 s    ii 15.5 s    b i 135 km/h    ii 192 km/h  
5. a i 310 g    ii 930 g    b i 63 days    ii 160 days  
c 200 g    d 25 g    e 60 to 70 days



- a 19 knots £16.48    c i £17.55    ii £17.10  
b 14.3 and 24.3 knots

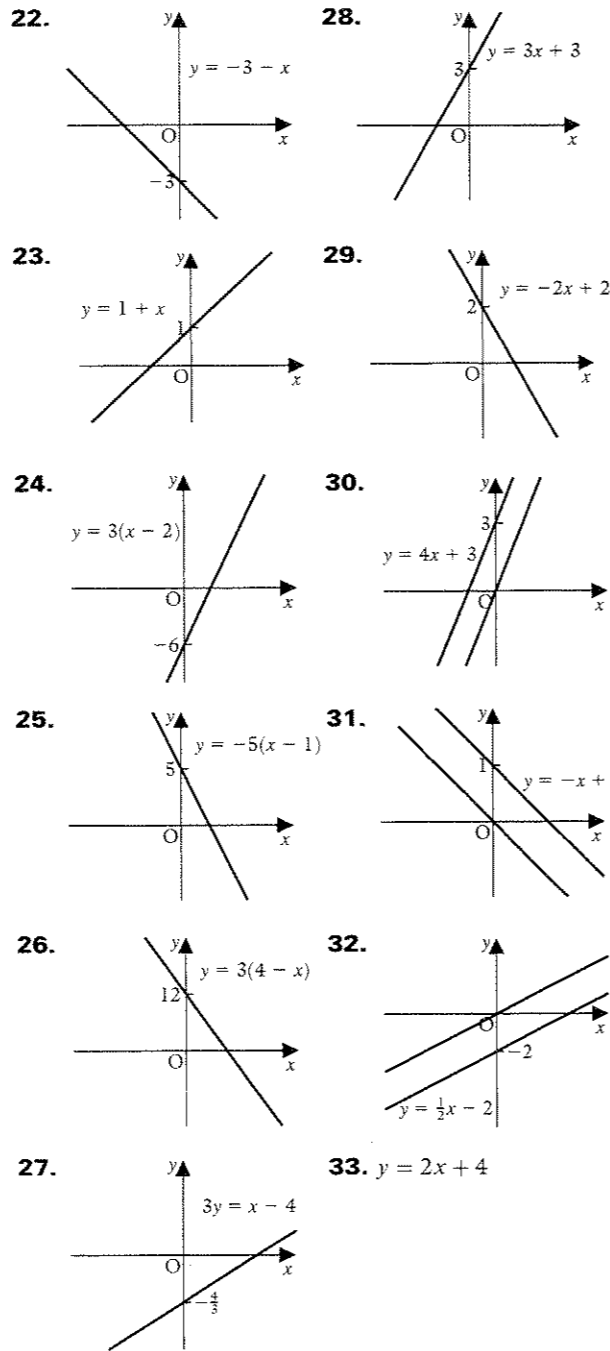
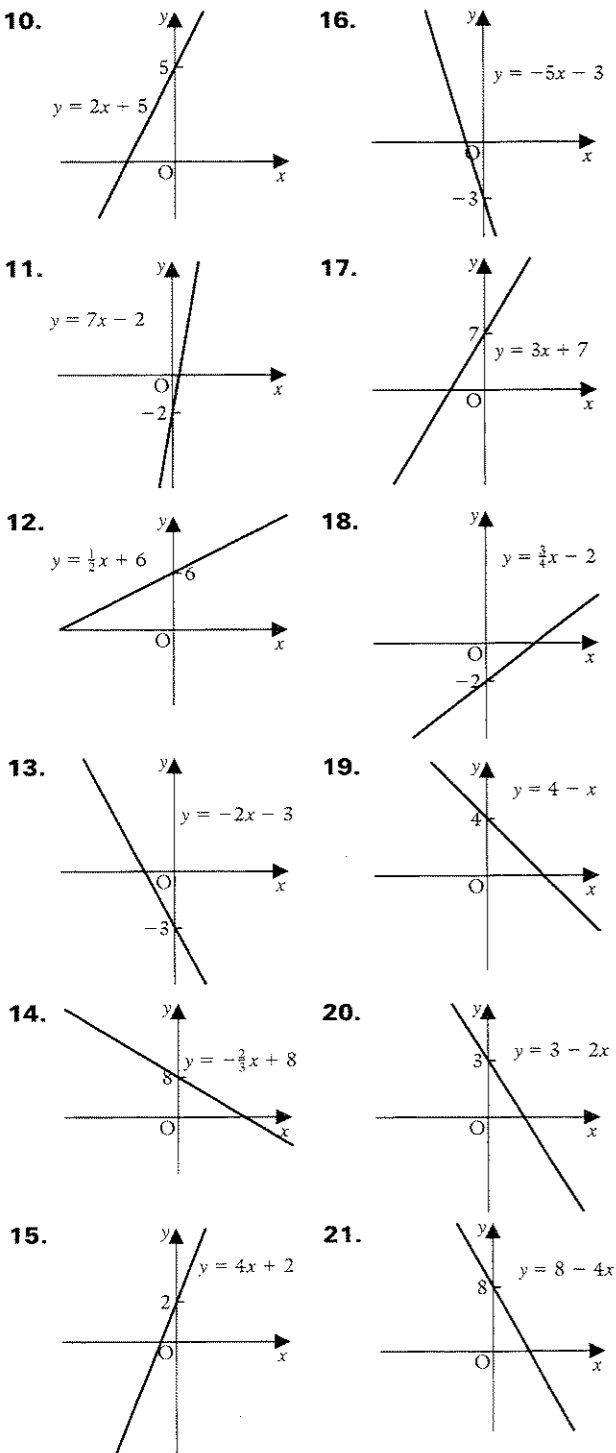


- a 2108    b 14 August  
8. a 5.1 litres/100 km    b 46.5 mpg

3. a 2  
d  $y = 2x + 3$   
e 2 is the coefficient of  $x$ , 3 is where the line cuts the  $y$ -axis
4. a -1  
d  $y = -x + 3$   
e -1 is the coefficient of  $x$ , 3 is where the line cuts the  $y$ -axis
5. b 3, 1  
6. b -3, 4  
7. b  $\frac{1}{2}$ , 4  
8. b -2, -7
- b 3  
c i -5 ii 7  
c i 7 ii -5  
c i 3 ii 4  
c i -5 ii -6.5

**Exercise 13D (p. 286)**

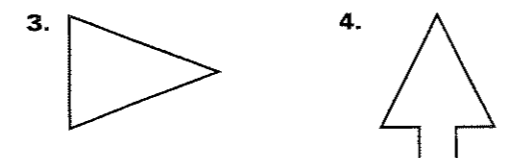
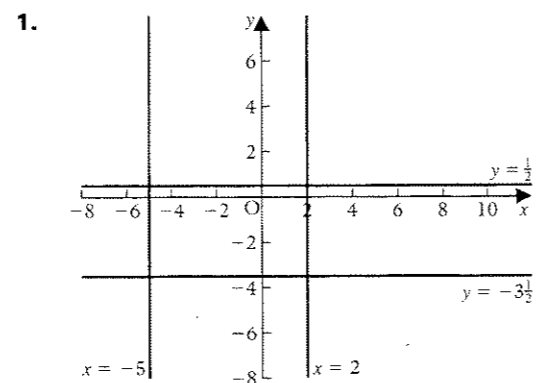
1.  $m = 4, c = 7$  4.  $m = -4, c = 5$  7.  $m = \frac{3}{4}, c = 7$   
2.  $m = \frac{1}{2}, c = -4$  5.  $m = 7, c = 6$  8.  $m = -3, c = 4$   
3.  $m = 3, c = -2$  6.  $m = \frac{2}{5}, c = -3$  9.  $m = -3, c = 4$



**Exercise 13E (p. 288)**

1. (3, 5) 4.  $x = 1.5, y = 4.5$   
2. (-2, 0) 5.  $x = -4.3, y = 1.1$   
3. (-3, -7) 6.  $x = 0.5, y = 2$

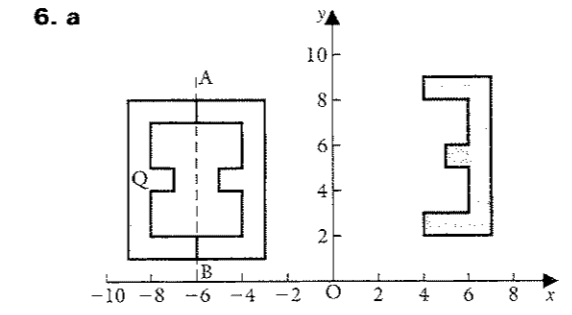
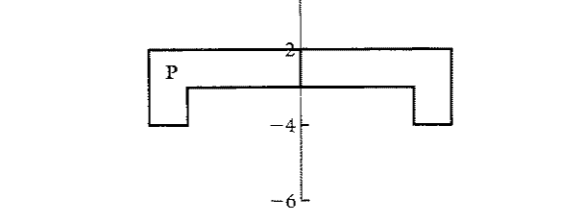
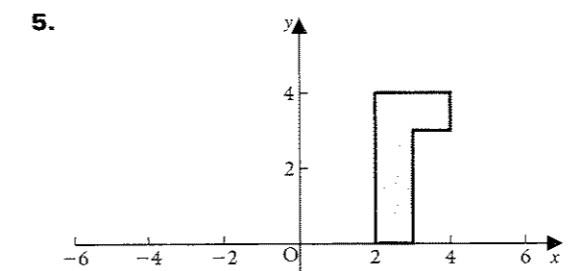
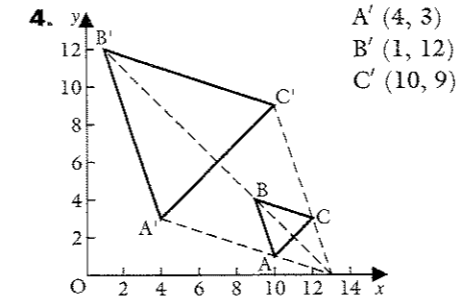
**Exercise 13F (p. 290)**



3. B1: reflect horizontally; B2: rotate 90° clockwise, then rotate 90° clockwise again.
4. B1: rotate 90° clockwise, then rotate 90° clockwise again. B2: reflect horizontally, then rotate 90° clockwise

**Exercise 71 (p. 161)**

1. a B, D b B c A, C  
2. a (3, 2) b 90° anticlockwise  
3. (13, 2)



**Chapter 8**

**Exercise 8A (p. 165)**

1.  $\text{cm}^2$  5.  $20.25 \text{ m}^2$   
2.  $\text{m}^2$  6.  $4.68 \text{ mm}^2$   
3. 3600 7.  $2500 \text{ cm}^2$   
4. 2 8.  $8925 \text{ m}^2$
9. a  $6 \text{ cm}^2$  d  $0.65 \text{ m}^2$  g  $0.08 \text{ km}^2$   
b  $0.35 \text{ m}^2$  e  $0.75 \text{ cm}^2$  h  $5500 \text{ mm}^2$   
c  $600 \text{ cm}^2$  f  $1\,050\,000 \text{ m}^2$
10.  $0.5 \text{ m}^2$  is far too large. It would not go in her bag.

11.  $5.5 \text{ m}^2$  13.  $3000 \text{ m}^2$   
12.  $21\,000 \text{ cm}^2$  14.  $10\,000 \text{ m}^2$   
15. a  $105\,000 \text{ g}$  b  $105 \text{ kg}$   
16. 600  
17.  $23.375 \text{ ha}$   
18.  $43\,500 \text{ m}^2$   
19. 48  
20.  $3900 \text{ m}^2$

**Exercise 8B (p. 167)**

1.  $64 \text{ sq in}$  3.  $1200 \text{ sq yd}$   
2.  $36 \text{ sq ft}$  4.  $28\,800 \text{ sq yd}$   
5. a  $792 \text{ sq in}$  b  $243 \text{ sq ft}$  c  $4 \text{ sq yd}$  d  $3.5 \text{ sq ft}$   
6. a  $4590 \text{ sq yd}$  b  $41\,310 \text{ sq ft}$   
7.  $8.75 \text{ sq ft}$ ,  $0.25 \text{ sq ft}$  smaller  
8.  $808 \text{ sq ft}$   
9. a  $22.5 \text{ sq ft}$  b  $216 \text{ sq in}$   
10.  $6.71 \text{ acres}$   
11.  $6.42 \text{ acres}$   
12.  $655.8 \text{ acres}$   
13. a  $60\,300\,000 \text{ acres}$   
b  $24\,400\,000 \text{ ha}$   
c  $244\,000 \text{ km}^2$  (all correct to 3 s.f.)  
14.  $78\,744 \text{ km}^2$ . Only accurate to at most 4 s.f. since the conversion factor used was correct to 5 s.f.  
15. a  $56 \text{ ha}$  b  $138 \text{ acres}$ .

**Exercise 8C (p. 170)**

1.  $0.4 \text{ cm}$  6.  $1.5 \text{ m}$   
2.  $5 \text{ cm}$  7.  $1.25 \text{ cm}$   
3.  $10 \text{ m}$  8.  $3 \text{ m}$   
4.  $4 \text{ mm}$  9.  $7 \text{ m}$   
5.  $5 \text{ cm}$  10.  $6 \text{ cm}$

**Exercise 8D (p. 171)**

1. 3 11. 0.0001 21. 49 31. 8.19  
2. 6 12. 0.25 22. 4900 32. 2.39  
3. 2 13. 0.0049 23. 490 000 33. 25.5  
4. 9 14. 0.0036 24. 49 000 000 34. 101.0  
5. 7 15. 0.0144 25. 6.20 35. 2000  
6. 11 16. 1.21 26. 4.45 36. 89.4  
7. 8 17. 1.44 27. 20.7 37. 8.94  
8. 12 18. 400 28. 65.0 38. 3.35  
9. 0.01 19. 160 000 29. 5.66 39. 4.90  
10. 0.04 20. 1600 30. 3.13 40. 27.0

41. a 2.45 b 24.5 c 245 d 7.75  
e  $77.5$ , e.g.  $\sqrt{6 \times 100}$  has the same digits as  $\sqrt{6}$  but the point is in a different place.  $\sqrt{6 \times 10}$  has different digits.  
42. a 2.24 b 0.707 c 0.224 d 70.7  
e  $22.4$ , e.g.  $\sqrt{5 \times 10^{\text{even power}}}$  have the same digits but the point is in a different place.  $\sqrt{5 \times 10^{\text{odd power}}}$  have the same digits but different from those of  $\sqrt{5 \times 10^{\text{even power}}}$   
43. 90 lies between the square numbers 81, ( $9^2$ ), and 100, ( $10^2$ )  
44.  $9.22 \text{ cm}$  47.  $5.66 \text{ m}$  50.  $27.4 \text{ mm}$   
45.  $11.0 \text{ cm}$  48.  $0.245 \text{ m}$  51.  $290 \text{ km}$   
46.  $7.07 \text{ m}$  49.  $3.89 \text{ cm}$  52.  $0.0922 \text{ km}$

**Exercise 8F (p. 176)**

- 84 cm<sup>2</sup>
- 37.2 cm<sup>2</sup>
- 0.0288 m<sup>2</sup>
- 1280 cm<sup>2</sup>
- 600 cm<sup>2</sup>
- 1736 m<sup>2</sup>
- 2448 mm<sup>2</sup>
- 6.9 cm<sup>2</sup>
- 3888 mm<sup>2</sup>
- 28.8 cm<sup>2</sup>
- 8 cm<sup>2</sup>
- 2000 cm<sup>2</sup>
- 11.25 cm<sup>2</sup>
- 26.4 cm<sup>2</sup>
- 352 cm<sup>2</sup>
- 63 cm<sup>2</sup>
- 48 cm<sup>2</sup>
- 180 cm<sup>2</sup>
- 130 cm<sup>2</sup>
- 3600 mm<sup>2</sup>
- 11.25 cm<sup>2</sup>
- 8
- infinite
- no
- all same area; all have the same length base and the same height

**Exercise 8G (p. 180)**

- 48 cm<sup>2</sup>
  - 1.56 m<sup>2</sup>
  - 80 cm<sup>2</sup>
  - 3.2 cm<sup>2</sup>
  - 100 cm<sup>2</sup>
  - 399 cm<sup>2</sup>
  - 24 cm<sup>2</sup>
  - 14.4 m<sup>2</sup>
  - 40 cm<sup>2</sup>
  - 45 cm<sup>2</sup>
  - 22.2 cm<sup>2</sup>
  - 32.4 m<sup>2</sup>
  - 26.46 cm<sup>2</sup>
  - 16.52 cm<sup>2</sup>
  - 44 cm<sup>2</sup>
  - 64 cm<sup>2</sup>
  - 540 cm<sup>2</sup>
  - 33 cm<sup>2</sup>
  - 75 cm<sup>2</sup>
  - 70 cm<sup>2</sup>
  - 24.4 cm<sup>2</sup>
  - 82.5 cm<sup>2</sup>
  - 30 cm<sup>2</sup>
  - 96 cm<sup>2</sup>
  - 21 cm<sup>2</sup>
  - 8.32 cm<sup>2</sup>
  - 10
  - 12
29. each; all the same because they have equal bases and heights 8 cm<sup>2</sup>
30. 1424 cm<sup>2</sup>

**Exercise 8H (p. 184)**

- 42 cm<sup>2</sup>
- 94.5 cm<sup>2</sup>
- 21 cm<sup>2</sup>
- 8.75 cm<sup>2</sup>
- 30
- 56
- 12 150 mm<sup>2</sup>
- 900 cm<sup>2</sup>

**Exercise 8I (p. 186)**

- 2.5 cm
- 2 m
- 20 cm
- 3.4 m
- 2.45 cm
- 20 mm
- 8 cm
- 59.5 cm<sup>2</sup>
- 8.94 m
- 6 cm
- 6 cm
- 2 cm
- 3 cm
- 2.5 cm
- 4.5 m
- 2 cm
- 4.24 cm
- 6 cm
- 2 cm
- 2.08 mm
- 4 m
- 4 cm
- 3.5 cm
- 59.5 cm<sup>2</sup>
- 5.95 cm
- 8.94 m
- No, the answer has been rounded down. He should also buy more to allow for trimming.
- 25 m
- 98.9 m

**Exercise 8J (p. 189)**

- 78 cm<sup>2</sup>
- 22.5 cm<sup>2</sup>
- 20 cm<sup>2</sup>
- 54 cm<sup>2</sup>
- 84 cm<sup>2</sup>
- 78 cm<sup>2</sup>
- 22 cm<sup>2</sup>
- 80 cm<sup>2</sup>
- 128 cm<sup>2</sup>
- 90 cm<sup>2</sup>
- 82.5 cm<sup>2</sup>
- 60 cm<sup>2</sup>
- 75 cm<sup>2</sup>
- 18 cm<sup>2</sup>
- 68 cm<sup>2</sup>
- 316 mm<sup>2</sup>
- 305 mm<sup>2</sup>
- 24.5 sq units
- 24 sq units

- 5.85 m<sup>2</sup>
- 1.6 m<sup>2</sup>
- 2.16 m<sup>2</sup>
- 2.09 m<sup>2</sup>
- 9.5 cm × 8.5 cm
- 10.4 cm × 9.4 cm
- 17.0 cm<sup>2</sup>
- 72 cm<sup>2</sup>
- 57 600 cm<sup>2</sup> = 5.76 m<sup>2</sup>
- 102.5 cm<sup>2</sup>
- 240.4 cm<sup>2</sup>
- 16 cm<sup>2</sup>

**Exercise 8K (p. 193)**

- 180 cm<sup>2</sup>
- 20 cm<sup>2</sup>
- 88 cm<sup>2</sup>
- 10 cm<sup>2</sup>
- 48 cm<sup>2</sup>
- 130 cm<sup>2</sup>
- 14 cm
- 6.5 cm
- 6 cm

## Chapter 9

**Exercise 9A (p. 197)**

- 12 cm
- 10 ft
- 30 in
- 7 cm
- 2 km
- 9.2 cm

**Exercise 9B (p. 198)**

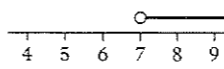
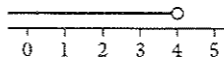
- 13.8 m
- 27.6 cm
- 17.4 cm
- 318 mm
- 1.5 mm
- 216 ft
- 28.8 m
- 10.8 m
- 42 yd
- 168 mm
- 8.4 m
- 210 in
- 970 mm
- 88 in
- 48 m
- 220 cm
- 1600 mm
- 2000 ft
- 26 mm, 82 mm (2 s.f.)
- 24 mm, 75 mm (2 s.f.); 20 mm, 63 mm (2 s.f.)
- 4.40 m
- 194 cm
- 176 cm
- no, needs 3.8 m (3 is an underestimate for π)
- 176 cm, 200
- 12.6 cm
- 94.2 cm
- 62.8 m
- 6.3 sec, 9.5 turns (each to 2 s.f.)
- 31.4 m, smaller, each circle of thread has a diameter that is larger than the diameter of the reel.
- 12.6 m
- 71 (nearest whole number)
- 94 m (nearest whole number)

**Exercise 9C (p. 204)**

- 10 cm
- 9.55 cm
- 43.8 cm
- 175 mm
- 12 in
- 11.5 in
- 73.5 mm
- 16.6 cm
- 6.7 m
- 6.37 m
- 132 in
- 124 yd
- 97 cm
- 92.6 cm
- 13.9 m
- 24.2 ft

- 8.5x g
- 88.4x = 218.4, 2.47 acres
- x = 3
- x = 5
- x = 4.77
- x = 3.42
- 8.5x = 164.05
- 19.3 g
- x = 2.4
- x = 4
- x = 2.02
- x = 1.08

**Exercise 12F (p. 267)**

- n < 3
- x < -6
- x > 10
- w > 5
- x > 1
- 
- 
- 7, 8, 9, 11, 12
- 7, 10, 12, 13, 14
- 7, 8, 12, 14
- 1, 5
- 8, 3, -1, 1, -3, 2, 4, -1, 1
- x > 500; any values bigger than 500
- w < 7.5; any values bigger than 0 and less than 7.5
- x > 500; any values bigger than 500
- x > 250 000; any values bigger than 250 000
- 5 > 3
- 1 > -1
- 0 > -1
- 4 > -5
- 1 < 6
- 3 < 2
- yes
- yes
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 7, 8, 9, 11, 12
- 7, 8, 9, 11, 12
- 7, 8, 9, 12, 14
- 1
- 5
- none
- 1
- 5
- none
- 8, 3, -1, 1, -3, 2, 4, -1, 1
- 7.1, 3.9, -1.9, 0.1, -2.1, 1.1, 4.9, -0.1, 1.4
- x > 500; any values bigger than 500
- w < 7.5; any values bigger than 0 and less than 7.5
- x > 500; any values bigger than 500
- x > 250 000; any values bigger than 250 000
- 5 > 3
- 1 > -1
- 0 > -1
- 4 > -5
- 1 < 6
- 3 < 2
- yes
- yes

**Exercise 12G (p. 269)**

- x < 12
- x < 2
- x > 5
- x > 2
- x < -2
- x < 3
- x < -3
- x < -3
- x < -7
- x < -5
- x < -2
- x > -1
- x < 3
- x > 0
- x > -3
- x < -3
- x < 1
- x < -5
- x < 1
- x < 1
- x < -1
- x < -1
- x > 7
- x > -5
- x > -3
- x < 13
- x > 12

**Exercise 12H (p. 271)**

- x<sup>2</sup>
- p<sup>3</sup>
- s<sup>3</sup>
- t<sup>4</sup>
- 8a<sup>2</sup>
- 15d<sup>2</sup>
- 12x<sup>2</sup>
- 3y<sup>2</sup>
- 6a<sup>3</sup>
- 8n<sup>3</sup>
- 12p<sup>3</sup>
- 60s<sup>2</sup>

**Exercise 12I (p. 272)**

- ±6.20
- ±4.45
- ±20.7
- ±6.54
- ±2.07
- ±25.5
- ±8.06
- ±0.469
- ±7.62
- ±4.36
- ±10.1
- ±7.81
- ±10.7
- ±4.90
- ±0.755

- x<sup>2</sup> = 50
- 3x<sup>2</sup> = 120
- x<sup>2</sup> = 290, 17.0 cm
- 6x<sup>2</sup> = 250, 6.45 cm
- 7.07 cm
- 6.32 cm

**Exercise 12J (p. 275)**

- 1.4
- 1.6
- 2.5
- 1.5
- 3.1
- 7.9
- 3.3
- 2.4
- 2.2
- 1.8
- 1.3
- 1.3
- 3.3
- 1.1
- 0.7 or 4.3

**Exercise 12L (p. 277)**

- 12x + 24
- 6x + 19
- x = 1
- x = 6
- a
- N < 6
- x < 3
- a b<sup>2</sup>
- x = ±6.71
- 2x<sup>2</sup> = 300
- x = 0.5
- 6a - 3b
- 2b - a
- x = 2
- x = 3.04
- b
- iii no
- iv no
- x < -1
- 2a<sup>2</sup>
- 12.3 cm
- 8a + 12
- 8a + 12
- 4p + 15

## Chapter 13

**Exercise 13A (p. 281)**

- 2
- 2
- The gradient is the same as m, the coefficient of x.
- |   |      |   |     |
|---|------|---|-----|
| y | -7.5 | 0 | 7.5 |
|---|------|---|-----|

  
Gradient, 2.5; the gradient is the same as m
- |   |    |    |   |
|---|----|----|---|
| y | -3 | -1 | 2 |
|---|----|----|---|

  
Gradient 0.5; the gradient is the same as m
- a 5
- 7
- 12
- 1/4

**Exercise 13B (p. 283)**

- y = 5x
- y = 5x
- y = 1/2 x
- y = -3x
- y = 10x
- y = -1/2 x
18. a 1/2
- y = -6x
- y = 0.75x
- acute
- acute
- obtuse
- obtuse
- acute
- acute
- 1
- b = 1
- c = -3

**Exercise 13C (p. 284)**

- a 1
- a 1
- b 3
- y = x + 3
- 1 is the coefficient of x, 3 is where the line cuts the y-axis
- 2
- y = x + 2
- 1 is the coefficient of x, 2 is where the line cuts the y-axis

**Exercise 11D (p. 248)**

1. 10      7.  $1\frac{1}{3}$       13. 0.8      19. 18 cm  
 2.  $3\frac{2}{5}$       8. 12      14. 2.25      20. 98 cm  
 3.  $5\frac{2}{5}$       9.  $6\frac{2}{5}$       15.  $1\frac{1}{5}$       21.  $10\frac{2}{3}$  cm  
 4.  $5\frac{1}{4}$       10.  $3\frac{3}{5}$       16. 5.6      22. 27 cm  
 5. 48      11.  $1\frac{2}{7}$       17. 1      23. 30 cm  
 6.  $6\frac{2}{3}$       12.  $7\frac{1}{2}$       18.  $1\frac{7}{8}$       24. 12 m
25. a 6      b  $62\frac{1}{2}$  ml  
 26. a 20 kg      b 100 kg  
 27. a 15 cm by 25 cm  
 b No; they are in the ratio 25 : 4

**Exercise 11E (p. 250)**

1. 48 p and 32 p      6. 16  
 2. 12 cm and 20 cm      7. £2.50 and £17.50  
 3. £20 and £25      8. a  $252\text{ m}^2$       b  $105\text{ m}^2$   
 4. Dick, 15, Tom, 25      9. 12  
 5. Mary, 30 p, Eleanor, 45 p      10. a  $\frac{2}{3}$  litre      b  $9\frac{1}{3}$  litres
11. a 48 g  
 b It can only be an estimate, buttons etc. not included
12. a Length 22.5 cm, width 13.5 cm  
 b Length 10 cm, width 6 cm
13. £8, £10, £8  
 14. 6 cm, 8 cm, 10 cm  
 15.  $42\text{ m}^2$ ,  $14\text{ m}^2$ ,  $7\text{ m}^2$   
 16. 10 litres, 12.5 litres, 2.5 litres  
 17. 4 litres  
 18. 570 ml  
 19. a 280 ml      b 170 ml  
 20. 600 g  
 21. a 12 : 15 : 14      b £878 : £1098 : £1024  
 22. a J £25.21, S £45.01      b £1.23

**Exercise 11F (p. 253)**

1. 1 : 50 000      7. 3 km  
 2. 1 : 500 000      8. 70 m  
 3. 1 : 100 000      9. 200 m  
 4. 1 : 500 000      10. 2 000 000 cm, 10 cm  
 5. 1 : 100 000      11. 1.8 cm  
 6. 1 : 2 000 000

**Exercise 11G (p. 254)**

1. 4 : 9      5.  $8\frac{1}{4}$   
 2. 5 : 8      6. 100 m  
 3. £40 : £52 : £8      7. 1 : 4 : 100  
 4. a 2 : 3      b 8 : 27

**Chapter 12**

**Exercise 12B (p. 258)**

1.  $2x + 2$       12.  $5a + 5b$       23.  $-3x - 8$   
 2.  $9x - 6$       13.  $6x + 4$       24.  $-15 - 4x$   
 3.  $5x + 30$       14.  $18 + 10x$       25.  $6c - 2$   
 4.  $12x - 12$       15.  $5x + 23$       26.  $x - 8$   
 5.  $8 + 10x$       16.  $14x - 18$       27.  $7 - 8x$   
 6.  $12 + 10a$       17.  $3x + 3$       28.  $6a - 6$   
 7.  $24 - 16x$       18.  $6x - 15$       29.  $2 - 12x$   
 8.  $16x - 12$       19.  $3x + 7$       30.  $38 - 10w$   
 9.  $18 - 12x$       20.  $17x - 23$       31.  $-3y - 12$   
 10.  $5x - 5$       21.  $5x + 5$       32.  $4x + 8 = 8x$   
 11.  $14 - 7x$       22.  $4x + 17$

**Exercise 12C (p. 259)**

1.  $-6x + 30$       22.  $3 - 5x$   
 2.  $-15c - 15$       23.  $17x - 1$   
 3.  $-10e + 6$       24.  $9x - 18$   
 4.  $4 - 3x$       25.  $9x + 1$   
 5.  $-16 + 40x$       26.  $15 - 5x$   
 6.  $-2x + 3$       27.  $12x + 8$   
 7.  $-7x - 28$       28.  $12x - 14$   
 8.  $-6d + 6$       29.  $4x - 12$   
 9.  $-8 - 4x$       30.  $9x + 19$   
 10.  $21x - 14$       31.  $x - 39$   
 11.  $-4 + 5x$       32.  $31x - 11$   
 12.  $-5x + 3$       33.  $11x + 7$   
 13.  $12 - 15x$       34.  $-6x - 19$   
 14.  $57 - 6c$       35.  $5x - 2$   
 15.  $20 - 10m$       36.  $11 - 6x$   
 16.  $11 - 6x$       37.  $15x - 9$   
 17.  $4 - 4x$       38.  $14x + 11$   
 18.  $13 - 8g$       39.  $-15x - 7$   
 19.  $x - 2$       40.  $2x + 21$   
 20.  $16f - 12$       41.  $2x + 15$   
 21.  $4s - 3$       42.  $14x - 19$

**Exercise 12D (p. 261)**

1.  $x = 2$       18.  $x = 2$   
 2.  $x = 0$       19.  $x = 1$   
 3.  $x = 1\frac{3}{8}$       20.  $x = -2$   
 4.  $x = 3$       21.  $x = 3$   
 5.  $x = 1$       22.  $x = -2$   
 6.  $x = 2$       23.  $x = 2$   
 7.  $x = 5$       24.  $x = 2$   
 8.  $x = 3$       25.  $x = \frac{1}{5}$   
 9.  $x = -3$       26.  $x = -1$   
 10.  $x = 5$       27.  $x = 5$   
 11.  $x = \frac{2}{3}$       28.  $x = 1$   
 12.  $x = 4$       29.  $x = 3\frac{1}{4}$   
 13.  $x = 0$       30.  $x = 2$   
 14.  $x = 4$       31. 6 cm  
 15.  $x = -3\frac{1}{2}$       32. 4 cm  
 16.  $x = 2$       33. 8 cm  
 17.  $x = \frac{4}{5}$       34. 5.56 cm

35. a  $7 = 2(x - 5)$       b 8.5  
 36. a  $P = 2x + 4$       b  $x = 10$   
 37. a  $P = 10a - 6$       b  $32 = 10a - 6$       c 3.8 cm  
 38. a equilateral      b  $3(x - 3) = 36$       c  $x = 15$   
 39. 48  
 40. a  $2x$       c  $2x + 14 = 36$   
     b  $2x + 14$       d 11  
 41. a  $x + 6$       c  $2x + 12 = 3x$   
     b  $2x + 12$       d  $x = 12$   
 42. a  $x + 5$   
     b i  $4(x + 5)$       ii  $3x$   
     c 43 p  
 43. 12  
 44. 4  
 45. 21

**Exercise 12E (p. 265)**

1. 8      4. 1.79      7. 47.5  
 2. 30      5. 1.95      8. 0.8  
 3. 0.4      6. 24      9. 0.513  
 10. a £3.8x      b  $3.8x = 22.23$       c £5.85

5. 59.8 m  
 6. 31.8 cm  
 7. 20.1 m  
 8. 4.93 cm  
 9. 9.55 cm  
 10. a 3.82 cm      b 45.8 cm  
 11. 9.55 cm  
 12. 37.7 cm  
 13. 4.77 cm  
 14. less; a radius of 2 m gives a circumference of 12.6 m, he needed to use a more accurate value of  $\pi$ .

**Exercise 9D (p. 206)**

1.  $48\text{ cm}^2$ ,  $50.3\text{ cm}^2$       12.  $714\text{ m}^2$   
 2.  $192\text{ cm}^2$ ,  $201\text{ cm}^2$       13.  $451\text{ mm}^2$   
 3.  $75\text{ m}^2$ ,  $78.5\text{ m}^2$       14.  $374\text{ cm}^2$   
 4.  $10\,800\text{ cm}^2$ ,  $11\,300\text{ cm}^2$       15.  $942\text{ cm}^2$   
 5.  $78.5\text{ ft}^2$       16.  $19\,300\text{ mm}^2$   
 6.  $38.5\text{ in}^2$       17.  $354\,000\text{ mm}^2$   
 7.  $45.4\text{ m}^2$       18.  $707\text{ cm}^2$   
 8.  $9.62\text{ km}^2$       19.  $236\text{ cm}^2$   
 9.  $25.1\text{ cm}^2$       20.  $531\text{ mm}^2$   
 10.  $58.9\text{ in}^2$       21.  $26.2\text{ in}^2$   
 11.  $457\text{ ft}^2$   
 22. no, 2 bottles are needed; the area to be covered is  $78.5\text{ m}^2$   
 23. no, area of bed is  $4.52\text{ m}^2$   
 24.  $21.5\text{ in}^2$   
 25. 8 mats;  $110\text{ cm}^2$   
 26.  $1\,170\,000\text{ mm}^2 = 1.17\text{ m}^2$   
 27. 2

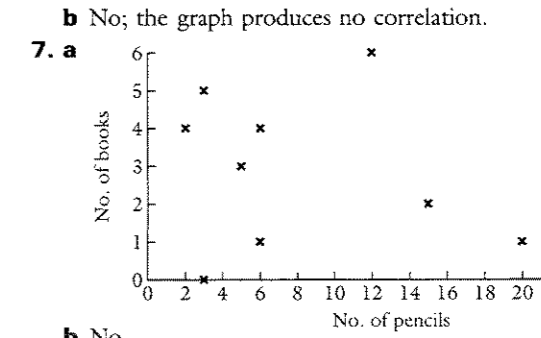
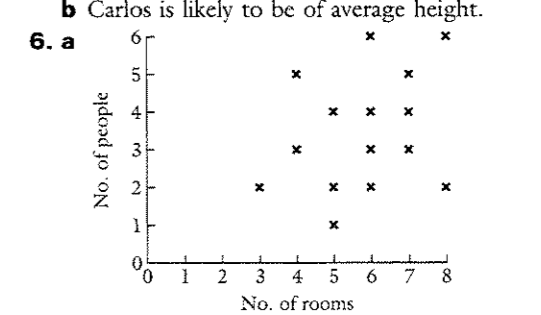
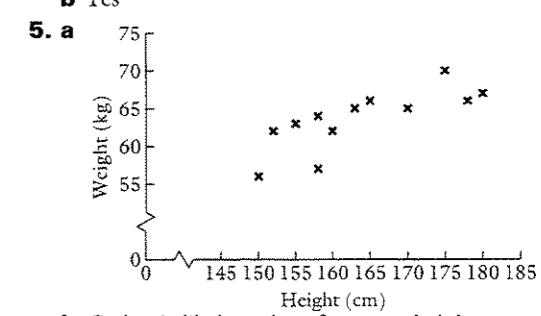
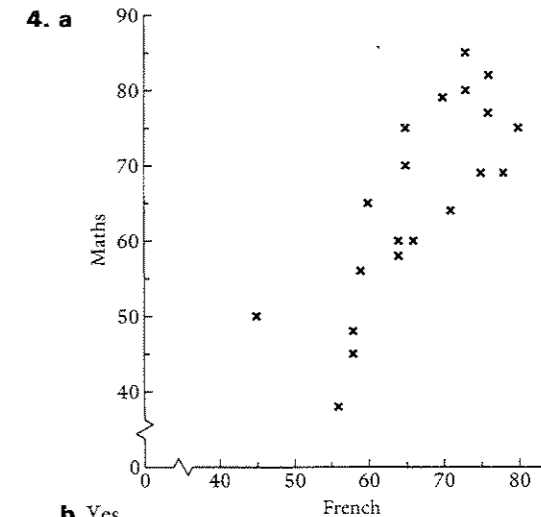
**Exercise 9E (p. 210)**

1. 17.6 mm      5. 89.1 mm  
 2. 9.55 m      6.  $491\text{ cm}^2$   
 3. 37.7 cm      7. 28.6 mm  
 4.  $26.4\text{ m}^2$       8.  $87.5\text{ cm}^2$

**Chapter 10**

**Exercise 10B (p. 215)**

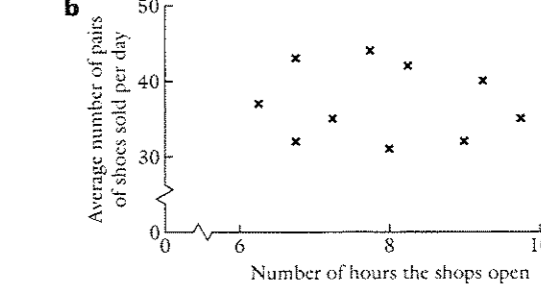
1. a Males tend to have larger feet than females so the same conclusion may not be true for a mixture of males and females.  
 b Sections of the axes covering values smaller than those in the data have been cut out. If the axes were scaled from zero, the marks would be concentrated in one corner; this would not be clear.
2. a Yes (until 6 years old): the price of a second-hand car tends to decrease with age.  
 b Its mileage, maintenance, whether it has been overhauled, etc.  
 c No
3. a No  
 b End-of-year examination grades are partly a good guide to future GCSE grades, but a lot can change in 3 years.  
 c The heights of pupils make no difference to their results.  
 d Positive or negative correlation can be obtained.



b No

8. There is little relationship between the time it takes people to travel to work and the hourly pay of the job they do, but people on very low pay are not prepared to travel far.

9. a However long Joyce's shop is open (more than 6 hours) it has little effect on the number of pairs of shoes sold.



**Exercise 10C (p. 220)**

- No. 4: moderate positive correlation  
No. 5: strong positive correlation  
No. 6: no correlation  
No. 7: no correlation
- e.g. (Accept any answer with a reasonable supporting argument)  
a strong positive correlation  
b weak positive correlation  
c moderate positive correlation  
d strong negative correlation  
e no correlation  
f moderate correlation  
g strong positive correlation  
h weak correlation (opinions get stronger with age)

**Exercise 10D (p. 221)**

- b Debateable, not everyone knows their continental size, but it does avoid the problem of half sizes.  
c Decide in advance whether to round up or down.  
d Decide in advance whether to round up or down.  
e Ask them to place a tick on a table.
- a Brown, blue, grey, hazel. Need to know the options when deciding how to describe a colour.  
c Different people have different ideas about e.g. the grey/hazel choice. Some people have two different colour eyes.
- a Almost everyone will be in the same category.  
b i They are all the same range of time.  
ii They could be smaller time intervals, say 10 or even 5 minutes.  
c Very few will know exactly how long they spent, some work in fits and starts.
- In general, having four categories is a good idea. It allows for some indication of strength of feeling, while not allowing total indifference.
- It is usually safest to stick to one set wording of the question, avoiding any bias or 'leading'.

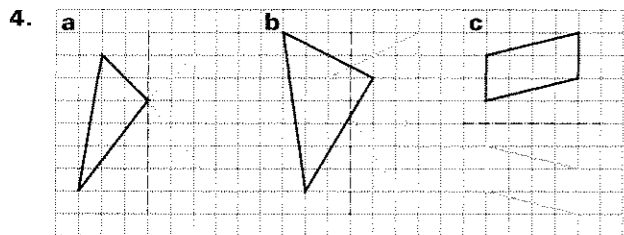
**Exercise 10E (p. 223)**

- The first two questions set an 'agenda' which may influence the response to the final question (particularly in Group 1), but they also give some reason for how people answer it.

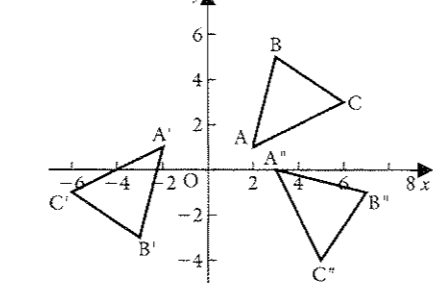
**Summary 3**

**Revision Exercise 3.1 (p. 227)**

- a i 6      ii 8      iii 4  
b i 5      ii 4      iii 6
- a  $24^\circ$ ,  $156^\circ$       b 30
- a  $100^\circ$       b  $102^\circ$



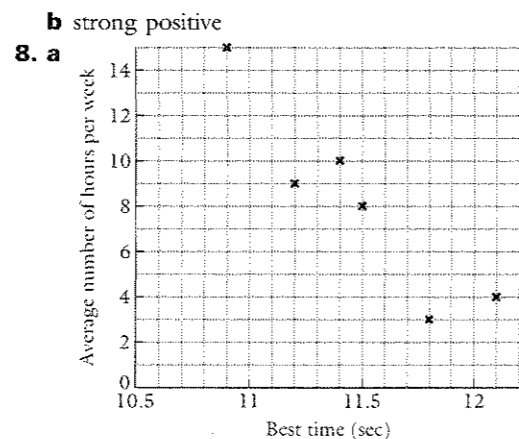
- a B      b E and D      c A and C      d none



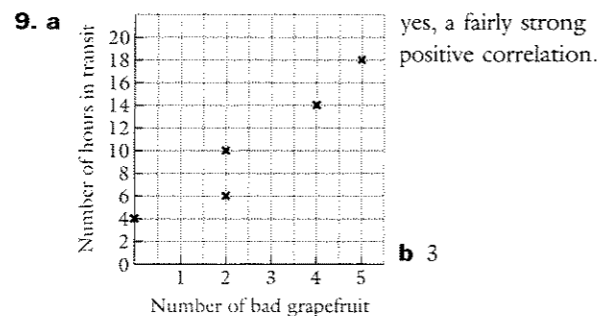
- a  $50 \text{ cm}^2$       b  $145.2 \text{ cm}^2$
- a 2.5 cm      b 6.2 cm
- 6 sq units
- a  $48 \text{ cm}^2$       b  $74 \text{ cm}^2$

**Revision Exercise 3.2 (p. 229)**

- a 21.4 cm      b  $1.13 \text{ cm}^2$
- a 41.1 cm      b  $101 \text{ cm}^2$
- a 19.1 cm      b 4.77 in
- a 12 cm; i  $37.7 \text{ cm}$       ii  $113 \text{ cm}^2$   
b  $144 \text{ cm}^2$       c  $30.9 \text{ cm}^2$       d 21.5%
- $393 \text{ cm}^2$
- a 17.9 cm      b  $19.6 \text{ cm}^2$
- a i B      ii D      iii C



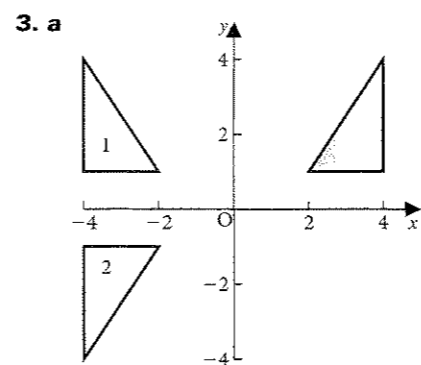
- b yes, fairly strong negative correlation, as the hours in training go up, the time goes down.  
c 11.2 sec



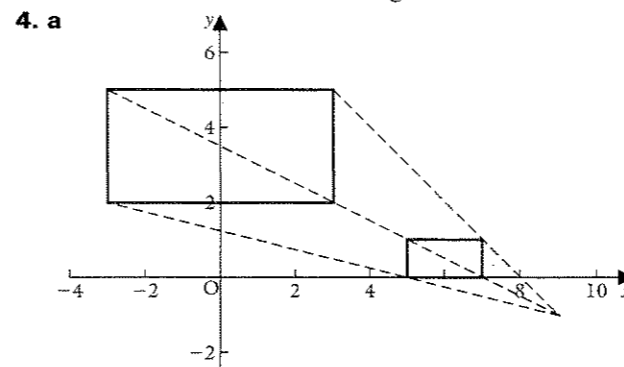
- a a strong negative correlation  
b a fairly strong positive correlation  
c there is no correlation  
d no effect - see graph C

**Revision Exercise 3.3 (p. 231)**

- a yes, 12  
b no, 35 will not divide into 360 exactly
- a 54      b 113



b Rotation of  $180^\circ$  about the origin.



- b (9, -1)  
c Object  $1 \times 2$ , image  $3 \times 6$ , so the scale factor is 3. All angles are  $90^\circ$  - unchanged.

- a 6.4 cm      b 25 mm      c 13 cm      d 3.75 cm
- a i 0.593      ii 0.219  
b i  $22.2 \text{ cm}^2$       ii  $4.44 \text{ cm}^2$
- a 24.2 cm,  $460 \text{ cm}^2$   
b i 30.0 cm      ii  $42.9 \text{ cm}^2$
- minute hand 10.1 m, hour hand 0.576 m
- a positive correlation, but not very strong.  
b positive correlation  
c little correlation  
d strong positive correlation  
e moderate positive correlation  
f good negative correlation
- a positive correlation, could be height and weight  
b no correlation; weight and month of birth  
c strong negative correlation; weight and level of fitness

**Revision Exercise 3.4 (p. 234)**

- a i 17.9      ii 43.08      iii 67 500      iv 0.01  
b i 20      ii 2      iii 4      iv 0.05
- a  $d = 55$       b  $p = 45, q = 40, r = 275$
- a i  $19\frac{1}{3}$       ii  $\frac{3}{14}$       iii  $\frac{3}{4}$       iv  $\frac{8}{15}$   
b £406      c £360      d 56
- $\frac{79}{80}$
- a i 10      ii -28      iii 35      iv -10  
b i 18      ii 3
- a  $720^\circ$   
b  $20p = 720, p = 36$   
c  $q = 90, r = 72$
- (9, 8), scale factor 2
- a  $288 \text{ cm}^2$       b  $47.2 \text{ cm}^2$       c  $112 \text{ cm}^2$
- a 18.3 m      b  $22.3 \text{ m}^2$
- a moderate positive correlation  
b moderate positive correlation  
c moderate negative correlation

- no correlation
- strong negative correlation
- perfect positive correlation
- strong negative correlation

**Revision Exercise 3.5 (p. 236)**

- a i 787      ii 153.67      iii 457 000      iv 10  
b 354; 345
- $d = 40, e = f = 70$
- a  $\frac{7}{30}$       b 754 m      c  $\frac{8}{9}$  of  $2\frac{1}{4}$  by  $\frac{1}{18}$
- a 100      b 100      c 300
- a  $\frac{5}{6}$       b 10.2
- a 18      b 16
- The image of A is the point (3, -4); of B the point (0, -1) and of C the point (3, 1)
- a i 1.95 m  
b i  $36.9 \text{ cm}^2$       ii  $3.69 \text{ cm}$
- 48.3  $\text{cm}^2$
- a i negative      ii moderate  
b yes

**Chapter 11**

**Exercise 11B (p. 241)**

- 1:4      11. 5:4      21. 25:2
- 1:3      12. 4:1      22. 4:1
- 9:200      13. 4:3      23. 1:5
- 16:3      14. 2:3      24. 3:2
- 1:6      15. 5:6      25. 1:2:3
- 20:1      16. 1:2      26. 1:8:3
- 1:4      17. 5:3      27. 4:6:3
- 2:1      18. 20:1      28. 1:4:3
- 4:1      19. 1:1      29. 20:4:1
- 80:3      20. 10:7
- 3 apples: 1 orange: 1 banana
- a 3:2      b 2:5      33. a 2:5      b 8:3
- a 3:4      b 9:16      34. a 3:2      b 2:3
- a 3:2      b 9:5      c 18:13      d 1:1
- 8:12:9      37. 3:7
- a 12:3:5      b 2:3      c 5:3
- 1:6
- a 2:175      b no; the order is reversed
- a 5:8      b 55:76
- a 13:7  
b The result would be a photograph smaller than the original.

- 2:1
- a 1:1      c 1:8      e 1:3  
b 1:2      d 1:1      f 1:8
- a 1:9      b 1:4      c 4:9

**Exercise 11C (p. 245)**

- 1:1.5      11. 1:0.333
- 1:2.4      12. 1:1.78
- 1:0.857      13. £38/tonne
- 1:2.73      14. 70p/doz
- 1:0.6      15. 15p/cm
- 1:2.63      16. 72p/20 screws
- 1:1.33      17. £3/25 kg
- 1:0.75      18. £2.49/6
- 1:1.43      19. £2.20/4
- 1:0.75      20. 500 ml/£2.56