



for **AQA, Edexcel** and **OCR**
two-tier GCSE mathematics

Answers for *Foundation 1* practice

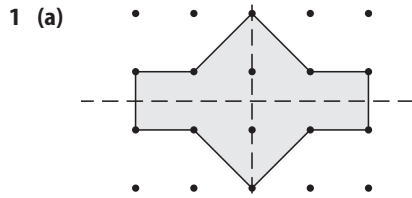
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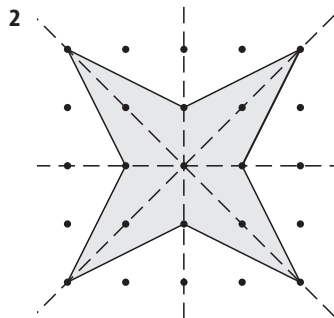
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1 Reflection and rotation symmetry

C Both types of symmetry (p 9)



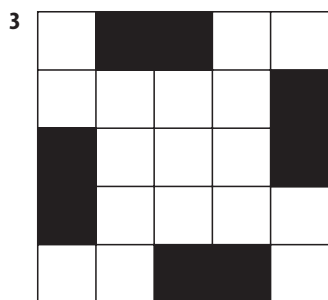
(b) 2



(a) The completed shape as above

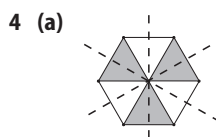
(b) All the lines of symmetry drawn as above

(c) 4

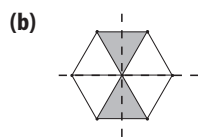


(a) The completed diagram as above

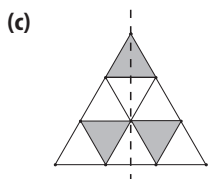
(b) 0



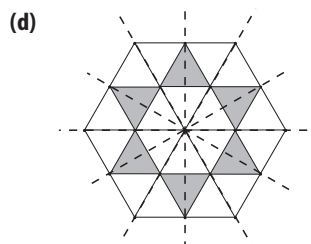
Order 3



Order 2



Order 1



Order 6

D Special triangles and quadrilaterals

E Symmetrical and regular polygons (p 10)

1 (a) Trapeziums

(b) (i) Pentagon (ii) 2 (iii) 0

2 10

3 All the lines of symmetry drawn on a rhombus

4 Hexagon

5 (a) Isosceles (b) Scalene (c) Equilateral

6 (a) A drawing of a parallelogram

(b) 0 (or 2 if a rhombus or rectangle has been drawn, or 4 if a square has been drawn)

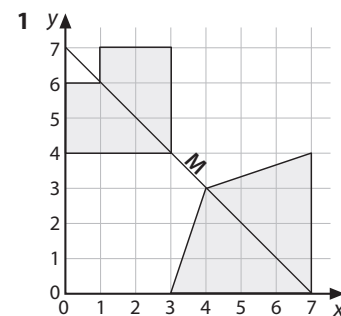
7 C

8 (a) A drawing of any pentagon with only one line of symmetry

(b) A drawing of any parallelogram (except a square) including a rhombus or rectangle

9 A drawing of any hexagon with two lines of symmetry

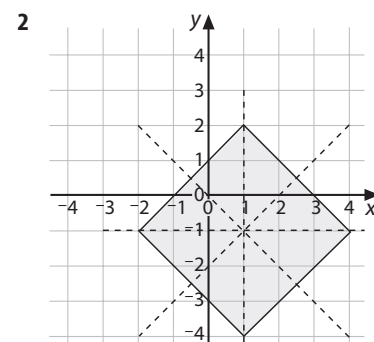
F Using coordinates (p 11)



(a) The completed shapes on a coordinate grid as above

(b) (4, 3), (7, 4), (7, 0), (3, 0)

(c) Hexagon

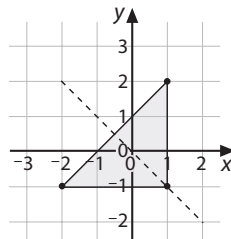
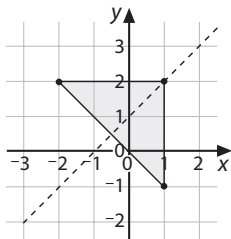
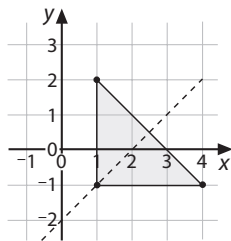
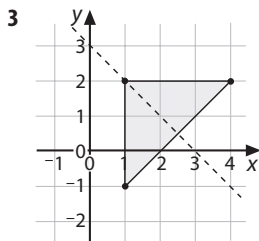


(a) The completed shape on a coordinate grid as above

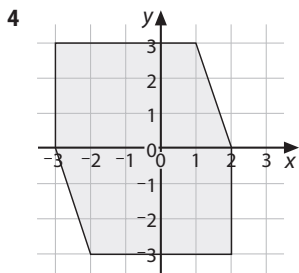
(b) Square

(c) (1, 2), (4, -1), (1, -4), (-2, -1)

(d) All the lines of symmetry drawn as above



- (a) Points (1, 2) and (1, -1) plotted on a grid
 (b) (i) Any one of the triangles above
 (ii) The coordinates of the third point:
 (4, 2), (4, -1), (-2, 2) or (-2, -1)
 (c) The line of symmetry on the triangle



- (a) The completed hexagon on a coordinate grid as above
 (b) 0

2 Fractions

B Equivalent fractions

C Simplifying a fraction (p 12)

- 1 $\frac{8}{12}$ and $\frac{2}{3}$
 2 (a) $\frac{1}{2} = \frac{4}{8}$ (b) $\frac{2}{5} = \frac{6}{15}$ (c) $\frac{3}{4} = \frac{12}{16}$
 (d) $\frac{3}{8} = \frac{15}{40}$ (e) $\frac{4}{7} = \frac{16}{28}$
 3 (a) $\frac{3}{5}$ (b) $\frac{1}{3}$ (c) $\frac{2}{3}$ (d) $\frac{3}{5}$ (e) $\frac{3}{7}$
 4 (a) $\frac{3}{4}$ (b) $\frac{3}{8}$ (c) $\frac{1}{5}$ (d) $\frac{8}{25}$
 5 (a) $\frac{3}{9}, \frac{6}{18}, \frac{2}{6}, \frac{8}{24}$ (b) $\frac{8}{20}, \frac{10}{25}, \frac{14}{35}$ (c) $\frac{18}{30} = \frac{3}{5}$
 6 $\frac{6}{24} = \frac{1}{4}, \frac{3}{15} = \frac{1}{5}$
 So $\frac{6}{24}$ is larger because $\frac{1}{4}$ is greater than $\frac{1}{5}$.

D Mixed numbers (p 12)

- 1 (a) $2\frac{3}{5}$ (b) $1\frac{2}{3}$ (c) $1\frac{5}{7}$ (d) $2\frac{1}{6}$ (e) $2\frac{3}{8}$
 2 $\frac{12}{7}, \frac{10}{5}, \frac{13}{6}, \frac{13}{4}, \frac{14}{3}$
 3 (a) $1\frac{1}{2}$ (b) $1\frac{2}{3}$ (c) $2\frac{1}{2}$ (d) $3\frac{1}{4}$ (e) $2\frac{1}{5}$

E Writing one number as a fraction of another (p 13)

- 1 $\frac{2}{3}$
 2 $\frac{1}{5}$
 3 $\frac{3}{8}$
 4 $\frac{1}{5}$
 5 (a) $\frac{2}{5}$ (b) $\frac{1}{3}$ (c) $\frac{4}{15}$

F Adding and subtracting fractions

G Multiplying a fraction by a whole number (p 13)

- 1 (a) $\frac{3}{5}$ (b) $\frac{7}{9}$ (c) $\frac{2}{7}$ (d) $\frac{6}{7}$ (e) $\frac{2}{11}$
 (f) $\frac{2}{3}$ (g) $\frac{3}{4}$ (h) $\frac{2}{5}$ (i) $\frac{2}{3}$ (j) $\frac{2}{3}$
 2 (a) $\frac{4}{10} = \frac{2}{5}$ (b) $\frac{6}{10} = \frac{3}{5}$
 3 (a) 1 (b) $1\frac{1}{5}$ (c) 1 (d) $1\frac{4}{7}$ (e) $1\frac{3}{5}$
 4 (a) 5 (b) $1\frac{3}{4}$ (c) $2\frac{2}{3}$ (d) $3\frac{3}{4}$ (e) $4\frac{4}{5}$
 5 $3\frac{1}{3}$ pints

3 Reading scales

A Whole numbers (p 14)

- 1 (a) 520 (b) 560 (c) 585 (d) 24
 (e) 26 (f) 250 (g) 65 (h) 70
 (i) 1500 (j) 420 (k) 470

B Decimals (p 14)

- 1 (a) 4.2 (b) 4.7 (c) 1.2 (d) 1.4
 (e) 1.7 (f) 0.5 (g) 3.5 (h) 3.75
 (i) 4.2 (j) 5 (k) 5.4
- 2 (a) 9 kg
 (b) 7.9 kg
 (c) (i) 2.2 m (ii) 1.4 m
 (d) 4.5 kg

4 Arrow diagrams and equations

A Mathematical whispers (p 15)

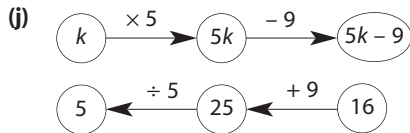
- 1 (a) $9 \xrightarrow{\div 3} 3 \xrightarrow{+5} 8$
 (b) $7 \xrightarrow{-1} 6 \xrightarrow{\times 4} 24$
 (c) $2 \xrightarrow{\times 5} 10 \xrightarrow{-3} 7$
 (d) $12 \xrightarrow{+3} 15 \xrightarrow{\div 3} 5$
- 2 (a) $3 \xrightarrow{\times 2} 6 \xrightarrow{+7} 13$
 (b) $1 \xrightarrow{+1} 2 \xrightarrow{\times 7} 14$
 (c) $5 \xrightarrow{+10} 15 \xrightarrow{\div 3} 5$
 (d) $20 \xrightarrow{\div 5} 4 \xrightarrow{-3} 1$
- 3 (a) $3 \xrightarrow{+2} 5 \xrightarrow{\times 6} 30 \xrightarrow{-7} 23$
 (b) $35 \xrightarrow{-7} 28 \xrightarrow{\div 4} 7 \xrightarrow{+5} 12$

B Using letters

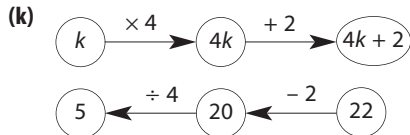
C Solving equations (p 15)

- 1 (a) M (b) K (c) J (d) L

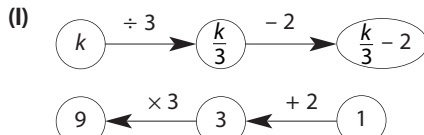
- 2 (a) $x \xrightarrow{\times 3} 3x \xrightarrow{+5} 3x+5$
 $3 \xleftarrow{\div 3} 9 \xleftarrow{-5} 14$
 $x = 3$
- (b) $x \xrightarrow{\times 10} 10x \xrightarrow{+6} 10x+6$
 $4 \xleftarrow{\div 10} 40 \xleftarrow{-6} 46$
 $x = 4$
- (c) $x \xrightarrow{\times 4} 4x \xrightarrow{-8} 4x-8$
 $11 \xleftarrow{\div 4} 44 \xleftarrow{+8} 36$
 $x = 11$
- (d) $n \xrightarrow{\times 2} 2n \xrightarrow{-4} 2n-4$
 $7 \xleftarrow{\div 2} 14 \xleftarrow{+4} 10$
 $n = 7$
- (e) $n \xrightarrow{\div 4} \frac{n}{4} \xrightarrow{+4} \frac{n}{4} + 4$
 $12 \xleftarrow{\times 4} 3 \xleftarrow{-4} 7$
 $n = 12$
- (f) $n \xrightarrow{\div 5} \frac{n}{5} \xrightarrow{+3} \frac{n}{5} + 3$
 $10 \xleftarrow{\times 5} 2 \xleftarrow{-3} 5$
 $n = 10$
- (g) $y \xrightarrow{\times 3} 3y \xrightarrow{+2} 3y+2$
 $7 \xleftarrow{\div 3} 21 \xleftarrow{-2} 23$
 $y = 7$
- (h) $y \xrightarrow{\div 3} \frac{y}{3} \xrightarrow{-4} \frac{y}{3} - 4$
 $30 \xleftarrow{\times 3} 10 \xleftarrow{+4} 6$
 $y = 30$
- (i) $y \xrightarrow{\div 8} \frac{y}{8} \xrightarrow{+9} \frac{y}{8} + 9$
 $8 \xleftarrow{\times 8} 1 \xleftarrow{-9} 10$
 $y = 8$



$k = 5$



$k = 5$



$k = 9$

- 3 (a) $b = 3.1$ (b) $c = 54$ (c) $n = 5.7$

D Number puzzles (p 16)

Any letter can be used in each equation.

- 1 (a) $5n + 6 = 51; n = 9$
 (b) $\frac{n}{7} + 18 = 20; n = 14$
 (c) $2n - 9 = 11; n = 10$
 (d) $9n - 5 = 22; n = 3$
 (e) $\frac{n}{2} - 14 = 1; n = 30$
 (f) $4n + 18 = 30; n = 3$
- 2 (a) I think of a number.
 I multiply by 4.
 I subtract 2.
 My answer is 18.
 What was my number?
 ($n = 5$)
- (b) I think of a number.
 I multiply by 8.
 I add 1.
 My answer is 49.
 What was my number?
 ($n = 6$)
- (c) I think of a number.
 I divide by 5.
 I add 2.
 My answer is 4.8.
 What was my number?
 ($n = 14$)

5 Decimals

A One and two decimal places

B More than two decimal places (p 17)

- 1 (a) True (b) False
- 2 B: Zebra
- 3 (a) 1.29, 1.3, 3.51, 3.6, 5 (b) 0.09, 0.34, 0.46, 0.8, 1
- 4 (a) 2.009 kg, 2.453 kg, 2.67 kg
 (b) 5.24 kg, 5.329 kg, 5.4 kg
- 5 (a) 2.5 (b) 8.25 (c) 1.825

C Rounding to the nearest whole number (p 17)

- 1 (a) 4 cm (b) 9 cm (c) 8 cm
 (d) 20 cm (e) 21 cm
- 2 (a) 124 km (b) 99 km (c) 342 km
 (d) 984 km (e) 128 km
- 3 (a) 6 (b) 49 (c) 34
 (d) 30 (e) 150
- 4 (a) 7 litres (b) 3 litres (c) 13 litres
 (d) 9 litres (e) 11 litres
- 5 (a) 8 kg (b) 42 kg (c) 915 kg
 (d) 110 kg (e) 1 kg

D Rounding to one decimal place

E Rounding to more than one decimal place (p 18)

- 1 (a) 15.6 (b) 7.9 (c) 10.7 (d) 1.4 (e) 4.0
- 2 (a) 4.1, 4.0, 4.2, 4.3 → EACK → CAKE
 (b) 4.5, 4.1, 4.1, 4.6, 4.2, 4.1 → HEESCE → CHEESE
 (c) 4.4, 4.8, 4.7, 4.1, 4.0 → RDBEA → BREAD
- 3 (a) 4.95 (b) 9.07 (c) 24.19 (d) 4.20
- 4 (a) £5.84 (b) £20.95 (c) £6.08 (d) £32.50
- 5 (a) 1.235 (b) 3.568 (c) 0.885 (d) 17.900

F Multiplying and dividing by powers of ten (p 18)

- 1 (a) 25.7 (b) 73.8 (c) 58 678
 (d) 984.2 (e) 2380 (f) 178.65
- 2 (a) 1.48 (b) 3.6932 (c) 53.6847
 (d) 0.97 (e) 0.14 (f) 0.019
- 3 (a) 7630 (b) 786.1 (c) 1.987
 (d) 765 (e) 0.010 769 (f) 76 930
- 4 (a) 7.53 (b) 100 (c) 1000

6 Angles, triangles and quadrilaterals

A Review: angles round a point, on a line, in a triangle

(p 19)

- $a = 110^\circ, b = 135^\circ, c = 155^\circ, d = 25^\circ, e = 155^\circ,$
 $f = 50^\circ, g = 60^\circ, h = 60^\circ, i = 125^\circ, j = 70^\circ, k = 110^\circ,$
 $l = 70^\circ, m = 40^\circ, n = 90^\circ, o = 50^\circ, p = 40^\circ, q = 60^\circ,$
 $r = 60^\circ, s = 60^\circ, t = 60^\circ, u = 90^\circ, v = 30^\circ$
- $a = 53^\circ$ (angles of a triangle add up to 180°)
 $b = 127^\circ$ (angles on a straight line add up to 180°)
 $c = 45^\circ$ (angles round a point add up to 360°)
 $d = 75^\circ$ (angles of a triangle add up to 180°)
 $e = 45^\circ$ (angles of a triangle add up to 180°)
 $f = 45^\circ$ (vertically opposite angles are equal)
 $g = 50^\circ$ (angles on a straight line add up to 180°)
 $h = 80^\circ$ (angles of a triangle add up to 180°)
 $i = 100^\circ$ (angles on a straight line add up to 180°)
- $a = 55^\circ, b = 90^\circ, c = 298^\circ$

B Angles in an isosceles triangle

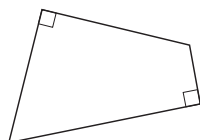
(p 20)

- $a = 80^\circ, b = 20^\circ, c = 43^\circ, d = 94^\circ, e = 74^\circ, f = 74^\circ,$
 $g = 41^\circ, h = 41^\circ, i = 32^\circ, j = 68^\circ$
- Equilateral; $x = 60^\circ, y = 60^\circ, z = 60^\circ$
- $a = 112^\circ, b = 66^\circ, c = 102^\circ, d = 229^\circ$

C Properties of special quadrilaterals

(p 21)

- Drawings of a rhombus, a rectangle, a kite and a parallelogram
 - Rectangle
 - Rhombus and parallelogram
 - Kite
 - Parallelogram and rhombus
 - Kite
- Drawing with the points ABCD joined
 - A trapezium
- Trapezium, kite
 - A shape such as this



7 Experiments

A Specifying the problem and planning

(p 22)

- Brian's is better. If people have the same list the second time they will remember words from the first time.
- They could use Brian's method with 10 boys and then with 10 girls. They could then find the difference between the mean scores with and without the pictures – first for the boys and then the girls. They could then compare these two differences.

B Processing and representing

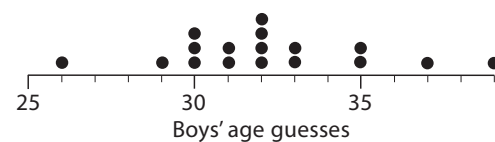
C Interpreting and discussing

(p 22)

1 (a)



(b)



(c) Median 30, range 8

(d) Median 32, range 13

(e) Boys

(f) Boys

2 (a)



(b) 35.5 kg

(c)



(d) 28 kg

(e) The writing hand

3 (a) Acute angle: mean 58.85° , range 22°

Obtuse angle: mean 120.95° , range 35°

(b) The estimates of the acute angle were more accurate because the mean estimate was only 2.85° away from the actual size, compared with 7.95° for the obtuse angle. Also the range was narrower for the acute angle.

(c) The results support what the student thought. The difference between the mean estimate and the actual size is only 0.8° for the 'horizontal' angle, but 2.2° for the 'non-horizontal' angle. Also the range for the 'horizontal' angle is less.

8 Multiples, factors and primes

A Multiples (p 24)

- 1 42, 14, 700, 49
- 2 12, 9, 15, 300, 24
- 3 Six numbers from the list
6, 12, 18, 24, 30, 36, 42, 48, 54, 60
- 4 Six numbers from the list
9, 18, 27, 36, 45, 54, 63, 72, 81, 90, 99
- 5 32, 40, 48
- 6 (a) (i) 21, 28, 35, 63 (ii) 8, 10, 20, 24, 28, 40
(iii) 33, 55 (iv) 10, 20, 35, 40, 55
(v) 8, 20, 24, 28, 40 (vi) 20, 40
(b) 10, 20, 40
(c) 21, 33, 63

B Factors (p 24)

- 1 5
- 2 4, 8
- 3 (a) 1, 2, 4, 8 (b) 1, 2, 3, 4, 6, 12
(c) 1, 2, 3, 5, 6, 10, 15, 30 (d) 1, 2, 4, 8, 16
(e) 1, 13

4

	is a factor of 24	is a factor of 20
is a factor of 40	8	5
is a factor of 12	3	4

- 5 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72

C Multiples and factors (p 25)

- 1 (a) True (b) True (c) False
(d) True (e) True (f) False
- 2 (a) Factor (b) Factor (c) Multiple
(d) Factor (e) Multiple (f) Factor
- 3 (a) 6 (b) 40 (c) 27 (d) 48

D Common multiples and factors (p 25)

- 1 15, 30, 90
- 2 1, 2, 4
- 3 Five numbers from the list:
20, 40, 60, 80, 100, 120, 140, 160, 180, ...
- 4 (a) 1, 2, 3, 6 (b) 1, 5 (c) 1, 2, 4

- 5 (a) 12 (b) 35 (c) 60

- 6 (a) 5 (b) 12 (c) 6

- 7 1

- 8 5p

E Prime numbers (p 26)

- 1 23, 29
- 2 21, 85, 86, 132
- 3 7, 31, 5, 17
- 4 41, 43, 47
- 5 They are all even and greater than 2 so none can be prime.
- 6 (a) 37 (b) 11 (c) 83

F Products of prime factors (p 26)

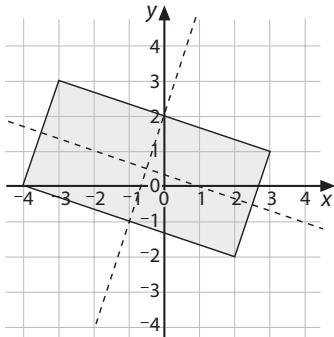
- 1 $2 \times 3 \times 5$
- 2 (a) A factor tree with 2, 2, 2, 2 at the ends of the branches: $16 = 2 \times 2 \times 2 \times 2$
(b) A factor tree with 2, 2, 2, 3 at the ends of the branches: $24 = 2 \times 2 \times 2 \times 3$
(c) A factor tree with 2, 2, 5, 5 at the ends of the branches: $100 = 2 \times 2 \times 5 \times 5$
(d) A factor tree with 3, 5, 5 at the ends of the branches: $75 = 3 \times 5 \times 5$
(e) A factor tree with 2, 2, 2, 3, 5, 5 at the ends of the branches: $600 = 2 \times 2 \times 2 \times 3 \times 5 \times 5$
- 3 (a) (i) $77 = 7 \times 11$ (ii) $84 = 2 \times 2 \times 3 \times 7$
(b) 7
(c) B: $2 \times 2 \times 3 \times 7 \times 11$
- 4 (a) $21 = 3 \times 7$ $35 = 5 \times 7$
Highest common factor is 7
(b) $42 = 2 \times 3 \times 7$ $30 = 2 \times 3 \times 5$
Highest common factor is $2 \times 3 = 6$
(c) $44 = 2 \times 2 \times 11$ $132 = 2 \times 2 \times 3 \times 11$
Highest common factor is $2 \times 2 \times 11 = 44$
- 5 (a) $26 = 2 \times 13$ $39 = 3 \times 13$
Lowest common multiple is $2 \times 3 \times 13 = 78$
(b) $54 = 2 \times 3 \times 3 \times 3$ $99 = 3 \times 3 \times 11$
Lowest common multiple is
 $2 \times 3 \times 3 \times 3 \times 11 = 594$
(c) $24 = 2 \times 2 \times 2 \times 3$ $108 = 2 \times 2 \times 3 \times 3 \times 3$
Lowest common multiple is
 $2 \times 2 \times 2 \times 3 \times 3 \times 3 = 216$

Mixed practice 1 (p 27)

1 (a) 2, 4, 12 (b) 12, 24 (c) 2

2 4

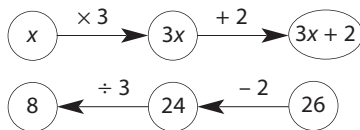
3



- (a) Points (3, 1), (-3, 3) and (2, -2) plotted on a grid as above
 (b) (i) The completed rectangle as above
 (ii) (-4, 0)
 (c) The lines of symmetry drawn on the rectangle as above

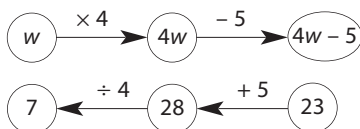
4 5

5 (a)



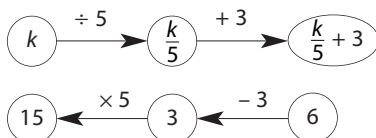
$x = 8$

(b)



$w = 7$

(c)



$k = 15$

6 $a = 35^\circ$, $b = 138^\circ$, $c = 42^\circ$, $d = 138^\circ$, $e = 60^\circ$, $f = 30^\circ$, $g = 80^\circ$

7 (a) $\frac{3}{5}$ (b) 9

8 (a) 9 hours (b) 8 hours (c) 7.5 hours

9 (a) (i) 7.6 cm (ii) 3.8 cm (iii) 2.5 cm
 (b) (i) 2 inches (ii) 2.5 inches (iii) 1.4 inches

10 (a) 42 (b) 9

11 (a) 15 kg (b) 12.24 (c) 0.877

12 (a) Isosceles

(b) 3

(c) Equilateral

(d) $a = 40^\circ$, $b = 70^\circ$, $c = 70^\circ$, $d = 160^\circ$

13 (a) 2.5 (b) 740 (c) 6.924 (d) 0.014

14 $3\frac{3}{4}$

15 (a) 5.03, 5.15, 5.25, 5.5, 5.52

(b) 0.05, 0.082, 0.25, 0.5, 0.853, 1

16 Rhombus

17 $56 = 2 \times 2 \times 2 \times 7$

9 Working with formulas 1

A Review: expressions (p 29)

1 (a) 8 (b) 4 (c) 15 (d) 0

2 (a) 5 (b) 4 (c) 15 (d) 24

B Arranging tables and chairs (p 29)

1 (a) 14

(b) 32

(c) 602

(d)

Number of tables	1	2	3	4	5	6	10	100
Number of chairs	8	14	20	26	32	38	62	602

(e) number of chairs = number of tables \times 6 + 2

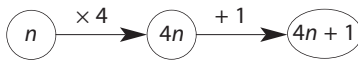
(f) $c = 6t + 2$

C Designing pendants (p 30)

- 1 (a) 9
 (b) 21
 (c) 41
 (d) Multiply by 2 and then add 1
 (e) $2n + 1$
- 2 (a) $5n + 2$ (b) 42

D Equations and arrow diagrams (p 31)

- 1 (a) When $n = 4$, $4n + 1 = 4 \times 4 + 1 = 17$ and this is the number of posts in the fence.
 (b) $4n + 1 = 61$

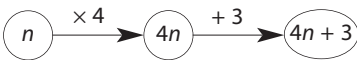


$n = 15$

Check

When $n = 15$, the fence needs $4 \times 15 + 1$ posts
 $= 60 + 1$
 $= 61$ posts which is correct

- 2 $4n + 3 = 95$



$n = 23$

Check

When $n = 23$, the fence needs $4 \times 23 + 3$ posts
 $= 92 + 3$
 $= 95$ posts which is correct

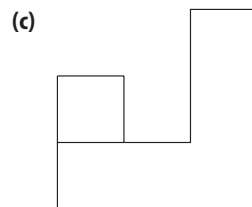
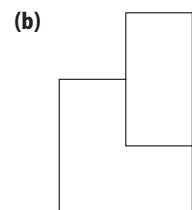
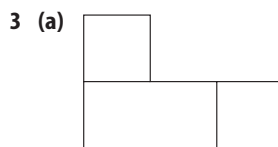
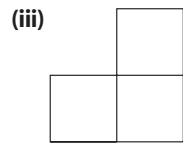
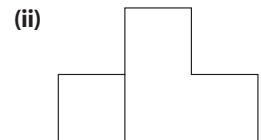
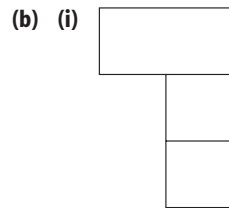
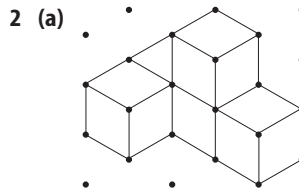
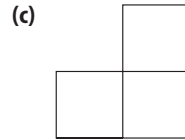
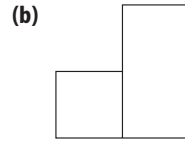
- 3 (a) $3n + 1$ (b) Size 27

10 Representing 3-D objects

A The Soma cube

B Plan and elevations (p 32)

- 1 (a) Y

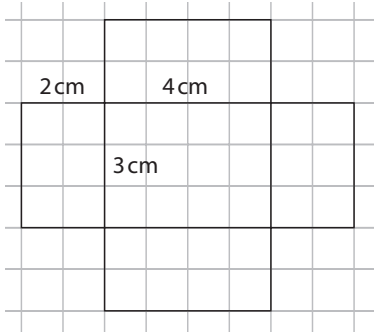


C Nets

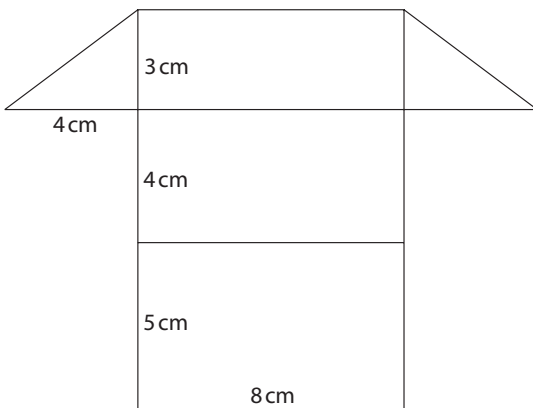
D Prisms (p 33)

1 A, D

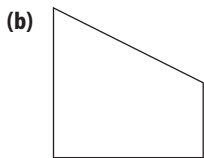
2 This net drawn to the sizes shown



3 This net drawn to the sizes shown



4 (a) C



E Reflection symmetry (p 34)

1 B

2 (a) 2 (b) 4 (c) 1

3 (a) 3 (b) 2 (c) 1

4 2

11 Written calculation 1

A Adding and subtracting whole numbers and decimals

(p 35)

1 (a) 398 (b) 380 (c) 231 (d) 476 (e) 1003

2 (a) 1.11 (b) 6.52 (c) 5.64 (d) 7.19 (e) 6.14

3 Josh by 0.03 m (or 3 cm)

4 Jo's by 0.58 kg

B Multiplying whole numbers (p 35)

1 (a) 3678, CORK (b) 2198, TASK

(c) 9260, STOP (d) 9465, SHOW

(e) 34 172, CHART (f) 37 659, CROWS

2 (a) 5280 (b) 112 (c) 192

3 £1170

C Multiplying decimals (p 36)

1 (a) 8.7 (b) 7.25 (c) 6.42 (d) 17.12 (e) 37.74

2 £8.40

3 (a) About 15.4 pounds (b) About 8.75 pints

4 £19.80

5 4.5 litres

D Dividing whole numbers (p 36)

1 (a) 63 (b) 154 (c) 316 (d) 145 (e) 423

2 A and G (34), B and F (125), C and E (732)

The odd one out is D (325).

3 (a) 93 (b) 2

4 (a) 85 (b) 5

5 226

6 23

E Dividing decimals (p 37)

1 (a) 4.3 (b) 0.9 (c) 0.25 (d) 2.47 (e) 1.7

(f) 3.15 (g) 1.25 (h) 1.28 (i) 2.15 (j) 2.85

2 0.69 m

3 3.75 kg

4 (a) 0.82, 2.5, 1.7, 1.25, 0.2, 2.5 → YRHCER → CHERRY

(b) 0.4, 0.3, 0.2, 0.4, 1.5 → PLEPA → APPLE

(c) 1.25, 1.7, 1.5, 0.4, 0.2 → CHAPE → PEACH

(d) 0.4, 1.5, 2.5, 0.5, 0.2 → PARGE → GRAPE

F Mixed questions (p 37)

- 1 2.55 litres
- 2 17.6 cm
- 3 0.9 m
- 4 £5.77
- 5 7

12 Frequency

A Stem-and-leaf tables

B Median and range (p 38)

1 (a)

1	3 5 6 6 7 9 9
2	1 2 3 4 5 5 7 8 9
3	0 1 2 4 6 6 7 9
4	1 7 7 9
5	

Stem: 10 people

- (b) 49
 - (c) 27.5
 - (d) 36
- 2 (a) 15 days (b) 25 (c) 41

3 (a)

0	5 7 7 8
1	1 4 4 5 5 9 9
2	0 1 1 2 5 6 7 7 8
3	0 1 4 5 6 6
4	0 1 5 9

Stem: 10 tickets

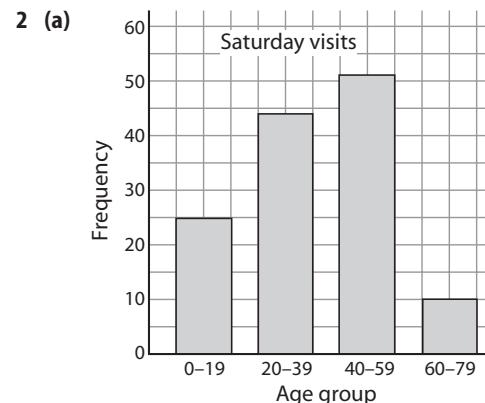
- (b) 23.5
- (c) 44
- (d) 6

C Comparisons (p 39)

- 1 (a) Median 45, range 40
- (b) Median 48, range 47
- (c) Tasty Toms because the median is higher
- 2 (a) Black Beauty: median 18, range 28
Long Purple: median 14, range 21
- (b) Black Beauty

D Grouping (p 39)

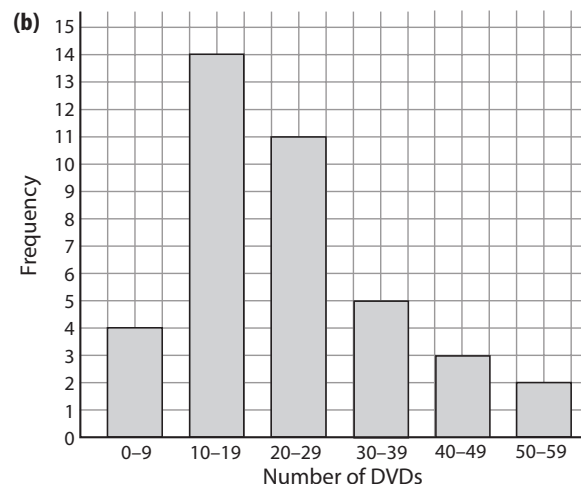
- 1 (a) 23 (b) 60 (c) 20–39 (d) 95



- (b) (i) 130 (ii) 35 more
- (iii) Statement such as:
More people do not work on Saturday so have time to visit the shop.
- (c) Statements such as:
More people aged 40–59 visited on Saturday.
Fewer people aged 60–79 visited on Saturday.

3 (a)

Number of DVDs	Frequency
0–9	4
10–19	14
20–29	11
30–39	5
40–49	3
50–59	2



E Mean (p 40)

- 1 (a) Mean 22.06 m, range 4.76 m
- (b) Mean 21.71 m (to 2 d.p.), range 7.20 m
- (c) Choice with reasons
- 2 (a) 14 (b) 98
- (c) 3.3 (to 1 d.p.) (d) 4

13 Fractions, decimals and percentages

A Fractions and percentages (p 41)

- 1 (a) $\frac{2}{5}$ (b) 40%
- 2 $\frac{3}{4}$ is equivalent to 75%, so 80% is bigger.
- 3 50% and $\frac{1}{2}$, 20% and $\frac{1}{5}$, 60% and $\frac{3}{5}$, 25% and $\frac{1}{4}$
- 4 30%, 40%, $\frac{1}{2}$, $\frac{3}{5}$, 70%, $\frac{8}{10}$

B Decimals and percentages (p 41)

- 1 (a) 10% (b) 35% (c) 90% (d) 55%
- 2 (a) 0.2 (b) 0.75 (c) 0.65 (d) 0.8
- 3 0.4 is equivalent to 40% not 4%.
- 4 (a) 0.2, 25%, 0.4, 60%, 0.65
(b) 30%, 0.45, 55%, 0.7, 90%

C Fractions and decimals (p 41)

- 1 (a) $\frac{3}{10}$ (b) 0.3
- 2 $\frac{1}{4}$ is equivalent to 0.25, so $\frac{1}{4}$ is smaller.
- 3 $\frac{7}{10}$ is equivalent to 0.7, so 0.75 is larger.
- 4 (a) 0.2 (b) 0.4 (c) 0.625 (d) 0.875
- 5 (a) 0.1, $\frac{3}{10}$, $\frac{3}{5}$, $\frac{3}{4}$, 0.8 (b) 0.25, 0.4, $\frac{1}{2}$, $\frac{4}{5}$, $\frac{9}{10}$

D Thirds

E Converting between fractions, decimals and percentages (p 42)

Fraction	Decimal	Percentage
$\frac{81}{100}$	0.81	81%
$\frac{67}{100}$	0.67	67%
$\frac{74}{100}$	0.74	74%
$\frac{1}{100}$	0.01	1%
$\frac{9}{100}$	0.09	9%
$\frac{6}{100}$	0.06	6%

- 2 (a) $\frac{3}{10}$ (b) $\frac{3}{4}$ (c) $\frac{4}{5}$ (d) $\frac{1}{20}$ (e) $\frac{6}{25}$
- 3 $\frac{1}{3}$ is equivalent to $33\frac{1}{3}\%$, so 30% is smaller.
- 4 $\frac{2}{3}$ is equivalent to 0.6666..., so $\frac{2}{3}$ is larger.
- 5 (a) $\frac{1}{5}$, $\frac{1}{4}$, 0.27, 30%, 0.4 (b) $\frac{3}{5}$, 0.67, $\frac{3}{4}$, 0.8, $\frac{9}{10}$
(c) 0.06, 0.1, $\frac{1}{5}$, 25%, $\frac{1}{2}$ (d) 60%, $\frac{2}{3}$, $\frac{4}{5}$, 0.85, 0.9
- 6 $\frac{3}{5}$ is equivalent to 60%, so Lee ran further.

- 7 $\frac{1}{10}$ is equivalent to 10%, so Max was late more often.
- 8 30%

14 Area of a parallelogram

A Changing a parallelogram into a rectangle (p 43)

- 1 (a) 10 cm² (b) 12 cm² (c) 18 cm²
(d) 20 cm² (e) 16 cm² (f) 15 cm²
- 2 (a) Three parallelograms, each with area 12 cm²
(b) Three parallelograms, each with area 15 cm²

B Using the formula (p 44)

- 1 (a) 12 cm² (b) 15 cm²
- 2 (a) 63 cm² (b) 12 cm² (c) 48 cm²
(d) 120 cm² (e) 252 cm² (f) 504 cm²
- 3 (a) 84 cm² (b) 200 cm² (c) 72 cm²

15 Negative numbers

A Temperature changes (p 45)

- 1 (a) -7°C , -2°C , 0°C , 3°C , 5°C
 (b) -7.5°C , -4°C , -1°C , 2.5°C , 5°C
- 2 4°C
- 3 22 degrees colder

4

Start temperature	Change	End temperature
1°C	rise 5 degrees	6°C
4°C	fall 7 degrees	-3°C
-2°C	rise 5 degrees	3°C
-3°C	rise 3 degrees	0°C
-5°C	rise 4 degrees	-1°C
-6°C	fall 4 degrees	-10°C

B Adding negative numbers (p 45)

- 1 (a) 2 (b) 5 (c) -6 (d) 7 (e) 8
 (f) -8 (g) -10 (h) 9 (i) -12 (j) -6
- 2 (a) $-6 + -4$ (b) $-6 + 5$ (c) $-4 + 5$
 (d) $-6 + 2$ (e) $-4 + 2$
- 3 (a) 5 (b) -12 (c) -2 (d) -7
- 4 (a) 1 (b) -4 (c) -8 (d) -7

C Subtracting a negative number (p 46)

- 1 (a) 8 (b) 6 (c) 13 (d) 6 (e) 14
 (f) -3 (g) 3 (h) 5 (i) 7 (j) 2
- 2 $-5 + -3$ and $-10 - -2$ (-8)
 $3 - 7$ and $-1 + -3$ (-4)
 $-4 - -2$ and $2 - 4$ (2)
- 3 (a) 6 (b) -12 (c) -12 (d) 6
 (e) -9 (f) 5 (g) -5 (h) 9
 (i) -4 (j) -12 (k) 4 (l) 12
- 4 (a) $-5 + -3 = -8$ (b) $3 - 5 = -2$ or $-5 - -3 = -2$
 (c) $-5 + 3 = -2$ (d) $3 - -5 = 8$ or $5 - -3 = 8$

D Multiplying a negative by a positive number (p 46)

- 1 (a) -15 (b) -28 (c) -16 (d) -12 (e) -25
 (f) -30 (g) -100 (h) -48 (i) -120 (j) -45
- 2 (a) $-18, 3, -6, -5 \rightarrow$ PURE \rightarrow PERU
 (b) $-3, 1, 5, -18, -20 \rightarrow$ NISPA \rightarrow SPAIN
 (c) $-2, -20, -8, -15, 1 \rightarrow$ YALTI \rightarrow ITALY
 (d) $5, 3, -6, 1, -20, 5 \rightarrow$ SURIAS \rightarrow RUSSIA
- 3 4 and -2

16 Metric units

A Using metric units (p 47)

- 1 Sensible estimates for
 (a) the width of the student's hand
 (b) the thickness of the practice book for F1
 (c) the length of the student's little finger
 (d) the length of the student's arm from wrist to elbow
- 2 (a) cm (b) mm (c) km (d) m
- 3 (a) m
 (b) km
 (c) cm
 (d) mm (or cm for a large spider!)
- 4 (a) kg (b) g (c) g
- 5 litres
- 6 (a) g (b) m (c) ml
 (d) km (e) kg (f) litres
- 7 (a) cm (b) litres (c) m (d) ml (e) kg

B Converting between metric units (p 48)

- 1 25 mm
- 2 (a) 200 cm (b) 160 cm (c) 7 cm
 (d) 6.7 cm (e) 361 cm
- 3 (a) 4 m (b) 7.8 m (c) 3000 m
 (d) 7820 m (e) 600 m
- 4 7.3 km
- 5 (a) 800 cm, 50 m, 4 km (b) 5 cm, 120 mm, 4 m
 (c) 28 mm, 3.5 cm, 0.2 m (d) 7400 cm, 0.5 km, 900 m
- 6 8.23 km
- 7 (a) 150 mm (b) 15 cm
- 8 2.44 m or 244 cm
- 9 1.6 kg
- 10 800 g
- 11 (a) 1.89 kg (b) 610 g
- 12 (a) 1940 ml (b) 9.76 litres
- 13 1.6 litres
- 14 3.35 kg
- 15 50

17 Working with expressions 1

A Simplifying expressions such as $4 + 2n - 3 + n$ (p 49)

- 1 (a) $5n$ (b) $3x$ (c) $3e + 4$
 (d) $2j + 11$ (e) $3m + 5$ (f) $10g + 8$
 (g) $30h + 11$ (h) $6k + 5$ (i) $8w + 10$
- 2 (a) $4s$ (b) $8x + 4$ (c) $3w + 3$ (d) $12d$
- 3 (a) $3p + 8$ (b) $2t + 6$
- 4 (a) $3x + 3$ (b) $10n + 6$ (c) $10v + 4$
 (d) $7k + 5$ (e) $7b + 6$ (f) $5w - 3$
 (g) $8q - 7$ (h) $7h - 6$ (i) $9m - 5$
- 5 (a) (i) $15x + 6$ (ii) Both totals are $15x + 6$.
 (b) (i) $15x + 6$ (ii) Both totals are $15x + 6$.
 (c) All the totals are the same.

(d) (i)

41	90	25
36	52	68
79	14	63

(ii) All totals are 156.

B Substituting into expressions such as $7 - 2n$ (p 50)

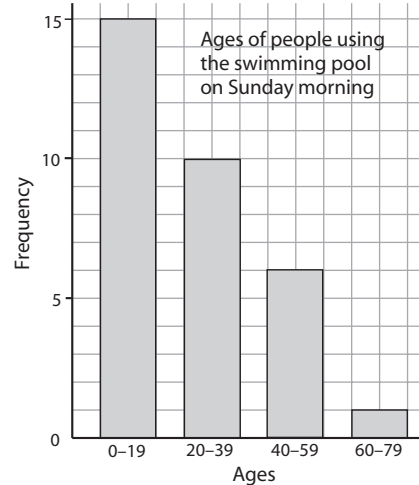
- 1 (a) 4 (b) 11 (c) 6 (d) 1
 2 (a) 3 (b) 2 (c) 9 (d) 0
 3 (a) 3 (b) -3 (c) 8 (d) -8

C Simplifying expressions such as $4 + 2n - 3 - 5n$ (p 50)

- 1 (a) $3a$ (b) $6n$ (c) $5x$
 (d) $5p$ (e) $2d$ (f) y
- 2 (a) $3x + 10$ (b) $2n + 1$ (c) $4y - 3$
 (d) $2m + 8$ (e) $6k + 6$ (f) $a - 8$
- 3 A and C ($3 + n - 5n = 3 - 4n$)
 B and H ($3 - 3n + n = 3 - 2n$)
 D and E ($n + 3 - 6n = 3 - 5n$)
 F and G ($3 - 7n - 2n = 3 - 9n$)
- 4 (a) $1 - 2n$ (b) $3 + 4x$ (c) $4 - 8h$
 (d) $1 - 2k$ (e) $2p + 5$ (f) $2a + 5$
 (g) $b + 5$ (h) $9 - 2d$ (i) $5 - 3m$
- 5 (a) $20x - 10$ (b) $k + 15$ (c) $18 - 4s$

Mixed practice 2 (p 51)

- 1 (a) 7
 (b) 32
 (c) 0-19
 (d)



- 2 (a) 675 (b) 297 (c) 456 (d) 66
 (e) 8.24 (f) 5.45 (g) 15 (h) 1.23

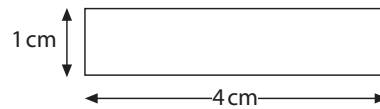
- 3 (a) 21

(b)

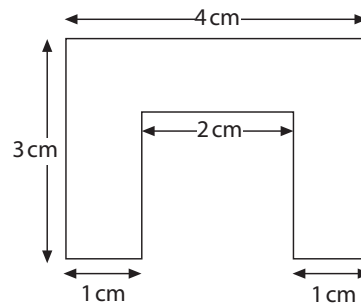
Size of necklace	1	2	3	4	5	10
Number of beads	6	11	16	21	26	51

- (c) $5n + 1$
 (d) Size 8
- 4 (a) -6°C , -3°C , 1°C , 2°C , 5°C
 (b) -3.5°C , -1.5°C , 0°C , 2.5°C , 3.5°C
- 5 0.8 litres or 800 ml
- 6 (a) Yes
 (b) 2
 (c) Full-size drawings of these.

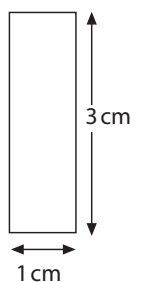
Plan



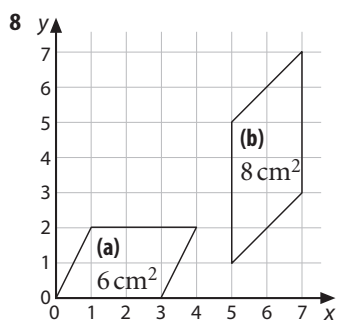
Front view



Side view



7 20%, 0.25, $\frac{1}{3}$, 65%, $\frac{3}{4}$



9 (a) 3 (b) -10 (c) -8 (d) 3 (e) -6

10 (a) $6k + 4$ (b) $8h - 4$ (c) $36 - 4g$

11

Fraction	Decimal	Percentage
$\frac{1}{4}$	0.25	25%
$\frac{1}{10}$	0.1	10%
$\frac{3}{100}$	0.03	3%

12 (a) kilograms (b) litres
(c) grams (d) millilitres

13 13.45 cm

14 (a) 13 (b) 12 (c) 3 (d) 5

15 (a)

	Mean	Range
Ann	1.55 m	0.17 m
Beth	1.6 m	0.53 m

(b) Choice with reasons. For example, Ann is a more consistent jumper than Beth (the range for her is smaller) and her mean is only 0.05 m less than Ann's. Alternatively, Beth has a higher mean and she was the one with the highest jump.

18 Graphs of changes over time

A Noise level (p 53)

- 1 (a) 7:29 p.m.
 (b) (i) 5 minutes (ii) 7:31 p.m.
 (c) (i) Just after 7:38 p.m.
 (ii) 2 times
 (d) 7:41 p.m.
 (e) (i) 7:44 p.m. (ii) 3 minutes

C Temperature (p 54)

- 1 (a) (i) 13°C (ii) 27°C
 (iii) 16°C
 (b) 12 noon
 (c) (i) 30°C (ii) 1 p.m.
 (d) (i) 11°C (ii) 4 a.m.
 (e) 15 hours
 (f) (i) 1 p.m.
 (ii) About $1\frac{1}{2}$ hours
 The temperature in the car rises between about 2:30 p.m. and 4 p.m., suggesting that the car is not occupied. At 4 p.m., the temperature drops quite quickly, suggesting that the air-conditioning has been turned on again for Julie to drive back from the shops.
 (iii) 4 p.m.

19 Chance

A Probability as a fraction (p 55)

- 1 (a) Blue
 (b) (i) $\frac{4}{8}$ or $\frac{1}{2}$ (ii) $\frac{1}{8}$ (iii) $\frac{3}{8}$
 (c) $\frac{7}{8}$
- 2 (a) $\frac{1}{7}$ (b) $\frac{3}{7}$ (c) $\frac{6}{7}$ (d) $\frac{2}{7}$
 (e) $\frac{2}{7}$ (f) 0
- 3 (a) $\frac{6}{15}$ or $\frac{2}{5}$ (b) $\frac{9}{15}$ or $\frac{3}{5}$ (c) 0
- 4 (a) $\frac{3}{12}$ or $\frac{1}{4}$ (b) $\frac{5}{12}$ (c) $\frac{7}{12}$ (d) $\frac{8}{12}$ or $\frac{2}{3}$
- 5 (a) $\frac{2}{7}$ (b) $\frac{3}{7}$ (c) $\frac{1}{7}$ (d) $\frac{2}{7}$
 (e) $\frac{4}{7}$ (f) $\frac{4}{7}$

B Listing outcomes (p 56)

1 (a)

First spinner	Second spinner
Crown	Crown
Crown	Star
Crown	Pearl
Star	Crown
Star	Star
Star	Pearl
Pearl	Crown
Pearl	Star
Pearl	Pearl
Diamond	Crown
Diamond	Star
Diamond	Pearl

- (b) 12
 (c) (i) $\frac{1}{12}$ (ii) 0 (iii) $\frac{3}{12}$ or $\frac{1}{4}$ (iv) $\frac{9}{12}$ or $\frac{3}{4}$

2 (a)

First spinner	Second spinner
1	2
1	4
1	6
2	2
2	4
2	6
3	2
3	4
3	6

- (b) 9
 (c) (i) $\frac{1}{9}$ (ii) $\frac{3}{9}$ or $\frac{1}{3}$ (iii) 0 (iv) $\frac{8}{9}$

3 (a)

First card	Second card
P	P
P	Q
P	R
P	S
Q	P
Q	Q
Q	R
Q	S
R	P
R	Q
R	R
R	S
S	P
S	Q
S	R
S	S

- (b) 16
 (c) (i) $\frac{1}{16}$ (ii) $\frac{4}{16}$ or $\frac{1}{4}$ (iii) $\frac{6}{16}$ or $\frac{3}{8}$ (iv) $\frac{2}{16}$ or $\frac{1}{8}$

C Using a grid (p 57)

1 (a)

		Bag A				
		1	2	3	4	5
Bag B	+	1	2	3	4	5
	1	2	3	4	5	6
	3	4	5	6	7	8
	5	6	7	8	9	10
	7	8	9	10	11	12
	9	10	11	12	13	14

- (b) (i) $\frac{3}{25}$ (ii) $\frac{6}{25}$ (iii) $\frac{15}{25}$ or $\frac{3}{5}$ (iv) $\frac{2}{25}$

2 (a)

		First spinner				
		1	2	3	4	5
Second spinner	1	0	1	2	3	4
	2	1	0	1	2	3
	3	2	1	0	1	2
	4	3	2	1	0	1
	5	4	3	2	1	0

- (b) 1
 (c) $\frac{5}{25}$ or $\frac{1}{5}$
 (d) $\frac{6}{25}$
 (e) $\frac{14}{25}$

3 (a)

		First spinner			
		1	2	3	4
Second spinner	×	1	2	3	4
	3	3	6	9	12
	4	4	8	12	16
	5	5	10	15	20
6	6	12	18	24	

(b) 12

(c) (i) $\frac{1}{16}$ (ii) $\frac{2}{16}$ or $\frac{1}{8}$ (iii) $\frac{4}{16}$ or $\frac{1}{4}$ (iv) $\frac{8}{16}$ or $\frac{1}{2}$

(d) $\frac{2}{16}$ or $\frac{1}{8}$

20 Area of a triangle and of composite shapes

A Area of a triangle (p 58)

- 1 (a) 4.5 cm^2 (b) 6 cm^2 (c) 3 cm^2
 2 (a) 7.5 cm^2 (b) 4 cm^2 (c) 4.5 cm^2
 3 Three different triangles with area 8 cm^2 , for example with base 4 cm and perpendicular height 4 cm
 4 (a) 14 cm^2 (b) 81 cm^2 (c) 71.5 cm^2
 5 Three different triangles with area 17.5 cm^2 , for example with base 5 cm and perpendicular height 7 cm

B Area of composite shapes (p 59)

- 1 With sketches:
 (a) 12 cm^2 (b) 10 cm^2 (c) 8 cm^2
 2 With sketches:
 (a) 52 cm^2 (b) 144 cm^2 (c) 45 cm^2 (d) 36 cm^2
 (e) 18 cm^2 (f) 22.5 cm^2 (g) 36 cm^2 (h) 68 cm^2

21 Working with percentages

A Review: fractions, decimals and percentages (p 60)

- 1 (a) 0.15 (b) 0.7 (c) 0.24 (d) 0.03 (e) 0.09
 2 (a) $45\% = \frac{9}{20}$, $80\% = \frac{4}{5}$, $62\% = \frac{31}{50}$, $64\% = \frac{16}{25}$
 (b) 85%
 3 0.56 is 56%, $\frac{27}{50}$ is 54%. So $\frac{27}{50}$ is closer to 50%.
 4 (a) 0.6, 66%, $\frac{2}{3}$, $\frac{7}{10}$, 75% (b) 1%, 0.05, $\frac{1}{10}$, 0.15, $\frac{1}{5}$

B Finding a percentage of an amount (mentally) (p 60)

- 1 (a) £6 (b) 16p (c) 9 litres (d) 20 m
 (e) £14 (f) £12 (g) 54 g (h) 88 kg
 2 100 ml
 3 125 g
 4 (a) £32 (b) £16 (c) £48 (d) £112
 5 (a) £6 (b) 4.5 kg (c) 21 ml (d) £21
 (e) 300 m (f) 180 g (g) £33 (h) £38
 6 (a) 16p (b) 96p
 7 (a) 35% (b) 175 g
 8 (a) £120 (b) £360

C Finding a percentage of an amount (with a calculator) (p 61)

- 1 (a) 27 (b) £91 (c) £14.40 (d) 151.2 m
 (e) £16.90 (f) 16.02 kg (g) £8.74 (h) 44.64 kg
 2 (a) £6678 (b) £5922
 3 (a) £97.92 (b) £57.84
 4 Protein 6.6 g, carbohydrate 40.8 g, fat 7.2 g, fibre 4.2 g

D Expressing one number as a percentage of another (p 61)

- 1 (a) 48% (b) 55% (c) 35% (d) 35%
 2 24%
 3 (a) 20% (b) 30% (c) 50% (d) 70%
 4 8%
 5 64% of girls had breakfast. 70% of boys had breakfast. So a larger percentage of boys had breakfast.

E Expressing one number as a percentage of another (with a calculator) (p 62)

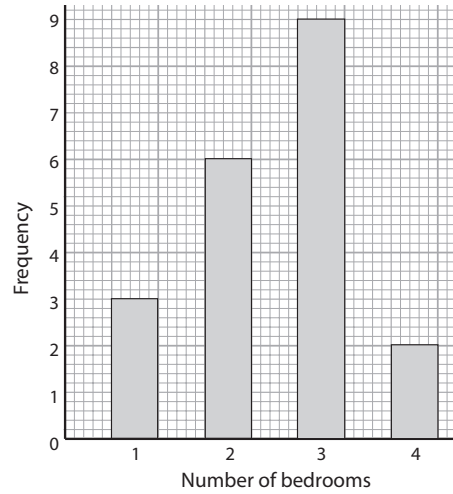
- 1 (a) 75% (b) 16% (c) 35% (d) 42%
 2 (a) 48% (b) 52%

- 3 (a) 73% (b) 86% (c) 71% (d) 91%
- 4 CDs 42%, books 27%, stationery 13%, make-up 18% (all to the nearest 1%)
- 5 Kyle missed 28% of the time. Jack missed 25% of the time. So Jack is more accurate.

F Mixed questions (p 62)

- 1 (a) 75
 (b) 21% (to the nearest 1%)
 (c) 9% (to the nearest 1%)
- 2 £45.36

- 2 (a) 7
 (b) 17
 (c) 2
 (d)



22 Representing data

A Two-way tables

B Two-way tables with grouped data (p 63)

1 (a)

	Play a musical instrument	Do not play a musical instrument	Total
Boys	8	6	14
Girls	7	9	16
Total	15	15	30

- (b) 14 (c) $\frac{7}{16}$ (d) $\frac{15}{30} = \frac{1}{2}$
- 2 (a) 56 (b) 30.4% (to 1 d.p.)
 (c) 50% (d) 44%

3 (a)

	Age 0–17	Age 18–59	Age 60+	Total
Male	17	35	13	65
Female	22	34	29	85
Total	39	69	42	150

- (b) 39 (c) 150 (d) $\frac{65}{150} = \frac{13}{30}$
 (e) 28% (f) $\frac{34}{150} = \frac{17}{75}$

C Pictograms and bar charts (p 64)

- 1 Rock | ○ ○ ○
 Metal | ○ ○ ◐
 Classical | ○ ○ ○ ○ ○
 Jazz | ○ ◐

○ represents 10 CDs

D Dual bar charts (p 64)

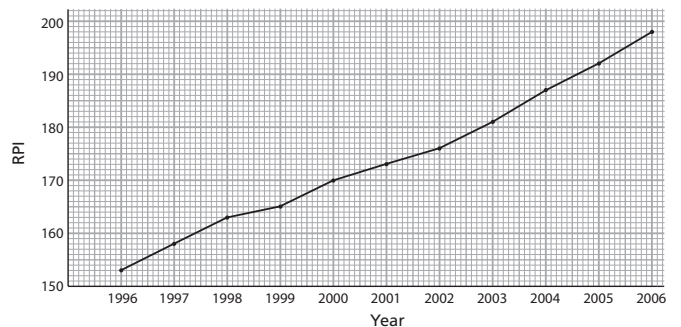
- 1 (a) School work (b) Listening to the radio
 (c) Two comparisons

E Line graphs for time series

F Index numbers (p 65)

- 1 (a) 20% (b) 22% (c) 1998
 (d) Statement such as:
 The percentage of classes with 31 or more pupils gradually increased from 1989 to 1998. After this it rapidly dropped until 2003 when it stayed about the same.

2 (a)



(b) 1998–1999

23 Ratio and proportion

A Recipes (p 66)

- 1 (a) 50 g (b) 750 g (c) 400 g (d) 10 ml
- 2 (a) 50 g peeled prawns, 20 g butter, 2.5 ml lemon juice, 5 ml chopped parsley
(b) (i) 300 g peeled prawns, 120 g butter, 15 ml lemon juice, 30 ml chopped parsley
(ii) 500 g peeled prawns, 200 g butter, 25 ml lemon juice, 50 ml chopped parsley
(iii) 750 g peeled prawns, 300 g butter, 37.5 ml lemon juice, 75 ml chopped parsley
- 3 (a) 100 g
(b) (i) 300 g (ii) 500 g (iii) 1200 g
- 4 375 g caster sugar, 375 ml water, $4\frac{1}{2}$ pink grapefruit, 3 lemons

B Comparing prices (p 66)

- 1 (a) £4.20 (b) Yes
- 2 (a) 5 (b) No
- 3 Three packets make the bottle and would cost £4.47, so the packet is better value for money.
- 4 (a) 4 (b) £7.44 (c) Yes, 9p

C Unitary method (p 67)

- 1 (a) 40 (b) 200
- 2 (a) 5 seconds (b) 75 seconds
- 3 60 km
- 4 360 km
- 5 200 ml soured cream, 250 g blue Stilton cheese
- 6 21 sandwiches, 7 packets of crisps, 7 pieces of fruit, 3.5 litres of water

D Unit cost (p 68)

- 1 (a) 4 pack: 75p, 8 pack: 65p, 12 pack: 60p, 20 pack: 55p
(b) 20 pack
(c) 4 pack
- 2 (a) 5 kg costs 27p per kg; 4 kg costs 28p per kg. So 5 kg is cheaper.
(b) 8 litres costs 50p per litre; 10 litres costs 55p per litre. So 8 litres is cheaper.
(c) 9 kg costs £3 per kg; 2 kg costs £2.90 per kg. So 2 kg is cheaper.
(d) 7 metres costs £1.25 per metre; 8 metres costs £1.20 per metre. So 8 metres is cheaper.

- 3 (a) £2.66 (b) 67p (c) 12p (d) £1.33

- 4 Large size costs £4.76 per 25 ml; standard size costs £4.77 per 25 ml. So the large size gives better value.

E Mixtures and ratio (p 68)

- 1 (a) Yes (b) No, 4:1 (c) No, 5:2 (d) No, 2:1
(e) Yes (f) Yes (g) No, 2:1
- 2 (a) (i) 15 (ii) 25 (iii) 100
(b) (i) 2 (ii) 4 (iii) 10
- 3 (a) (i) 400 (ii) 650
(b) (i) 30 (ii) 58
- 4 120 ml
- 5 (a) 150 ml (b) 1000 ml (c) 4 glassfuls
- 6 (a) 2:5 (b) 20 (c) 10

F Writing a ratio in its simplest form (p 69)

- 1 (a) 3:1 (b) 2:5 (c) 3:7 (d) 4:5
- 2 (a) 1:3 (b) 2:3 (c) 7:4
- 3 (a) 3:1 (b) 3 litres

24 Cuboids

A Volume of a cuboid

B Cubic metres (p 70)

- 1 (a) 63 cm^3 (b) 50 cm^3 (c) 60 cm^3
 (d) 36 cm^3 (e) 64 cm^3 (f) 60 cm^3
 (g) 24 cm^3 (h) 75 cm^3 (i) 90 cm^3
- 2 300 cm^3
- 3 (a) 4830 cm^3 (b) 1070.16 cm^3 (c) 233.92 cm^3
- 4 $a = 5 \text{ cm}, b = 2 \text{ cm}, c = 2 \text{ cm}$
- 5 (a) 124.8 m^3 (b) 0.432 m^3
- 6 30 m^3
- 7 0.2 cm (or 2 mm)

C Surface area (p 71)

- 1 248 cm^2
- 2 (a) 236 cm^2 (b) 442 cm^2 (c) 175 cm^2
 (d) 185.5 cm^2

D Volume of a solid made from cuboids (p 72)

- 1 (a) 228 cm^3 (b) 936 cm^3 (c) 1440 cm^3
 (d) 213.75 cm^3

Mixed practice 3 (p 73)

- 1 (a) 15 (b) $\frac{5}{15}$ or $\frac{1}{3}$
- 2 (a) -3°C
 (b) Wednesday
 (c) Mean: 7.3°C (to 1 d.p.), range: 6 degrees
- 3 (a) 24 cm^2 (b) 168 cm^2 (c) 45 cm^2
- 4 (a) Dice

	+	1	2	3	4	5	6
Spinner	1	2	3	4	5	6	7
	2	3	4	5	6	7	8
	3	4	5	6	7	8	9
	4	5	6	7	8	9	10

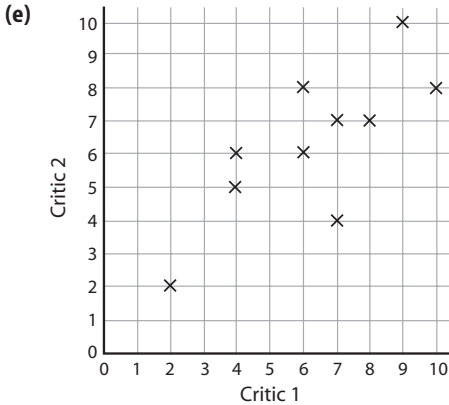
- (b) $\frac{4}{24}$ or $\frac{1}{6}$
 (c) $\frac{6}{24}$ or $\frac{1}{4}$
- 5 (a) 2:1 (b) 2:3 (c) 9:2 (d) 2:5
- 6 The 1.2 litre bottle works out cheapest.
 The 500 ml bottle costs $\pounds 1.44$ per litre.
 The 1.2 litre bottle costs $\pounds 1.25$ per litre.
 The 3 litre bottle costs $\pounds 1.40$ per litre.
- 7 (a) 16% (b) 70% (c) 48% (d) 34%
- 8 (a) 6 litres (b) 9 litres
- 9 (a) $\pounds 4.17$ (b) $\pounds 18.89$ (c) $\pounds 0.88$ (d) $\pounds 5.67$
- 10 (a) 4410 cm^3 (b) 1974 cm^2
- 11 600 g
- 12 (a) 30 (b) 13 (c) $\frac{5}{30}$ or $\frac{1}{6}$
 (d) 57% (e) 83% (f) 44%

25 Scatter diagrams and correlation

A Scatter diagrams

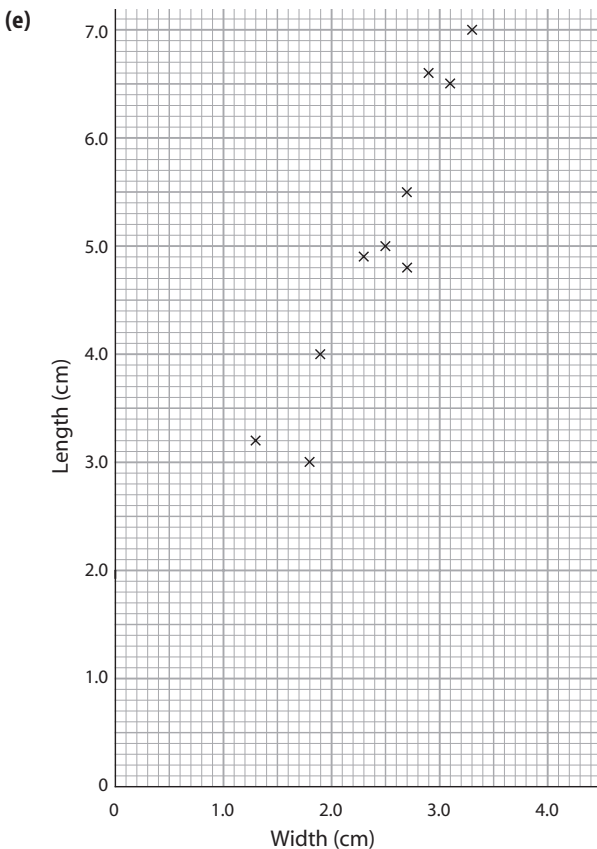
B Correlation (p 75)

- 1 (a) 9 (b) Critic 2 (c) C (d) F



- (f) Yes, they both gave each film similar scores.

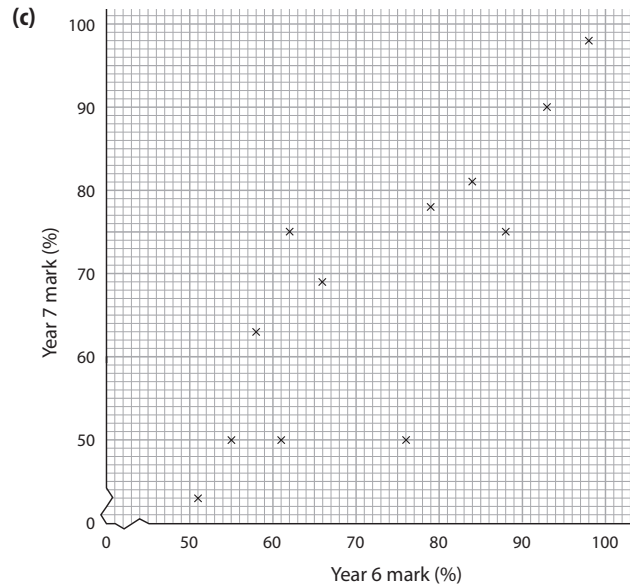
- 2 (a) 4.0 cm (b) A, D, J (c) 7.0 cm (d) Yes



- (f) There is a positive correlation between leaf width and leaf length, i.e. there is a tendency for wider leaves to be longer.

- 3 (a) 75%

- (b) Fiona

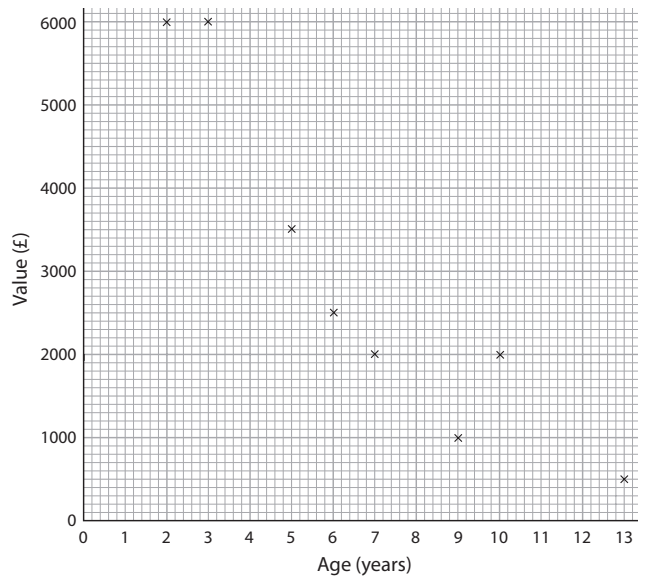


- (d) Positive correlation

- (e) There is a tendency for those who did well in year 6 to do well in year 7 too.

- (f) Dan

- 4 (a)

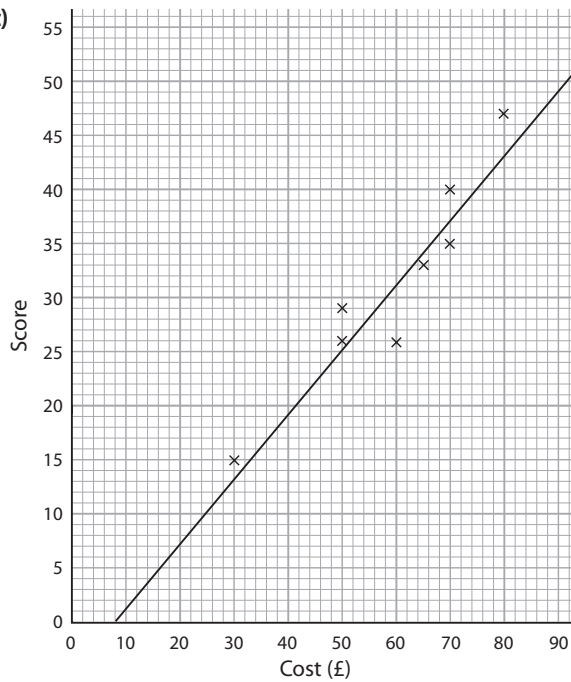


- (b) Negative correlation

- (c) As cars get older, their value decreases.

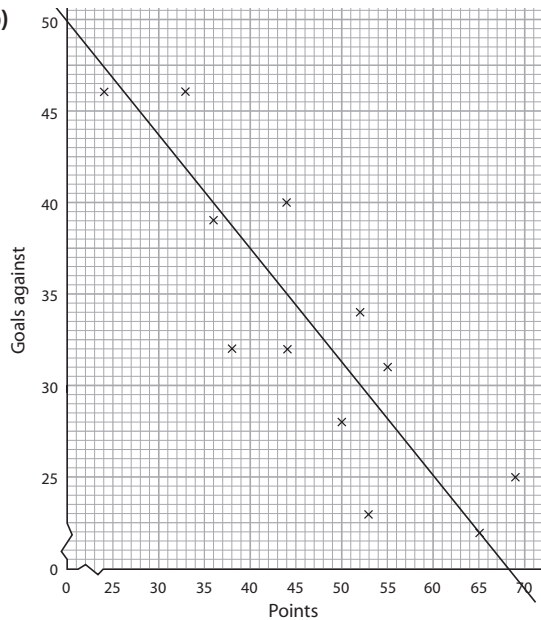
C Line of best fit (p 77)

1 (a), (c)



- (b) Positive correlation
- (d) About 20
- (e) About £78
- (f) About 4; unreliable as outside the range of data

2 (a), (b)



- (c) There is a tendency for those with the most points to have fewer goals scored against them.
- (d) 32–33 goals
- (e) About 43 points

26 Square and cube numbers

A Squares and square roots (p 78)

- 1 4, 9, 25, 81, 100
- 2 (a) 64 (b) 121 (c) 10
- 3 (a) 25 (b) 16 (c) 4 (d) 7 (e) 1
- 4 (a) 361 (b) 784 (c) 21

B Cubes and cube roots (p 78)

- 1 1, 8, 27
- 2 (a) 125 (b) 10
- 3 (a) 343 (b) 1331 (c) 512
- 4 (a) 2 (b) 3 (c) 6 (d) 4

C Squares, cubes and higher powers (p 78)

- 1 (a) 8 (b) 25 (c) 16
- 2 (a) 225, 256, 289, 324, 361, 400 (b) 216, 343
- 3 (a) 81 (b) 8 (c) 169

27 Surveys

B Designing a questionnaire (p 79)

- B is better because it is quicker to classify the responses.
- B is better because it stops people thinking they have to give an exact amount and makes the responses easier to classify.

D Summarising results (p 79)

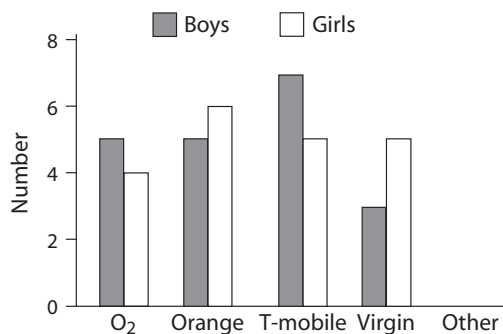
1 (a) Network

	O ₂	Orange	T-mobile	Virgin	Other
Boys	5	5	7	3	0
Girls	4	6	5	5	0

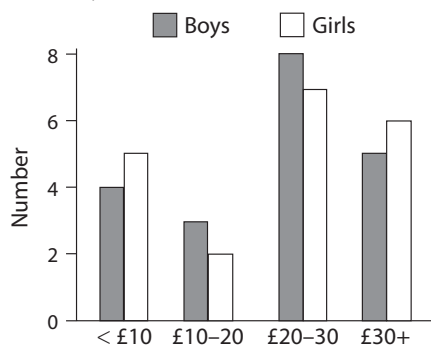
(b) Monthly cost

	< £10	£10–20	£20–30	£30+
Boys	4	3	8	5
Girls	5	2	7	6

2 (a) Network



(b) Monthly cost



28 Imperial measures

A Length (p 80)

- (a) 3 feet (b) 6 feet

(c) 150 feet (d) 3000 feet
- 10 metres by 25 metres
- (a) 9 kilometres (b) 20 miles

(c) 100 miles (d) 12 miles
- (a) 48 km/h (b) 80 km/h (c) 112 km/h
- (a) Birmingham 80 miles
Derby 60 miles
Leeds 40 miles
Brighton 250 miles

(b) Birmingham 128 km
Derby 96 km
Leeds 64 km
Brighton 400 km
- (a) 50 miles (b) 25 miles

(c) 20 miles (d) 125 miles

B Weight (p 80)

- (a) 2 lb (b) 6 lb (c) 3 lb (d) 9 lb
- (a) 2 kg (b) 10 kg (c) 50 kg (d) $\frac{1}{2}$ kg
- (a) 5 kg (b) 7 kg (c) 80 lb (d) 300 g
- Marrow 4 kg
Lemons 4
Sugar 3 kg

C Liquid measure (p 81)

- (a) 2 pints (b) 8 pints

(c) 36 pints (d) 7 pints
- (a) 2 litres (b) 9 litres

(c) 15 litres (d) $4\frac{1}{2}$ litres
- (a) 1000 ml (b) 500 ml (c) 250 ml (d) 50 ml
- (a) Gold top 36 pints
Silver top 144 pints
Semi-skimmed 128 pints
Skimmed 72 pints

(b) Gold top 18 litres
Silver top 72 litres
Semi-skimmed 64 litres
Skimmed 36 litres

D Mixed questions (p 81)

- 5 kg
- (a) I travelled 640 kilometres to get to Scotland.
(b) The petrol tank in my car holds 60 litres (or 67.5 litres).
(c) The weight of all the luggage we took on holiday was 50 kg.
(d) My rubber plant has grown to a height of 3 metres.
- 200 miles
- $2\frac{1}{2}$ litres

29 Navigation

A Four-figure grid references and points of the compass (p 82)

- (a) The tower (b) 1926
(c) The windmill (d) The phone mast
(e) North-east (f) East
(g) 2424

B Scales and points of the compass (p 83)

- (a) (i) 25 km (ii) 20 km (iii) 15 km
(b) The lighthouse
(c) 15 km
(d) North-west
- (a) (i) 4 m (ii) 8 m (iii) 22 m (iv) 23 m
(b) 4 cm by 1.5 cm
(c) 2.3 cm
- (a) 175 km (b) 300 km (c) 625 km (d) 35 km
- (a) 4 cm (b) 17 cm (c) 30 cm (d) 7.5 cm

D Bearings (p 84)

- (a) 16 km
(b) E
(c) 031°
(d) 190°
(e) (i) 10.2 km (ii) 9.6 km (iii) 0.6 km
(iv) 117° (v) 011°
(f) Peak A
(g) 241°

30 Rounding with significant figures

A Rounding a whole number to one significant figure

B Rounding a decimal to one significant figure (p 85)

- (a) 600 (b) 80 (c) 4000 (d) 90 000 (e) 9000
- (a) 1000 (b) 2100 (c) 4000 (d) 18 000 (e) 40 000
- (a) £600
(b) Smaller, because 30 is smaller than 32 and £20 is smaller than £21
- (a) 60 (b) 0.5 (c) 0.08 (d) 40 (e) 0.005
- (a) The world's longest cable suspension bridge has a main span of **2000** m.
(b) The world's fastest train travelled at **600** kilometres per hour.
(c) The world's smallest spider has a length of **0.4** mm.
(d) The world's smallest fish has a length of **0.008** m.

C Multiplying decimals (p 85)

- (a) $3 \times 4 = 12$ (b) $8 \times 4 = 32$
 $3 \times 0.4 = 1.2$ $8 \times 0.4 = 3.2$
 $0.3 \times 0.4 = 0.12$ $0.8 \times 0.4 = 0.32$
(c) $4 \times 5 = 20$
 $4 \times 0.5 = 2$
 $0.4 \times 0.5 = 0.2$
- (a) 0.16 (b) 0.06 (c) 0.45 (d) 0.04
- (a) 24
(b) (i) 2.4 (ii) 0.24 (iii) 2.4 (iv) 0.024
- (a) 153 (b) 15.3 (c) 15.3 (d) 1.53 (e) 0.153
- (a) 15 (b) 80 (c) 400 (d) 0.36 (e) 810

D Rough estimates with decimals (p 86)

- (a) 1.8 (b) 14 (c) 0.15 (d) 120
- (a) £1000
(b) Smaller, because 50 is smaller than 52 and £20 is smaller than £21.50
- (a) 28 m^2
(b) Bigger, because 7 m is bigger than 6.82 m and 4 m is bigger than 3.85 m
- (a) 4 (b) 10 (c) 4 (d) 2

E Rounding answers (p 86)

- (a) 8.66 (b) 10.8 (c) 37.10 (d) 0.087
- (a) £9 (b) £9.77

- 3 54.0 kg
4 £4.55

31 Solving equations

B Seeing a balance puzzle as an equation (p 87)

- 1 (a) A, $x = 4$ (b) D, $x = 5$ (c) B, $x = 2$ (d) C, $x = 1$

C Solving an equation using balancing (p 87)

- 1 (a) $x = 5$ (b) $x = 3$ (c) $x = 6$
(d) $x = 4$ (e) $x = 12$ (f) $x = 2$
- 2 (a) $5x + 10 = 3x + 22$ (b) $x = 6$
- 3 (a) $x = 4$ (b) $x = 3$ (c) $x = 2$
(d) $x = 5$ (e) $x = 1$ (f) $x = 3$
(g) $x = 5$ (h) $x = 3$ (i) $x = 5$

E Undoing a subtraction in an equation (p 88)

- 1 (a) $x = 5$ (b) $x = 12$ (c) $x = 3$
(d) $x = 4$ (e) $x = 1$ (f) $x = 5$
- 2 (a) $x = 5$ (b) $x = 4$ (c) $x = 2$
(d) $x = 2$ (e) $x = 7$ (f) $x = 4$
- 3 (a) $x = 2$ (b) $x = 4$ (c) $x = 3$

F Decimal, negative and fractional solutions (p 88)

- 1 (a) $y = 1.5$ or $1\frac{1}{2}$ (b) $p = 0.1$ or $\frac{1}{10}$ (c) $n = 0.8$ or $\frac{4}{5}$
(d) $b = -2$ (e) $y = -4$ (f) $a = -2$
(g) $x = 1.5$ or $1\frac{1}{2}$ (h) $d = 2.5$ or $2\frac{1}{2}$ (i) $k = 0.6$ or $\frac{3}{5}$
(j) $p = -1$ (k) $s = -2$ (l) $m = -3$
- 2 (a) $x = \frac{1}{4}$ (b) $x = \frac{1}{3}$ (c) $x = \frac{4}{7}$

G Problem solving (p 88)

- 1 (a) $3x + 60^\circ$
(b) $3x + 60^\circ = 180^\circ$; $x = 40^\circ$
- 2 (a) $6x + 8$
(b) $6x + 8 = 62$; $x = 9$
(c) 18 cm

32 Written calculation 2

A Multiplying by a two-digit number (p 89)

- 1 (a) 252 (b) 943 (c) 1470 (d) 4424
2 (a) 4088 (b) 6068 (c) 4216 (d) 7553
3 (a) 3675 (b) 12 528 (c) 64 768 (d) 19 173
4 (a) $20 \times 40 = 800$ (b) 738

B Dividing by a two-digit number (p 89)

- 1 (a) 19 (b) 21 (c) 27 (d) 16
2 (a) 31 (b) 19 (c) 17 (d) 27
3 (a) 32 (b) 32 (c) 54 (d) 26
4 (a) 80 (b) 45
5 (a) 6 (b) 14

C Mixed questions (p 90)

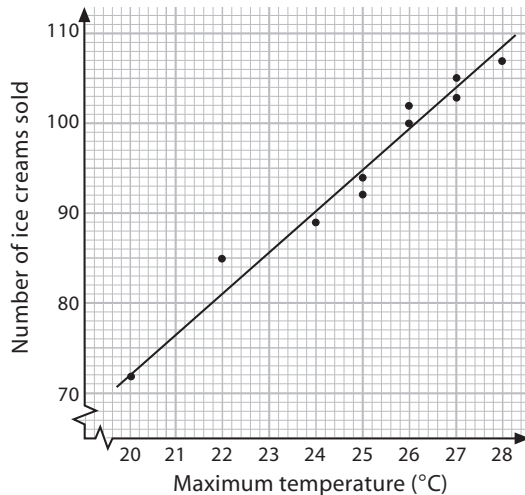
- 1 56
2 1872
3 £13.35
4 (a) 47 (b) 1134
5 (a) 36 litres (b) £33.12
6 (a) 29 (b) 35 ml
7 (a) 18 (b) 24 (c) 432 (d) £155.52
8 £47.20

Mixed practice 4 (p 91)

- 1 (a) Question A is a leading question.
Question B will not tell you how much pocket money each student gets, just what they think about the amount. Also, there is no box for people who think they get round about the average.
- (b) A question such as:

How much pocket money do you get each week?	
£0–£4.99	<input type="checkbox"/>
£5–£9.99	<input type="checkbox"/>
£10–£14.99	<input type="checkbox"/>
£15–£19.99	<input type="checkbox"/>
£20+	<input type="checkbox"/>

2 (a), (b)



- (c) Strong positive correlation
(d) About 86
- 3 589m^2
- 4 (a) 14 m (b) 103m^2 (c) 43 m
- 5 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196
- 6 40 000
- 7 6.5 cm
- 8 (a) $n = 8$ (b) $n = 2$ (c) $n = 3$
(d) $n = 3$ (e) $n = 5$ (f) $n = -2$
- 9 3 kg
- 10 41
- 11 0.04
- 12 1000
- 13 (a) 360 (b) 36
- 14 8

- 15 (a) 1 litre (b) 6 litres (c) 8 or 9 litres
- 16 (a) $7x + 1$ (b) $7x + 1 = 50; x = 7$
- 17 40 km
- 18 (a) $50 \times 5 = 250$ (b) $60 \div 2 = 30$
(c) $\frac{100 \times 0.5}{2} = \frac{50}{2} = 25$ (d) $\frac{0.1 \times 4000}{4} = \frac{400}{4} = 100$
- 19 548
- 20 $x = \frac{1}{3}$

33 Sequences

A Continuing a sequence (p 93)

- 1 (a) 17, 21, 25 (b) 24, 48, 96
(c) 121, 364, 1093
- 2 (a) 23, 28 Add 5 to the previous term
(b) 28, 25 Subtract 3 from the previous term
(c) 80, 160 Double the previous term
(d) -8, -13 Subtract 5 from the previous term
(e) -1, -4 Subtract 3 from the previous term
(f) $3, 2\frac{1}{2}$ Subtract $\frac{1}{2}$ from the previous term
- 3 23, 37
- 4 Jo could be right as the rule 'add 2, add 4, add 6, add 8 and so on' produces 1, 3, 7, 13, 21, ...
Peter could be right as the rule 'multiply the previous term by 2 and add 1' produces 1, 3, 7, 15, 31, ...

B Describing numbers in some sequences (p 93)

- 1 A and Q; B and S; C and P; D and R

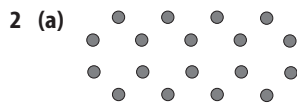
C Sequences from patterns (p 94)

1 (a)

Pattern	1	2	3	4	5
No. of matches	9	13	17	21	25

(b) Pattern 7

- (c) An explanation such as:
I added 4 each time till I reached pattern number 10 to give $25 + 4 + 4 + 4 + 4 + 4 = 45$.
or
I multiplied the pattern number by 4 and added 5 to give $10 \times 4 + 5 = 45$.



Pattern 4

(b)

Pattern	1	2	3	4	5
No. of dots	6	10	14	18	22

- (c) 42; an explanation such as:
I added 4 each time till I reached pattern number 10 to give $22 + 4 + 4 + 4 + 4 + 4 = 42$.
or
I multiplied the pattern number by 4 and added 2 to give $10 \times 4 + 2 = 42$.

3 (a)

Shape	1	2	3	4	5
No. of matches	7	12	17	22	27

- (b) 62; an explanation such as:
I added 5 each time till I reached shape 12 to give $27 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 62$.
or
I multiplied the shape number by 5 and added 2 to give $12 \times 5 + 2 = 62$.
- (c) Shape 14

34 Problem solving with a calculator

A Which calculation? (p 95)

- 1 $630 - 243 = 387$ miles
2 $32 \times 27 = 864$ chairs
3 (a) $\pounds 14.80 + \pounds 8.46 + \pounds 4.28 = \pounds 27.54$
(b) $\pounds 27.54 \div 6 = \pounds 4.59$
4 (a) $\pounds 84.35 - \pounds 12.55 = \pounds 71.80$
(b) $\pounds 71.80 \div 4 = \pounds 17.95$
5 (a) $\pounds 9.82 - \pounds 1.49 = \pounds 8.33$
(b) $\pounds 8.33 \div \pounds 1.19 = 7$ bottles

B Showing working (p 95)

- 1 Cost of bed and tables = $\pounds 345.50 + 2 \times \pounds 39.90 = \pounds 425.30$
Cost of wardrobe = $\pounds 741.25 - \pounds 425.30 = \pounds 315.95$
2 Total profit = $\pounds 12.35 - \pounds 4.88 = \pounds 7.47$
Profit per person = $\pounds 7.47 \div 3 = \pounds 2.49$
3 Total distance travelled = $46\,060 - 45\,928 = 132$ miles
Distance from home to work = $132 \div 8 = 16.5$ miles
4 Cost of 1 coffee = $\pounds 4.95 \div 3 = \pounds 1.65$
Cost of 2 muffins = $\pounds 9.40 - \pounds 1.65 \times 4 = \pounds 2.80$
Cost of muffin = $\pounds 2.80 \div 2 = \pounds 1.40$
5 Cost of individual tickets = $2 \times \pounds 6.60 + 2 \times \pounds 4.20 = \pounds 21.60$
Money saved with family ticket = $\pounds 21.60 - \pounds 16.80 = \pounds 4.80$

C Changing money to a different currency (p 96)

- 1 657 rand
2 $\pounds 20.19$
3 (a) 16 324 rupees (b) $\pounds 22.79$
4 $\pounds 81.41$
5 (a) 741.33 rand
(b) $\pounds 51.70$ (to the nearest penny)

35 Working with expressions 2

A Substituting into expressions such as $2a - b$ (p 97)

- 1 (a) 7 (b) 1 (c) 6 (d) 11
 (e) 9 (f) 10 (g) 2 (h) 1
- 2 (a) 11 (b) 25 (c) 20 (d) 1
 (e) 19 (f) 7 (g) 2 (h) 22

B Simplifying expressions such as $3a + 2b + a + 5b$

C Simplifying expressions such as $3a + 2b + a - 5b$ (p 97)

- 1 (a) $3n + 4m$ (b) $7r + 3s$ (c) $8p + 3q$
 (d) $3a + 4b + 5$ (e) $5g + 3f + 9$ (f) $9j + 5k + 1$
 (g) $11x + 3y - 1$ (h) $7p + 2q - 2$ (i) $5h + 6g - 9$
- 2 (a) $5a + 4b$ (b) $10p + q$ (c) $3c + 2d$
 (d) $4r + 2s$ (e) $4x + 3y$ (f) $5m - 2n$
 (g) $3x - 2y$ (h) $5w - 6v$ (i) $9c - 5d$
- 3 (a) $2b + 5c + 3$ (b) $5p + q$ (c) $6a - b$
- 4 (a) $m - n + 10$ (b) $2p + q + 2$
- 5 $4x + 3y$

36 Calculating with negative numbers

A Adding and subtracting (p 98)

- 1 (a) -4 (b) 1 (c) -7 (d) 1 (e) -13
- 2 (a) -3 (b) -8 (c) -6 (d) 7

- 3 (a)

-3	1	8
13	2	-9
-4	3	7

 (b)

-4	3	-5
-3	-2	-1
1	-7	0

- (c)

-4	1	0
3	-1	-5
-2	-3	2

- 4 (a) 8 (b) 11 (c) 3 (d) 18 (e) 7
- 5 (a) $1 - 5 = -4$ or $-3 - 1 = -4$ (b) $-4 - 1 = -5$
 (c) $5 + -4 = 1$ (d) $-3 - -4 = 1$

B Multiplying (p 98)

- 1 (a) -15 (b) -8 (c) -18 (d) 6 (e) -6
 (f) 4 (g) 56 (h) 24 (i) -24 (j) 60

- 2 (a)

×	-1	-3	4
3	-3	-9	12
-2	2	6	-8
-5	5	15	-20

 (b)

×	-4	6	8
2	-8	12	16
-3	12	-18	-24
-10	40	-60	-80

- (c)

×	-1	2	-4
2	-2	4	-8
-3	3	-6	12
-4	4	-8	16

- 3 (a) -3 (b) -7 (c) -6 (d) -8

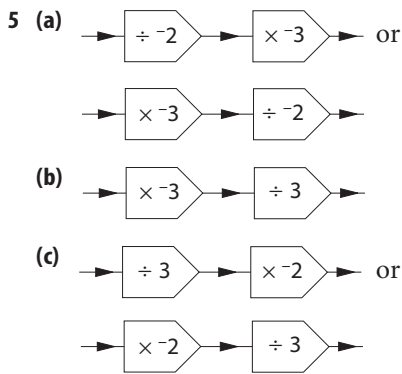
C Dividing (p 99)

- 1 (a) -5 (b) -5 (c) 2 (d) 45 (e) -32
 (f) 8 (g) -5 (h) 50 (i) -1 (j) 1

- 2 (a) -3 (b) 7 (c) -5 (d) -1 (e) 56
 (f) -10 (g) -4 (h) 6

- 3 (a) $-6 \div 3 = -2$ (b) $3 \times -4 = -12$
 (c) $-24 \div -6 = 4$ (d) $-4 \times -6 = 24$

- 4 (a) $3 \times -5 = -15$
 (b) $-20 \div -5 = 4$
 (c) $-20 \times -5 = 100$
 (d) $5 \times -5 = -25$
 (e) $5 \div -5 = -1$ or $-5 \div 5 = -1$



D Negative square roots and cube roots (p 99)

- 1 (a) 4 (b) 36 (c) -64 (d) 81 (e) -512
- 2 (a) (i) 8 (ii) -8
(b) (i) 11 (ii) -11
- 3 (a) 4 and -4 (b) 3 and -3
(c) 5 and -5 (d) 10 and -10
- 4 (a) 4 (b) -4 (c) 10 (d) -5 (e) 8
- 5 (a) $(-9)^2 = 81$ (b) $(-8)^2 = 64$
(c) $(-4)^3 = -64$ (d) $(-1)^3 = -1$

E Mixed questions (p 100)

- 1 (a) -5 (b) -21 (c) -7 (d) -4 (e) 18
(f) 6 (g) 7 (h) 6 (i) -4 (j) 6
- 2 (a) 2 (b) 4 (c) 30 (d) -6
- 3 (a) 9 (b) -14 (c) 5 (d) 16 (e) -2
(f) -3 (g) 2 (h) 25
- 4 (a) -7 (b) -9 (c) -21 (d) 6
- 5 (a) $-7, -12, -17$ (b) $-6, 1, 8$
(c) $-40, 80, -160$
- 6 (a) -7 (b) 9 (c) 15 (d) -27
- 7 (a) -22 (b) 18 (c) -42
- 8 $(-4)^3, (-2)^3, (-1)^2, 2^3, 3^2, (-5)^2$
- 9 (a) INKIGS \rightarrow SKIING
(b) TEARAK \rightarrow KARATE
(c) GNITARK \rightarrow KARTING
(d) TSAINKG \rightarrow SKATING

37 Brackets

A Dividing an expression by a number (p 101)

- 1 (a) 3 (b) 2 (c) $5a$ (d) $7b$
- 2 (a) $4n$ (b) $3a$ (c) $5y$ (d) $4x$ (e) $4b$
- 3 (a) $3n + 7$ (b) $4k + 5$ (c) $p + 2$ (d) $6 + 5w$

B Expressions with brackets

C Factorising an expression (p 101)

- 1 $5(c + 1) = 5c + 5$
 $5(c + 2) = 5c + 10$
 $5(c + 10) = 5c + 50$
The odd one left over is $5c + 2$.
- 2 (a) $2a + 6$ (b) $4b - 20$ (c) $8c - 16$
(d) $20 + 5d$ (e) $7e - 21$
- 3 (a) $10a + 15$ (b) $6b - 8$ (c) $14 + 21c$
(d) $12d - 3$ (e) $45e + 63$
- 4 (a) 4 (b) 2 (c) 8 (d) 2 (e) 3 (f) 10
- 5 (a) $2(p + 6)$ (b) $3(q + 2)$ (c) $7(r + 1)$
(d) $7(s - 2)$ (e) $5(t + 4)$ (f) $2(2u + 5)$
(g) $3(2v - 3)$ (h) $5(2w + 1)$ (i) $5(3x - 2)$
(j) $2(6y + 1)$
- 6 (a) $4(2a + 1)$ (b) $10(b - 5)$ (c) $4(4c - 3)$
(d) $6(3d + 5)$ (e) $8(3e - 4)$
- 7 (a) (i) $5(2x + 3), 3(2x + 1) \rightarrow$ NIAL \rightarrow NAIL
(ii) $2(x + 1), 3(x + 2), 6(x + 2) \rightarrow$ ERAMHM \rightarrow HAMMER
(iii) $6(2x + 1), 2(3x + 2), 4(2x + 3) \rightarrow$ HLESCI \rightarrow CHISEL
(b) A set of three expressions that factorise to give 2, 3, 4, $(x + 1)$, $(2x + 1)$ and $(3x + 2)$ in any order

D Factorising more complex expressions (p 102)

- 1 (a) $x(x + 5) = x^2 + 5x$ (b) $y(y - 7) = y^2 - 7y$
(c) $z(3z - 2) = 3z^2 - 2z$
- 2 (a) $a^2 + 9a$ (b) $b^2 - 6b$ (c) $4c + c^2$
(d) $3d - d^2$ (e) $3e^2 + 5e$ (f) $f - 2f^2$
(g) $10g^2 - 9g$ (h) $7h + 5h^2$
- 3 (a) $2a^2 + 6a$ (b) $3b^2 - 6b$ (c) $5c + 5c^2$
(d) $20d - 4d^2$
- 4 $c(2c + 1) = 2c^2 + c$
 $c(3c + 5) = 3c^2 + 5c$
 $c(2c + 5) = 2c^2 + 5c$
The odd one left over is $c(c + 1)$, which multiplies out to give $c^2 + c$.

- 5 (a) $s(s + 4)$ (b) $t(t - 9)$ (c) $v(7 + v)$
 (d) $x(x + 8)$ (e) $y(y + 5)$ (f) $z(12 + z)$
 (g) $u(2u + 3)$ (h) $w(3 - 5w)$
- 6 (a) $3c + 3d$ (b) $2x - 2y$ (c) $10r + 5t$
 (d) $3x + 18y$ (e) $12g - 8h$ (f) $8p - 14q$
 (g) $30m + 24n$ (h) $10h - 50g$
- 7 $2x + 2y = 2(x + y)$
 $2x + 4y = 2(x + 2y)$
 $8x + 4y = 4(2x + y)$
- 8 (a) $4(u + v)$ (b) $2(a + 4b)$ (c) $5(m - 4n)$
 (d) $3(3c + 4d)$

E Adding an expression containing brackets

F Subtracting an expression containing brackets (p 103)

- 1 (a) $2a + 10$ (b) $3 + 5b$ (c) $5c + 12$
 (d) $5d - 12$ (e) $5e + 8$ (f) $3f - 15$
- 2 (a) $11u + 3$ (b) $9 + 15v$ (c) $10w + 24$
 (d) $20x$ (e) $2y + 8$ (f) $31z - 30$
- 3 (a) $8c + 17$ (b) $20d + 4$ (c) $29e - 3$
- 4 $10 - (x + 4) = 6 - x$
 $5 - (x + 1) = 4 - x$
 $8 - (x - 6) = 14 - x$
 $1 - (x - 1) = 2 - x$
- 5 (a) $11 - a$ (b) $11 - b$ (c) $3c + 3$
 (d) $4d - 7$ (e) $5 + 4e$ (f) $13f - 3$
- 6 (a) $9 - 2m$ (b) $6n + 6$ (c) $12p - 20$
 (d) $2 - 4q$ (e) $13r + 10$ (f) $2s + 1$
- 7 (a) $2g + 3$ (b) $4h + 18$ (c) $2j + 22$
 (d) $3k + 41$ (e) $2l - 2$ (f) $2m + 5$
- 8 $(4x - 3) - 2(x - 1)$
- 9 (a) $18n - 11$ (b) $x + 1$ (c) $8k + 2$

38 Pie charts

B Reading a pie chart: simple fractions and percentages (p 104)

- 1 (a) Semi-detached house
 (b) Bungalow
 (c) 25%
 (d) 480
 (e) (i) 120° (ii) $\frac{1}{3}$ (iii) 160
 (f) 60

C Reading a pie chart: the unitary method (p 104)

- 1 (a) 5
 (b) (i) 75° (ii) 375
 (c) 675
 (d) 425
- 2 (a) $\frac{1}{3}$ (b) 90 (c) 40 (d) 5

D Drawing a pie chart: angles (p 105)

- 1 (a) 30
 (b) 12°
 (c) 60°
 (d) Pie chart with sectors:
 blonde 60°, black 84°, brown 144°, red 24°, other 48°
- 2 Pie chart with sectors:
 kitchen 160°, stairs 90°, bathroom 60°, living room 36°,
 other 14°

- 3 (a) 72° (b) 150

E Drawing a pie chart: percentages (p 106)

- 1 (a) Pie chart with sectors:
 football 45%, motor racing 32%, snooker 6%,
 tennis 12%, cricket 5%
 (b) Comment, for example:
 Football is most popular for both young people
 and senior citizens.
 (c) Comment, for example:
 A higher percentage of young people liked motor
 racing.
- 2 Pie chart with sectors:
 skiing 46%, cycling 20%, walking 16%, boating 18%

F Handling real data (p 106)

- 1 Pie chart with sectors:
 Channel Tunnel 50° or 14%, sea 91° or 25%,
 air 219° or 61%
- 2 Pie chart with sectors:
 Premier League 160° or 45%,
 Championship 120° or 33%, League One 51° or 14%,
 League Two 29° or 8%
 (The Premier League percentage has been rounded up
 so the total is 100%)

39 Working with expressions 3

A Substituting into linear expressions (p 107)

1	2	1	3	1	4	1
	5	2	6	7		7
7	3		8	2	9	4
10	1	11	3		12	4
	14	5	6			0

- 2 (a) 7 (b) 9 (c) 3 (d) 0 (e) -2
 3 (a) -3 (b) 2 (c) 5 (d) 12 (e) -2
 4 (a) -3 (b) -3 (c) 5 (d) 2 (e) -1

B Squares and cubes (p 107)

- 1 (a) 25 (b) 21 (c) 125 (d) 75 (e) 250
 2 (a) 45 (b) 1 (c) 54 (d) -1 (e) 13
 3 17
 4 (a) 1152 (b) 64 (c) 192 (d) 41 472 (e) -76

C Using more than one letter (p 108)

- 1 (a) 7 (b) 1 (c) 14 (d) 17 (e) 6
 (f) 12 (g) 7 (h) 24 (i) 40 (j) 16
 (k) 9 (l) 25 (m) 7 (n) 19 (o) 13
 2 (a) 13 (b) 29 (c) 13 (d) 36 (e) 21
 (f) 16 (g) 22 (h) 6 (i) 32 (j) 11
 3 (a) 3 (b) 1 (c) 3 (d) 2 (e) 2
 4 (a) -8 (b) -50 (c) 105 (d) -15 (e) -15
 (f) 25 (g) -2 (h) -150 (i) 5 (j) 0
 (k) -1 (l) -25 (m) 125 (n) 15 (o) 3

D Area and simplifying (p 108)

- 1 (a) $6k$ (b) $12h$ (c) $10g$ (d) $24m$ (e) $42p$
 2 (a) mn (b) $2fg$ (c) $5hj$ (d) $21kl$ (e) $35pq$
 (f) $10p^2$ (g) $12n^2$ (h) $10w^2$ (i) $9b^2$ (j) $6k^2$
 3 (a) $18a$ (b) $16mn$ (c) $30x^2$
 4 (a) $6pq$ (b) $10x^2$ (c) $4ab$ (d) $7k^2$ (e) $3ab$
 (f) $3x^2$

40 Multiplying and dividing fractions

A Finding a fraction of a quantity: fractional results 1

(p 109)

- 1 $1\frac{1}{4}$ bars
 2 $1\frac{1}{2}$ pizzas
 3 (a) $3\frac{1}{3}$ (b) $2\frac{1}{4}$ (c) $2\frac{1}{5}$ (d) $1\frac{1}{2}$

B Finding a fraction of a quantity: fractional results 2

(p 109)

- 1 (a) $5\frac{1}{2}$ (b) $2\frac{1}{2}$ (c) $4\frac{1}{2}$ (d) $3\frac{2}{3}$
 2 (a) EBD \rightarrow BED (b) LAETB \rightarrow TABLE
 (c) TECHS \rightarrow CHEST
 3 (a) $3\frac{3}{4}$ (b) $1\frac{1}{5}$ (c) $5\frac{1}{3}$ (d) $1\frac{3}{7}$
 4 (a) CRIE \rightarrow RICE (b) EBFE \rightarrow BEEF
 (c) SIPCH \rightarrow CHIPS

C Dividing a unit fraction by a whole number (p 110)

- 1 (a) $\frac{1}{12}$ (b) $\frac{1}{10}$ (c) $\frac{1}{10}$ (d) $\frac{1}{18}$
 2 $\frac{1}{9}$
 3 (a) $\frac{1}{12}$ (b) $\frac{1}{20}$ (c) $\frac{1}{10}$ (d) $\frac{1}{14}$

D Dividing a fraction by a whole number (p 110)

- 1 $\frac{3}{8}$
 2 (a) $\frac{2}{15}$ (b) $\frac{2}{15}$ (c) $\frac{3}{20}$ (d) $\frac{4}{15}$
 3 (a) $\frac{3}{10}$ (b) $\frac{3}{32}$ (c) $\frac{2}{15}$ (d) $\frac{2}{27}$

E Multiplying fractions (p 110)

- 1 (a) $\frac{1}{8}$ (b) $\frac{1}{24}$ (c) $\frac{3}{20}$ (d) $\frac{3}{8}$
 2 (a) $\frac{3}{10}$ (b) $\frac{1}{5}$ (c) $\frac{3}{16}$ (d) $\frac{1}{14}$
 (e) $\frac{1}{20}$ (f) $\frac{5}{24}$ (g) $\frac{1}{16}$ (h) $\frac{1}{16}$
 3 A and H: $\frac{1}{12}$, B and E: $\frac{5}{18}$, C and D: $\frac{5}{12}$, F and G: $\frac{5}{24}$

41 Working with formulas 2

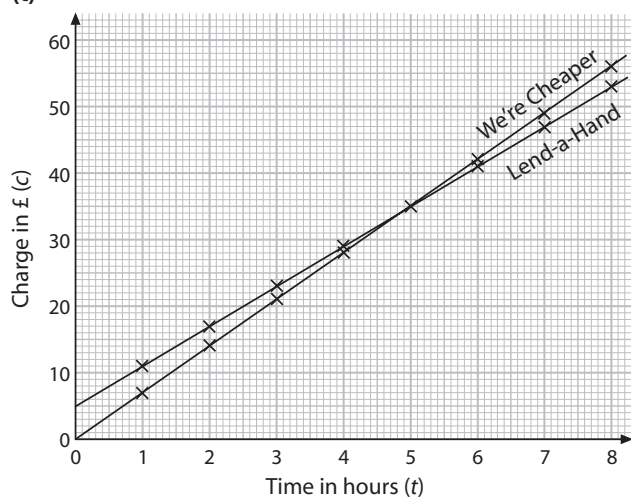
A Formulas and graphs (p 111)

1 (a) £17

(b)

Time in hours (t)	1	2	3	4	5	6	7	8
Charge in £ (c)	11	17	23	29	35	41	47	53

(c)



The line for Lend-a-Hand drawn as above

(d) £26

(e) 7.5 hours

2 (a) £14

(b)

Time in hours (t)	1	2	3	4	5	6	7	8
Charge in £ (c)	7	14	21	28	35	42	49	56

(c) The line for We're Cheaper drawn as in the graph in question 1 (c) above

(d) 7.1 or 7.2 hours

(e) We're Cheaper is cheaper.

An explanation such as:

At $2\frac{1}{2}$ hours, the line for We're Cheaper is below the line for Lend-a-Hand.

(f) An explanation such as:

The lines cross at the point where the time is 5 hours, so both companies charge the same for this time.

B Forming and using formulas (p 112)

1 (a) 72 cm (b) 20 cm

2 (a) 36

(b) 41

(c) $C = 2U + 8$

(d) 42

(e) $2U + 8 = 40$; $U = 16$ so his UK shirt size is 16.

3 (a) £110

(b) $C = 20t + 50$

(c) 130

(d) $20t + 50 = 100$; $t = 2.5$ so he took 2.5 hours.

4 (a) $C = 15n + 80$ (b) 125 (c) 5

C Forming and using expressions and formulas (p 113)

1 $x + 4$

2 $m - n$

3 (a) $10n$ (b) $n + 8$ (c) $11n + 8$

4 (a) $c + p$ (b) $3c + 5p$

5 $c = 20 - 3x$

6 (a) $2x$

(b) $x - 6$

(c) $4x - 6$

(d) $4x - 6 = 94$; $x = 25$ so pile A has 25 stones.

Mixed practice 5 (p 114)

- 1 (a) 6 hours (b) 7 hours (c) $4\frac{1}{2}$ hours
- 2 (a) -10 (b) 12 (c) -5 (d) -5 (e) 7
- 3 (a) $2x + 6$ (b) $15n - 12$ (c) $h^2 + 3h$
(d) $3n^2 - 15n$ (e) $5a + 10b$
- 4 (a) 25%
(b) $\frac{1}{6}$
(c) (i) 120° (ii) $\frac{1}{3}$
(d) 75
- 5 (a) Add 6 to the previous term (b) 26, 32
- 6 -5
- 7 (a) $5a + 11b$ (b) $2x + 5y$ (c) $7k - 4h$
- 8 (a) 11 (b) £3.84 (c) 12
- 9 4
- 10 $1\frac{1}{3}$ buns
- 11 (a) 14
(b)

Pattern number	1	2	3	4	5
Number of dots	5	8	11	14	17
- (c) (i) 32
(ii) An explanation such as:
I added 3 each time till I reached pattern 10 to give $17 + 3 + 3 + 3 + 3 + 3 + 3 = 32$.
or
I multiplied the pattern number by 3 and added 2 to give $10 \times 3 + 2 = 32$.
- (d) Pattern 50
- 12 £76.84
- 13 (a) -3 (b) -2 (c) 3 (d) 72 (e) 4
- 14 17
- 15 (a) 257.79 US dollars (b) £170.73
- 16 (a) 13 (b) 40 (c) 104 (d) -40 (e) -6
- 17 (a) $12(n + 2)$ (b) $2(2g - 7)$ (c) $n(n + 7)$
(d) $x(x - 8)$ (e) $4(a + b)$
- 18 (a) $2\frac{1}{2}$ (b) $3\frac{1}{3}$ (c) $\frac{1}{6}$ (d) $\frac{1}{20}$ (e) $\frac{1}{12}$
- 19 $90x + 65y$
- 20 (a) $10x$ (b) $10ab$ (c) $12n^2$ (d) $5gh$ (e) $2k^2$

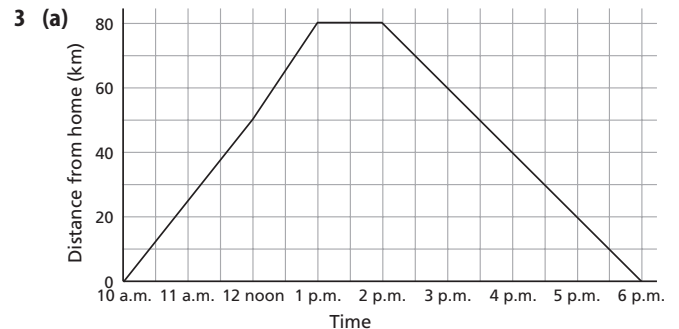
42 Travel

A Calculating speed (p 116)

- 1 (a) 30 m/s (b) 29 m/s
- 2 (a) 80 km/h (b) 530 km/h
- 3 (a) 60 m.p.h. (b) 22 m/s
- 4 (a) 30 km/h (b) 96 km/h (c) 18 km/h
- 5 (a) 144 miles (b) 48 m.p.h.

B Distance–time graphs (p 116)

- 1 We walked at 4 km/h for the first 2 hours.
We stopped for a break for 1 hour.
It took us 3 hours to get back home.
We walked a total of 16 km.
- 2 (a) 30 km/h
(b) He stopped.
(c) Between 2 p.m. and 3 p.m.
(d) 60 km
(e) 2 p.m.
(f) 4:30 p.m.



- (b) 20 km/h
- 4 (a) BC (b) AB (c) 6 km/h (d) 4 km/h

C Calculating distance and time (p 118)

- 1 4 hours
- 2 (a) 420 m (b) 340 m (c) 1650 km
(d) 16 km (e) 135 miles
- 3 (a) 30 miles (b) 150 miles (c) 195 miles
- 4 (a) 2 hours (b) 4 hours (c) $2\frac{1}{2}$ hours
(d) $1\frac{1}{2}$ hours
- 5 (a) 2 hours (b) 5 hours (c) $2\frac{1}{2}$ hours
(d) $3\frac{1}{2}$ hours
- 6 125 miles
- 7 (a) $2\frac{1}{2}$ hours (b) 11:15 a.m.
- 8 (a) 40 m.p.h. (b) 248 m.p.h. (c) 48 m.p.h.

43 Graphs from rules

A Patterns in coordinates (p 119)

1 $y = 4x$

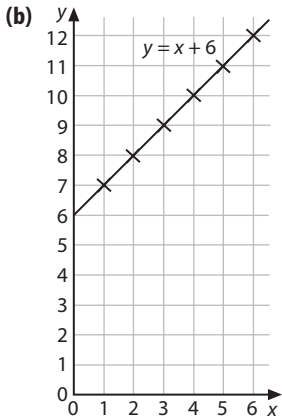
2 A, $y = 5x + 3$; B, $y = 5x + 2$; C, $y = 3x$; D, $y = 3x + 1$

B Drawing a straight-line graph

C Including negative coordinates (p 119)

1 (a)

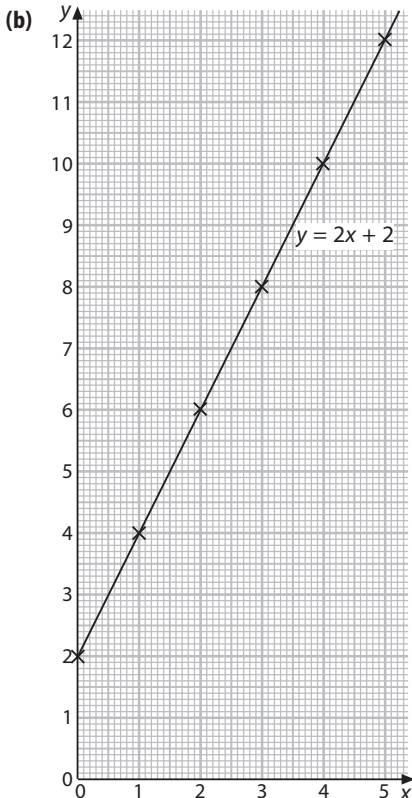
x	0	1	2	3	4	5
y	6	7	8	9	10	11



(c) 12 (d) 9.5

2 (a)

x	0	1	2	3	4	5
y	2	4	6	8	10	12



(c) 7

(d) (i) (1.3, 4.6)

(ii) (4.5, 11)

(iii) (3.6, 9.2)

(iv) (0.6, 3.2)

3 (a)

x	-2	-1	0	1	2	3
y	-8	-5	-2	1	4	7

(b) Graph of $y = 3x - 2$ as in part (d) (ii) below

(c) (i) (0.5, -0.5)

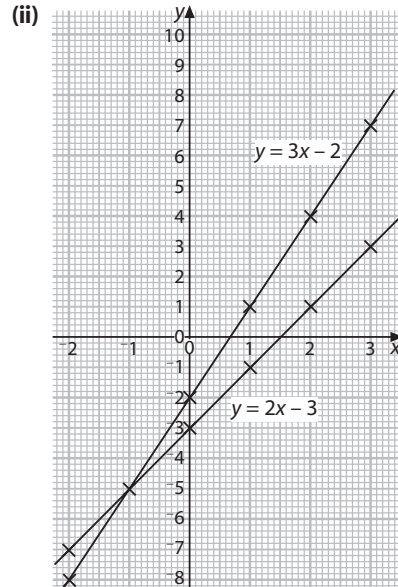
(ii) (2.5, 5.5)

(iii) (2.8, 6.4)

(iv) (-1.4, -6.2)

(d) (i)

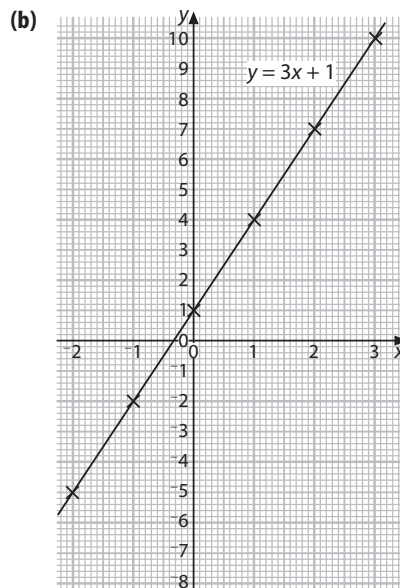
x	-2	-1	0	1	2	3
y	-7	-5	-3	-1	1	3



(e) (-1, -5)

4 (a)

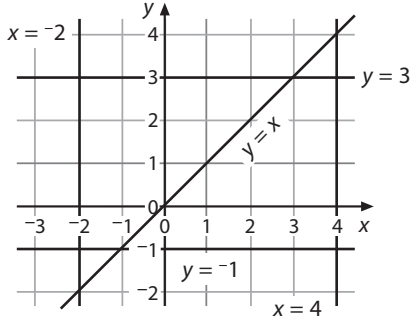
x	-2	-1	0	1	2	3
y	-5	-2	1	4	7	10



- (c) 5.5
(d) 2.4

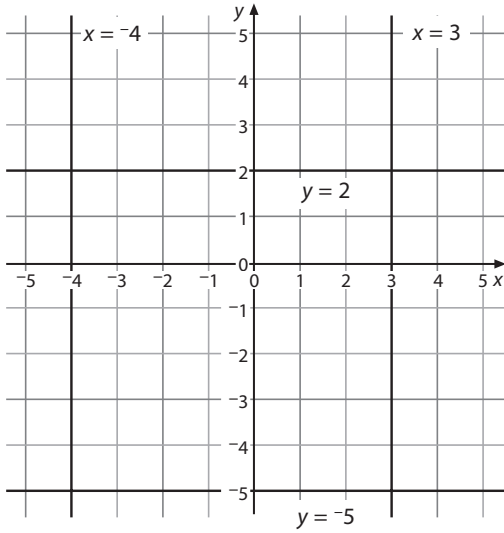
D Equations of horizontal and vertical lines (p 121)

1 (a), (b)



- (c) $(-2, -2), (-1, -1), (3, 3), (4, 4)$

2



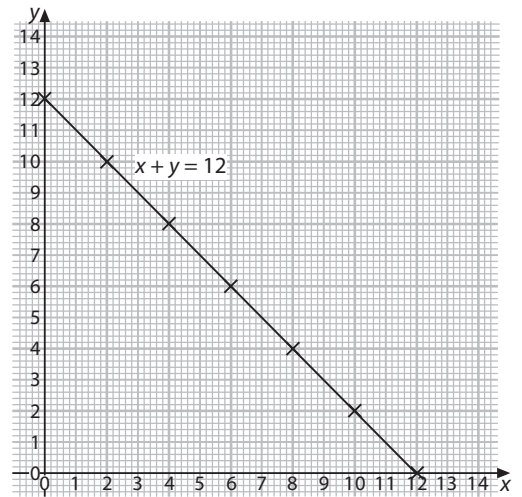
- (b) A square
(c) $(-4, 2), (3, 2), (3, -5), (-4, -5)$

E Implicit equations (p 121)

1 (a)

x	0	2	4	6	8	10	12
y	12	10	8	6	4	2	0

(b)



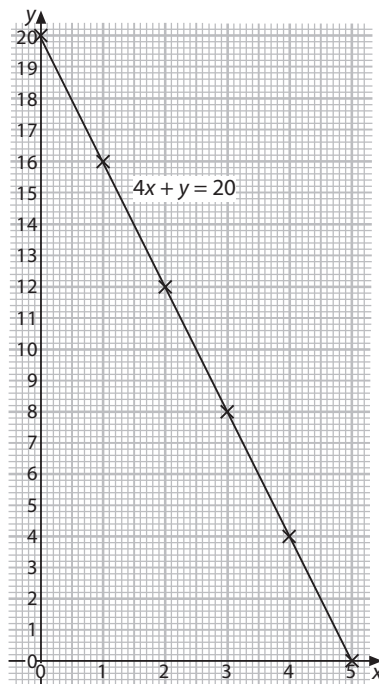
- (c) (i) $(4.5, 7.5)$ (ii) $(2.5, 9.5)$

- (d) $(1.4, 10.6)$ and $(5.5, 6.5)$

2 (a)

x	0	1	2	3	4	5
y	20	16	12	8	4	0

(b)



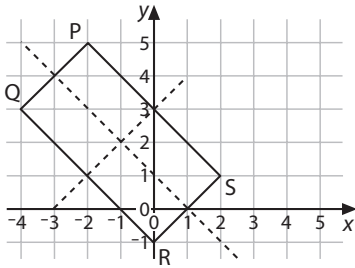
- (c) 2.5

44 Working with coordinates

A Shapes on a grid

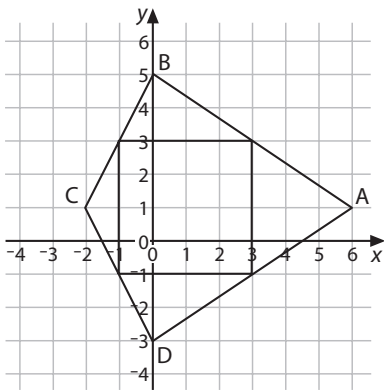
B Mid-points (p 122)

- 1 (a) Parallelogram (b) Y (or Z) (c) $(4, 2\frac{1}{2})$
 2 (a) P (-2, 5); Q (-4, 3); R (0, -1)
 (b) (i) Point S plotted as on diagram below



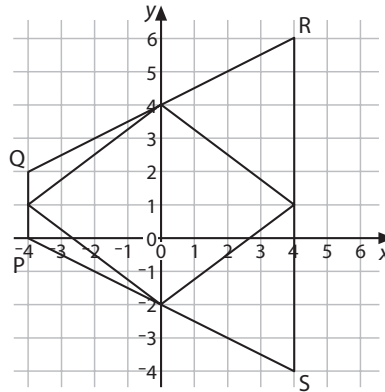
- (ii) (2, 1)
 (c) Lines as shown dotted on diagram above
 (d) 2

3



- (a) A, B and C plotted as on diagram above
 (b) D plotted as on diagram above
 (c) 32 cm^2
 (d) (i) Mid-points plotted and joined as on diagram above
 (ii) Square

4



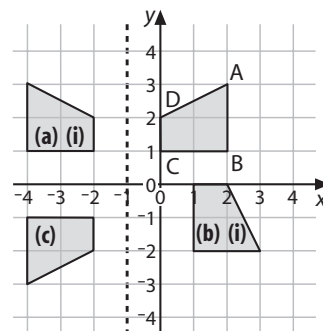
- (a) P, Q and R plotted as on diagram above
 (b) (i) S plotted as on diagram above
 (ii) $y = 1$
 (c) (i) Mid-points plotted and joined as on diagram above
 (ii) Rhombus

C Reflection

D Rotation (p 123)

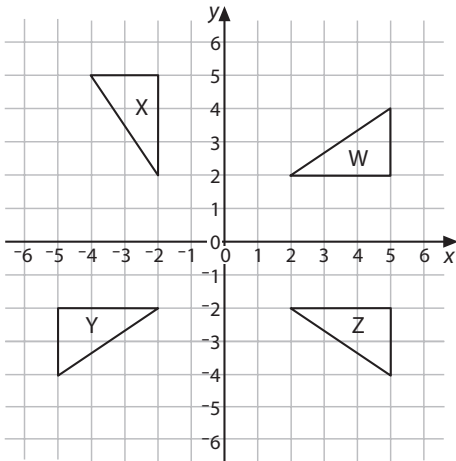
- 1 (a) D
 (b) (i) Reflection in $x = 1$
 (ii) Reflection in $y = 2$
 (c) (0, 3)
 (d) (-3, 6)

2



- (a) (i) Image drawn as above
 (ii) (-4, 3)
 (b) (i) Image drawn as above
 (ii) (1, -2)
 (c) Image drawn as above

3



- (a) W drawn as on diagram above
 (b) X drawn as on diagram above
 (c) Y drawn as on diagram above
 (d) Z drawn as on diagram above
 (e) (i) Reflection in the y -axis
 (ii) Rotation of 90° anticlockwise about $(0, 0)$

45 Trial and improvement

A Searching for whole numbers (p 124)

- 1 24, 36
 2 343
 3 (a) 45, 46 (b) 73, 75

B Searching for decimals (p 124)

- 1 16, 16.5
 2 5.2, 11.8

C Searching for approximate values (p 124)

- 1 6.4 cm
 2 4.6 cm

46 Constructions

A Drawing a triangle using lengths

B Drawing a triangle using angles

C Drawing a triangle using two sides and an angle

(p 125)

Answers obtained by measurement may differ by up to 2° or 0.2 cm from the values given here.

- 1 Triangles drawn accurately with the measurements given
 $x = 79^\circ$ or 80° , $y = 9.7$ cm, $z = 8.5$ cm
- 2 (a) An accurate drawing from the measurements given
 (b) Right-angled
 (c) 27.3 cm^2
- 3 (a) No, the two new lines would be parallel.
 (b) Yes
 (c) No, the two new lines would diverge.
- 4 (a) Yes
 (b) No, the two new lines are together not long enough.
 (c) No, PR and RQ are together not long enough for PQ.
- 5 Accurate drawings of two different triangles with the given measurements; in one the third side will be 7.0 cm long and in the other it will be 4.6 cm long.
- 6 (a) An accurate drawing from the measurements given
 (b) A parallelogram
- 7 (a) An accurate drawing from the measurements given
 (b) A trapezium

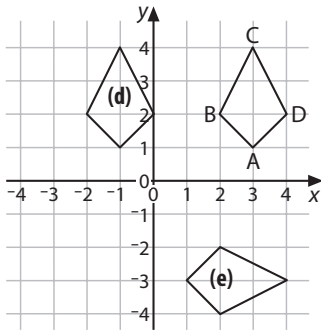
D Scale drawings (p 126)

- 1 (a) An accurate scale drawing from the measurements given
 (b) (i) 32.0 cm (ii) 17.2 cm
- 2 (a) An accurate scale plan from the measurements given
 (b) 111 m (from Main Gate to Honeysuckle Gate)

Mixed practice 6 (127)

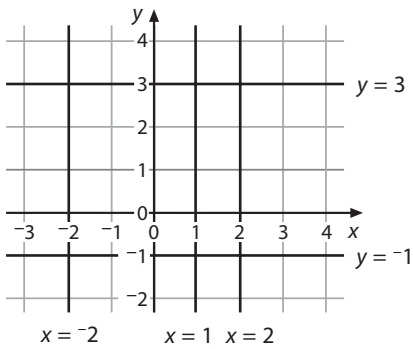
- 1 (a) 147 miles (b) 53 m.p.h. (c) 42 m.p.h.

2



- (a) A, B and C plotted as on diagram above
 (b) D plotted as on diagram above
 (c) $(2\frac{1}{2}, 3)$
 (d) Image shown as on diagram above
 (e) Image shown as on diagram above

3

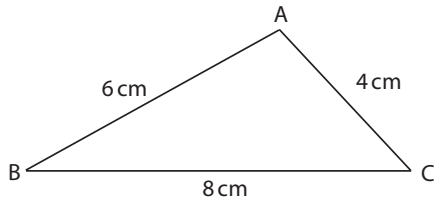


- (a) $x = 1$, $x = -2$, $y = 3$ and $y = -1$ labelled as on diagram above
 (b) $x = 2$ drawn and labelled as on diagram above

4 29.7 cm

5 12 miles

- 6 (a) An accurate full-size construction of this triangle

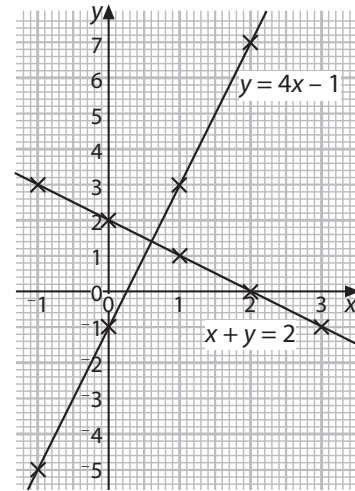


- (b) 104°
 7 3 hours and 15 minutes

8 (a)

x	-1	0	1	2
y	-5	-1	3	7

(b), (e)



- (b) $y = 4x - 1$ drawn as on diagram above
 (c) (i) -3 (ii) 1.5

(d)

x	-1	0	1	2	3
y	3	2	1	0	-1

- (e) $x + y = 2$ drawn as on diagram above
 (f) (0.6, 1.4)

- 9 (a) 20 km (b) 20 km/h
 (c) Fraser stopped (d) 35 km/h

10 25