

Ordering and comparing numbers

Page 8

Ruby

- 1 a $\frac{7}{100}$ or seven hundredths
b 7 or seven ones
c 7,000 or seven thousand
d or seven tenths
- 2 $0.007 < 0.7$
- 3 29,912 29,128 28,182 2,921

Pearl

- 1 a 30,000 or thirty thousand
b $\frac{3}{1000}$ or three thousandths
- 2 3,748,968 3,749,634 3,749,851
- 3 5.96, 5.935, 5.9
- 4 $5.798 < 5.98$

Diamond

- 1 5,987,642
- 2 Any number using 5, 2 and 7 as digits with 2 in third decimal place, e.g. 5.702, 75.002, 0.002 75

Rounding Page 9

Ruby

- 1** **a** 735,000
 b 434,000
- 2** **a** 600,000
 b 300,000
- 3** 89
- 4** 89.5

Pearl

- 1** 1,300,000
- 2** **a** $40,000 + 20,000 = 60,000$
 b $60,000 - 40,000 = 20,000$
- 3** 76.2
- 4** **a** $24 - 15 = 9$
 b $63 + 18 = 81$

Diamond

- 1** Dave's number was between 5,500,000 and 6,499,999. Ben's number was between 6,150,000 and 6,249,999 so Dave's number could be larger.
- 2** 31,650 to 31,749
- 3** Both values must be >12.35 , e.g. $12.35 + 12.39$

Negative numbers Page 10**Ruby**

- 1** **a** -3
 b 1.5
 c 4.5
 d 0
- 2** **a** -8 -7 -6 -4 -1
 b -21 -15 -12 -9 -6
- 3** 5°C

Pearl

- 1** **a** -45 -42 -6 6 29
 b -56 -44 -35 -22 -2
 c -9 -5 -2 12 18
- 2** **a** -2
 b -1
 c 4
 d 5

Diamond

- 1** 8, -2
- 2** No, you can add a number to a negative number and get a negative number as an answer, e.g. $-10 + 6 = -4$.
 Accept any correct example alone as an explanation.

Multiples, factors and prime numbers Page 11

Ruby

- 1 117
- 2 77, 84, 91, 98
- 3 156
- 4 6, 8, 12 indicated only
- 5 14, 70
- 6 7, 11, 13 indicated only

Pearl

- 1 1 and 72, 2 and 36, 3 and 24, 4 and 18, 6 and 12, 8 and 9
- 2 **a** 3: 3, 6, 9, **12**, 15, 18, 21, **24**, 27, 30
4: 4, 8, **12**, 16, 20, **24**, 28, 32, 36, 40
b 5: 5, 10, 15, 20, 25, **30**, 35, 40, 46, 50
6: 6, 12, 18, 24, **30**, 36, 42, 48, 54, 60
- 3 24
- 4 **a** 71, 73, 79
b 101, 103, 107, 109

Diamond

- 1 120
- 2 9
- 3 101, 103, 107
- 4 5, 10, 15, 30
- 5 Sometimes, e.g. $21 \div 7 = 3$. Accept any correct example alone as an explanation.

Number – calculations **Page 12****Ruby**

- 1**
- a** 16,882
 - b** 16,020
 - c** 179,869
 - d** 264,528
 - e** 140,488
 - f** 270,608
- 2** 160,800 (biscuits)
- 3** 51,030 (km)

Pearl

- 1**
- a** 29,835
 - b** 364,296
 - c** 221,435
 - d** 521,478
 - e** 225,922
 - f** 306,852
- 2** 45,880 (cars)
- 3** 206.25 (kg) or 206,250 g

Diamond

- 1** $91 \times 38 = 3,458$
Accept $3,458 \div 38 = 91$
- 2** Accept any three of:
160 (boxes) \times 30 (tins)
150 (boxes) \times 32 (tins)
120 (boxes) \times 40 (tins)
100 (boxes) \times 48 (tins)
96 (boxes) \times 50 (tins)
80 (boxes) \times 60 (tins)
- 3** 3,488
- 4** Yes, $170 \times 30 = 5,100$ (bottles), so 170 packs is enough.

Short and long division Page 13

Ruby

- 1
- a 19
 - b 28
 - c 86
 - d 289
 - e 47.4
 - f 349.5 or $349\frac{1}{2}$ or $349\text{ r }4$ or $349\frac{4}{8}$
- 2
- a $3, \frac{1}{2}$, 0.5 indicated only
 - b $3, \frac{3}{4}$, 0.75 indicated only

Pearl

- 1 1,230
- 2 109 (boxes)
- 3 34
- 4 80.5
- 5 37 (people)

Diamond

- 1 Yes, Harry is correct.
Other ways of dividing are based on factors of 24, e.g. $\div 4 \div 6$ or $\div 2 \div 2 \div 2 \div 3$
The numbers used for division should multiply to 24.
- 2 **3,874**
- 3 There are a variety of possible answers, including:
 $900 \div \mathbf{1} = \mathbf{27,000} \div 30$
 $900 \div \mathbf{900} = \mathbf{30} \div 30$
The missing numbers will always multiply to 27,000.

Multi-step problems Pages 14–15

Ruby

- 1 (£)2,034
- 2 4,940 (g) or 4.94(0)(kg)
- 3 7,524 (tins)
- 4 8,460 (miles)
- 5 Dan spends (£)7.45. Sam spends (£)8.75. Sam spends more money.

Pearl

- 1 34 (stickers)
- 2 (£)75.95
- 3 (£)5
- 4 2,160 (questions)
- 5 The computer in Budget Bytes costing £550 would be reduced to £440 in the sale and would be cheaper by £10.

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 $3 \times 450 \text{ g tins to buy } 1,350 \text{ g} = 1.35 \text{ kg}$, $3 \times 70\text{p} = \text{£}2.10$

$5 \times 200 \text{ g tins to buy } 1,000 \text{ g} = 1 \text{ kg}$, $5 \times 40\text{p} = \text{£}2$

$4 \times 400 \text{ g pack to buy } 1,600 \text{ g} = 1.6 \text{ kg}$, $1 \times \text{£}2 = \text{£}2$

Making use of just one offer, either buying five 200 g tins or one pack of four 400 g tins would be the cheapest way to buy to buy 1 kg, but the pack of four 400 g tins offers better value.

Alternatively, $2 \times 450\text{g} + 1 \times 200\text{g}$ for £1.80 is the cheapest way to buy at least 1 kg.

- 2 2 tickets for £5: $6 \times 2 \text{ tickets} = 12 \text{ tickets}$, $6 \times \text{£}5 = \text{£}30$

3 tickets for £8: $4 \times 3 \text{ tickets} = 12 \text{ tickets}$, $4 \times \text{£}8 = \text{£}32$

6 tickets for £14: $2 \times 6 \text{ tickets} = 12 \text{ tickets}$, $2 \times \text{£}14 = \text{£}28$

The offer of 6 tickets for £14 offers the best value.

- 3 Parcels A + B + C + D + E = 23 kg

There are several ways to work this out, e.g., . Parcels A + B + C + D = 8 kg + 9 kg = 17 kg, **Parcel E** = 23 kg – 17 kg = **6 kg**

Parcels D + E = 8 kg, **Parcel D** = 8 kg – 6 kg = **2 kg**

Parcels C + D = 9 kg, **Parcel C** = 9 kg – 2 kg = **7 kg**

Parcels B + C = 10 kg, **Parcel B** = 10 kg – 7 kg = **3 kg**

Parcels A + B = 8 kg, **Parcel A** = 8 kg – 3 kg = **5 kg**

4 Possible answers would be:

- 4 black and white pages and 8 coloured
- 12 black and white pages and 5 coloured
- 20 black and white pages and 2 coloured.

5 Computer games could cost:

5 computer games for £25

8 computer games for £35

10 computer games for £50

16 computer games for £70

15 computer games for £75

24 computer games for £105

Using these lists, it can be seen that Tia could buy 16 computer games for £70, while Nisha could buy 15 games for £75.

Estimation Pages 16–17

Ruby

- 1** Suitable approximations are:
- a** $400 \times 7 = 2,800$ or $400 \times 10 = 4,000$
- b** $400 \times 8 = 3,200$ or $400 \times 10 = 4,000$
- c** $900 \times 90 = 81,000$ or $900 \times 100 = 90,000$
- d** $6,000 \times 40 = 240,000$
- 2**
- a** $1,295 + 564 = 1,895$ Calculation correct
- b** $3,343 - 766 = 2,577$ Calculation incorrect
 $1,566 + 766 = 2,332$
- 3**
- a** $37 \times 15 = 555$ Calculation correct
- b** $6,345 \div 7 = 906 \text{ r } 3$ Calculation incorrect
 $897 \times 7 = 6,279$
- 4**
- a** $1,000 \times 70$
- b** $800 \div 20$

Pearl

- 1**
- a** $68,154 - 42,522 = 25,632$ Calculation correct
- b** $658 \times 12 = 7,896$ Calculation correct
- c** $1,974 \div 24 = 82 \text{ r } 6$ Calculation incorrect
 $329 \times 24 = 7,896$
- d** $2,794 + 3,634 = 6,428$ Calculation correct
- 2** Suitable approximations are:
- a** $70,000 + 30,000 = 100,000$ or $69,000 + 33,000 = 102,000$
- b** $100,000 - 20,000 = 80,000$ or $94,000 - 16,000 = 78,000$
- c** $6,000 \div 30 = 200$
- d** $6,000 \times 40 = 240,000$
- 3**
- a** $6,000 \times 80$
- b** $7,000 \div 30$

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** The answer is 9,680.
- Dev has probably added the ones column, $3 + 7 = 10$ and not carried the 1 ten.

2 7 rounded to the nearest thousand is 0.

A better strategy would be to leave the 7 as 7 and just round 4,599 to 5,000.

3 a $5,660 \times 40 = 226,400$

$$6,000 \times 40 = 240,000$$

The actual answer is $5,658 \times 41 = 231,978$, so $5,660 \times 40$ gives a closer approximation.

b Although $5,660 \times 40$ gives a closer approximation, it is better to use $6,000 \times 40$ as this is an easier calculation.

4 Dan is not right because he has made an error in his calculation, but he does know that his calculation is approximately correct and it is unlikely he has made a place-value error.

Order of operations Page 18

Ruby

- 1**
- a** 25
 - b** 6
 - c** 30
 - d** 9
 - e** 6
- 2**
- a** $(6 + 8) \times 2 = 28$
 - b** $(7 - 3) \times 4 = 16$
 - c** $2 \times (6 + 7) = 26$
 - d** $8 \times (3 + 7) = 80$
 - e** $(9 - 7) \times 3 = 6$

Pearl

- 1**
- a** 20
 - b** 16
 - c** 25
 - d** 75
 - e** 800
- 2**
- a** $(20 + 30) \div 2 = 25$
 - b** $(200 - 100) \times 2 = 200$
 - c** $(50 - 10) \div 2 = 20$
 - d** $20 + 20 \times (10 - 5) = 120$
 - e** $100 \div (20 + 30) + 1 = 3$

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** Possible answers include:
- $(12 + 4) \times 4 + 8 = 72$
 - $12 + 4 \times (4 + 8) = 60$
 - $(12 + 4) \times (4 + 8) = 192$
 - $(12 + 4 \times 4) + 8 = 36$
 - $12 + (4 \times 4 + 8) = 36$

- 2** 3

3 Possible answers include:

$$(4 + 2) \times (5 - 1) = 24$$

$$(4 + 4) \times (5 - 2) = 24$$

$$(4 + 8) \times (5 - 3) = 24$$

$$(4 + 20) \times (5 - 4) = 24$$

Also allow decimals and fractions if correct, e.g.

$$(4 + 6) \times (5 - 2.6) = 24$$

4 A sequence may be:

$$20 + 6 \times 0 - 12 = 8$$

$$20 + 6 \times 1 - 12 = 14$$

$$20 + 6 \times 2 - 12 = 20$$

$$20 + 6 \times 3 - 12 = 26$$

$$20 + 6 \times 4 - 12 = 32 \dots$$

The rule for the sequence would be 'add 6' because each calculation is including an extra multiple of 6.

Equivalent fractions Page 19

Ruby

1 a $\frac{3}{4}$

b $\frac{2}{5}$

c $\frac{1}{3}$

d $\frac{4}{5}$

2 a 6

b 15

c 30

d 50

Pearl

1 a $\frac{4}{5}$

b $\frac{1}{2}$

c $\frac{1}{3}$

2 a 21 and 100

b 25 and 160

c 18 and 50

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

1 No, $\frac{24}{30}$ is not in its lowest terms. The correct answer is $\frac{4}{5}$.

2 $\frac{18}{50}$ is the odd fraction out. This simplifies to $\frac{9}{25}$, all the other fractions simplify to $\frac{3}{8}$.

3 No, the denominator would also have to be even, e.g. you cannot simplify $\frac{4}{7}$ by dividing numerator and denominator by 2, as 2 is not a common factor of 4 and 7.

Compare and order fractions Page 20

Ruby

1 a $\frac{3}{4}$

b $\frac{9}{9}$

2 a $\frac{15}{40}$

b $\frac{6}{15}$

3 $\frac{1}{9}, \frac{6}{18}, \frac{20}{27}$

Pearl

1 $\frac{2}{3}$

2 $\frac{5}{12}$

3 $\frac{3}{4}, \frac{17}{24}, \frac{2}{3}, \frac{5}{8}$

4 $2\frac{2}{3}, 2\frac{5}{6}, 3\frac{3}{8}, 3\frac{5}{12}$

5 5

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

1 Accept any fraction that is $> \frac{5}{6}$ but $< \frac{11}{12}$,

e.g. $\frac{21}{24}, \frac{31}{36}, \frac{32}{36}$...

2 The fractions are ordered from smallest to largest.

Changing the fractions to have a common denominator means they can be compared:

- $\frac{3}{5} = \frac{72}{120}$

- $\frac{5}{8} = \frac{75}{120}$

- $\frac{13}{20} = \frac{78}{120}$

Addition and subtraction of fractions Page 21

Ruby

- 1 a $1\frac{1}{12}$
- b $\frac{11}{18}$
- c $1\frac{9}{20}$
- d $\frac{5}{30} = \frac{1}{6}$
- 2 a 24
- b 4
- c 7
- d 7

Pearl

- 1 a $\frac{8}{12} = \frac{2}{3}$
- b $\frac{14}{15}$
- 2 a 1
- b 2
- 3 a $5\frac{7}{24}$
- b $2\frac{3}{20}$
- c $10\frac{7}{30}$
- d $2\frac{9}{30} = 2\frac{3}{10}$

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 $6\frac{1}{3}$
- 2 $\frac{1}{4} + \frac{5}{12} + \frac{1}{3} = \frac{3}{12} + \frac{5}{12} + \frac{4}{12} = \frac{12}{12} = 1$

The blue, yellow and green counters make up the whole, so there are no counters left to be red.

3 There are many possible answers, e.g. $\frac{5}{6} - \frac{2}{6}$, $\frac{5}{6} - \frac{1}{3}$, $\frac{7}{8} - \frac{3}{8}$

4 There are many possible answers, e.g. $1\frac{1}{8} + 1\frac{1}{8}$, $2\frac{1}{12} + \frac{1}{6}$, $\frac{7}{8} + 1\frac{3}{8}$

Fractions, decimals and percentages Page 22

Ruby

1	a	i	$\frac{21}{100}$	ii	0.21
	b	i	$\frac{7}{100}$	ii	0.07
2	a	i	0.8	ii	80%
	b	i	0.12	ii	12%
3	a	i	3%	ii	$\frac{3}{100}$
	b	i	79%	ii	$\frac{79}{100}$

Pearl

- 1 40%, 0.4
- 2 0.67, $\frac{67}{100}$
- 3 39%, $\frac{39}{100}$
- 4 a 85%
- b 84%
- 5 0.6

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 18 out of 25 = 72% and $\frac{15}{20} = 75\%$

As percentages the three scores for the tests were 72%, 70% and 75%.

The best result was $\frac{15}{20}$ (75%).

- 2 $\frac{1}{6} = 0.16$ recurring, this is 16.6% recurring.

Tyler could round this to 17% or 16.7% (1 d.p.)

- 3 Ben could have 2, 3 or 4 questions wrong.

- 4 Any three decimals > 0.125 but < 0.375 exclusive.

This is true because $\frac{1}{8} = 0.125$ and $\frac{3}{8} = 0.375$

Multiplication of fractions Page 23

Ruby

1 a 3

b $5\frac{1}{4}$

c $8\frac{1}{4}$

2 a $2\frac{2}{3}$

b $6\frac{2}{3}$

c 12

Pearl

1 a $\frac{1}{12}$

b $\frac{3}{5}$

2 $\frac{1}{2} \times \frac{1}{4} = \frac{1}{8}$

3 $\frac{1}{24}$

Diamond

1 Missing numbers could be:

- $\frac{1}{1} \times \frac{16}{20} = \frac{16}{20} = \frac{4}{5}$

- $\frac{1}{2} \times \frac{16}{10} = \frac{16}{20} = \frac{4}{5}$

- $\frac{1}{4} \times \frac{16}{5} = \frac{16}{20} = \frac{4}{5}$

Denominators in calculation can be given in either order.

The missing numerator must be 16.

The missing denominators can be found by finding factor pairs of 20.

2 One half of one half of one half is the same as $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2}$

$2 \times 2 \times 2 = 8$, so $\frac{1}{2} \times \frac{1}{2} \times \frac{1}{2} = \frac{1}{8}$

Fraction problems Pages 24–25

Ruby

- 1 150 (cards)
- 2 3 (cakes)
- 3 8 (pizzas)
- 4 $18\frac{3}{4}$ (m). Accept 18.75 (m).
- 5 Max, Joe, Ben. Accept $\frac{3}{4}$ ($\frac{18}{24}$), $\frac{17}{24}$, $\frac{5}{8}$ ($\frac{15}{24}$)
- 6 Dividing 7 pizzas into sixths.
- 7 $\frac{4}{5}$ of 60. Accept 48.

Pearl

- 1 $\frac{3}{8}$
- 2 Jim. Accept 18 (counters).
- 3 $\frac{7}{24}$
- 4 $\frac{1}{10}$
- 5 $\frac{1}{8}$
- 6 $\frac{4}{15}$ (kg)
- 7 0.3
- 8 (£) 5
- 9 4 (friends)

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

1 $\frac{3}{8}$ of 5 kg = $1\frac{7}{8}$ (kg). Accept 1.875 (kg).

$\frac{2}{5}$ of 4,500 g = 1,800 (g)

1,800 (g) = 1.8 (kg) or 1.875 (kg) = 1,875 (g)

1.875 (kg) > 1.8 (kg) or 1,875 (g) > 1,800 (g)

2 63

3 250. Divide by 12, $600 \div 12 = 50$, multiply by 5 to get 250.

4 $\frac{6}{25}$ (m²). Accept $\frac{12}{50}$ (m²).

5 a The missing numbers could be:

- $\frac{1}{1} \times \frac{1}{20} = \frac{1}{20}$

- $\frac{1}{2} \times \frac{1}{10} = \frac{1}{20}$

- $\frac{1}{4} \times \frac{1}{5} = \frac{1}{20}$

Denominators can be given in either order.

b There are a large number of possible answers.

Examples of missing numbers could be:

- $\frac{1}{2} \div 6 = \frac{1}{12}$

- $\frac{3}{12} \div 3 = \frac{1}{12}$

- $\frac{2}{3} \div 8 = \frac{1}{12}$

Division of fractions Page 26

Ruby

- 1 5
2 40
3 80
4 (£)10
5 $\frac{3}{4}$

Pearl

- 1 a $\frac{1}{12}$
b $\frac{1}{10}$
c $\frac{1}{16}$
- 2 $\frac{1}{15}$
- 3 a 4
b 10
c 3

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 a Possible answers are:

$$\frac{1}{3} \div 4 = \frac{1}{12}$$

$$\frac{1}{6} \div 2 = \frac{1}{12}$$

$$\frac{1}{12} \div 1 = \frac{1}{12}$$

- b Possible answers are:

$$\frac{1}{2} \div 10 = \frac{1}{20}$$

$$\frac{2}{20} \div 2 = \frac{1}{20}$$

$$\frac{2}{5} \div 8 = \frac{1}{20}$$

2 Always true.

3 8 (friends)

Multiplication and division by 10, 100 and 1,000 Page 27

Ruby

- 1 **a** 0.62
 b 730
- 2 **a** 10
 b 0.9
- 3 (£)322.50
- 4 (£)0.65. Accept 65p.

Pearl

- 1 **a** 10,400
 b 0.073
- 2 **a** 40
 b 100
- 3 1,000 (songs)
- 4 200 (kg)

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 $32 \div 10 = 0.32 \times 10$
 $32 \div 10 = 3.2$
 $0.32 \times 10 = 3.2$
 $32 \div 1 = 0.32 \times 100$
 $32 \div 1 = 32$
 $0.32 \times 100 = 32$
- 2 $76 \div 100 = 7.6 \div 10$
 $76 \div 100 = 0.76$
 $7.6 \div 10 = 0.76$
 $76 \div 1,000 = 7.6 \div 100$
 $76 \div 1,000 = 0.076$
 $7.6 \div 100 = 0.076$
- 3 $6 \times 100 \div 1,000 = 0.6$
 Accept other alternative solutions, e.g.
- $60 \times 10 \div 1,000 = 0.6$

- $600 \div 10 \div 100 = 0.6$

Multiplication and division of decimals

Page 28

Ruby

- 1 1.5
2 2.4
3 (£)1. Accept 100p.
4 3.8
5 1.69
6 (£)9.25

Pearl

- 1 7.2
2 0.02
3 £0.09. Accept 9p.
4 23.5
5 (£)10.50
6 25
7 **a** $4 \div 5 = 0.8$
b $5 \div 8 = 0.625$

Diamond

- 1 22.4
2 There are many possible answers, e.g.
 - 2.4×1
 - 1.2×2
 - 0.8×3
 - 0.6×4
 - 0.24×10
 - 0.024×100
3 $0.6 \times 0.7 = 0.42$
 $0.06 \times 70 = 4.2$
 $60 \times 0.7 = 42$
 $4.2 \div 7 = 0.6$
 $420 \div 0.6 = 700$

Ratio and proportion Page 29

Ruby

- 1** **a** 49 (questions)
 b 6 (questions)
- 2** 21
- 3** **a** (£)3.60
 b (£)1.50

Pearl

- 1** 75 (kg)
- 2** (£)20.40
- 3** **a** 36 (blue beads)
 b 100 (white beads)
 c $\frac{5}{8}$

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** (£)8
- $$1 \frac{1}{2} = \frac{3}{2}$$
- $$£12 \div 3 = £4$$
- $$£4 \times 2 = £8$$
- 2** 3 : 2
- 3 apples out of 5 pieces of fruit means there are 2 pears.
- The ratio of apples to pears is 3 : 2.
- 3** 13 (tins)
- There are 8 large tins and 5 small tins.
- $$(8 \times £0.75) + (5 \times £0.55) = £8.75$$

Calculating percentages Page 30

Ruby

- 1**
- a** 9 (kg)
 - b** (£)5
 - c** 14 (m)
 - d** 49
- 2** 2 (km)
- 3** 45 (questions)
- 4** 300 (g)

Pearl

- 1**
- a** (£)3.65
 - b** (£)7.30
 - c** (£)10.95
 - d** (£)14.60
- 2** (£)39.20
- 3** 500
- 4** 152

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** 800
- 75% of the number = 600
- 25% of the number = $600 \div 3 = 200$
- 100% of the number = $200 \times 4 = 800$
- 2** There are many possible answers, e.g.
- 10% of 400 = 40
 - 20% of 200 = 40
 - 100% of 40 = 40
 - 5% of 800 = 40
 - 1% of 4,000 = 40
- 3** 6(%)

Scale factors Page 31

Ruby

- 1** **a** 60 (cm) × 32 (cm)
 b 105 (cm) × 56 (cm)
 c 75 (cm) × 40 (cm)
- 2** **a** 28 (cm) × 14 (cm)
 b 84 (cm) × 42 (cm)
 c 140 (cm) × 70 (cm)
- 3** 72 (sweets)
- 4** 64 (boys) and 56 (girls)

Pearl

- 1** 5
- 2** **a** 72 (cm)
 b 6 (cm)
 c 3 (cm)

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** 2.5 or $2\frac{1}{2}$
- 2** 100
 1 m = 100 cm, so ratio is 1 : 100.
- 3** 15 (m)
 Scale factor $6 \div 2.4 = 2.5$
 Height of tree $6 \times 2.5 = 15$

Unequal sharing

Page 32

Ruby

- 1 25 and 5
- 2
 - a 18 and 6
 - b 45 and 15
 - c 120 and 40
- 3 (£)45
- 4 (£)5
- 5 (£)22.50

Pearl

- 1 27 and 18
- 2 175 and 75
- 3 60 (counters)
- 4 40 (milk chocolate bars)
- 5 (£)14
- 6 60, 45 and 15

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 A ratio of 5 : 3 gives a total of 8 shares (5 + 3).
 $30 \div 8 = 3.75$
 $3.75 \times 5 = 18.75$
 $3.75 \times 3 = 11.25$
It is not possible to have 18.75 boys and 11.25 girls.
- 2 Noah is correct, it is not fair. The ratio of their hours is 3 : 2, giving 5 parts.
 $3 + 2 = 5$
 $60 \div 5 = 12$
 $12 \times 3 = 36$
 $12 \times 2 = 24$
Toby should get £36 and Noah should get £24. They have used the wrong ratio (3 : 1).
- 3 0.2 (kg). Accept 200 g.

Formulae Page 33

Ruby

- 1 $18 - n = 3$
- 2 $7n = 35$. Accept $7 \times n = 35$.
- 3 $\frac{20}{n} = 4$. Accept $20 \div n = 4$.
- 4
 - a 40 (cm)
 - b 70 (cm)

Pearl

- 1 $5 + 12 + n = 35$. Accept $17 + n = 35$.
- 2
 - a 180 (minutes). Accept 3 hours.
 - b 255 (minutes). Accept 4 hours 15 minutes.
 - c 355 (minutes). Accept 5 hours 55 minutes.
- 3
 - a $r = 11$
 - b $s = 30$
 - c $t = 17$

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 Ari is correct. $3x$ means 3 multiplied by x , if $x = 8$ then $3 \times 8 = 24$.
- 2 5, 6, 7, 8, 9.
- 3 Ola is not correct. If the value of y is less than -5 , the answer to the calculation will be a negative number, e.g. $-6 + 5 = -1$.

Linear number sequences Pages 34–35

Ruby

- 1 54, 61
- 2 The rule is 'add 9'.
- 3 63, 71
- 4 The rule is 'subtract 6'.
- 5 34, 43
- 6 72, 84
- 7 33
- 8 30
- 9 No
- 10 1

Pearl

- 1 59, 65
- 2 53, 45
- 3 Yes
- 4 35
- 5 44, 47, 50, 53
- 6 All the numbers in the sequence will be 1 more than a multiple of 4.
401 is 1 more than 400, which is a multiple of 4.
- 7 2, 11
- 8 $4n + 3$
- 9 68
- 10 $7n + 3$, 143

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 $6n - 2$
- 2 15 is not a multiple of 8, so in this add 8 sequence, none of the numbers will be multiples of 8.
8,888 is a multiple of 8, so will not appear in the sequence.
- 3 33
- 4 **a** $2n + 3$
b 53

5 a $3n + 5$

 b 245

Equations with two unknowns Page 36

Ruby

1 a $\blacksquare = 9$ $\bullet = 3$

b $\blacksquare = 9$ $\bullet = 0$

2 a There are many possible answers, e.g.

• $5 + 1 = 2 + 4$

• $5 + 2 = 2 + 5$ The second number will always be 3 greater than the first.

b There are many possible answers, e.g.

• $8 - 4 = 4 - 0$

• $8 - 5 = 4 - 1$ The second number will always be 4 less than the first.

c There are many possible answers, e.g.

• $4 \times 1 = 2 \times 2$

• $4 \times 2 = 2 \times 4$ The second number will always be 2 times greater than the first.

3 $a = 11$

4 $c = 3$

Pearl

1 Accept any of the following:

- 2 teams of 14 children
- 4 teams of 7 children
- 7 teams of 4 children
- 14 teams of 2 children.

2 120 and 40

3 $a = 5.5$

4 $c = 24$

5 $e = 30$

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

1 $\blacksquare = 8$

2 There are many possible answers, e.g.

• $x = 4, y = 14$

• $x = 8, y = 13$

- $x = 12, y = 12$

3 Accept any of the following:

7 adult tickets (£42) + 2 child tickets (£8)

5 adult tickets (£30) + 5 child tickets (£20)

3 adult tickets (£18) + 8 child tickets (£32)

1 adult ticket (£6) + 11 child tickets (£44)

Possible combinations Page 37

Ruby

1 6 (red and yellow, yellow and red, yellow and blue, blue and yellow, blue and red, red and blue)

2 a red + white, red + blue, white + red, white + blue, blue + white, blue + red

b 12

3 657

Pearl

1 a 6

b 6

2 a 16

b 20

3 11

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

1 Accept any of the following:

- $a = 1, b = 12$ ($3 \times 1 + 12 = 15$)
- $a = 2, b = 9$ ($3 \times 2 + 9 = 15$)
- $a = 3, b = 6$ ($3 \times 3 + 6 = 15$)
- $a = 4, b = 3$ ($3 \times 4 + 3 = 15$)

2 Accept any of the following:

- $c = 3, d = 2$ ($4 \times 3 - 2 = 10$)
- $c = 4, d = 6$ ($4 \times 4 - 6 = 10$)
- $c = 5, d = 10$ ($4 \times 5 - 10 = 10$)
- $c = 6, d = 14$ ($4 \times 6 - 14 = 10$)

3 100. Each flavour of ice-cream can have 10 different toppings, $10 \times 10 = 100$.

4 Accept any of the following:

- 15 small cans + 0 large cans ($15 \times £0.75 + 0 \times £1.25 = £11.25$)
- 10 small cans + 3 large cans ($10 \times £0.75 + 3 \times £1.25 = £11.25$)
- 5 small cans + 6 large cans ($5 \times £0.75 + 6 \times £1.25 = £11.25$)
- 0 small cans + 9 large cans ($0 \times £0.75 + 9 \times £1.25 = £11.25$)

Converting units of measurement

Page 38

Ruby

- 1** **a** 4.75 m
 b 780 mm
- 2** **a** 4,400 g
 b 3.875 kg
- 3** **a** 7,000 ml
 b 8.4 l
- 4** 6 l, $5\frac{1}{2}$ l, 5,100 ml, 5,000 ml
- 5** 0.45 l or 450 ml
- 6** 1.15 kg or 1,150 g

Pearl

- 1** **a** 125 mm, 0.125 cm
 b 957.4 cm, 9.574 m
- 2** **a** 3.9 l
 b 3,900 ml
- 3** 3,155 m
- 4** **a** 75 miles
 b 280 km

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** Poppy needs another 90 ten gram weights.

$$10 \times 10 \text{ g} = 100 \text{ g}$$

$$1 \text{ kg} = 1,000 \text{ g}$$

$$1,000 \text{ g} - 100 \text{ g} = 900 \text{ g}$$

$$900 \text{ g} \div 10 \text{ g} = 90$$

- 2** Parcel B weighs 1.6 (kg) or 1,600 (g).

Converting units of time Page 39

Ruby

- 1 2 hours
- 2 300 minutes
- 3 52 weeks and 1 day. Accept 52 weeks and 2 days with reference to a leap year.
- 4 1 hour 30 minutes. Accept 90 minutes.
- 5 3:45 p.m. Accept 3:45, 15:45, quarter to 4.
- 6 2 September

Pearl

- 1 1,440 minutes
- 2 17:45
- 3 7:45 a.m.
- 4 155 minutes
- 5 12:37 a.m. Accept 00:37, 23 to 1; do not accept 12:37.
- 6 May

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 3:48 p.m. Accept 15:48, 12 to 4.
- 2 Josef is correct.
1.5 means $1\frac{1}{2}$.
 $1\frac{1}{2}$ hours is 90 minutes.
- 3 Polly is incorrect.
60 seconds \times 60 (minutes) = 3,600 seconds in 1 hour
3,600 seconds \times 24 (hours) = 86,400 seconds in 1 day
86,400 seconds \times 7 (days) = 604,800 seconds in 1 week
86,400 seconds \times 14 (days) = 1,209,600 seconds in 2 weeks

Alternatively, 10 years (approximately) = $10 \times 365 \times 24 \times 60 \times 60 =$ (approximately) 315 million seconds.
- 4 16:10

Measurement – mixed units **Pages 40–41****Ruby**

- 1** 800 ml
- 2** 1,950 g
- 3** 1,285 ml
- 4** 17.52 m. Accept 1,752 cm.
- 5** 14.56 l
- 6** 17.2 km
- 7** 10,500 ml
- 8** 150 ml. Accept 0.15 l.
- 9** **a** 0.25 m. Accept 25 cm.
 b 0.35 m. Accept 35 cm.

Pearl

- 1** 8,000 m
- 2** 49.2 kg
- 3** 21 (glasses)
- 4** 1,365 g. Accept 1.365 kg.
- 5** 1.65 l
- 6** 58.95 m
- 7** 1,875 g
- 8** 61.215 m

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** 475 ml. Accept 0.475 l.
- 2** 1.77 m
- 3** 1.612 kg. Accept 1,612 g.
 $2.874 - 0.35 = 2.524$ kg
 $2.524 \div 2 = 1.262 =$ mass of small parcel
mass of large parcel = $1.262 + 0.35 = 1.612$ kg
- 4** 6.75 l
 $2 \times 1.5 = 3$ (second jug)
 $3 \times 1.5 = 4.5$ (third jug)

$$4.5 \times 1.5 = 6.75 \text{ (fourth jug)}$$

5 5 m will not be enough.

$$150 \text{ cm} \times 6 = 900 \text{ cm}$$

$$900 \text{ cm} = 9 \text{ m}$$

$$9 \text{ m} > 5 \text{ m}$$

Perimeter and area Pages 42–43**Ruby**

- 1**
- a** 14 cm
 - b** 12 cm
 - c** 16 cm
 - d** 12 cm
 - e** 18 cm
- 2**
- a** 12 cm^2
 - b** 14 cm^2
 - c** 12 cm^2
 - d** 8 cm^2
 - e** 5 cm^2

Pearl

- 1**
- a** 48 cm
 - b** 120 cm^2
- 2**
- a** 48 cm
 - b** 96 cm^2
- 3** 400 cm^2
- 4** 132 cm^2
- 5** 178.5 cm^2
- 6** Accept any of the following:
- 74 cm
 - 40 cm
 - 30 cm
 - 26 cm
 - 24 cm
- 7** Accept any of the following:
- 56 cm^2
 - 54 cm^2
 - 50 cm^2
 - 44 cm^2
 - 36 cm^2

- 26 cm^2
- 14 cm^2

8 7 cm

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

1 32 cm

2 $40\text{ cm} \times 1\text{ cm}$

3 No. Gregor has probably multiplied the two sides of the parallelogram. He needs to find a height of the parallelogram, which is the distance between two of the parallel sides and multiply it by the length of one of the parallel sides.

4 72 cm^2

5 Always correct.

Volume Pages 44–45

Ruby

- 1 100 m^3
- 2 240 cm^3
- 3 300 m^3
- 4 72 m^3
- 5 600 cm^3
- 6 960 cm^3
- 7 144 cm^3
- 8 40 cm^3
- 9 400 cm^3
- 10 300 cm^3

Pearl

- 1 420 cm^3
- 2 216 cm^3
- 3 512 cm^3
- 4 $2,400 \text{ cm}^3$
- 5 462 cm^3
- 6 $1,050 \text{ cm}^3$
- 7 Cuboid A. Accept 336 cm^3 .
- 8 0.125 m^3 or $125,000 \text{ cm}^3$
- 9 $1,000 \text{ cm}^3$
- 10 5 cm

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 If Nia has a metre cube, she would need to multiply:

$$1 \text{ m} \times 1 \text{ m} \times 1 \text{ m} = 100 \text{ cm} \times 100 \text{ cm} \times 100 \text{ cm} = 1,000,000 \text{ cm}^3$$

If Nia had a cube with a volume of 100 cm^3 , she would need to find three identical numbers that would multiply to 100; this would mean the sides would be about 4.64 cm.

- 2 There are many possible answers, e.g.

- $100 \text{ cm} \times 1 \text{ cm} \times 1 \text{ cm}$
- $50 \text{ cm} \times 2 \text{ cm} \times 1 \text{ cm}$

- $20\text{ cm} \times 5\text{ cm} \times 1\text{ cm}$
- $10\text{ cm} \times 5\text{ cm} \times 2\text{ cm}$
- $5\text{ cm} \times 5\text{ cm} \times 4\text{ cm}$

3 There are many possible answers.

Accept any two measurements that multiply to 72 cm^2 , e.g.

- $72\text{ cm} \times 1\text{ cm}$
- $36\text{ cm} \times 2\text{ cm}$
- $24\text{ cm} \times 3\text{ cm}$
- $18\text{ cm} \times 4\text{ cm}$
- $12\text{ cm} \times 6\text{ cm}$
- $9\text{ cm} \times 8\text{ cm}$

4 125 (cubes)

5 $250,000\text{ mm}^3$, $2,500\text{ cm}^3$ ($2,500,000\text{ mm}^3$), 0.025 m^3 ($25,000,000\text{ mm}^3$)

Shapes Pages 46–47

Ruby

- 1
- a Regular
 - b Irregular
 - c Irregular
 - d Regular
 - e Irregular
- 2
- a A **(regular) pentagon** has **5** corners and **5** sides.
 - b A **triangle** has **3** corners and **3** sides.
 - c A **(irregular) hexagon** has **6** corners and **6** sides.
- 3
- Accept a shape drawn with 2 shorter and 2 longer sides and 4 right angles.
Accept the names **rectangle** or **oblong**.
- 4
- Regular octagon

Pearl

- 1
- a Trapezium
Properties could include:
 - 4 sides
 - 4 corners or vertices
 - 1 pair of parallel sides
 - b Regular hexagon
Properties could include:
 - 6 (equal) sides
 - 6 corners or vertices
 - 6 equal angles (of 120°)
 - 6 lines of symmetry
 - 6 diagonals
 - Diagonals that bisect each other
 - c Kite
Properties could include:
 - 4 sides
 - 4 corners or vertices
 - 2 pairs of equal and adjacent sides

- Diagonals are perpendicular
- 1 pair of opposite angles that are equal
- 1 diagonal is bisected by the other

2 a Square-based pyramid

Properties could include:

- 5 faces
- 4 faces are triangles, 1 face is square
- 5 vertices
- 8 edges

b (Regular) pentagonal prism

Properties could include:

- 7 faces
- 5 faces are rectangles, 2 faces are (regular) pentagons
- 15 edges

c Cylinder

Properties could include:

- 2 flat faces and 1 curved surface
- 2 faces are circles
- 2 circular faces are parallel to each other
- 2 edges
- 0 vertices

3 Accept:

- square
- rhombus

4 Cone

5 a The circumference is the edge (perimeter) of a circle.

b The radius is the distance from the centre of a circle to the circumference.

6 13.5 cm

Diamond

- 1 a** Has 4 sides: B, D, F
b Has parallel sides: A, B, F
c Has at least 1 line of symmetry: A, B, C, D, E
d Has diagonals that bisect each other: A, B, F (D has only one bisected diagonal)
e Could have at least 1 right angle: B, D, E, F (F if a rectangle is seen as a type of parallelogram)
- 2 a** Has parallel faces: C, D, F
b Has perpendicular faces: C, D, F

- c** Has a constant cross-section: C, D, F
- d** Has at least 1 curved surface: B, F
- e** Has at least 1 triangular face: A, C, E

Drawing 2-D shapes Pages 48–49

Ruby

Where specific lengths are given, accept lines ± 2 mm.

- 1** Shapes drawn are:
- a** a square
 - b** an equilateral triangle
 - c** a pentagon with two right angles
 - d** an octagon.
- 2** Shapes drawn are:
- a** a rectangle 10 cm \times 5 cm
 - b** a rectangle 12 cm \times 4.5 cm
 - c** a rectangle
Possible lengths and widths of the rectangle include:
 - 30 cm \times 1 cm
 - 15 cm \times 2 cm
 - 10 cm \times 3 cm
 - 6 cm \times 5 cm
 - 20 cm \times 1.5 cm
 - 12 cm \times 2.5 cm
 - d** a rectangle
Possible lengths and widths of the rectangle include:
 - 24 cm \times 1 cm
 - 12 cm \times 2 cm
 - 8 cm \times 3 cm
 - 6 cm \times 4 cm
 - 16 cm \times 1.5 cm
- 3**
- a** a square 5 cm \times 5 cm
 - b** a square 6 cm \times 6 cm

Pearl

Where specific lengths are given, accept lines ± 2 mm.

Where specific angles are drawn, accept angle $\pm 2^\circ$.

- 1** Check learner has drawn:
- a** a pentagon with three right angles
 - b** a parallelogram with a side 7 cm and a height of 4 cm
 - c** a parallelogram with a side 8 cm and a height of 5 cm
 - d** a hexagon with an area of 6 cm^2
 - e** a trapezium with two right angles and parallel sides 12 cm and 9 cm
 - f** a rectangle 7 cm \times 3 cm.
- 2** Check learner has drawn:
- a** an angle of 50°
 - b** an angle of 135°
 - c** a right-angled isosceles triangle with two equal sides of 10 cm; angles should be 90° , 45° and 45°
 - d** a triangle with a base of 12 cm and angle of 65° and 35°

Diamond

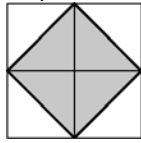
Possible explanations are outlined below. Alternative methods and layouts are allowed.

Where specific lengths are given, accept lines ± 2 mm.

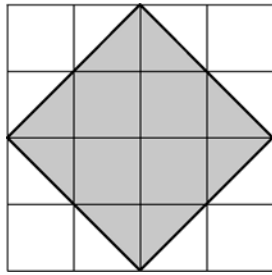
Where specific angles are drawn, accept angle $\pm 2^\circ$.

- 1 Check learner has drawn a rectangle $9\text{ cm} \times 4\text{ cm}$
- 2 Check learner has drawn a square $7\text{ cm} \times 7\text{ cm}$
- 3 Check learner has drawn:

a a square with an area of 2 cm^2



b a square with an area of 8 cm^2 .



4 90° , 60° and 30°

5 Max is incorrect.

The angles of a quadrilateral total 360° . If three angles are right angles (270°), the fourth angle must also be a right angle, which means the shape must be a square or a rectangle.

Or the three angles are not right angles.

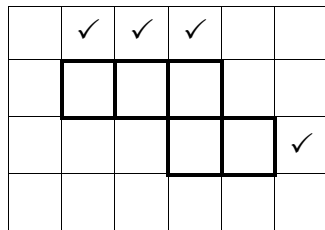
Building 3-D shapes Pages 50–51

Ruby

- 1
- a Yes
 - b Yes
 - c Yes
 - d Yes
 - e Yes
- 2
- a Yes
 - b Yes
 - c No
 - d No
 - e Yes

Pearl

- 1 Accept any of the ticked squares as correct.



- 2 A triangular prism has only two triangular faces.
- 3 Cone
- 4 Tetrahedron. Accept triangular-based pyramid.
- 5 To make the net of a cylinder, use two **circles** and one **rectangle**.
- 6 To make the net of a cuboid, use **6** rectangles.
- 7 The net of a square-based pyramid has **4 triangles** and **1 square**.

Diamond

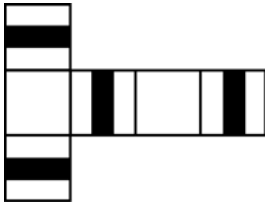
Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 There are many possible answers.
- Accept any three numbers that multiply to 36, e.g.
- $36 \text{ cm} \times 1 \text{ cm} \times 1 \text{ cm}$
 - $18 \text{ cm} \times 2 \text{ cm} \times 1 \text{ cm}$
 - $12 \text{ cm} \times 3 \text{ cm} \times 1 \text{ cm}$

- $9\text{ cm} \times 4\text{ cm} \times 1\text{ cm}$
- $9\text{ cm} \times 2\text{ cm} \times 2\text{ cm}$
- $6\text{ cm} \times 6\text{ cm} \times 1\text{ cm}$
- $6\text{ cm} \times 3\text{ cm} \times 2\text{ cm}$
- $4\text{ cm} \times 3\text{ cm} \times 3\text{ cm}$

2 3

3

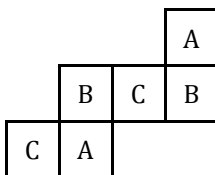


4 Accept either explanation:

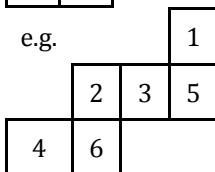
- A triangular prism has 3 rectangular faces. Each rectangle has four right angles.
- The triangular face could be a right-angled triangle.

5 There are many possible answers.

Letter pairs e.g. AA should total 7.



e.g.



Unknown angles **Pages 52–53****Ruby**

- a** 52°
- b** 99°
- c** 79°
- d** 18°
- e** 18°
- f** 150°
- g** 94°
- h** 270°
- i** 206°
- j** 29°

Pearl

- 1** **a** 68°
- b** 203°
- c** 110°
- d** 75°
- e** 35°
- 2** 120°
- 3** 38°
- 4** 108°

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** 72°
- 2** 56° , 56° and 68° or 56° , 62° and 62°
The angles of a triangle total 180° .
In an isosceles triangle two angles are equal.
 $56^\circ \times 2 = 112^\circ$
 $180^\circ - 112^\circ = 68^\circ$
or
 $180^\circ - 56^\circ = 124^\circ$
 $124^\circ \div 2 = 62^\circ$
- 3** 90° , 45° and 45°

In the triangle, one angle is a right angle, 90° .

The triangle is an isosceles triangle, so the other two angles are equal.

$$180^\circ - 90^\circ = 90^\circ$$

$$90^\circ \div 2 = 45^\circ$$

4 $a = 50^\circ$

The triangle with 65° is an isosceles triangle and two angles are the same.

$$65^\circ \times 2 = 130^\circ$$

$$180^\circ - 130^\circ = 50^\circ$$

Angle a is vertically opposite the angle of 50° .

$$b = 130^\circ$$

Angles a and b are on a straight line and total 180° .

$$180^\circ - 50^\circ = 130^\circ$$

Accept a follow-through of correct arithmetic using an incorrect answer to a .

$$c = 25^\circ$$

The angle vertically opposite b is 130° and the triangle is isosceles.

$$180^\circ - 130^\circ = 50^\circ$$

$$50^\circ \div 2 = 25^\circ$$

Accept a follow-through of correct arithmetic using an incorrect answer to b .

5 35° , 145° and 145°

The opposite angles of a parallelogram are equal.

The angle opposite 35° is 35° .

The angles of a parallelogram (quadrilateral) total 360° .

$$35^\circ + 35^\circ = 70^\circ$$

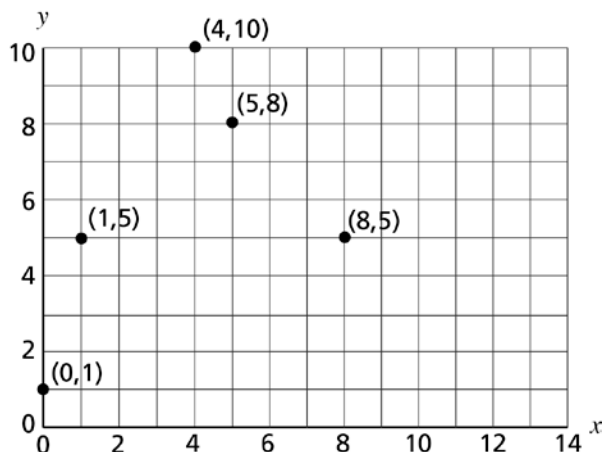
$$360^\circ - 70^\circ = 290^\circ$$

$$290^\circ \div 2 = 145^\circ$$

Coordinates Pages 54–55

Ruby

1

2 $A(1, 1), B(3, 0), C(8, 5), D(3, 5), E(0, 3)$

Pearl

1 (7, 9)

2 Hexagon

3 (3, 1)

4 Trapezium

5 (0, 4)

Diamond

1 Accept any two coordinates that have the same x -coordinate, e.g. $(-10, 1)$ and $(-10, 8)$.2 $(5, -1)$

3 Accept any coordinate pairs that add up to 2, e.g.

- $(-3, 5)$
- $(-2, 4)$
- $(-1, 3)$
- $(1, 1)$

4 $(12, 16), (9, 15)$. The rule for the x coordinates is subtract 3. The rule for the y coordinates is subtract 1.5 $(-27, -28)$. $x = -35$ is a horizontal line and part forms one side of the rectangle. The missing x coordinate is -27 as a second vertical line $x = -27$ is needed. The y coordinates of the three vertices are: $-23, -28$ and -23 . $y = -23$ is a vertical line and part forms one side of the rectangle. The missing y coordinate is -28 as a second vertical line $y = -28$ is needed. So the coordinates of the missing vertex are $(-27, -28)$.

Reflections **Pages 56–57****Ruby**

1–10 Check reflections of the shapes have been drawn.

Pearl

- 1** **a** $(4, -7), (4, -5), (8, -6)$
 b $(-4, 7), (-4, 5), (-8, 6)$
- 2** **a** $(-4, 2), (-8, 3), (-7, 7), (-3, -6)$
 b $(4, -2), (8, -3), (7, -7), (3, -6)$
- 3** **a** $(5, 2), (2, 6), (8, 6)$
 b $(-5, -2), (-2, -6), (-8, -6)$

Diamond

- 1** **a** $(-3, -6), (-3, -2), (2, -6)$
 b $(3, 6), (3, 2), (-2, 6)$
- 2** $(3, 2), (3, -7), (7, -7)$
- 3** $(-12, -18)$
- 4** $(15, -20)$

Translations Pages 58–59

Ruby

- 1**
- a** 6 right, 1 up
 - b** 5 left, 2 up
 - c** 8 left, 3 down
 - d** 6 right, 3 down
 - e** 4 left, 4 up

2–4 Check the shapes have been correctly translated.

Pearl

- 1** $(-3, -2), (0, -4), (-2, -5)$
- 2** $(-5, 5), (-8, 3), (-2, 3)$
- 3** $(-1, 3), (-3, -1), (2, -2)$
- 4** $(1, 6), (-1, 3), (6, 5), (-2, 2)$
- 5** $(-2, 0), (2, 1), (-3, -2), (1, -2)$

Diamond

- 1** $(1, 3), (2, 0), (-1, -1)$
- 2** $(-2, 3), (-4, 2), (1, 0)$
- 3** $(-2, 6), (3, 6), (-3, 4), (0, 2)$
- 4** $(0, 1), (5, 0), (2, -3), (4, -3)$
- 5** $(-6, -2)$

Line graphs Pages 60–61

Ruby

- 1 April was warmer.
- 2 August
- 3 December
- 4 The temperature rose.
- 5 10°C
- 6 5 degrees
- 7 May
- 8 March

Pearl

- | | | | |
|----------|----------------|-----------|----------|
| 1 | Brighton | 32 km | |
| | Lewes | 24 km | ± 1 km |
| | Eastbourne | 8 km | ± 1 km |
| 2 | Bromley | 56 km | ± 1 km |
| | Central London | 40 km | ± 1 km |
| | Ashford | 24 km | ± 1 km |
| 3 | Ostend | 25 miles | ± 1 km |
| | Calais | 22 miles | ± 1 mile |
| | Dunkirk | 13 miles | ± 1 mile |
| 4 | Dusseldorf | 31 miles | ± 1 mile |
| | Essen | 11 miles | ± 1 mile |
| | Dortmund | 2.5 miles | ± 1 mile |

Diamond

Accept answers in the following ranges inclusive.

- 1 \$455–\$465
- 2 £1 = \$1.85 because he will have more dollars to spend.
- 3 Two-thirds of £120 will have the same value as two-thirds of \$220.
- 4 £30 is equivalent to \$50 and \$30 is equivalent to £15. Jack is wrong.

Pie charts Pages 62–63

Ruby

- 1 $\frac{1}{2}$
- 2 $\frac{1}{4}$
- 3 $\frac{1}{8}$
- 4 5 (children)
- 5 5 (children)
- 6 20 (children)
- 7 Bus
- 8 Bicycle and walking

Pearl

- 1 Seashore
- 2 15 (children)
- 3 Accept an answer in the range 18–22 (children)
- 4 $\frac{1}{3}$ (about)
- 5 $\frac{1}{2}$ (about)
- 6 There are 60 children.
 $60 \div 7 = 8.57$ (2 d.p.)
 As the pie chart is about children, there cannot be 8.57 children. There must be a whole number.

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1 Both pie charts show the fraction of guests that are children is $\frac{1}{4}$.

The numbers of guests at the two hotels are different.

Beach Hotel: 100 guests

$\frac{1}{4}$ of 100 = 25 children

Sea Hotel: 400 guests

$\frac{1}{4}$ of 400 = 100 children

There are more children at Sea Hotel than Beach Hotel.

2 40 (men)

(100 guests – 25 children = 75 men and women)

There are 5 more men than women.

$$75 - 5 = 70$$

$$70 \div 2 = 35$$

$$35 + 5 = 40 \text{ men)}$$

3 150 (men)

(400 guests – 100 children = 300 men and women)

There are equal numbers of men and women.

$$300 \div 2 = 150 \text{ men)}$$

4 Beach Hotel

$$100 \div 4 = 25 \text{ children}$$

$$100 - 25 = 75 \text{ men and women}$$

There are 5 more men than women.

$$75 - 5 = 70$$

$$70 \div 2 = 35 \text{ women}$$

Sea Hotel

$$400 \div 4 = 100 \text{ children}$$

$$400 - 100 = 300 \text{ men and women}$$

There are equal numbers of men and women.

$$300 \div 2 = 150 \text{ women}$$

$$150 \text{ women (Sea Hotel)} > 35 \text{ women (Beach Hotel)}$$

5 144°

40 out of 100 guests at the Beach Hotel are men.

$$\frac{40}{100} = \frac{2}{5}$$

$$360^\circ \div 5 \times 2 = 144$$

Finding the mean Page 64

Ruby

- 1**
- | | |
|----------|-----|
| a | 25 |
| b | 10 |
| c | 24 |
| d | 70 |
| e | 600 |
| f | 450 |
- 2** 13.2(°C)
- 3** (£)12

Pearl

- 1**
- | | |
|----------|-----|
| a | 86 |
| b | 325 |
| c | 97 |
| d | 181 |
- 2** 79(%)
- 3** 57

Diamond

Possible explanations are outlined below. Alternative methods and layouts are allowed.

- 1** 228
- 2** 93
- 3** The tallest friend is 1.58 m, but one of the friends is 1.4 m
The mean can't be 1.58 m, as 1.4 m would reduce the value of the mean.
- 4** Accept three of the following:
- $1 + 1 + 1 + 17 = 20$
 - $2 + 2 + 2 + 14 = 20$
 - $3 + 3 + 3 + 11 = 20$
 - $4 + 4 + 4 + 8 = 20$
 - $6 + 6 + 6 + 2 = 20$
- Accept fractions, decimals and negative numbers if correct.