Answers

Worked solutions and answers to ***all*** activities appear in the Teacher Companion.

Chapter 1

Recall 1 (p. 4)

1 (a) B (b) D

2 (a) 0, 12, 74, 567, 602, 4500, 6008, 11 100

(b) 2400, 2196, 1200, 1010, 987, 240, 204, 95

3 (a) 56 895 (b) 7 025 073

4 (a) (i) 1250 (ii) 1200 (iii) 1000

(b) (i) 8980 (ii) 9000 (iii) 9000

5 (a) 18 (b) 90 (c) 8 (d) 10 000

6 (a) 512 (b) 2063 (c) 1698

7 (a) 175 (b) 627 (c) 1157

8 (a) 315 (b) 670 (c) 3230

9 (a) 211 (b) 412 (c) 128 rem 1

Exercise 1.1 (p. 7)

1 (a) 73 (b) 107 (c) 199 (d) 60 (e) 120

(f) 420 (g) 210 (h) 120 (i) 280 (j) 120

(k) 180 (l) 380 (m) 228 (n) 178 (o) 216

2 (a) 153 (b) 152 (c) 294 (d) 186 (e) 364

(f) 215 (g) 891 (h) 231 (i) 456 (j) 154

(k) 195 (l) 192 (m) 808 (n) 565 (o) 1364

3 (a) 121 (b) 503 (c) 165 (d) 360 (e) 98

(f) 189 (g) 618 (h) 242 (i) 582 (j) 360

(k) 266 (l) 420

4 C

5 (a) 245 km (b) 235 km

6 1000

7 (a) $136 (b) $53

8 (a) 720

(b) May be about to begin or end a busy time (e.g. peak hour). A bottleneck, accident or other traffic hold-up may occur.

9 $390

10 (a) $7.84 (b) $2.31 (c) $7.08 (d) $4.10

11 (a) Multiplying 7 by 20 gives one lot less of 7 than needed, not one lot less of 21. Need to multiply 7 by 20, then add 7 to get 147.

(b) Doubling twice is the same as multiplying by 4, not by 3. You can double 35 to get 70, then add another 35 to get 105.

(c) The remaining 9 should have been subtracted to get 191, not added.

12 (a) Alex and Khalid's methods are correct.

(b) They both round off the multiplier (Alex rounds 9 to 10 and Khalid 29 to 30), multiply, then subtract 1 lot of the number they multiplied by (Alex subtracts 1 lot of 29, as he had 10 lots instead of 9, and Khalid subtracts 1 lot of 9, as he had 30 lots instead of 29).

(c) The other two students round off correctly, but then subtract the wrong number.

Open-ended – Sample answers

13 5 picture hooks at 28 cents each = $1.40;
12 curtain rings at 15 cents each = $12 \times 10 + 12 \times 5 = \$1.80$.
Total: $\$(1.40 + 1.80 + 6) = \$9.20$.
Tranh should have enough money.

14 Do the calculations $9 \times 23 + 2 \times 23$.

15 Group the numbers and then use multiplication and addition. He has 7 1s (worth $7 \times 1 = 7$), 9 2s (worth $9 \times 2 = 18$) and so on. When the multiplications are finished add together the results. He should get 50.

Exercise 1.2 (p. 15)

1 (a) $2 \times 2 \times 2 = 8$

(b) $2 \times 2 \times 2 \times 2 = 16$

(c) $2 \times 2 \times 2 \times 2 \times 2 \times 2 = 64$

(d) $1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 \times 1 = 1$

(e) $0 \times 0 \times 0 \times 0 \times 0 \times 0 \times 0 = 0$

(f) $10 \times 10 \times 10 = 1000$

(g) $6 \times 6 \times 6 \times 6 = 1296$

(h) $5 \times 5 \times 5 \times 5 \times 5 = 3125$

(i) $8 \times 8 \times 8 \times 8 \times 8 \times 8 = 262\,144$

(j) $11 \times 11 \times 11 = 1331$

(k) $12 \times 12 \times 12 \times 12 = 20\,736$

(l) $14 \times 14 \times 14 \times 14 \times 14 = 537\,824$

2 (a) 8^3 (b) 4^6 (c) 12^5 (d) 16^9

(e) 17^3 (f) 19^2 (g) 8^4 (h) 13^7

(i) 11^7 (j) 9^6

3 (a) 16 384 (b) 46 656 (c) 6561 (d) 512

(e) 16 807 (f) 3375 (g) 289 (h) 125 000

(i) 64 (j) 500 (k) 4000 (l) 2000

(m) 1024 (n) 19 683 (o) 1

4 (a) five squared (b) thirty-one squared

(c) three cubed (d) twenty-seven cubed

(e) four to the power of five (f) nine to the power of six

(g) one to the power of four

(h) seven to the power of seven

5 25, 36, 49

6 64, 125, 216

7 (a) 5 (b) 7 (c) 10 (d) 11

(e) 1 (f) 0 (g) 70 (h) 20

(i) 2 (j) 4 (k) 10 (l) 1

(m) 0 (n) 5 (o) 20 (p) 30

8 (a) A (b) C (c) A

9 (a) 5 (b) 7 (c) 65 (d) 32

(e) 64 (f) 243 (g) 21 (h) 45

(i) 51

10 (a) 1^{200}, 5^4, 10^3, 4^5, 5^5, 4^6

(b) 10^5, 100^2, 3^2, 2^3, 1^{1000}, 0^{100}

11 (a) 16, 36 (b) 49, 81

12 (a) 0 (b) 190 000 (c) 45 000 (d) 2 472 768

(e) 537 824 (f) 51 998 079 (g) 266 240 (h) 79 785

(i) 439 291

13 (a) 3, 4 (b) 2, 3 (c) 4, 5 (d) 7, 8

(e) 9, 10 (f) 1, 2 (g) 8, 9 (h) 10, 11

14 (a) $\sqrt[3]{64}$, 5, $\sqrt{49}$, 2^4 (b) $\sqrt[3]{125}$, $\sqrt{60}$, 9, 7^2

(c) $\sqrt[3]{8}$, $\sqrt{90}$, 10, 4^2 (d) 8, $\sqrt{80}$, $\sqrt{105}$, 3^3

15 (a)

Index form	Expanded form	Value
10^1	10	10
10^2	10×10	100
10^3	$10 \times 10 \times 10$	1 000
10^4	$10 \times 10 \times 10 \times 10$	10 000
10^5	$10 \times 10 \times 10 \times 10 \times 10$	100 000

(b) The index number in the first column is the same as the number of zeroes after the 1 in the third column.

16 (a) 4 (b) 2 (c) 3 (d) 5

(e) 1 (f) 6 (g) 4 (h) 2

(i) 4

17 (a) $5^2 \times 5^3 = 25 \times 125 = 3125$. $5 \times 5 \times 5 \times 5 \times 5 = 3125$.

(b) $2^3 \times 2^6 = 8 \times 64 = 512$. $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 = 512$

(c) The sum of the powers is the number of times the base is multiplied with itself to obtain the answer.

18 (a) 4 (b) 10 (c) 16

19 (a) (i) True (ii) True (iii) True (iv) False

(b) (i) False (ii) True

20 (a) (i) one hundred (ii) one hundred

(b) (i) 10^{100} (ii) 10^{100}, more than a lifetime

21 (a) 121; 12 321; 1 234 321

(b) 123 454 321; 12 345 654 321; 1 234 567 654 321

Open-ended – Sample answers

22 $12^3 = 1728$; $31^2 = 961$; $3^{21} = 10\,460\,353\,203$

23 (a) 5, 6, 7, 8 or 9 (b) 10, 11, ... 21

24 (a) Mina is partly correct. The 'little 2' does mean two 35s, but they are multiplied together, not added. A better explanation for Mina to give Jo would be: 'The 2 tells you how many 35s you need to multiply together.'

(b) 2^2 is a bit of a special case. $2^2 = 2 \times 2$, which gives the same answer as $2 + 2$ or 'double 2'. However, this is not true for any other number, except 0.

Exercise 1.3 (p. 24)

1 (a) 108 (b) 246 (c) 496 (d) 150 (e) 17

(f) 54 (g) 315 (h) 65 (i) 1050 (j) 180

(k) 18 (l) 15

2 (a) 492 (b) 442 (c) 1292 (d) 1403 (e) 1519

(f) 2184 (g) 1974 (h) 2597 (i) 3025 (j) 5002

(k) 5544 (l) 4896

3 (a) 2100 (b) 2000 (c) 26 000 (d) 18 (e) 27

(f) 16 (g) 480 000 (h) 12 800 000

(i) 140 000 000 (j) 600 (k) 500 (l) 2100

4 (a) 9 (b) 5 (c) 32 (d) 760

(e) 1060 (f) 1836 (g) 150 (h) 43

(i) 150 (j) 1440 (k) 4248 (l) 2450

5 48 000 m

6 Divide by 10 and double the answer: 26.

7 \$1248

8 \$250

9 \$648 000

10 92 streets, some left over

11 (a) \$66 (b) \$55 (c) He will gain \$55.

12 (a)

×	100	60	2	+
200	20 000	12 000	400	= 32 400
40	4000	2400	80	= 6480
6	600	360	12	= 972
				39 852

(b)

×	300	50	6	+
400	120 000	20 000	2400	= 142 400
10	3000	500	60	= 3560
2	600	100	12	= 712
				146 672

(c)

×	100	0	7	+
500	50 000	0	3500	= 53 500
60	6000	0	420	= 6420
0	0	0	0	= 0
				59 920

13 B

Open-ended – Sample answers

14 **(a)** 2×810, 4×405, 5×324, 10×162, 20×81, 30×54, 6×270, 12×135, 18×90

(b) 18×90, 30×54, 20×81

15 **(a)** $9 \times 24 = 216$
$12 \times 43 = 516$

(b) Kim has forgotten that the first digit in the numbers she is splitting up (24 and 43) is in the 'tens' place value column. She is multiplying them as though they were units.

(c) Write out the number being split into tens and units:
$9 \times 24 = 9 \times (20 + 4)$
$12 \times 43 = 12 \times (40 + 3)$

Half-time 1 (p. 28)

1 **(a)** 340 **(b)** 690 **(c)** 185
(d) 760 **(e)** 239 **(f)** 261

2 **(a)** **(i)** 216 **(ii)** 3125 **(iii)** 10 **(iv)** 49
(v) 7 **(vi)** 2 **(vii)** 10 **(viii)** 4

(b) **(i)** 49 and 4 **(ii)** 216

3 **(a)** 171 **(b)** 328 **(c)** 190 **(d)** 374
(e) 441 **(f)** 636 **(g)** 4757 **(h)** 7728

4 **(a)** 34 **(b)** 29 **(c)** 116 **(d)** 47
(e) 16 **(f)** 39 **(g)** 18 **(h)** 56

5 **(a)** 3^6 **(b)** 6^5 **(c)** 4^7 **(d)** 15^2
(e) 21^3 **(f)** 41^3

6 **(a)** 4200 **(b)** 3000 **(c)** 120 000
(d) 200 000 **(e)** 90 **(f)** 30
(g) 5 **(h)** 620 **(i)** 150

7 $676 000

Exercise 1.4 (p. 32)

1 **(a)** 70 **(b)** 70 **(c)** 10 **(d)** 6
(e) 600 **(f)** 700 **(g)** 500 **(h)** 1000
(i) 5000 **(j)** 4000 **(k)** 10 000 **(l)** 10 000
(m) 80 000 **(n)** 700 000 **(o)** 800 000 **(p)** 2 000 000

2 **(a)** 28 000 **(b)** 40 000 **(c)** 48 000 **(d)** 60
(e) 50 **(f)** 25 **(g)** 80 000 **(h)** 900 000
(i) 2 100 000 **(j)** 63 000 **(k)** 300 000 **(l)** 1000
(m) 50 **(n)** 60 **(o)** 90 000 000

3 **(a)** $40 \times 25 = 1000$ **(b)** $120 \times 50 = 6000$
(c) $200 \times 15 = 3000$ **(d)** $400 \div 40 = 10$
(e) $400 \div 20 = 20$ **(f)** $250 \div 50 = 5$
(g) $1600 \times 20 = 32 000$ **(h)** $34 000 \times 20 = 680 000$
(i) $4000 \times 250 = 1 000 000$ **(j)** $3500 \div 50 = 70$
(k) $11 000 \div 100 = 110$ **(l)** $45 000 \div 15 = 3000$
(m) $24 000 \div 400 = 60$ **(n)** $15 000 \div 2500 = 6$
(o) $5000 \times 2500 = 12 500 000$

4 **(a)** C
(b) **(i)** C **(ii)** B

5 **(a)** $1200 + 300 = 1500$ **(b)** $10 300 + 200 = 10 500$
(c) $15 000 + 3000 = 18 000$ **(d)** $820 - 80 = 740$
(e) $1200 - 200 = 1000$ **(f)** $500 - 300 = 200$

6 **(a)** 24 000, actual answer will be lower
(b) 800 000, actual answer will be higher
(c) 4000, actual answer will be lower
(d) 100, actual answer will be lower
(e) 10, actual answer will be higher
(f) 6, actual answer will be lower

7 **(a)** D **(b)** B **(c)** A **(d)** D

8 **(a)** 300 000 **(b)** $6 million

9 **(a)** $760 **(b)** $9000

10 **(a)** A **(b)** $16 \times 15 \div 2 = 120$

11 79×5003 will give the closer answer because the numbers are much closer to the rounded ones (80 and 5000). 5488 is rounded a long way down and so gives an estimated answer that is a lot less than the actual one.

12 **(a)** $1344 \div 21 \approx 1000 \div 20 = 50$

(b) $1344 \div 21 \approx 1340 \div 20 = 67$

(c) Answer **(b)** will give a closer estimate to the answer because the initial numbers have been rounded far less.

(d) $1344 \div 21 = 64$—much closer to answer **(b)**

13 If she estimated by rounding down, she would run the risk of not having enough seats on the buses for 428 people; e.g. rounding to the first digit gives $400 \div 50 = 8$ buses, but eight 52–seater buses have 416 seats—way too few.

Open-ended – Sample answers

14 **(a)** Natalie's rounded down total outweighs her rounded up total. Natalie rounded the T-shirt up by $3 and the lip gloss up by $1 = $4. She rounded the earrings down by $4 and the necklace down by $3 = $7. She is $3 short.

(b) A 'safer' method is to round up all purchases to a convenient multiple of 5 or 10.

15 **(a)** 39 and 82 **(b)** 12 and 19
(c) 214 and 487 **(d)** 72 and 573

Exercise 1.5 (p. 37)

1 **(a)** 25 **(b)** 7 **(c)** 11 **(d)** 0
(e) 3 **(f)** 17 **(g)** 9 **(h)** 12
(i) 9 **(j)** 50 **(k)** 5 **(l)** 84
(m) 21 **(n)** 14 **(o)** 88 **(p)** 41

2 **(a)** False **(b)** True **(c)** False **(d)** True
(e) False **(f)** True

3 **(a)** C **(b)** D

4 **(a)** **(i)** 2×6, then 2×2 **(ii)** $15 \div 5$, then 6×3
(b) **(i)** 6 **(ii)** 21

5 **(a)** $(6 + 6) \times 3 = 36$ **(b)** $(10 - 4) \times 5 = 30$

(c) $(9 - 8) \times 6 + 4 = 10$ **(d)** $12 + 6 \div (7 - 4) = 14$

(e) $6 \div (3 + 3) \times 5 = 5$ **(f)** $3 \times 6 \div (8 - 4 + 5) = 2$

(g) $3 \times (10 - 7) \div 9 + 12 = 13$ **(h)** $18 \div 3 \times (5 - 3) + 2 = 14$

(i) $(7 + 3) \div (4 + 1) = 2$ **(j)** $(5 - 3) \times (8 - 6) \div 2 = 2$

6 **(a)** $73 \times 5 + 29 + 50 \times 8 = 794$, \$7.94

(b) $2000 - (5 \times 73 + 29 + 8 \times 50) = 1206$, \$12.06

7 **(a)** $6 \times 90 + 5 \times 70$
$= 540 + 350$
$= 890$ cents
$= \$8.90$

(b) $6 \times 90 + 6 \times 70 + 5 \times 50$
$= 540 + 420 + 250$
$= 1210$ cents
$= \$12.10$

(c) \$5.30

8 **(a)** $2 + 21 \div 3 = 9$ **(b)** $15 - 6 \div 2 = 12$

(c) $14 - 8 - 6 = 0$ **(d)** $7 \times 5 - 6 = 29$

(e) $14 + 3 - 2 = 15$ **(f)** $(24 + 6) \div 10 = 3$

(g) $8 + 5 \times 2 - 6 = 12$ **(h)** $12 \div 2 + 1 \times 9 = 15$

9 **(a)** $6 \times (4 \div 2) \times 3 = (6 \times 4) \div 2 \times 3$

(b) $(1 + 4) \times 20 \div 5 > 1 + (4 \times 20) \div 5$

(c) $100 + 10 \div 10 > (100 + 10) \div 10$

(d) $36 \div 6 \times (3 - 3) < 36 \div 6 \times 3 - 3$

10 **(a)** Both pairs of brackets are unnecessary.

(b) Both pairs of brackets are unnecessary.

(c) First pair is unnecessary.

(d) Second pair is unnecessary.

11 **(a)** 26 is the correct answer.

(b) The calculator 'does' order of operations, the phone does every operation as it is entered.

Open-ended – Sample answers

12 $(8 + 4) \times 6 \div 2 - 1 = 35$; $8 + (4 \times 6) \div 2 - 1 = 19$;
$8 + 4 \times (6 \div 2) - 1 = 19$; $8 + 4 \times 6 \div (2 - 1) = 32$;
$(8 + 4 \times 6) \div 2 - 1 = 15$; $8 + (4 \times 6 \div 2) - 1 = 19$;
$8 + 4 \times (6 \div 2 - 1) = 16$

13 Correct answer is 75. Step 2 is incorrect—he needed to do $30 \div 2$, first, then multiply by 5.

Mathspace (p. 40)

1 72 muscles

2 500 shades of grey

3 165 km/h

4 2000 scents

5 **(a)** 2 **(b)** 6

6 **(a)** 300 **(b)** 206

7 10 billion flakes

8 15 million cells

9 3 millimetres

10 7.25 metres

Brain surgery #1

1 2

2 21

3 1

4 3

5 5

Brain surgery #2

1 24

2 39

3 15

4 1

5 36

Exercise 1.6 (p. 42)

1 **(a)** 724 **(b)** \$9225 **(c)** \$351 **(d)** 31 hours

2 30 minutes

3 72 laps

4 50 400 min

5 **(a)** 5998 m **(b)** 4643 m

6 Shoes $68 + 34 = \$102$
T-shirts $19 + 9 = \$28$
Earrings = \$25
Total = \$155

7 $192 - 18 = 174$ buns sold

8 **(a)** 222 km **(b)** 3931 km **(c)** 3709 km

9 73 cm

10 \$2646

11 42

12 **(a)** 3 trips there and back (12 boxes), plus 1 more trip to new house (with last box), = 7 times

(b) 49 km

13 **(a)** 11 weeks, 3 days

(b) 2 months, 2 weeks, 6 days

(c) 2 months, 3 weeks, 3 days

(d) In **(b)**, 80 was divided by 30 to find the number of months. Dividing by a larger number gives a smaller remainder to split into weeks and days. In **(c)**, 80 was divided by 28 (4 weeks).

14 Vet + Jason + 2 Scruffys: $91 + 56 = 147$ kg
Scruffy's weight $= 147 - 138 = 9$ kg

Open-ended – Sample answers

15 **(a)** The two numbers need to be different by at least 30; e.g. 25 and 66.

(b) The two numbers need to be single-digit numbers; e.g. 4 and 7, 5 and 6, 9 and 3.

16 **(a)** 20×300 mL bottles: 6 kg
20×600 mL bottles: 12 kg
20×1000 mL bottles: 20 kg

(b) Numbers of each box that give a total mass of 1000 kg:

1 L: 50 boxes
600 mL: 83 boxes
300 mL: 166 boxes

(c) 23×1 L boxes + 30×600 mL boxes + 30×300 mL boxes
26×1 L boxes + 26×600 mL boxes + 28×300 mL boxes

Challenge 1 (p. 45)

1 D
Number must end in 6 or 8 to be even, smallest number needs biggest digit at end, so ends in 8. Largest remaining digit needs to be in the tens place.

2 C
List the possibilities, $2 \times 2 = 4$, $2 \times 4 = 8$, $2 \times 6 = 12$, $2 \times 8 = 16$, Note: 16 is repeated. $4 \times 4 = 16$, $4 \times 6 = 24$, $4 \times 8 = 32$, $6 \times 6 = 36$, $6 \times 8 = 48$, $8 \times 8 = 64$.

3 B
Three-digit number has to be as small as possible, two-digit number as large as possible: 356 – 87 = 269.

4 10 × $5 = $50, Kim has $50 more, whereas Brian has $10 less than the amount they each started with.

By trial and error: If they both start with $50, Kim will now have $100 and Brian will have $40. But $40 × 3 = $120. Too much, so try a smaller amount. If they both start with $40, Kim will now have $90 and Brian will have $30. $30 × 3 = $90. They both started with $40.

5 Find the factors of 15 181. It helps to realise that the only pairs of numbers that multiply to give a number ending in 1 are: 1 and 1, 3 and 7, 9 and 9. Hence, possible teenage children could be 11, 13, 17 or 19. See which of these numbers are factors of 15 181, then work out the remaining age. The ages are 17, 19 and 47, so the father is 47 years old.

6 Numbers are consecutive odd numbers.

Sum of first row = 1, sum of second row = 3 + 5 = 8, sum of third row = 7 + 9 + 11 = 27

$1 = 1^3$, $8 = 2^3$, $27 = 3^3$. Sum of row is row number cubed.

Sum of 7th row = $7^3 = 343$.
Sum of 100th row = $100^3 = 1\,000\,000$.

7 $\sqrt{8} \approx 2.8$, $\sqrt{8008} \approx 89.5$, so the squares of 3, 4, 5, … 89 are between 8 and 8008. 89 – 2 = 87 numbers.

8 After the first two terms, each term is the sum of the previous two terms: 18 + 29 = 47, 29 + 47 = 76, 47 + 76 = 123. Terms are 47, 76, 123.

9 1001 ÷ 6 = 166.83, so 1001 will appear in the 167th row. The odd-numbered rows run from left to right and the row would start with 997, as row 166 ends with 996 (166 × 6) in column A. Counting across gives 1001 in column E.

10 **(a)** 0, 1, 4, 9, 16, 25, 36, 49, 64, 81

(b) 0, 1, 4, 5, 6, 9

(c) 2, 3, 7, 8

(d) **(i), (iii), (v)**

(e) 961: factor ends in 1 or 9. $900 = 30^2$, so try 31^2.

Chapter review 1 (p. 46)

1 **(a)** 142 **(b)** 138 **(c)** 225 **(d)** 120
(e) 315 **(f)** 437 **(g)** 180 **(h)** 544

2 **(a)** 144 **(b)** 125 **(c)** 100 000 **(d)** 8
(e) 30 **(f)** 3 **(g)** 129 **(h)** 3853
(i) 72

3 **(a)** 7^5 **(b)** 10^3 **(c)** 5^2 **(d)** 12^8

4 **(a)** 1400 **(b)** 170 000 **(c)** 5299 **(d)** 3038
(e) 22 **(f)** 1593 **(g)** 153 **(h)** 108

5 **(a)** 8000 **(b)** 60 000 **(c)** 50 **(d)** 300
(e) 60 000 **(f)** 3 000 000 **(g)** 8 **(h)** 300

6 **(a)** 550 ÷ 10 = 55 **(b)** 2000 ÷ 20 = 100
(c) 15 600 ÷ 200 = 78 **(d)** 30 × 600 = 18 000
(e) 160 × 400 = 64 000 **(f)** 500 × 2000 = 1 000 000
(g) 54 000 ÷ 900 = 60 **(h)** 12 800 ÷ 200 = 64

7 **(a)** 1 **(b)** 13 **(c)** 11 **(d)** 6 **(e)** 5 **(f)** 41

8 $66

9 720

10 **(a)** 80 000, close to **(b)** 90 000, close to
(c) 600, lower **(d)** 5000, higher

11 **(a)** 23 **(b)** 7

12 B

13 **(a)** 4 × (2 + 3) ÷ 5 – 1 = 3 **(b)** (5 + 1) ÷ 6 + 4 + 2 = 7

14 **(a)** $1200

(b) Melissa's weekly salary will be less than $1200.

15 **(a)** 3 and 4 **(b)** 5 and 6
(c) 9 and 10 **(d)** 12 and 13

16 Jessica: $180, Amy: $165, Aaron: $135, Nikkita: $90, Josef: $210; Total: $780

17 **(a)** 9 + 7 × 3 = 30 **(b)** 16 – 4 × 2 ÷ 2 = 12

18 **(a)** 6 + 3 × 5 **(b)** $19 change

19 **(a)** 129 **(b)** 3853 **(c)** 36

20 **(a)** $2^4 = 16$, $2^5 = 32$, $2^6 = 64$

(b) $2^{10} = 1024$; therefore, 20^{10} will be larger than 1000. The difference is 24.

21 4, $\sqrt{81}$, $\sqrt{121}$, 2^4, 3^3, 10^2

22 $21

23 224 ÷ 42 = 5 rem 14, so 6 buses will be needed. Rounding to the first digit gives 200 ÷ 40 = 5, meaning the 14 remaining passengers would be stranded—this is because 224 was rounded down.

24 8 numbers: 17, 18, 19, 20, 21, 22, 23, 24

25 A

26 $3^2 = 3 \times 3$, which is not equal to 3 × 2

27 Less than, because both of the numbers being rounded are being rounded up, and then multiplied.

NAPLAN practice 1

1 C **2** C **3** D **4** D
5 D **6** $28.40 **7** 180 **8** C
9 The Shwarma family

Chapter 2

Recall 2 (p. 52)

1 **(a)** 42, 36, 24, 66, 48 **(b)** 77, 49, 35, 14, 21
(c) 56, 48, 32, 80, 64 **(d)** 108, 27, 45, 99, 72
(e) 84, 72, 144, 108, 132

2 **(a)** 0, 2, 4, 6, 8 **(b)** 1, 3, 5, 7, 9

3 **(a)** 10 > 7 **(b)** 3 < 6 **(c)** 2 > 0 **(d)** 0 < 5

4 (a) 23 (b) 34 (c) 65 (d) 5
(e) 47 (f) 76

5 (a) -11°C, -4°C, 0°C, 7°C, 15°C, 21°C
(b) -25°C, -14°C, -3°C, 5°C, 10°C, 32°C

6 (a) 49 (b) 81 (c) 64 (d) 1

7 (a) 225 (b) 8 (c) 100 (d) 32

Exercise 2.1 (p. 57)

1 (a) 1, 2, 3, 6, 9, 18
(b) 1, 2, 4, 8, 16
(c) 1, 23
(d) 1, 2, 3, 4, 6, 8, 12, 24
(e) 1, 2, 4, 5, 10, 20
(f) 1, 5, 7, 35
(g) 1, 2, 3, 4, 6, 9, 12, 18, 36
(h) 1, 2, 3, 6, 7, 14, 21, 42
(i) 1, 53
(j) 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60
(k) 1, 7, 11, 77
(l) 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84

2 (a) 108
(b) 92, 108, 3100
(c) 245, 3100
(d) None
(e) 108

3 (a) 10 (b) 9 (c) 25 (d) 30 (e) 28
(f) 24 (g) 63 (h) 60 (i) 66 (j) 36
(k) 100 (l) 56 (m) 60 (n) 50 (o) 300

4 (a) 10: 1, 2, 5, 10
15: 1, 3, 5, 15
HCF = 5

(b) 8: 1, 2, 4, 8
24: 1, 2, 3, 4, 6, 8, 12, 24
HCF = 8

(c) 5: 1, 5
12: 1, 2, 3, 4, 6, 12
HCF = 1

(d) 26: 1, 2, 13, 26
36: 1, 2, 3, 4, 6, 9, 12, 18, 36
HCF = 2

(e) 11: 1, 11
33: 1, 3, 11, 33
HCF = 11

(f) 28: 1, 2, 4, 7, 14, 28
70: 1, 2, 5, 7, 10, 14, 35, 70
HCF = 14

(g) 44: 1, 2, 4, 11, 22, 44
22: 1, 2, 11, 22
HCF = 22

(h) 10: 1, 2, 5, 10
30: 1, 2, 3, 5, 6, 10, 15, 30
HCF = 10

(i) 40: 1, 2, 4, 5, 8, 10, 20, 40
70: 1, 2, 5, 7, 10, 14, 35, 70
HCF = 10

(j) 32: 1, 2, 4, 8, 16, 32
60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60
HCF = 4

(k) 35: 1, 5, 7, 35
70: 1, 2, 5, 7, 10, 14, 35, 70
HCF = 35

(l) 42: 1, 2, 3, 6, 7, 14, 21, 42
48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48
HCF = 6

5 (a) A (b) C

6 (a) C (b) D

7 (a) A (b) D

8 (a) False (b) False (c) True (d) True
(e) False (f) False

9 (a) (i) 60 (ii) 2
(b) (i) 24 (ii) 2
(c) (i) 48 (ii) 4
(d) (i) 200 (ii) 5

10 (a) divisible (b) factor (c) multiple (d) divisible

11 (a) 2 bags with 12 lollies in each bag; 3 bags of 8; 4 bags of 6; 6 bags of 4; 8 bags of 3; 12 bags of 2; 24 bags of 1

(b) 2 bags with 18 lollies in each bag; 3 bags of 12; 4 bags of 9; 6 bags of 6; 9 bags of 4; 12 bags of 3; 18 bags of 2; 36 bags of 1

12 (a) 1 row of 96, 2 rows of 48, 3 rows of 32, 4 rows of 24, 6 rows of 16, 8 rows of 12, 12 rows of 8, 16 rows of 6, 24 rows of 4, 32 rows of 3, 48 rows of 2, 96 rows of 1

(b) 8 rows of 12 or 12 rows of 8

13 5 groups of 4 and 2 groups of 3; 2 groups of 4 and 6 groups of 3

14 D

15 5 min, 10 min, 15 min

16 (a) 56
(b) 110
(c) 112
(d) 210

17 (a) 15 times
(b) 7 times
(c) 4, 7, 10, 13, 16, 19, 22

18 (a)

202 008	2, 3, 4, 6, 8
12 121 212	2, 3, 4, 6
300 300 300	2, 3, 4, 5, 6, 9, 10
7 500	2, 3, 4, 5, 6, 10
900 090	2, 3, 5, 6, 9, 10
123 456 789	3, 9

(b) (i) 2 (ii) 3

(c) 2 is a factor of 4, so if a number is divisible by 4, it is also divisible by 2.

3 is a factor of 9, so if a number is divisible by 9, it is also divisible by 3.

19 6 is the LCM of 2 and 3.

20 (a) 28 (b) 496

21 18 and 20

22 (a) multiply the two numbers together

(b) If the HCF of the numbers is 1, this will be the LCM.

Open-ended – Sample answers

23 (a) 4 rows of 15; 5 rows of 12; 6 rows of 10

(b) Boxes that are squarer in shape are more practical and require less packaging to make, so 5×12 or 6×10 are more likely.

24 Sam's age must be a multiple of 3 and 5; i.e. a multiple of 15: 15, 30, 45, 60, 75.

25 No. Multiplying any common multiple by a whole number greater than 1 gives a higher common multiple.

Exercise 2.2 (p. 62)

1 2, 3, 5, 7, 11, 13, 17, 19

2 Four (2, 3, 5, 7)

3 23, 29, 31, 37, 41, 43, 47, 53, 59

4 **(a)** B **(b)** D

5 **(a)** 61 **(b)** 62 **(c)** 9, 15 **(d)** 47

6 **(a)** False **(b)** True **(c)** True **(d)** False
(e) True **(f)** True **(g)** True **(h)** False

7 **(a)** Divisible by 10, 5 and 2 **(b)** Divisible by 3 and 9
(c) Divisible by 3 and 9 **(d)** Divisible by 3 and 9
(e) Divisible by 2 and 4 **(f)** Divisible by 5

8 **(a)** Yes, HCF = 1 **(b)** Yes, HCF = 1
(c) No, HCF = 13 **(d)** No, HCF = 9

9 The only common factors of any two prime numbers is 1.

10 All other even numbers have 2 as a factor.

11 It is even, so 2 is a factor.

12 There are no more even prime numbers.

13 1

14 **(a)** 99 and 101 **(b)** 35 and 37

15 No, a prime number will only be coprime with any whole number that is not a multiple of the original prime number.

16 The smaller of the two numbers will be a common factor.

Open-ended – Sample answers

17 The first 10 even composite numbers:

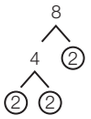
$4 = 2 + 2$
$6 = 3 + 3$
$8 = 3 + 5$
$10 = 5 + 5$
$12 = 5 + 7$
$14 = 7 + 7$
$16 = 11 + 5$
$18 = 11 + 7$
$20 = 13 + 7$
$22 = 11 + 11$

18 3 and 7 $(3 \times 2 + 1 = 7)$
2 and 5 $(2 \times 2 + 1 = 5)$
5 and 11 $(2 \times 5 + 1 = 11)$

Exercise 2.3 (p. 68)

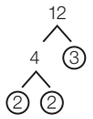
1 The factor trees can differ slightly from these. The factors at the end should be the same.

(a)



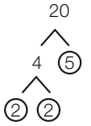
$8 = 2 \times 2 \times 2$
$= 2^3$

(b)



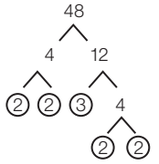
$12 = 2 \times 2 \times 3$
$= 2^2 \times 3$

(c)



$20 = 2 \times 2 \times 5$
$= 2^2 \times 5$

(d)



$48 = 2 \times 2 \times 2 \times 2 \times 3$
$= 2^4 \times 3$

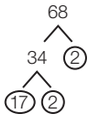
(e)

$14 = 2 \times 7$

(f)

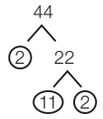
$26 = 2 \times 13$

(g)



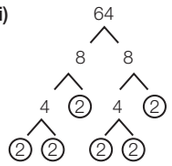
$68 = 2 \times 2 \times 17 = 2^2 \times 17$

(h)



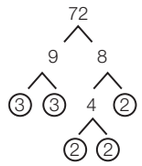
$44 = 2 \times 2 \times 11 = 2^2 \times 11$

(i)



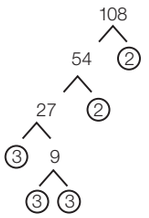
$64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$
$= 2^6$

(j)



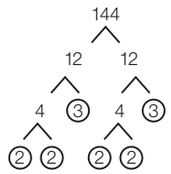
$72 = 2 \times 2 \times 2 \times 3 \times 3$
$= 2^3 \times 3^2$

(k)



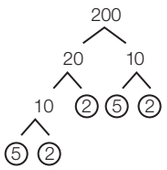
$108 = 2 \times 2 \times 3 \times 3 \times 3$
$= 2^2 \times 3^3$

(l)



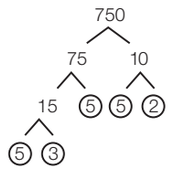
$144 = 2 \times 2 \times 2 \times 2 \times 3 \times 3$
$= 2^4 \times 3^2$

(m)



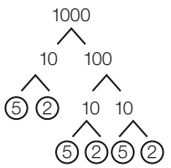
$200 = 2 \times 2 \times 2 \times 5 \times 5$
$= 2^3 \times 5^2$

(n)



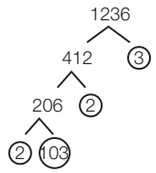
$750 = 2 \times 3 \times 5 \times 5 \times 5$
$= 2 \times 3 \times 5^3$

(o)



$1000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5$
$= 2^3 \times 5^3$

(p)



$1236 = 2 \times 2 \times 3 \times 103$
$= 2^2 \times 3 \times 103$

2 **(a)** $8 = 2^3$ **(b)** $12 = 2^2 \times 3$
(c) $28 = 2^2 \times 7$ **(d)** $36 = 2^2 \times 3^2$
(e) $39 = 3 \times 13$ **(f)** $77 = 7 \times 11$
(g) $51 = 3 \times 17$ **(h)** $38 = 2 \times 19$
(i) $30 = 2 \times 3 \times 5$ **(j)** $63 = 3^2 \times 7$
(k) $96 = 2^5 \times 3$ **(l)** $132 = 2^2 \times 3 \times 11$
(m) $168 = 2^3 \times 3 \times 7$ **(n)** $198 = 2 \times 3^2 \times 11$
(o) $288 = 2^5 \times 3^2$ **(p)** $212 = 2^2 \times 53$

3 **(a)** $8 = 2 \times 2 \times 2$
$20 = 2 \times 2 \times 5$
HCF $= 2 \times 2$
$= 4$

(b) $12 = 2 \times 2 \times 3$
$18 = 2 \times 3 \times 3$
HCF $= 2 \times 3$
$= 6$

(c) $12 = 2 \times 2 \times 3$
$36 = 2 \times 2 \times 3 \times 3$
HCF $= 2 \times 2 \times 3$
$= 12$

(d) $36 = 2 \times 2 \times 3 \times 3$
$48 = 2 \times 2 \times 2 \times 2 \times 3$
HCF $= 2 \times 2 \times 3$
$= 12$

(e) $24 = 2 \times 2 \times 2 \times 3$
$56 = 2 \times 2 \times 2 \times 7$
HCF $= 2 \times 2 \times 2$
$= 8$

(f) $28 = 2 \times 2 \times 7$
$84 = 2 \times 2 \times 3 \times 7$
HCF $= 2 \times 2 \times 7$
$= 28$

(g) $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$
$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$
HCF $= 2 \times 2 \times 2 \times 2 \times 2$
$= 32$

(h) $70 = 2 \times 5 \times 7$
$98 = 2 \times 7 \times 7$
HCF $= 2 \times 7$
$= 14$

(i) $60 = 2 \times 2 \times 3 \times 5$
$105 = 3 \times 5 \times 7$
HCF $= 3 \times 5$
$= 15$

(j) $66 = 2 \times 3 \times 11$
$110 = 2 \times 5 \times 11$
HCF $= 2 \times 11$
$= 22$

(k) $80 = 2 \times 2 \times 2 \times 2 \times 5$
$128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$
HCF $= 2 \times 2 \times 2 \times 2$
$= 16$

(l) $130 = 2 \times 5 \times 13$
$156 = 2 \times 2 \times 3 \times 13$
HCF $= 2 \times 13$
$= 26$

4 **(a)** D **(b)** A

5 **(a)** 72 **(b)** 300 **(c)** 54 000 **(d)** 2205 **(e)** 15 400 **(f)** 7744

6 **(a)** $2^4 \times 3$ **(b)** $2^5 \times 3$ **(c)** $2^4 \times 3^2$

7 **(a)** $2 \times 3 \times 5 \times 11$ **(b)** $2^2 \times 3 \times 5 \times 11$ **(c)** $2 \times 3^2 \times 5 \times 11$

8 2, 3, 7

9 **(a)** Prime factors of 36: $2 \times 2 \times 3 \times 3$
Prime factors of 100: $2 \times 2 \times 5 \times 5$
Highest common factor (HCF) of 36 and 100: $2 \times 2 = 4$
Factors of 36 not used to find the HCF: $3 \times 3 = 9$
Factors of 100 not used to find the HCF: $5 \times 5 = 25$
HCF × unused factors of 36 × unused factors of 100:
$4 \times 3 \times 3 \times 5 \times 5 = 900$

(b) **(i)** 72 **(ii)** 36 **(iii)** 40 **(iv)** 72 **(v)** 260 **(vi)** 800 **(vii)** 1000 **(viii)** 800 **(ix)** 4000

10 **(a)** 6 **(b)** 14 red balloons and 9 blue balloons

11 17; 510

12 **(a)** **(i)** 6 **(ii)** 30 **(iii)** 210

(b) **(i)** 4 **(ii)** 8 **(iii)** 16

13 **(a)** Yes, 105 is a winning number.

(b) There would be four winning tickets: 15, 105, 165 and 195.

Open-ended – Sample answers

14 Trial and error; e.g. try $2 \times 2 \times 3 \times 5$. If it is too small, try a bigger prime. $2 \times 2 \times 3 \times 11 = 132$; $2 \times 2 \times 5 \times 7 = 140$

15 **(a)** 2, 4, 5, 10 (and 20)

(b) A factor need not be prime. For example, 6 is a factor of 18, but 6 is a composite number.

(c) If a factor is composite, Ray should find its factors.

Exercise 2.4 (p. 75)

1 **(a)** +300 **(b)** -50 000 **(c)** -8 **(d)** +4
(e) +36 **(f)** +45 **(g)** -20 **(h)** +12
(i) -2 **(j)** -7 **(k)** +28 **(l)** -40 000
(m) +225 **(n)** -9

2 **(a)** +6 > -3 **(b)** +1 > -3 **(c)** -7 < +5
(d) -2 < +6 **(e)** -12 < -4 **(f)** -7 < –1
(g) -2 > -11 **(h)** -9 < 0 **(i)** 0 > -2
(j) -35 < +7 **(k)** -4 < +67 **(l)** -11 < +75

3 **(a)** -12, -4, -3, -1, 6 **(b)** -11, -10, 2, 9, 10
(c) -6, -4, 1, 2, 9 **(d)** -8, -6, -5, 1, 7
(e) -12, -8, -7, -4, -1 **(f)** -79, -56, 0, 6, 23

4 **(a)** 8, 7, 3, -5, -6 **(b)** 10, 7, 1, -8, -12
(c) 1, -4, -6, -8, -9 **(d)** 7, 0, -5, -11, -12
(e) -2, -5, -9, -11, -12 **(f)** 79, 4, 0, -9, -54

5 **(a)** east 300 km **(b)** 3 days early
(c) 7°C above zero **(d)** subtract 5
(e) add 22 **(f)** right 3 m
(g) +2 **(h)** -16
(i) +350

6 **(a)** A **(b)** D

7 **(a)** True **(b)** False **(c)** False **(d)** True
(e) False **(f)** False **(g)** True **(h)** True

8 **(a)** -3, -2, -1, 0, 1, 2 **(b)** -1, 0, 1
(c) -8, -7, -6, -5 **(d)** -4, -3, -2, -1
(e) -38, -39, -40, -41 **(f)** -119, -118, -117, -116

9 **(a)** -12, -10, -8 **(b)** -5, 0, 5
(c) 0, -3, -6 **(d)** -24, -30, -36
(e) 0, -10, -20 **(f)** -3, -8, -13

10 **(a)** Ben **(b)** Damien

11 **(a)** Tuesday **(b)** Friday **(c)** Tuesday

12 **(a)** 156 m **(b)** 154 m **(c)** 310 m

13 **(a)** 4 km west **(b)** 4 km east

14 **(a)** 4 floors up **(b)** 4 floors down

15 **(a)** Sam has more money at the end of the week.

(b) Withdrawals \$80 + \$120 + \$50 = \$250
Deposits \$350 + \$40 = \$390
\$140 more in the account

Open-ended – Sample answers

16 Any three of -7, -6, -5, -4, -3, -2, -1

17 **(a)** 3

(b) -3, -3, 6, 1, 1, 2 1, 1, -3, 1, 2, 2 4, 4, -3, 1, 1, -3

18 Students' own answers.

Half-time 2 (p. 79)

1 **(a)** 45 **(b)** 24

2 B

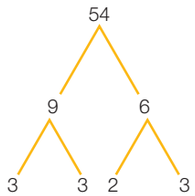
3 **(a)** +85 **(b)** -7 **(c)** +3 **(d)** +28 000

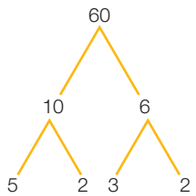
(e) -40 **(f)** +11

4 31, 37, 41, 43, 47

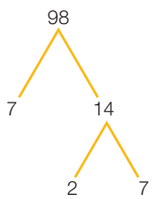
5 **(a)** $6 < 10$ **(b)** $-4 < 7$ **(c)** $3 > -12$ **(d)** $-8 > -15$

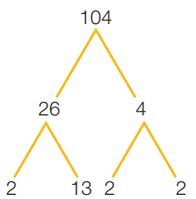
6 **(a)** $54 = 2 \times 3^3$ **(b)** $60 = 2^2 \times 3 \times 5$





(c) $98 = 2 \times 7^2$ **(d)** $104 = 2^3 \times 13$





7 **(a)** 76 905 is divisible by both 3 and 5, so it is divisible by 15.

(b) 4734 is divisible by 2, as it is even. Sum of digits is 18, which is divisible by 3. Therefore, as 4734 is divisible by both 2 and 3, it is divisible by 6.

8 **(a)** -37, -30, -3, 0, 3, 7

(b) -40, -20, -5, -1, 54

9 24

10 D

11 **(a)** 150 seconds

(b) Honda 6 laps,
Holden 5 laps,
Ford 3 laps

(c) 12 laps

Exercise 2.5 (p. 82)

1 **(a)** 11 **(b)** 8 **(c)** 11 **(d)** 8

(e) -2 **(f)** -5 **(g)** -5 **(h)** -6

(i) 6 **(j)** 12 **(k)** 25 **(l)** 20

(m) -10 **(n)** -4 **(o)** -20 **(p)** -31

2 **(a)** 2 **(b)** 6 **(c)** 5 **(d)** 0

(e) -6 **(f)** -11 **(g)** -8 **(h)** -4

(i) -10 **(j)** -8 **(k)** -20 **(l)** -12

(m) -12 **(n)** -30 **(o)** -69 **(p)** -124

3 **(a)** B **(b)** D

4 **(a)** 12 **(b)** 11 **(c)** 12 **(d)** 7

(e) -18 **(f)** -22 **(g)** -5 **(h)** -10

(i) -8 **(j)** 13 **(k)** -1 **(l)** 1

5 +8°C

6 the 11th floor

7 34 metres below the surface

8 5 m

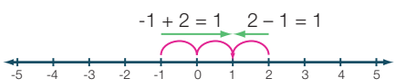
9 $13

10 **(a)** positive five subtract positive seven equals negative two

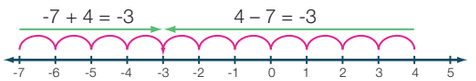
(b) negative eight add positive nine equals positive one

(c) negative four subtract positive three equals negative seven

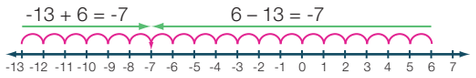
11 **(a)** **(i)**



(ii)



(iii)



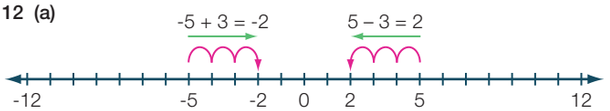
(b) The finishing point of the number line journeys for these pairs of additions and subtractions is the same. The pairs are equivalent—each addition can be rewritten as a subtraction. $-1 + 2 = 2 - 1$.

(c) **(i)** $-37 + 86 = 86 - 37 = 49$

(ii) $-72 + 95 = 95 - 72 = 23$

(iii) $-104 + 119 = 119 - 104 = 15$

12 **(a)**



(b) **(i)** $-8 + 6 = -2$ **(ii)** $-5 + 4 = -1$

(iii) $10 - 6 = 4$ **(iv)** $12 - 9 = 3$

(c) **(i)** -6 **(ii)** -21

(iii) -25 **(iv)** -19

Open-ended – Sample answers

13 Assuming that the temperature rises fairly gradually after sunrise, a possible answer might be:

6 a.m.	7 a.m.	8 a.m.	9 a.m.	10 a.m.	11 a.m.	12 p.m.
-4°C	0°C	7°C	13°C	17°C	21°C	25°C

14 Any three positive integers less than 13.

Exercise 2.6 (p. 88)

1 (a) 1 (b) 1 (c) 9 (d) 6
(e) -4 (f) -5 (g) -7 (h) -11
(i) -9 (j) -11 (k) -20 (l) -34
(m) -10 (n) -90 (o) -29 (p) -133

2 (a) 11 (b) 6 (c) 10 (d) 12
(e) 8 (f) 3 (g) 16 (h) -6
(i) 12 (j) -1 (k) 8 (l) -6
(m) -10 (n) -10 (o) -26 (p) -28

3 (a) A (b) B

4 (a) 0 (b) -6 (c) -7 (d) -10
(e) -5 (f) 6 (g) 5 (h) 9
(i) -3 (j) -2 (k) -8 (l) 22

5 -4°C

6 -3 (3 floors below ground level)

7 $3500 in debt

8 9 m

9 3 m

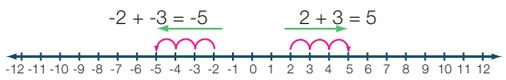
10 31 m

11 (a) negative five add negative six equals negative eleven

(b) positive seven subtract negative eight equals positive fifteen

(c) negative nine subtract negative fourteen equals positive five

12 (a)



(b) (i) $-1 - 6 = -7$ (ii) $-4 - 7 = -11$
(iii) $3 + 8 = 11$ (iv) $5 + 4 = 9$

(c) (i) -36 (ii) -55 (iii) -77 (iv) -94

13 (a) (i) 6 (ii) 18 (iii) -9 (iv) 3

(b) smaller; larger

Open-ended – Sample answers

14 Must be -22 or less; e.g. -25, -35, -28.

15 (a) The correct answer is -9, not -1.

(b) Max has moved in the wrong direction on the number line. To add a negative number, he needs to walk forwards, but in the negative direction.

Exercise 2.7 (p. 94)

1 (a) 7 (b) 3 (c) 11 (d) -2
(e) 2 (f) -12 (g) -11 (h) -10
(i) 9 (j) 6 (k) -2 (l) -4
(m) -1 (n) 6 (o) 12 (p) 2
(q) -10 (r) -12 (s) 5 (t) 4

2 (a) False (b) True (c) True (d) False

3 (a) -12 (b) -11 (c) 4 (d) 3
(e) -5 (f) -8 (g) -13 (h) -12
(i) -30 (j) -31 (k) 57 (l) 65

4 (a) C (b) B

5 (a) 6 (b) 7 (c) -7 (d) -4
(e) -6 (f) -8 (g) 4 (h) 1
(i) –12 (j) -11 (k) -9 (l) -9

6 -$150

7 (a) the 10th floor

(b) the 4th floor below the ground floor

(c) the 8th floor

8 -$350, a loss of $350

9 (a)

+	-6	+20	-14	31
+4	-2	+24	-10	35
-7	-13	+13	-21	24
+8	+2	+28	-6	39
-9	-15	+11	-23	22

(b)

–	8	-11	19	-25
3	5	-14	16	-28
-7	15	-4	26	-18
+5	3	-16	14	-30
-10	18	-1	29	-15

10 (a) 6

(b)

1	6	-1
0	2	4
5	-2	3

11 (a)

-3	2	-5
-4	-2	0
1	-6	-1

(b) -6
Each of the three digits in the row, column or diagonal has been reduced by 4. This means that the magic sum of the digits will be 12 less than the original magic sum.

Open-ended – Sample answers

12 (a)

Hole number	1	2	3	4	5	6	7	8	9	Total
Par for the hole	4	4	5	3	4	5	4	3	4	36
Shots taken	4	3	4	5	5	4	3	3	4	35
Score compared to par	0	-1	-1	+2	+1	-1	-1	0	0	-1

(b)

Hole number	1	2	3	4	5	6	7	8	9	Total
Par for the hole	4	4	5	3	4	5	4	3	4	36
Shots taken	3	6	4	4	5	3	3	4	3	35
Score compared to par	-1	+2	-1	+1	+1	-2	-1	+1	-1	-1

13 Ignoring the signs, the numbers will add to 31; e.g. -14 and 17, -10 and 21, 18 and -13

Challenge 2 (p. 97)

1 **(a)** 1, -3, -7 **(b)** -7, -1, 5

2 The twins are the youngest and have the same age. Look for three factors of 72 in which the smallest two are the same: $1 \times 1 \times 72$, $2 \times 2 \times 18$, $3 \times 3 \times 8$; $3 + 3 + 8 = 14$. ($6 \times 6 \times 2$ gives sum of 14, but twins are not the youngest.) The brothers are 3, 3 and 8 years old.

3 $172 \div 2 = 86$ (average of two numbers is the one in the middle) so the middle number is 86. Numbers are 85, 86, 87.

4 Consider factors of 150. $10 \times 15 = 150$,
$(10 - 4) \times (15 + 10) = 6 \times 25 = 150$, $(10 + 10) \times (15 - 4) = 220$;
$6 \times 25 = 150$, $(6 + 10) \times (25 - 4) = 336$, $(6 - 4) \times (25 + 10) = 70$.
Originally, there were 10 rows of 15 chairs.

5 11×0, $(10 + 10 + 1) \times 1$, $(10 + 10) \times$ each other digits.
Sum $= 0 + 21 + 20 \times (2 + 3 + 4 + 5 + 6 + 7 + 8 + 9)$
$= 21 + 20 \times 44$
$= 901$

6 The amount that each person raised has been counted twice.
$(\$130 + \$150 + \$100 + \$70 + \$90) \div 2 = \$540 \div 2 = \$270$

7 Numbers that give a remainder of 2 when divided by 4 are: 6, 10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50, 54, 58, 62, ...

Numbers that give a remainder of 3 when divided by 5 are: 8, 13, 18, 23, 28, 33, 38, 43, 48, 53, 58, 63, ...

Numbers that give a remainder of 4 when divided by 6 are: 10, 16, 22, 28, 34, 40, 46, 52, 58, 64, ...

Looking at the patterns, the first number to appear in all three is 58.

8 B

Prime: $11 \rightarrow 11$, $13 \rightarrow 31$, $17 \rightarrow 71$, $31 \rightarrow 13$, $37 \rightarrow 73$, $71 \rightarrow 17$, $73 \rightarrow 37$, $79 \rightarrow 97$, $97 \rightarrow 79$

Not prime: $19 \rightarrow 91$

Any primes in the 20s, 40s, 60s and 80s will give even numbers when reversed, so not prime.

Any primes in the 50s will give a number ending in 5 when reversed, so not prime.

9 **(a)** B $10, 15 \times 2 = 30$

(b) C $10, 15 \times 2 = 30, 20, 25 \times 4 = 100$

(c) D $10, 15 \times 2, 20, 25 \times 4 = 100, 30, 35 \times 2 = 70, 40, 45 \times 2 = 90, 50 \times 2 = 100, 55 \times 2 = 110$

(d) D $10, 15 \times 2, 20, 25 \times 4 = 100, 30, 35 \times 2, 40, 45 \times 2, 50 \times 2 = 100, 55 \times 2 = 110, 60, 65 \times 2 = 130, 70, 75 \times 4 = 300, 80, 85 \times 2 = 170, 90, 95 \times 2 = 190$

Chapter review 2 (p. 98)

1 **(a)** 18 **(b)** 36 **(c)** 30

2 **(a)** 1, 2, 3, 4, 6, 9, 12, 18, 36

(b) 1, 2, 3, 4, 6, 8, 12, 16, 24, 48

(c) 1, 3, 17, 51

(d) 1, 2, 4, 5, 10, 20, 25, 50, 100

3 **(a)** 8 **(b)** 18 **(c)** 5

4

5301	3, 9
10 000	2, 4, 5, 10
333 333	3, 9
31 700	2, 4, 5, 10
43 521 820	2, 4, 5, 10

5 **(a)** Prime, because it has exactly two factors, 1 and 5.

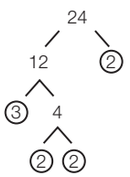
(b) Composite, because it has more than two factors; i.e. 1, 2, 4, 8, 16.

(c) Composite, because it has more than two factors; i.e. 1, 7, 11, 77.

(d) Composite, because it has more than two factors; e.g. 1, 10, 27 635, 276 350.

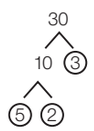
6 The factor trees can vary, but the factors on the last line should be the same, even though they may be in a different order.

(a)



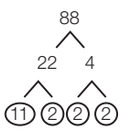
$24 = 2 \times 2 \times 2 \times 3$

(b)



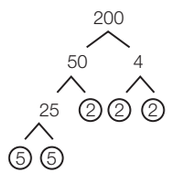
$30 = 2 \times 3 \times 5$

(c)



$88 = 2 \times 2 \times 2 \times 11$

(d)



$200 = 2 \times 2 \times 2 \times 5 \times 5$

7 **(a)** $27 = 3 \times 3 \times 3$
$36 = 2 \times 2 \times 3 \times 3$
HCF $= 3 \times 3$
$= 9$

(b) $72 = 2 \times 2 \times 2 \times 3 \times 3$
$96 = 2 \times 2 \times 2 \times 2 \times 2 \times 3$
HCF $= 2 \times 2 \times 2 \times 3$
$= 24$

(c) $108 = 2 \times 2 \times 3 \times 3 \times 3$
$240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5$
HCF $= 2 \times 2 \times 3$
$= 12$

8 (a) -14 (b) +200

9 (a) south 5 km (b) subtracting 27

10 (a) -52 < 25 (b) 19 > -20

11 (a) -9, -7, 0, 7, 12 (b) -4000, 4, 40, 400

12 (a) 18 (b) 15 (c) -10 (d) 6
(e) -4 (f) 8 (g) -5 (h) -32

13 (a) -3 (b) 3 (c) -7 (d) 0
(e) -7 (f) 2 (g) -3 (h) -12

14 (a) -2 (b) 7 (c) 11 (d) -4
(e) 37 (f) 14 (g) -11 (h) -3

15 (a) divisible, multiple (b) factor, multiple
(c) divisible, multiple

16 96 (1 packet), 48 (2 packets), 32 (3 packets), 24 (4 packets), 16 (6 packets), 12 (8 packets), 8 (12 packets), 6 (16 packets), 4 (24 packets), 3 (32 packets), 2 (48 packets), 1 (96 packets)

17 (a) -12 (b) -81 (c) -60 (d) -70

18 (a) Start at +3 and walk 8 steps to the left, finishing at -5.
(b) Start at -6 and walk 5 steps to the left, finishing at -11.

19 (a) coprime (b) not coprime, HCF = 3
(c) not coprime, HCF = 7 (d) coprime

20 2 runs

21 (a) HCF = 12, so 12 tables are required
(b) 9 females, 7 males

22 504

23 (a) 71 (b) 72

24 (a) decreased (b) $61

25 150 seconds

26 -900 + (-250) = -1150 m

27 (a) = (b) < (c) = (d) <

28 2 and 4

29 910 and 13

NAPLAN practice 2

1 C **2** B **3** 8th floor (-3 + 11 = 8)

4 B **5** A **6** D

7 $265 **8** B **9** -5

Mixed review A (p. 102)

1 -48, -25, -10, 0, 8, 17, 32

2 (a) 9^2 (b) 7^4 (c) 4^3

3 24, 48, 72, 96

4 (a) -570 (b) +5

5 (a) -27 < 14 (b) 0 > -35

6 (a) 40 (b) 300 (c) 500
(d) 3600 (e) 600 000 (f) 10 000 000

7 (a) 340 (b) 403 (c) 798
(d) 396 (e) 240 (f) 960

8 (a) 72 (b) 47 (c) 29
(d) 47 (e) 0 (f) 80

9 (a) -2 (b) -3 (c) 4 (d) -17

10 (a) 1800 (b) 15 000 (c) 60 000 (d) 100
(e) 40 (f) 2

11 (a) -15, -5, 0, 5, 10 (b) -300, -30, 0, 3, 3000

12 (a) 24 (b) 48

13 (a) 9 (b) 8

14 (a) 1, 2, 3, 6, 9, 18 composite
(b) 1, 23 prime
(c) 1, 2, 4, 11, 22, 44 composite
(d) 1, 79 prime

15 (a) $63 = 3^2 \times 7$ (b) $48 = 2^4 \times 3$
(c) $72 = 2^3 \times 3^2$ (d) $120 = 2^3 \times 3 \times 5$

16 (a) -6 – 7 = -13 (b) 4 + 11 = 15
(c) -2 + 7 = 5 (d) 22 – 9 = 13
(e) -5 + 10 = 5 (f) 18 + 3 = 21

17 -180 m

18 (a) 3, 7, 11, 19, 43, 13, 2 (b) 9, 16, 25
(c) 16, 32, 8, 2

19 216

20 (a) 12 000 (actual answer will be lower)
(b) 20 000 (actual answer will be higher)
(c) 100 (actual answer will be higher)

21 (a) 9000 (b) $108 000

22 (a) more (b) $5

23 B

Chapter 3

Recall 3 (p. 106)

1 (a), (b), (e)

2 (a) $\frac{1}{5}$ (b) $\frac{3}{8}$ (c) $2\frac{2}{5}$ or $\frac{12}{5}$ (d) $\frac{1}{10}$
(e) $\frac{5}{8}$ (f) $\frac{2}{3}$ (g) $\frac{12}{5}$ (h) $\frac{7}{16}$

3 (a) $2, 1\frac{1}{4}, 1, \frac{3}{4}, 0$ (b) $0, \frac{1}{8}, \frac{3}{8}, \frac{7}{8}, 1, \frac{9}{8}, \frac{11}{8}$

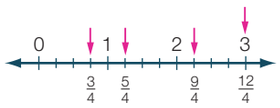
4 (a) $\frac{5}{7}$ (b) $\frac{6}{11}$ (c) $\frac{4}{3}$ or $1\frac{1}{3}$

5 (a) 8, 16, 24, 32, 40 (b) 12, 24, 36, 48, 60
(c) 24 (d) 1, 2, 3, 4, 6, 8, 12, 24
(e) 1, 2, 3, 4, 6, 9, 12, 18, 36 (f) 12

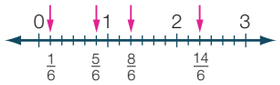
Exercise 3.1 (p. 111)

1 (a) 9 (b) 6

2 (a)



(b)



3 (a) (i) $\frac{10}{2}$ (ii) $\frac{35}{7}$ (iii) $\frac{55}{11}$ (iv) $\frac{25}{5}$ (v) $\frac{5}{1}$

(b) (i) $\frac{26}{2}$ (ii) $\frac{65}{5}$ (iii) $\frac{104}{8}$ (iv) $\frac{169}{13}$ (v) $\frac{13}{1}$

4 (a) (i) $\frac{1}{2}$ (ii) $\frac{2}{3}$ (iii) $\frac{6}{5}$ or $1\frac{1}{5}$ (iv) $\frac{10}{7}$ or $1\frac{3}{7}$

(b) (iii) and (iv)

5 (a) 4 (b) 12 (c) 2 (d) 10

6 (a) $\frac{5}{8}$ (b) $\frac{4}{9}$

7 (a) $\frac{1}{2}$ (b) $\frac{7}{9}$ (c) $\frac{11}{4}$ (or $2\frac{3}{4}$)

(d) $\frac{3}{5}$ (e) $\frac{3}{14}$ (f) $\frac{25}{8}$ (or $3\frac{1}{8}$)

(g) $\frac{7}{6}$ (or $1\frac{1}{6}$) (h) $\frac{5}{3}$ (or $1\frac{2}{3}$) (i) $\frac{19}{7}$ (or $2\frac{5}{7}$)

8 (a) $\frac{8}{17}$ (b) $\frac{15}{4}$ (c) $\frac{9}{20}$ (d) $2\frac{2}{3}$

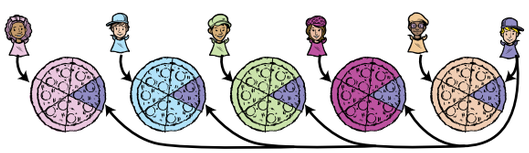
(e) $4\frac{1}{2}$ (f) $3\frac{7}{24}$

9 (a) $\frac{2}{7}$ (b) $\frac{1}{24}$ (c) $\frac{1}{60}$ (d) $\frac{17}{60}$

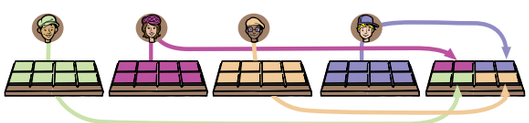
(e) $\frac{157}{375}$ (f) $\frac{421}{500}$

10 (a) $\frac{7}{14}$ or $\frac{1}{2}$ (b) $\frac{11}{14}$ (c) $\frac{10}{14}$ or $\frac{5}{7}$

11 (a)



(b)



12 (a) $\frac{149}{185}$ (b) $\frac{185}{149}$ or $1\frac{36}{149}$

13 (a) 32 km (b) Toby ate 12 lollies. 18 lollies in bag.

14 Boys: $\frac{4}{5}$ of a pizza each. Girls: $\frac{5}{4}$ of a pizza each ($1\frac{1}{4}$).
Girls each receive more pizza.

15 (a) $\frac{1}{4}$

(b) Not possible—not divided into equal parts and unable to create equal parts by further dividing shape up.

(c) $\frac{1}{2}$ (d) $\frac{3}{8}$

(e) Not possible—same reason as (b). (f) $\frac{1}{2}$

16 D **17** C

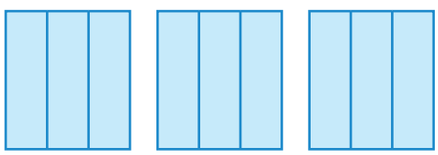
18 5 whole numbers: 1, 2, 3, 4, 5

Open-ended – Sample answers

19 (a) $\frac{3}{8}$ of the shape is shaded

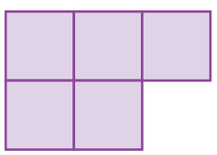
(b) $\frac{5}{6}$ of the collection of stars is shaded.

(c) $\frac{9}{3}$

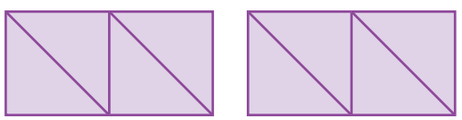


20 (a)

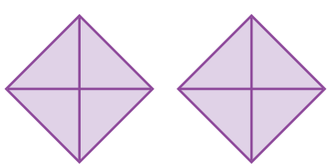
Or



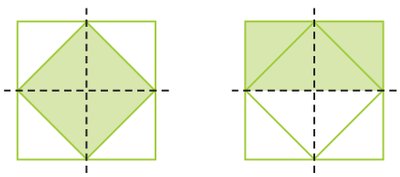
(b)



Or



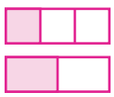
21



Drawing in a vertical and a horizontal line divides the square into quarters and shows that half of each quarter is shaded. We can rearrange things so that it is more obvious that half the square is shaded.

22 **(a)** Oliver's shaded areas (representing the fractions $\frac{1}{2}$ and $\frac{1}{3}$) look the same because he is not comparing fractions of the same-sized whole.

(b)



$\frac{1}{3}$

$\frac{1}{2}$

Exercise 3.2 (p. 120)

1 **(a)** 15 **(b)** 21 **(c)** 26 **(d)** 40

(e) 2 **(f)** 3 **(g)** 10 **(h)** 63

(i) 36 **(j)** 3 **(k)** 6 **(l)** 18

(m) 5 **(n)** 6 **(o)** 36 **(p)** 16

2 **(a)** $\frac{1}{2}$ **(b)** $\frac{1}{3}$ **(c)** $\frac{1}{4}$

(d) $\frac{1}{3}$ **(e)** $\frac{2}{5}$ **(f)** $\frac{4}{11}$

(g) $\frac{5}{8}$ **(h)** $1\frac{1}{2}$ or $\frac{3}{2}$ **(i)** $2\frac{2}{3}$ or $\frac{8}{3}$

(j) $3\frac{1}{6}$ or $\frac{19}{6}$ **(k)** $1\frac{3}{10}$ or $\frac{13}{10}$ **(l)** $12\frac{4}{5}$ or $\frac{64}{5}$

(m) $6\frac{4}{9}$ or $\frac{58}{9}$ **(n)** $3\frac{1}{4}$ or $\frac{13}{4}$ **(o)** $2\frac{5}{6}$ or $\frac{17}{6}$

(p) $100\frac{1}{7}$ or $\frac{701}{7}$

3 **(a)** $1\frac{2}{5}$ **(b)** $2\frac{1}{6}$ **(c)** $5\frac{3}{4}$ **(d)** $2\frac{1}{7}$

(e) $3\frac{7}{10}$ **(f)** $9\frac{3}{5}$ **(g)** $6\frac{2}{7}$ **(h)** $5\frac{9}{10}$

(i) $8\frac{5}{9}$ **(j)** $7\frac{7}{12}$ **(k)** $1\frac{7}{100}$ **(l)** $2\frac{17}{40}$

4 **(a)** $\frac{7}{4}$ **(b)** $\frac{16}{5}$ **(c)** $\frac{20}{3}$ **(d)** $\frac{59}{10}$

(e) $\frac{35}{8}$ **(f)** $\frac{51}{11}$ **(g)** $\frac{72}{7}$ **(h)** $\frac{74}{11}$

(i) $\frac{77}{12}$ **(j)** $\frac{309}{100}$ **(k)** $\frac{62}{9}$ **(l)** $\frac{79}{9}$

5 **(a)** C **(b)** D **(c)** C **(d)** B

6 **(a)** $\frac{6}{10}$ **(b)** $\frac{1}{4}$ and $\frac{3}{12}$ **(c)** $\frac{10}{12}$ **(d)** $\frac{3}{4}$ and $\frac{6}{8}$

7 **(a)** $\frac{1}{4}$, $\frac{1}{2}$

(b)

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

$\frac{1}{2} = \frac{3}{6}$

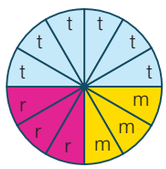
8 **(a)** They occupy the same position on the number line.

(b)

$\frac{1}{3}$ and $\frac{3}{9}$, $\frac{2}{3}$ and $\frac{6}{9}$, $\frac{3}{3}$ and $\frac{9}{9}$, $\frac{4}{3}$ and $\frac{12}{9}$, $\frac{5}{3}$ and $\frac{15}{9}$,

$\frac{6}{3}$ and $\frac{18}{9}$, $\frac{7}{3}$ and $\frac{21}{9}$, $\frac{8}{3}$ and $\frac{24}{9}$, $\frac{9}{3}$ and $\frac{27}{9}$

9 Monica 3, Michelle 3, Travis 6



10 35 slices

11 14 squares

12 40 squares, $\frac{5}{8} = \frac{40}{64}$

13 **(a)** $\frac{1}{30}$ **(b)** $\frac{1}{3}$ **(c)** $\frac{1}{5}$ **(d)** $\frac{3}{20}$

14 $\frac{1}{2}$ = 30 minutes, $\frac{1}{3}$ = 20 minutes, $\frac{1}{4}$ = 15 minutes,

$\frac{1}{5}$ = 12 minutes, $\frac{1}{6}$ = 10 minutes, $\frac{1}{7} = 8\frac{4}{7}$ minutes,

$\frac{1}{8} = 7\frac{1}{2}$ minutes, $\frac{1}{9} = 6\frac{2}{3}$ minutes, $\frac{1}{10}$ = 6 minutes,

$\frac{1}{11} = 5\frac{5}{11}$ minutes, $\frac{1}{12}$ = 5 minutes

15 4 whole numbers: 2, 3, 4, 5

16 C

17 $\frac{1}{7}$ and $\frac{1}{11}$ have no equivalent fractions on the wall. This is because their denominators are prime numbers with no multiples in the other denominators on the fraction wall.

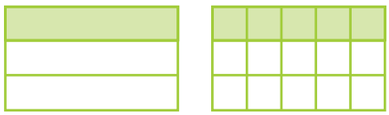
18 **(a)** $\frac{1}{2}$ **(b)** $\frac{1}{2}$ **(c)** $\frac{3}{8}$ **(d)** $\frac{13}{20}$ **(e)** $\frac{7}{18}$ **(f)** $\frac{9}{22}$

Open-ended – Sample answers

19 $\frac{8}{10}$, $\frac{12}{15}$, $\frac{16}{20}$ etc.

20 $\frac{5}{3}$, $\frac{15}{9}$, $\frac{10}{6}$ etc.

21 (a)



(b)

22 $\frac{3}{7}$, $\frac{7}{9}$ and $\frac{5}{11}$

Exercise 3.3 (p. 127)

1 (a) $\frac{3}{5}$ (b) $\frac{5}{4}$ (c) $\frac{7}{8}$ (d) $\frac{7}{12}$

(e) $\frac{5}{7}$ (f) $\frac{2}{9}$ (g) $\frac{5}{12}$ (h) $\frac{11}{6}$

(i) $1\frac{3}{4}$ (j) $\frac{5}{2}$ (k) $\frac{16}{7}$ (l) $2\frac{4}{9}$

2 (a) $\frac{3}{7}$ (b) $\frac{7}{8}$ (c) $\frac{5}{6}$ (d) $\frac{2}{5}$

(e) equivalent fractions (f) $\frac{5}{11}$ (g) $\frac{7}{8}$ (h) $\frac{7}{11}$

3 (a) $\frac{2}{7} < \frac{5}{7}$ (b) $\frac{4}{5} > \frac{4}{7}$ (c) $\frac{1}{2} < \frac{5}{8}$ (d) $\frac{8}{11} < \frac{9}{10}$

(e) $\frac{2}{4} = \frac{3}{6}$ (f) $\frac{6}{12} < \frac{7}{10}$ (g) $\frac{3}{7} < \frac{5}{8}$ (h) $\frac{5}{9} > \frac{2}{5}$

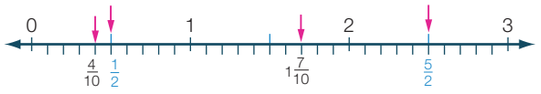
(i) $\frac{5}{6} < \frac{7}{8}$ (j) $\frac{7}{11} < \frac{8}{10}$ (k) $\frac{6}{10} = \frac{3}{5}$ (l) $\frac{4}{5} > \frac{6}{9}$

(m) $\frac{2}{4} < \frac{4}{2}$ (n) $\frac{24}{6} = \frac{8}{2}$ (o) $\frac{18}{11} < \frac{9}{5}$ (p) $\frac{9}{7} > \frac{11}{9}$

4 (a)

In ascending order: $\frac{2}{3}$, $\frac{3}{4}$, $1\frac{1}{3}$, $\frac{6}{4}$

(b)



In descending order: $\frac{5}{2}$, $1\frac{7}{10}$, $\frac{1}{2}$, $\frac{4}{10}$

5 $\frac{7}{8} > \frac{10}{12}$

Ali is the more accurate shooter.

6 $\frac{5}{16} < \frac{23}{64}$

The larger box has the greater fraction of nut chocolates.

7 (a) $\frac{10}{11}$ (b) $\frac{2}{3}$, $\frac{4}{6}$, $\frac{6}{9}$, $\frac{7}{11}$ and $\frac{8}{12}$

(c) $\frac{2}{5}$, $\frac{3}{7}$, $\frac{4}{10}$ and $\frac{5}{12}$ (d) $\frac{1}{5}$, $\frac{2}{10}$, $\frac{2}{9}$, $\frac{1}{4}$, $\frac{2}{8}$ and $\frac{3}{12}$

8 (a) Arrow B (b) Arrow C

9 (a) C (b) C

10 (a) $\frac{1}{2}$, $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$, $\frac{10}{11}$

All of the fractions have a numerator that is 1 less than the denominator—they are '1 piece' less than 1 whole. Higher denominator numbers mean that the whole is being cut into more, smaller-sized pieces. This means that the 'missing pieces' that make the fraction less than 1 are getting smaller.

(b) 0, $\frac{4}{7}$, $\frac{6}{7}$, $\frac{7}{8}$, 1, $\frac{7}{4}$

$\frac{7}{4}$ is the only improper fraction and so is greater than 1. All of the other fractions are less than 1, but greater than 0. $\frac{4}{7}$ and $\frac{6}{7}$ have the same denominator, so it is clear that $\frac{6}{7}$ is larger. $\frac{7}{8}$ is greater than $\frac{6}{7}$ for the same reasons described in (a). (Alternatively, they can be converted to fractions with an LCD of 56: $\frac{49}{56} > \frac{48}{56}$.)

11 (a) 1, $\frac{45}{63}$, $\frac{2}{3}$, $\frac{4}{7}$, $\frac{11}{21}$, $\frac{2}{9}$

All of the fractions are proper fractions, so they are all less than 1. They also all have an LCD of 63. Converting them to equivalent fractions with this LCD gives:

$1 > \frac{45}{63} > \frac{42}{63} > \frac{36}{63} > \frac{33}{63} > \frac{14}{63}$.

(b) $1\frac{7}{20}$, $\frac{21}{16}$, $1\frac{3}{10}$, $\frac{5}{4}$, $1\frac{3}{80}$, $\frac{39}{40}$

Converting all to equivalent fractions with an LCD of 80 gives:

$\frac{108}{80} > \frac{105}{80} > \frac{104}{80} > \frac{100}{80} > \frac{83}{80} > \frac{78}{80}$.

12 (a) approximately $\frac{3}{4}$

(b) Queensland takes up approximately $\frac{1}{5}$ of the area of Australia.

(c) approximately $\frac{2}{3}$

13 (a) same (b) same (c) B

(d) A (e) B (f) same

14 (a) Angus has drunk more cola.

(b) Gianni has drunk a greater fraction ($\frac{5}{6}$ to $\frac{4}{5}$).

Opened-ended – Sample answers

15 (a) $\frac{4}{5}$, $\frac{5}{6}$ (b) $\frac{5}{2}$, $\frac{11}{4}$

16 $\frac{7}{10}$, $\frac{3}{4}$, $\frac{5}{7}$

17 Jason is comparing fractions of different wholes (different numbers of marks). To do this, he needs to rewrite them out of the same total by finding equivalent fractions with the LCD. $\frac{16}{20} = \frac{80}{100}$, $\frac{43}{50} = \frac{86}{100}$, so $\frac{43}{50}$ is his better result.

Exercise 3.4 (p. 137)

1 (a) $\frac{1}{2}$ (b) $\frac{1}{20}$ (c) $\frac{9}{20}$

(d) $\frac{14}{55}$ (e) $\frac{7}{6}$ or $1\frac{1}{6}$ (f) $\frac{50}{49}$ or $1\frac{1}{49}$

(g) $\frac{5}{4}$ or $1\frac{1}{4}$ (h) $\frac{19}{20}$ (i) $\frac{1}{12}$

(j) $\frac{47}{36}$ or $1\frac{11}{36}$ (k) $\frac{25}{42}$ (l) $\frac{13}{12}$ or $1\frac{1}{12}$

(m) $\frac{73}{60}$ or $1\frac{13}{60}$ (n) $\frac{5}{12}$ (o) $\frac{87}{70}$ or $1\frac{17}{70}$

(p) $\frac{3}{10}$

2 (a) $1\frac{1}{6}$ (b) $\frac{25}{28}$

3 (a) $7\frac{3}{7}$ (b) $13\frac{2}{3}$ (c) $9\frac{5}{8}$ (d) $7\frac{9}{10}$

(e) $3\frac{1}{4}$ (f) $6\frac{1}{10}$ (g) $7\frac{1}{4}$ (h) $9\frac{1}{4}$

(i) $12\frac{3}{10}$ (j) $11\frac{1}{18}$ (k) $4\frac{42}{55}$ (l) $3\frac{31}{100}$

4 (a) $1\frac{4}{7}$ (b) $\frac{2}{3}$ (c) $4\frac{4}{9}$ (d) $1\frac{2}{3}$

(e) $1\frac{1}{4}$ (f) $2\frac{1}{2}$ (g) $1\frac{3}{10}$ (h) $1\frac{8}{9}$

(i) $\frac{17}{18}$ (j) $\frac{17}{20}$ (k) $\frac{23}{24}$ (l) $2\frac{11}{24}$

5 (a) $\frac{7}{8}$ (b) $\frac{11}{12}$ (c) 1

(d) $\frac{21}{5}$ or $4\frac{1}{5}$ (e) $\frac{401}{60}$ or $6\frac{41}{60}$ (f) $\frac{127}{60}$ or $2\frac{7}{60}$

6 (a) B (b) D

7 (a) $\frac{1}{2}$ (b) $\frac{3}{4}$

8 $\frac{3}{4}$ of the pizza

9 $\frac{1}{4}$

10 $10\frac{1}{12}$ hours

11 $\frac{3}{4}$ of a packet

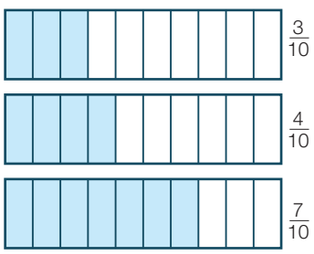
12 B 13 D

Open-ended – Sample answers

14 The correct answer is 2, as both fractions are slightly less than 1. Students answering 19 or 21 have just added the numerators or denominators.

15 $\frac{11}{40}$ and $\frac{19}{40}$

16 We add the numerators because we are 'counting up' how many equal-sized parts we have. Adding the denominators would change the part size.



17 Teachers use fraction notation just as a way of keeping track of marks for different sections of the test. The 'whole' is the total number of marks, and the number of correct answers is written as a fraction of that whole.

Half-time 3 (p. 141)

1 (a) $\frac{7}{15}$ (b) 6

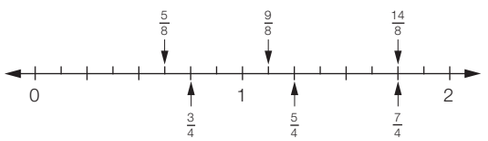
2 (a) $\frac{3}{8}$ (b) $\frac{1}{4}$

(c) $3\frac{3}{4}$ or $\frac{15}{4}$ (d) $7\frac{7}{10}$ or $\frac{77}{10}$

3 (a) $6\frac{3}{4}$ (b) 5 (c) 5 (d) $5\frac{2}{7}$

4 (a) $\frac{5}{8} < \frac{2}{3}$ (b) $\frac{4}{9} < \frac{15}{27}$ (c) $\frac{48}{56} = \frac{6}{7}$ (d) $\frac{11}{5} < \frac{9}{4}$

5 (a)

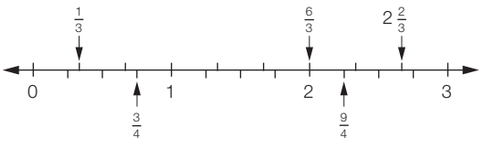


(b) $\frac{1}{4}$ and $\frac{2}{8}$, $\frac{2}{4}$ and $\frac{4}{8}$, $\frac{3}{4}$ and $\frac{6}{8}$, $\frac{5}{4}$ and $\frac{10}{8}$, $\frac{6}{4}$ and $\frac{12}{8}$

(c) (i) $\frac{5}{4}$ (ii) $\frac{7}{4}$

6 (a) $\frac{9}{8}$ or $1\frac{1}{8}$ (b) $\frac{1}{6}$ (c) $\frac{29}{18}$ or $1\frac{11}{18}$ (d) $\frac{7}{36}$

7



In ascending order: $\frac{1}{3}, \frac{3}{4}, \frac{6}{3}, \frac{9}{4}, 2\frac{2}{3}$

8 (a) 29 slices (b) 21 slices

9 (a) $\frac{281}{60}$ or $4\frac{41}{60}$ (b) $\frac{429}{100}$ or $4\frac{29}{100}$

(c) $\frac{81}{50}$ or $1\frac{31}{50}$ (d) $\frac{79}{50}$ or $1\frac{29}{50}$

10 (a) $\frac{5}{2}$ of $2\frac{1}{2}$ L (b) $1\frac{3}{4}$ L

Exercise 3.5 (p. 149)

1 (a) 6 (b) 3 (c) 3 (d) 4

(e) 21 (f) 24 (g) 48 (h) 27

(i) 30 (j) 120 (k) 55 (l) 75

2 (a) $\frac{1}{13}$ (b) $\frac{1}{9}$ (c) $\frac{4}{9}$ (d) $\frac{3}{13}$

(e) $\frac{1}{14}$ (f) $\frac{6}{11}$ (g) $\frac{5}{14}$ (h) $\frac{5}{66}$

(i) $\frac{9}{28}$ (j) $\frac{3}{4}$ (k) $\frac{8}{21}$ (l) $\frac{27}{250}$

3 (a) $\frac{2}{3}$ (b) 6 (c) $1\frac{1}{4}$ (d) $1\frac{1}{4}$

(e) $11\frac{1}{2}$ (f) 14 (g) 27 (h) $40\frac{2}{3}$

(i) 2 (j) $11\frac{1}{5}$ (k) 18 (l) 4

4 (a) $\frac{3}{20}$ (b) $\frac{2}{45}$ (c) $\frac{5}{14}$

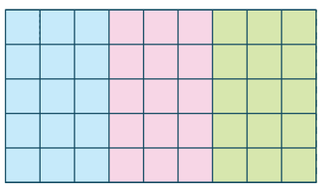
(d) $\frac{10}{13}$ (e) $\frac{7}{6}$ or $1\frac{1}{6}$ (f) $\frac{4}{3}$ or $1\frac{1}{3}$

5 (a) C (b) A

6 (a) $\frac{1}{7}$ (b) $310

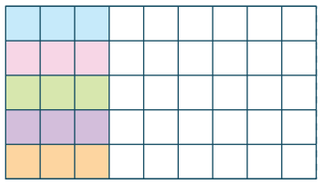
7 Michael $10 000, Marcus $4000, Lily $18 000, Julie $16 000

8 (a) 15



(b) (i) 3 (ii) $\frac{1}{15}$

(iii)



9 $\frac{1}{8}$ each

10 (a) $\frac{3}{20}$ (b) $\frac{1}{5}\times\frac{3}{4}$ or $\frac{3}{4}\times\frac{1}{5}$

11 (a) 13 L (b) 39 L

12 (a) 50 students (b) 40 students

13 450 g butter, $1\frac{1}{4}$ cups icing sugar, $3\frac{1}{8}$ cups self-raising flour, $\frac{5}{6}$ cup custard powder

14 $1\frac{1}{2}\times 12$

15 D

16 D

Open-ended – Sample answers

17 $\frac{1}{2}\times\frac{1}{3}$

18 The six possible answers are $\frac{1}{2}\times 30 = 15$, $\frac{1}{2}\times 32 = 16$, $\frac{1}{3}\times 30 = 10$, $\frac{1}{3}\times 33 = 11$, $\frac{1}{3}\times 36 = 12$, $\frac{1}{3}\times 39 = 13$.

19 Asher has cancelled out common factors between the two numerators. Common factors can only be cancelled between numerators and denominators. Correct working:

$$\frac{3}{1\cancel{5}}\times\frac{\overset{12}{\cancel{60}}}{1}=\frac{36}{1}=36$$

Exercise 3.6 (p. 157)

1 (a) 24 (b) 12 (c) 21

(d) 36 (e) 18 (f) 5

(g) $\frac{35}{3}$ or $11\frac{2}{3}$ (h) $\frac{63}{4}$ or $15\frac{3}{4}$ (i) $\frac{16}{3}$ or $5\frac{1}{3}$

(j) 3 (k) $\frac{15}{8}$ or $1\frac{7}{8}$ (l) $\frac{4}{3}$ or $1\frac{1}{3}$

2 (a) 2 (b) $\frac{3}{2}$ or $1\frac{1}{2}$ (c) $\frac{9}{8}$ or $1\frac{1}{8}$

(d) $\frac{7}{5}$ or $1\frac{2}{5}$ (e) $\frac{1}{6}$ (f) $\frac{1}{20}$

(g) $\frac{1}{4}$ (h) $\frac{3}{20}$ (i) $\frac{9}{16}$

(j) $\frac{14}{25}$ (k) $\frac{36}{85}$ (l) $\frac{27}{80}$

(m) 2 (n) $\frac{44}{43}$ or $1\frac{1}{43}$ (o) $\frac{15}{4}$ or $3\frac{3}{4}$

(p) $1\frac{5}{7}$

3 (a) C (b) D

4 (a) 2, 2 (b) 6, 6 (c) 4, 4 (d) 8, 8

5 D **6** 6 students

7 12 whole shifts **8** 30 batches of scones

9 5 drinks stations **10** 5 complete screenings

11 C **12** $\frac{4}{5}\div\frac{1}{3}$

13 **(a)** As the denominator number gets larger, the part size gets smaller, so you can fit more of the fraction into the number being divided.

(b) $13\frac{1}{3}$

Open-ended – Sample answers

14 $4 \div \frac{2}{5} = 10$, $4 \div \frac{2}{6} = 12$, $4 \div \frac{2}{7} = 14$, $4 \div \frac{2}{8} = 16$, $4 \div \frac{2}{9} = 18$

15 Gabi has not multiplied by the inverse. 12 is a reasonable answer because she is dividing by a number less than 1.

Exercise 3.7 (p. 163)

1 **(a)** $\frac{9}{4}$ or $2\frac{1}{4}$ **(b)** $\frac{39}{8}$ or $4\frac{7}{8}$ **(c)** $\frac{5}{99}$

(d) $\frac{3}{16}$ **(e)** $\frac{5}{16}$ **(f)** $\frac{11}{18}$

(g) $4\frac{3}{4}$ or $\frac{19}{4}$ **(h)** $3\frac{3}{8}$ or $\frac{27}{8}$ **(i)** $2\frac{13}{20}$ or $\frac{53}{20}$

(j) 1 **(k)** 4 **(l)** $\frac{2}{3}$

2 **(a)** A **(b)** A

3 **(a)** $\frac{41}{12}$ or $3\frac{5}{12}$ **(b)** $\frac{53}{30}$ or $1\frac{23}{30}$ **(c)** $\frac{17}{5}$ or $3\frac{2}{5}$ **(d)** 30

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

(e) 90 **(f)** 36

5 **(a)** $\frac{1}{75}$ **(b)** 75 **(c)** $\frac{2}{25}$ **(d)** 150 m **(e)** 1125 m

6 $\frac{97}{12}$ or $8\frac{1}{12}$ laps

7 **(a)** $\frac{11}{8}$ or $1\frac{3}{8}$ km **(b)** $\frac{95}{24}$ or $3\frac{23}{24}$ km **(c)** $\frac{32}{3}$ or $10\frac{2}{3}$ km

8 $7\frac{3}{4}$ hours or $\frac{31}{4}$ hours

9 Bryce

10 cutlery set

11 $\frac{63}{64}$

12 **(a)** $\frac{1}{2}$ of $\frac{1}{2}$ of $\frac{1}{2} = \frac{1}{8}$ **(b)** $13 \times 8 = 104$

Open-ended – Sample answers

13 $\frac{5}{8}, \frac{3}{4}, \frac{2}{3}$

14 **(a)** $\frac{2+1}{2-1} = \frac{3}{1} = 3$, $\frac{3+2}{3-2} = \frac{5}{1} = 5$, $\frac{4+1}{4-1} = \frac{5}{3}$ or $1\frac{2}{3}$ etc.

(b) 17 (when $A = 9$ and $B = 8$)

15 **(a)** $\frac{7}{3} + \frac{7}{4} = \frac{7}{3} \times \frac{7}{4} = \frac{49}{12}$ or $4\frac{1}{12}$

(b) $\frac{5}{3} + \frac{5}{2} = \frac{5}{3} \times \frac{5}{2} = \frac{25}{6}$ or $4\frac{1}{6}$

(c) The numerators are the sum of the denominators.

(d) Anything that obeys the statement in **(c)**;
e.g. $\frac{9}{4}$ and $\frac{9}{5}$, $\frac{11}{5}$ and $\frac{11}{6}$

Challenge 3 (p. 167)

1 C

Find number first, then find required fraction.

2 720 L

Fraction given equals volume given. Dividing by the fraction gives total volume.

3 A

Write fractions with lowest common denominator.

4 C

List all the possible fractions, remembering that they must already be in simplest form. Subtract the smallest fraction from the second list from the largest fraction from the first list and simplify.

5 B

Same method as in Q3 but remember to simplify fraction at the end.

6 1.20 p.m.

Divide each time into 60 minutes—realise that they both croak on the hour every hour. By listing or otherwise, find times after the hour that the frogs croak. This will give the first time they both croak together.

7 C

Rewrite the fraction doing the addition in the denominator. Then, do the division, then add.

8 $\frac{33}{109}$

Simplify each fraction step by step starting with the $3 + \frac{1}{3}$ fraction. Divide, then repeat the process of adding, then dividing until a single fraction remains.

9 36

Subtract $\frac{1}{3}$ of the number from 2 times the number.
This gives the fraction of the number equal to the amount.
Divide this fraction into the amount to find the whole.

10 $\frac{13}{96}, \frac{7}{48}, \frac{5}{32}$

Find the middle number using the method in Q3. Now, find the middle number between this number and the given numbers by finding equivalent fractions. Don't forget to write the fraction found in simplest form.

11 \$100

Cancelling common factors gives:

$$\frac{1}{\cancel{2}_1} \times \frac{\cancel{2}^1}{\cancel{3}_1} \times \frac{\cancel{3}^1}{\cancel{4}_1} \times \frac{\cancel{4}^1}{\cancel{5}_1} \times \frac{\cancel{5}^1}{\cancel{6}_1} \times \frac{\cancel{6}^1}{\cancel{7}_1} \times \frac{\cancel{7}^1}{\cancel{8}_1} \times \frac{\cancel{8}^1}{\cancel{9}_1} \times \frac{\cancel{9}^1}{10} \times \$1000$$

$$= \frac{1}{10} \times \$1000$$

$$= \$100$$

Chapter review 3 (p. 168)

1 (a) 16 (b) $\frac{5}{12}$

2 $\frac{3}{4}, \frac{5}{4}\left(\text{or } 1\frac{1}{4}\right)$

3 (a) (i) $\frac{18}{3}$ (ii) $\frac{60}{10}$ (iii) $\frac{6}{1}$

(b) (i) $\frac{33}{3}$ (ii) $\frac{110}{10}$ (iii) $\frac{11}{1}$

4 (a) $\frac{3}{5}$ (b) $1\frac{3}{4}$

5 (a) 42 (b) 4 (c) 90 (d) 30

6 (a) $\frac{4}{5}$ (b) $\frac{12}{5}$ or $2\frac{2}{5}$

(c) $3\frac{5}{6}$ or $\frac{23}{6}$ (d) $1\frac{1}{5}$ or $\frac{6}{5}$

7 (a) $\frac{23}{7}$ (b) $5\frac{5}{9}$

8 (a) < (b) = (c) > (d) <

9 (a) $\frac{31}{24}$ or $1\frac{7}{24}$ (b) $\frac{1}{6}$

(c) $\frac{8}{21}$ (d) $\frac{13}{15}$

10 (a) $1\frac{13}{20}$ (b) $8\frac{1}{6}$

(c) $\frac{37}{7}$ or $5\frac{2}{7}$ (d) $\frac{1}{6}$

11 (a) \$12 (b) $\frac{1}{6}$

12 (a) $\frac{5}{3}$ or $1\frac{2}{3}$ (b) $\frac{110}{9}$ or $12\frac{2}{9}$ (c) $\frac{3}{7}$

13 (a) 12 (b) $6\frac{9}{23}$ (c) $\frac{9}{16}$ (d) $\frac{39}{40}$

14 (a) $5\frac{17}{18}$ (b) $4\frac{9}{10}$ (c) $3\frac{9}{32}$

15 (a) $\frac{1}{2} + \frac{2}{5}$ (b) $\frac{9}{10}$

16 (a) $\frac{1}{3}$ (b) $2\frac{1}{6}$ or $\frac{13}{6}$ (c) $1\frac{1}{3}$ or $\frac{4}{3}$ (d) $\frac{3}{8}$

17 (a) $\frac{5}{9}$ (b) $\frac{2}{9}$ (c) $\frac{19}{27}$

18 (a) $\frac{1}{3}, \frac{1}{2}, \frac{3}{5}, \frac{3}{4}, 1$ (b) $\frac{30}{50}, \frac{5}{4}, 1\frac{2}{5}, 2, \frac{13}{5}$

19 Jamal

20 (a) $\frac{4}{15}$

(b) $\frac{16}{15}$ or $1\frac{1}{15}$ = more than a whole block of chocolate

21 $\frac{5}{6}$

22 (a) 30 000 L (b) 50 000 L (c) 12 000 L

23 45 g butter, $\frac{1}{6}$ cup castor sugar, 1 egg, $\frac{7}{16}$ cup self-raising flour, $\frac{1}{2}$ tablespoon cocoa, $\frac{1}{8}$ cup orange juice

24 (a) $\frac{1}{3}$ (b) $\frac{1}{4}$ (c) $\frac{3}{8}$

25 (a) Katya (6 km) (b) Mabok

26 A

NAPLAN practice 3

1 D **2** B **3** A **4** B

5 B **6** C **7** D **8** D

Chapter 4

Recall 4 (p. 174)

1 (a) $0.1 > 0.01$ (b) $2 < 2.2$ (c) $0.3 > 0.1$

(d) $3.2 < 4.1$ (e) $0.008 < 0.09$ (f) $0.7 > 0.07$

2 (a) seven tens and two ones

(b) six hundreds and three ones

(c) nine thousands, two hundreds, five tens and one one

(d) one ten-thousand, one thousand and eight tens

3 (a) (i) seven tenths (ii) 0.7

(b) (i) eight thousandths (ii) 0.008

(c) (i) three hundredths (ii) 0.03

(d) (i) one and nine tenths (ii) 1.9

4 (a) 110 (b) 1535 (c) 479 (d) 6499

5 (a) 49 (b) 447 (c) 7905 (d) 1648

6 (a) 34 (b) 2400 (c) 144 (d) 40 800

7 (a) 181 (b) 1051 (c) 28 (d) 150

8 (a) 7000 (b) 120 000 (c) 9 200 000 (d) 8

(e) 36 (f) 250 (g) 12 (h) 630

(i) 42.7 (j) 5.8 (k) 9.01 (l) 0.0762

9 (a) $\frac{1}{2}$ (b) $\frac{1}{10}$ (c) $\frac{1}{4}$ (d) $\frac{1}{5}$ (e) $\frac{1}{100}$ (f) $\frac{3}{5}$

Exercise 4.1 (p. 180)

1 **(a)** **(i)** 45.462 **(ii)** 12.519 372 **(iii)** 3.7985
(iv) 1.008 332 **(v)** 0.786 06 **(vi)** 7.033 047

(b) **(i)** $6 + \frac{6}{10} + \frac{3}{100}$

(ii) $\frac{9}{10} + \frac{2}{100} + \frac{1}{1000}$

(iii) $\frac{7}{10} + \frac{3}{100} + \frac{4}{1000} + \frac{5}{10\,000}$

(iv) $7 + \frac{8}{10} + \frac{2}{100} + \frac{6}{1000}$

(v) $23 + \frac{9}{10} + \frac{1}{100} + \frac{3}{1000} + \frac{4}{100\,000}$

(vi) $45 + \frac{4}{1000} + \frac{5}{10\,000} + \frac{8}{100\,000} + \frac{9}{1\,000\,000}$

2 **(a)** **(i)** 6.5 **(ii)** 0.97 **(iii)** 0.273
(iv) 37.4201 **(v)** 14.957 623 **(vi)** 700.004 59

(b) **(i)** five ones and two tenths
(ii) four ones and nine tenths
(iii) three tens, four ones, one tenth and seven hundredths
(iv) six tenths and one hundredth
(v) two ones, seven tenths, nine hundredths and four thousandths
(vi) seven ones, five tenths, nine thousandths and two ten-thousandths
(vii) three tens, five ones, eight tenths, six hundredths, five thousandths, four ten-thousandths and three hundred-thousandths
(viii) eight tenths, two hundredths, two hundred-thousandths and seven millionths

3 **(a)** **(i)** $\frac{2}{1000}$ **(ii)** $\frac{2}{100\,000}$ **(iii)** $\frac{2}{10}$ **(iv)** 2

(b) **(i)** seven tenths **(ii)** seven thousandths
(iii) seven ten-thousandths **(iv)** seven millionths

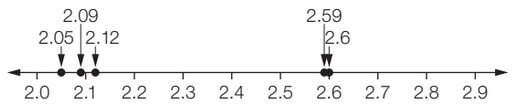
4 **(a)** $2.4 > 0.42$ **(b)** $2.32 > 1.955$
(c) $0.65 > 0.57$ **(d)** $0.3003 < 0.333$
(e) $4.7038 < 4.7312$ **(f)** $8.251 > 8.2501$
(g) $7.02 > 7.002$ **(h)** $4.7367 < 4.7376$
(i) $0.927 < 0.927\,34$ **(j)** $6.013 > 6.01$
(k) $3.406 < 3.4063$ **(l)** $0.9995 > 0.9986$

5 **(a)** False **(b)** False **(c)** False **(d)** False
(e) True **(f)** False **(g)** True **(h)** False

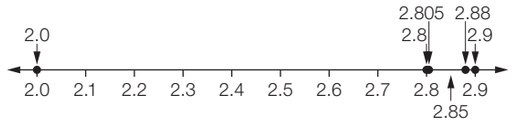
6 B

7 B

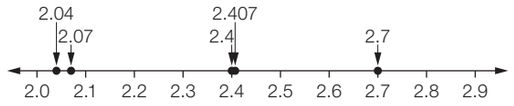
8 **(a)**



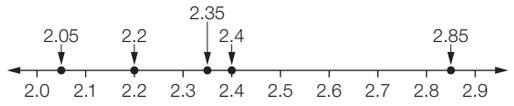
(b)



(c)



(d)

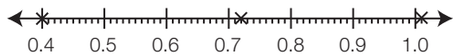


9 **(a)** 2.03, 2.13, 2.3 **(b)** 8.007, 8.67, 8.7
(c) 6.64, 6.6403, 6.646 **(d)** 0.0095, 0.0509, 0.0905
(e) 5.003 821, 5.3281, 5.38 **(f)** 3.116, 3.616, 3.661
(g) 0.092, 0.29, 0.92 **(h)** 0.086, 0.815, 0.85

10 37.901

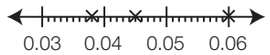
11 **(a)** $\frac{4}{10} + \frac{3}{100} + \frac{7}{1000}$ **(b)** $\frac{437}{1000}$

12 **(a)**

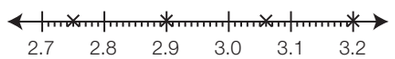


(b)

(c)



(d)



13 **(a)** 13.08 seconds **(b)** 13.95 seconds

14 25.6 m

15 **(a)** **(i)** 20.2 **(ii)** 21 **(iii)** 21.5
(b) 3.75 **(c)** 1.25 L **(d)** 2.60

16 **(a)** The 2 is in the thousandths place, not in the hundredths place.

(b) Should be 409.67. Al has written the 6 in the hundredths place and the 7 in the thousandths place.

(c) Max has put the 7 in the tenths place instead of in the ones place. Answer should be 7.0809.

(d) $\frac{9}{10} + \frac{5}{100} + \frac{6}{1000}$ means 0.956. Polly has not accounted for the 0 in the hundredths column. 0.9056 is the same as $\frac{9}{10} + \frac{5}{1000} + \frac{6}{10\,000}$.

Open-ended – Sample answers

17 **(a), (b)** 4.51, 4.52, 4.53, 4.6, 4.63, 4.67

18 **(a)** $2.13 < 5.6$, $3.52 < 5.1$, $4.69 < 5.3$

(b) 6, 7, 8, 9 could not be in the ones box.

19 (a) 2.57, 5.27, 7.25, 2.75, 5.72, 7.52, six different decimals

(b) 25.7, 27.5, 5.72, 52.7, 57.2, 7.25, 7.52, 72.5, 75.2, nine different decimals

Exercise 4.2 (p. 187)

1 (a) 4.9 (b) 6.7 (c) 7.64 (d) 4.55

(e) 0.642 (f) 3.28 (g) 0.3144 (h) 11.83

(i) 2.92 (j) 18.500 (k) 90.9000 (l) 19.000

(m) 23.41 (n) 57.080 (o) 259.9000

2 (a) \$4.50 (b) \$2.75 (c) \$11.05

(d) \$23.90 (e) \$176.35 (f) \$542.05

(g) \$789.55 (h) \$56.75 (i) \$6775.00

(j) \$1149.95 (k) \$8990.00 (l) \$10 000.00

3 D **4** 9.6 seconds

5 \$53.65

6 (a) 99.9 (b) 99.94

7 42°C **8** \$11.95

9 352.2 metres per second

10 1.27 m

11 (a) 12.138, 12.143, 12.149, 12.152, 12.157

(b) 12.14 s, 12.14 s, 12.15 s, 12.15 s, 12.16 s

(c) Yes—1st and 2nd, and 3rd and 4th, are now tied.

12 (a) \$20.35 (b) \$20.40—5 cents extra

Open-ended – Sample answers

13 3.792, 3.790 56, 3.787

14 (a) \$100.02, \$99.98 (b) \$99.60, \$100.48

15 2.548, rounding at the 1st step creates errors at the 2nd step.

16 The coins have no real 'purchasing' power anymore, as prices get higher and higher. They were not worth the cost of producing them.

Exercise 4.3 (p. 192)

1 (a) $4\frac{1}{10}$ (b) $6\frac{1}{2}$ (c) $8\frac{3}{5}$ (d) $9\frac{2}{5}$

(e) $4\frac{71}{100}$ (f) $2\frac{37}{100}$ (g) $\frac{7}{20}$ (h) $2\frac{12}{25}$

(i) $5\frac{9}{1000}$ (j) $\frac{221}{250}$ (k) $6\frac{16}{125}$ (l) $3\frac{43}{250}$

(m) $7\frac{9}{200}$ (n) $\frac{11}{125}$ (o) $6\frac{3}{2000}$ (p) $1\frac{3}{400}$

2 (a) 0.7 (b) 0.09 (c) 0.17 (d) 0.123

(e) 0.2 (f) 0.12 (g) 0.26 (h) 1.75

(i) 0.875 (j) 0.6875 (k) 0.575 (l) $0.78\dot{3}$

(m) $0.\dot{1}$ (n) $0.58\dot{3}$ (o) $2.8\dot{3}$ (p) $1.0\dot{6}$

3 D **4** D

5 $\frac{12}{25}$

6 $\frac{127}{50}$ (or $2\frac{27}{50}$)

7 $1\frac{7}{20}$

8 $\frac{3}{125\,000}$

9 0.000 005

10 $5\frac{17}{20}$ per cent, which is higher than $5\frac{3}{4}$ per cent ($5\frac{15}{20}$ per cent)

11 $4\frac{1}{5}$, 4.375, $4\frac{1}{2}$, 4.865, $4\frac{9}{10}$

Open-ended – Sample answers

12 (a) $3\frac{44}{100}$, $3\frac{45}{100}$, $3\frac{46}{100}$ (b) $3\frac{45}{99}$, $3\frac{44}{98}$, $3\frac{46}{97}$

13 $5\frac{62}{100}$, $5\frac{59}{100}$

Exercise 4.4 (p. 195)

1 (a) 16.2 (b) 12.94 (c) 0.914 (d) 25.648

(e) 26.418 (f) 39.811 (g) 22.827 (h) 10.259

(i) 8.858 (j) 23.917 (k) 17.595 (l) 11.5834

2 (a) 1.9 (b) 4.12 (c) 12.247 (d) 6.963

(e) 3.184 (f) 3.838 (g) 7.26 (h) 7.45

(i) 2.769 (j) 0.56 (k) 0.08 (l) 92.302

3 D

4 12.70 mm

5 (a) \$19.87 (b) \$19.85

6 \$295.51

7 40.5

8 267.9 km

9 196.96 km

10 \$63.65

11 0.375 litres

12 (a) \$165.90 (b) The fourth item (\$18.48) was added twice.

13 \$330.65

Open-ended – Sample answers

14 (a) 0.33 + 2.541 (b) 1.213 + 2.532 + 0.115

(c) The last digits of the numbers have to add up to 10 or 20.

15 (a) 4.1 + 3.85 = 7.95, 4.3 + 2.85 = 7.15, 4.6 + 2.85 = 7.45

(b) The last digit in the 2nd number must be a 5.

16 (a) 1.234 and 9.946 (b) 2.324 and 11.034

(c) The last digits must be the same.

17 53.47, 53.43

Exercise 4.5 (p. 203)

1 **(a)** 30.4 **(b)** 37.1 **(c)** 58.5 **(d)** 23.10
(e) 2.16 **(f)** 73.98 **(g)** 64.376 **(h)** 4.333
(i) 54.927 **(j)** 287.04 **(k)** 1219 **(l)** 1186.88
(m) 0.0008 **(n)** 0.0035 **(o)** 3.0018

2 **(a)** 144 **(b)** 228.9 **(c)** 119.64 **(d)** 114
(e) 2170 **(f)** 2650 **(g)** 27 546 **(h)** 27 434
(i) 29 202 **(j)** 38 828 **(k)** 67 201.5 **(l)** 411 576

3 **(a)** 0.48 **(b)** 0.24 **(c)** 0.36 **(d)** 6.524
(e) 1.236 **(f)** 4.208 **(g)** 2.3994 **(h)** 2.0812
(i) 0.6768 **(j)** 0.0024 **(k)** 0.009 24 **(l)** 0.0036

4 C **5** C **6** C

7 $18.20

8 10.619 grams

9 **(a)** 3 500 000 **(b)** 4 260 000 000
(c) 1 300 000 000 000 **(d)** 57 080 000
(e) 10 200 000 000 000 **(f)** 20 045 000 000

10 0.984 metres

11 $117.98

12 $516.00

13 53 500 000 000

14 **(a)** $94.50 **(b)** $12.83

15 1950 kilograms

16 $80.60

17 37.5 litres

18 292.25 kilojoules

19 **(a)** 22.3 million

(b) The 'exact' value is not accurate, as births and deaths cause it to change daily. It is not necessary or helpful, for most purposes, to give a more precise number.

20 **(a)** 6.75 metres **(b)** 2, 0.25 m

21 **(a)** $4.80 **(b)** $0.85

(c) Purchasing 3 multi-bags ($11.85) is slightly cheaper than purchasing individual bars ($12).

22 1.6 kilograms

23 **(a)** 76.3 kilowatt-hours **(b)** $9.92

Open-ended – Sample answers

24 **(a)** He forgot the place value of the digits. Estimation: $2 \times 90 = 180$ m.

(b) He could have multiplied 89 by 1, 0.6 and 0.03 and added the answers together.

(c) Students' own answers.

25 **(a)** 20 and 3.42, 30 and 2.28

(b) 12.5 and 5.472, 15 and 4.56

Half-time 4 (p. 207)

1 **(a)** $\frac{1}{4}$ **(b)** $\frac{3}{10}$ **(c)** $3\frac{27}{50}$ **(d)** $9\frac{69}{200}$

2 0.03, 0.321, 9.003 24, 9.01, 19.12

3 **(a)** 20.4 **(b)** 132.919 **(c)** 2.82 **(d)** 6.02
(e) 83.861 **(f)** 1.1

4 **(a)** 4.877 **(b)** 13.004 **(c)** 2.350 **(d)** 23.032

5 **(a)** 30.4 **(b)** 141.5 **(c)** 12.33 **(d)** 1356
(e) 520 **(f)** 3390 **(g)** 7.31 **(h)** 613.228
(i) 0.0006

6 **(a)** $100.55 **(b)** $48.45

7 **(a)** 23.4907 **(b)** 14.235 **(c)** 293.415 **(d)** 90.6207

8 **(a)** $1.95 **(b)** $35.10 **(c)** $57.45 **(d)** $190.00

9 **(a)** 0.8 **(b)** 0.85 **(c)** $0.\dot{6}$ **(d)** $0.58\dot{3}$

10 59.023, 59.105, 59.125, 59.23

11 $122.46

Exercise 4.6 (p. 211)

1 **(a)** 2.12 **(b)** 4.32 **(c)** 1.58 **(d)** 0.55
(e) 0.343 **(f)** 0.567 **(g)** 6.57 **(h)** 1.514
(i) 0.052 **(j)** 0.07 **(k)** 0.407 **(l)** 2.637
(m) 30.866 **(n)** 10.546 **(o)** 49.644

2 **(a)** 0.09 **(b)** 0.09 **(c)** 0.604 **(d)** 0.483
(e) 0.006 **(f)** 0.039 **(g)** 0.078 **(h)** 0.005
(i) 0.003 **(j)** 0.57 **(k)** 0.029 **(l)** 0.007

3 **(a)** 25.7 **(b)** 10.3 **(c)** 8.5 **(d)** 387
(e) 100.2 **(f)** 24.8 **(g)** 397 **(h)** 44.4
(i) 24.5 **(j)** 700 **(k)** 315 **(l)** 145
(m) 8700 **(n)** 11 500 **(o)** 16 700

4 D

5 C

6 0.289 kg

7 $1.965 million

8 $93.99 or $94 per guest

9 12 tankfuls

10 259 necklaces

11 12.43 km

12 $0.22/100 mL

13 $4.71

14 1933 worms

15 6.5 minutes

16 $4.75 per kilometre

17 Angie's team 1.60 m, Jessica's team 1.59 m. Therefore, Angie's team is taller on average by 0.01 m.

18 Brazilian Roast at $2.25 per 100 grams

19 33 5-cent coins, 23 10-cent coins, 26 20-cent coins, 15 50-cent coins

20 217 km

Open-ended – Sample answers

21 2.002, 3.006, 3.666

22 **(a)** 20.1 ÷ 1 (multiply by 2), 40.2 ÷ 2 (multiply by 4)

(b) 18.02 ÷ 0.1 (multiply by 5), 720.8 ÷ 0.4 (multiply by 20)

23 10 m and 0.845 m, perimeter 21.69 m; 5 m and 1.69 m, perimeter 13.38 m

24 **(a)** He didn't consider the place value of the digits to the RHS of the decimal point.

(b) To do decimal division more accurately, Tran should perform the division, ignoring the decimal point, and then place a decimal point in the answer, so it lines up with the one in the dividend.

Exercise 4.7 (p. 219)

1 **(a)** $\frac{3}{20}$ **(b)** $\frac{6}{25}$ **(c)** $\frac{9}{50}$ **(d)** $\frac{16}{25}$

(e) $\frac{11}{10}$ **(f)** $\frac{61}{50}$ **(g)** $\frac{7}{5}$ **(h)** $\frac{99}{50}$

2 **(a)** 0.34 **(b)** 0.13 **(c)** 0.78 **(d)** 0.92

(e) 1.2 **(f)** 1.23 **(g)** 2.54 **(h)** 3.2

3 **(a)** 40% **(b)** 75% **(c)** 30% **(d)** 35%

(e) 110% **(f)** 150% **(g)** 112% **(h)** 120%

(i) 37.5% **(j)** $33.\dot{3}\%$ **(k)** $83.\dot{3}\%$ **(l)** $44.\dot{4}\%$

(m) $86.\dot{6}\%$ **(n)** $63.\dot{3}\%$ **(o)** 82.5% **(p)** $73.\dot{3}\%$

4 **(a)** 87% **(b)** 34% **(c)** 65% **(d)** 96%

(e) 134% **(f)** 358% **(g)** 532% **(h)** 121%

5

Percentage	Fraction	Decimal
40%	$\frac{2}{5}$	0.4
70%	$\frac{7}{10}$	0.7
5%	$\frac{1}{20}$	0.05
2%	$\frac{1}{50}$	0.02
75%	$\frac{3}{4}$	0.75
125%	$\frac{5}{4}$	1.25

6 **(a)** 0.25, 0.5, 0.1, 0.2 **(b)** 25%, 50%, 10%, 20%

7 $\frac{19}{20}$

8 62.5%

9 **(a)** 0.03, $\frac{7}{50}$, 57%, $\frac{3}{5}$, 0.8, 82%

(b) 0.05, $\frac{3}{10}$, 43%, $\frac{1}{2}$, 73%, 1.05

10 **(a)** $\frac{3}{5}$ **(b)** 60%

11 63%

12 **(a)** **(i)** $\frac{1}{25}$ **(ii)** 4% **(iii)** 0.04

(b) The percentage, as most members of the public would be able to comprehend and visualise the size of the number.

(c) '4% of us believe in aliens'

13 $\frac{1}{4} = 25\%$ and $\frac{3}{4} = 75\%$, $75 = 3 \times 25$

14 **(a)** 75% **(b)** 0.75 **(c)** 25% **(d)** 0.25

Open-ended – Sample answers

15 $\frac{1}{3}, \frac{1}{4}, \frac{3}{10}$

16 34.1%, 34.2%, 34.3%

17 Students' own answers.

Exercise 4.8 (p. 223)

1 **(a)** \$18 **(b)** 45 m **(c)** 168 L **(d)** 96 m

(e) 450 kg **(f)** \$168 **(g)** 9.36 kg **(h)** \$95.58

(i) 183.96 m **(j)** 64.75 m **(k)** 71.536 L **(l)** \$1.31

2 **(a)** 85% **(b)** 22.7% **(c)** 40% **(d)** 80%

(e) 76% **(f)** 77.1% **(g)** 55.6% **(h)** 75%

(i) 82.4%

3 **(a)** \$12.50 **(b)** 7.5 kg **(c)** 15 km **(d)** 8 L

(e) 3.6 m **(f)** \$6 **(g)** 210 kg **(h)** 600 mL

(i) \$140

4 B

5 C

6 10 students

7 57.1% are cream biscuits

8 0.7 L

9 $83.\dot{3}\%$

10 Boys: 42.3%, Girls: 57.7%

11 **(a)** Damian 70%, Franco 68.75%

(b) Damian

12 33.1% of the score

13 **(a)** **(i)** \$8 **(ii)** \$31.25 **(iii)** \$32.50

(iv) \$23.90 **(v)** \$319.60 **(vi)** \$64.95

(b) **(i)** \$32 **(ii)** \$93.75 **(iii)** \$32.50

(iv) \$215.10 **(v)** \$479.40 **(vi)** \$1234.05

14 92%

15 Chelsea—Game 1: 68%, Game 2: 70.4%
Sonia—Game 1: 75%, Game 2: 73.9%

Chelsea increased her percentage, so she improved her accuracy, whereas Sonia's accuracy dropped slightly.

16 **(a)** 22% of 180 = 39.6, 34% of 180 = 61.2, 7% of 180 = 12.6

(b) Each of the answers is a decimal number, which is not possible when working with numbers of people (cannot have 0.6 of a student).

(c) Actual number with blue eyes could be either 39 or 40 (both give a percentage that rounds to 22 as the nearest whole number), actual number speaking two or more languages could be 61 or 62 (both give a percentage of 34 when rounded) and the actual number of left-handed students could be 12 or 13 (both give a percentage of 7 when rounded).

17 **(a)** 2700 kJ **(b)** 73 g of fat

Open-ended – Sample answers

18 Savings look more attractive, and are more easily interpreted (e.g. 50% off is easily recognised as half price).

19 50%, $10; 25%, $20; 10%, $50

20 Fedora's working is correct. Tanya has confused the method for finding a percentage with the method for writing one amount as a percentage of another. The question asked here has the percentage sign appearing in the question, which means that the first method (multiplying by the per cent) should be used. If the question contains the words 'out of', then the second method (writing one amount as a percentage of another) should be used.

Exercise 4.9 (p. 230)

1 **(a)** 5:3 **(b)** 4:7 **(c)** 3:2 **(d)** 8:3
(e) 1:2:3 **(f)** 2:9:2 **(g)** 3:4:7 **(h)** 3:2:1

2 **(a)** 2:3 **(b)** 3:5 **(c)** $\frac{3}{5}$ **(d)** 40%

3 **(a)** 2:6 **(b)** 2:16 **(c)** 2:22 **(d)** 2:66
(e) 12:15 **(f)** 12:28 **(g)** 2:3 **(h)** 2:3
(i) 5:4 **(j)** 2:1 **(k)** 56:35 **(l)** 60:55
(m) 8:3 **(n)** 100:30 **(o)** 20:18 **(p)** 75:65

4 **(a)** 1:5 **(b)** 1:4 **(c)** 2:9 **(d)** 2:7
(e) 3:2 **(f)** 8:5 **(g)** 8:5 **(h)** 4:3
(i) 27:32 **(j)** 14:17 **(k)** 8:9 **(l)** 2:5
(m) 3:2 **(n)** 3:2 **(o)** 7:4 **(p)** 40:11

5 **(a)** B **(b)** C

6 **(a)** 12:7:16 **(b)** 35 **(c)** $\frac{12}{35}$ **(d)** 20%

7 **(a)** 15:7:2 **(b)** $\frac{7}{24}$ **(c)** 29%

8 **(a)** 5:4:3 **(b)** $\frac{5}{12}$ **(c)** 42%

9 **(a)** 6:1 **(b)** 6:1 = 24:6, 6 instructors required
(c) 30

10 3:2:1 = 12:8:4, 8 buckets of sand, 12 buckets of gravel

11 **(a)** 10% **(b)** 2 g

12 **(a)** 25% **(b)** 75:25 = 3:1

13 **(a)** B **(b)** F **(c)** C **(d)** E

14 **(a)** 4 teachers are required—3 would only be enough for 60 students (1:20 = 3:60).

(b) 4:68 = 1:17

15 **(a)** Chloe: 1:5
Hannah: 2:5

(b) Hannah is correct. Looking at the simplified ratios, Hannah has 1 extra part of concentrate for the same number of parts of water.

16 **(a)** $\frac{5}{8}$ **(b)** $\frac{3}{8}$ **(c)** $\frac{4}{9}$
(d) 2 cats and 1 dog

Open-ended – Sample answers

17 **(a)** Answer will depend on the class.

(b) Unlikely, unless it is a single-sex school.

(c) No; there would be a big variation in all coeducational schools; some schools are mixed sex, others are single-sex.

18 8:14, 12:21, 16:28

19 The ratio should be 7:12; the student forgot to count the apples as fruit.

Mathspace (p. 234)

1 Asian—61%, European—12%, North American—8%, South American & Caribbean—5%, African—13%, Oceania—1%. Live without basic sanitation—43%, don't have access to clean, safe drinking water—33.$\dot{3}$%, are hungry and/or malnourished—13%, own 59% of the entire wealth—6%, have 75% of the income—20%, live on $2.50 or less per day—53%, can't read—14%, have a secondary education—7%, have a computer —12%, have the internet—3%.

2 75%

3 **(a)** 2 300 000 000

(b) 3 657 000 000

(c) 828 000 000

(d) 6 417 000 000

4 **(a)** 71%

(b) Younger people are less likely to have families to support.

(c) 66.7%

5 Sample answer: I hope that in 2055 everyone has basic sanitation and no one is malnourished. I hope that wealth is more evenly distributed and everyone has access to a good education.

Exercise 4.10 (p. 238)

1 **(a)** $5.60 **(b)** 104 cans **(c)** $1.20
(d) $8500 **(e)** 25 kg **(f)** 525 pages

2 **(a)** 600 g: $0.68 per 100 g, 250 g: $1.07 per 100 g; 600 g is the better value

(b) 500 g: $0.56 per 100 g, 750 g: $0.46 per 100 g; 750 g is the better value

(c) 375 g: \$0.34 per 100 g, 500 g: \$0.65 per 100 g; 375 g is the better value

(d) 200 g: \$1.61 per 100 g, 375 g: \$1.31 per 100 g; 375 g is the better value

(e) 500 mL: \$0.54 per 100 mL, 920 mL: \$0.47 per 100 mL; 920 mL is the better value

(f) 450 g: \$0.84 per 100 g, 1 kg: \$0.88 per 100 g; 450 g is the better value

3 A

4 D

5 19.2, or 20 loaves

6 (a) the 400 g jar

(b) Yes, the 280 g jar is now slightly better value for money, with both jars approximately \$1.60 per 100 g.

7 \$6

8 7.1 runs per over

9 (a) (i) packet of 6: \$0.18 per bar, packet of 10: \$0.75 per bar; packet of 10 is the better value

(ii) 12-pack: \$1.18 per can, 18-pack: \$1.12 per can, 30-pack: \$0.92 per can; 30-pack is the better value

(iii) box of 50: \$0.06 per bag, box of 200: \$0.04 per bag, box of 200 is the better value

(b) Multiply the cost of the box of 50 by 4 to get the price of 200, or multiply the cost of the box of 50 by 2 and divide the cost of the box of 200 by 2, to get the prices per 100 bags.

10 (a) \$1.45 (b) \$17.40

11 (a) 3.6 L (b) 25.2 L

12 (a) 3.25 g (b) 13 g (c) 16.25 g

13 (a) \$6.00 (b) \$0.60 (c) \$7.80

14 Individual cost of each bun in the packet = \$1.20
$4 \times \$1.20 = \$4.80$
\$7.20 (1 packet) + \$4.80 (4 loose) = \$12.00

15 (a) 4 kg is better value:
\$15.97 ≈ \$16
≈ \$4/kg

(b) 1 L carton is better:
1 L = 4 × 250 mL
$4 \times \$1.25 = 2 \times \$2.50 = \$5$

(c) packet ham is better value:
500 g of ham at \$13/kg
= \$6.50

(d) 400 g jar is better value:
\$7.99 ≈ \$8
≈ \$2/100 g, or \$6 for 300 g

(e) The product may be Australian made, the packaging may be appealing, or you may prefer a particular brand.

16 Plan: \$4.10 is cheaper, Pre-paid: \$4.25 is more expensive

17 (a) \$2516.13 kL/day

(b) 918 387.45 kL

(c) No—cannot assume that the rainfall in January will be the same for the other months of the year. January is part of the wet season, so other months will definitely be drier.

18 (a) The 500 g block is two times bigger than the 250 g block.

(b) 500 g block: \$9.00; 750 g block: \$13.50

(c) The packaging of larger items is cheaper; 'bulk' buys are made more attractive so that consumers will purchase more of the product.

Open-ended – Sample answers

19 soft drink, milk, fruit juice, yoghurt

20 (a) 9×500 g; 4×1 kg + 1×500 g; 2×2 kg + 1×500 g

(b) 2×2 kg + 1×500 g is the cheapest (\$10.28 compared to \$11.16 and \$10.64)

Challenge 4 (p. 241)

1 B

2 8×0.753. Try various combinations. Hopefully, the students will only need to investigate 8×0.753 and 7×0.853.

3 $0.01 - 0.001 = 0.009$

4 C \$$\frac{3}{4}$ = \$0.75, \$$\frac{3}{10}$ = \$0.30. Add the amounts.

5 C $200 \div 2.5 = 80$, so $20 \div 2.5 = 8$ and $20 \div 0.25 = 80$

6 B Amount is $49\,095 - 49.95 = 49\,045.05$ to be subtracted.

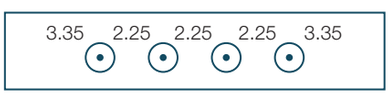
7 (a) The last digit of both of the decimal numbers must not multiply together to give a number ending in 0, e.g. $3.21 \times 4.547 = 14.595\,87$.

(b) The last digit of both of the decimal numbers must multiply together to give a number ending in 0, e.g. $1.25 \times 3.766 = 4.7075$.

(c) the last two digits of both of the decimal numbers must multiply together to give a number ending in 00, e.g. $7.25 \times 8.324 = 60.349$.

8 Scores a total of $6 \times 7.5 = 45$ goals. Least number of goals scored = 4, so she scores $45 - 4 = 41$ goals in 5 other games.
$41 = 4 \times 8 + 9$, so she must score at least 9 in one game.
$41 = 7 + 3 \times 8 + 10$, so she could score more than 9. The lowest value for the highest number of goals she scores is 9.

9 Length of strip of metal = $2 \times 3.35 + 3 \times 2.25 = 13.45$ cm



10 $0.01 \div 0.002 = 10 \div 2 = 5$

11 C $0.9 \times \$30\,000 = \$27\,000$; $1.1 \times \$27\,000 = \$29\,700$

12 A 13 B

Chapter review 4 (p. 242)

1 (a) $\frac{9}{10} + \frac{6}{100} + \frac{8}{1000}$ (b) $5 + \frac{7}{100} + \frac{2}{10\,000}$

(c) $6 + \frac{5}{1000}$

2 (a) 0.6524 (b) 0.080 093

3 (a) 4.3806 (b) 57.032 09

4 (a) one one, eight tenths, five hundredths, three thousandths and one ten-thousandth

(b) seven hundredths and six hundred-thousandths

(c) six tens, one one and nine ten-thousandths

5 (a) (i) $\frac{9}{100}$ (ii) nine hundredths

(b) (i) $\frac{9}{10\,000}$ (ii) nine ten-thousandths

(c) (i) $\frac{9}{100}$ (ii) nine hundredths

6 (a) $3.0427 > 3.0274$ (b) $0.009\,95 < 0.01$

7 (a) 0.5506, 0.6055, 0.607 (b) 0.071, 0.701, 0.71

8

9 (a) 4.4 (b) 34.65 (c) 23.1 (d) 102.47

10 (a) \$41.20 (b) \$10.05 (c) \$79.95 (d) \$99.00

11 (a) $3\frac{9}{10}$ (b) $\frac{31}{50}$ (c) $2\frac{9}{20}$ (d) $\frac{9}{5000}$

12 (a) 0.8 (b) 0.95 (c) $0.\dot{2}$ (d) $0.8\dot{3}$

13 (a) 28.39 (b) 15.4585 (c) 41.433
(d) 7.717 (e) 1.688 (f) 4.7802

14 (a) 13.504 (b) 104.65 (c) 200.97
(d) 47 200 (e) 164.4 (f) 3.45
(g) 0.54 (h) 0.000 36 (i) 19.76

15 (a) 2.58 (b) 1.004 (c) 0.469
(d) 0.240 (e) 0.016 (f) 0.182
(g) 12 (h) 2.4 (i) 5950

16 (a) 70% (b) 125% (c) 12.5% (d) $66.\dot{6}\%$

17 (a) 38% (b) 96% (c) 355% (d) 9%
(e) 323.4% (f) 54.32%

18 (a) \$24 (b) 12.75 L (c) 166 m (d) \$75

19 (a) 65% (b) 50% (c) 35% (d) 93.3%

20 (a) 8:7 (b) $\frac{7}{15}$ (c) 53%

21 (a) \$7.05 (b) \$3.14

22 (a) 1 326 000 000 (b) 1 140 000 000
(c) 228 200 000 (d) 4 270 000

23 (a) \$3023.60 (b) \$7559.00

24 (a) T-shirt discount \$3 Jeans discount \$24
(b) T-shirt \$27 Jeans \$36

25 (a) The 400 g jar is better value.

(b) Yes, the 250 g jar is now better value than the 400 g jar.

(c) People might only require a small amount of a product—a larger amount might be wasted, some amounts are in a more convenient size (e.g. travel packs)

26 (a) 75 mL (b) No; 60:40 = 3:2

27 (a) 7.8 (b) 23.4 (c) 63.18 Yes

28 (a) \$5.20 (b) \$0.40 (c) \$0.80

(d) Buy six 6-packs and four individual cans (total cost of \$32.28).

29 5 supervisors will be needed; 4 supervisors could only manage 48 children at the required ratio.

30 Store A discount = \$16.25, sale price = \$48.75

Store B discount = \$22.50, sale price = \$52.50

Sally should buy her shoes at Store A to pay the lowest price.

NAPLAN practice 4

1 D **2** B **3** D **4** B

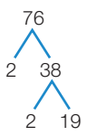
5 \$11 **6** D **7** C **8** \$178.92

Mixed review B (p. 246)

1 (a) $\frac{3}{10}$ (b) $\frac{3}{10}$ (c) $\frac{3}{4}$ (d) $\frac{4}{13}$

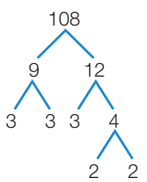
2 (a) -74 (b) +3 (c) -215 (d) +8

3 (a) (i)



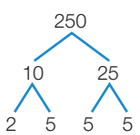
(ii) $2^2 \times 19$

(b) (i)



(ii) $2^2 \times 3^3$

(c) (i)



(ii) 2×5^3

4 (a) 4800 (b) 3300 (c) 12 (d) 4

5 (a) > (b) < (c) <

6 (a) 0.27 (b) 15.3 (c) 435

7 (a) -6 (b) 14 (c) -10 (d) -8
(e) 6 (f) -9

8 (a) $\frac{8}{25}$ (b) $1\frac{6}{25}$ (c) $3\frac{237}{1000}$

9 (a) 7^4 (b) 4^2 (c) $2^2 \times 3^3$ (d) 11^3

10 (a) 30 (b) 6 (c) 30

11 (a) < (b) > (c) <

12 (a) 6 (b) 8 (c) 12

13 (a) $\frac{19}{20}$ (b) $4\frac{1}{24}$ (c) $\frac{11}{24}$ (d) $\frac{3}{4}$

14 (a) 203 (b) 484 (c) 195 (d) 65
(e) 280 (f) 55

15 (a) 4 m (b) $3

16 (a) (i) $\frac{3}{10}$ (ii) 30%

(b) (i) $\frac{3}{13}$ (ii) 23.1%

17 (a) 14 g (b) 1.4 g (c) 4.2 g

18 (a) 29 slices (b) 13 slices

19 (a) 3200 (b) 1200 (c) 400

20 $3^2 = 3 \times 3$, not 3×2

21 Twice—if the cycles start on the hour, they will flash at 24 and 48 past the hour.

22 (a) $\frac{5}{18}$

(b) Eamon (30 pieces compared to Chloe's 9 pieces).

23 (a) 84.5

(b) It is a decimal number, which is impossible when dealing with numbers of students.

(c) The actual number of students was either 84 or 85. Both numbers give a percentage of 65 when the answer is rounded to the nearest whole number.

24 8

25 69 cards

Chapter 5

Recall 5 (p. 250)

1 (a) 5 (b) 2 (c) 1 (d) 4 (e) 2 (f) ±4

2 (a) (i) 41 (ii) 107 (iii) 2197
(b) (i) 10 (ii) 94 (iii) 58

3 (a) $11 + 17 = 28$ (b) $9 - 7 = 2$
(c) $3 \times 4 = 12$ (d) $16 \div 8 = 2$

4 (a) $6 \times 2 - 4$; 8 (b) $(10 + 5) \div 5$; 3
(c) $(6 + 5) \times 3$; 33 (d) $(23 - 21) \times 12$; 24

5 (a) peregrine falcon (b) kodiak bear

Exercise 5.1 (p. 253)

1 (a) $p - 3$ (b) $k + 9$ (c) $12v$
(d) $\frac{a}{4}$ (e) $d + e$

2 (a) $x + 2$ (b) $4y$ (c) $5 - t$
(d) $\frac{k}{7}$ (e) $6gh$ (f) $10d + 8$
(g) $10(d + 8)$ (h) $\frac{y + 9}{4}$ (i) $5e - 3$
(j) $\frac{r + s + t}{3} + 11$ (k) $y^2 + 20$ (l) $8x^2$

3 B

4 D

5 (a) $5(n + 1)$ (b) $\frac{2 + d}{9}$ (c) $12(a + b)$ (d) $mn - 3$

6 (a) $\frac{x}{2}$ (b) $\frac{x}{2} + 3$

7 (a) $\$6d$ (b) $\$2.5t$

8 $\$(55x + 300)$

9 $\$bv$

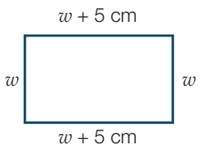
10 (a) $\$12t$ (b) $\$24s$ (c) $\$(12t + 24s)$

11 (a) $5n$ (b) $10r$ (c) $5n + 10r$

12 (a) $m + n + q + 1$ (b) $2m + 2n + 2q + 2$

(c) pens in large packs: $2m + 2m$,
pens in small packs: $m + m + m$
total pens = $3m + 4m$ or $7m$

13 (a) (i) $(w + 5)$ cm (ii)

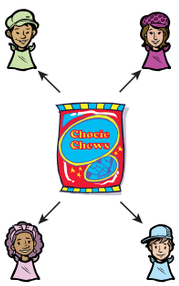


(b) $w + w + 5 + w + w + 5 = w + w + w + w + 10$ or $4w + 10$

Open-ended – Sample answers

14 (a)

(b) A packet of lollies shared between 4 people:



15 (a) Grandma's age is $2(r + d)$.

(b) Possible ages are: Rory 10, dad 30, grandma 80;
Rory 5, dad 25, grandma 60.

Exercise 5.2 (p. 258)

1 (a) (i) expression (ii) 2
(iii) x and y (iv) -7
(v) $2x$, $3y$, -7 and $4x^2$

(b) (i) equation (ii) -4
(iii) x, y and z (iv) 32
(v) 32, $-4x$, $3xy$ and $4z$

(c) (i) equation (ii) -23
(iii) x and y (iv) 9
(v) $2xy$, $-3x^2$, 9 and $-23x$

(d) (i) expression (ii) -1
(iii) x and y (iv) 6
(v) 6, $-x$, $8y$ and $-4xy$

2 (a) (i) number of girls, number of boys
(ii) Let x = number of boys; let y = number of girls
(iii) $x = 3y$

(b) (i) Fred's age; James' age
(ii) Let g = Fred's age; let h = James' age
(iii) $g = 3h - 1$

(c) (i) cost of an apple, cost of a pear
(ii) Let m = cost of an apple; let n = cost of a pear
(iii) $2m = 3n$

(d) (i) cost of a kilogram of potatoes, cost of a watermelon
(ii) Let a = cost of a kg of potatoes; let b = cost of a watermelon
(iii) $3a + b = \$5.20$

(e) (i) distance to Ranko's house, distance to Skye's house
(ii) Let r = distance to Ranko's house; let s = distance to Skye's house
(iii) $s + 5 = r$

(f) (i) number of plants, number of pavers
(ii) Let v = number of plants, let w = number of pavers
(iii) $2v + 6 = w$

3 (a) True (b) False (c) False (d) True (e) False
(f) True (g) True (h) False (i) True (j) True

4 (a) B (b) D (c) B (d) C (e) C (f) C

5 (a) (i) Let m = mass of 1 tablet
(ii) $25m + 120 = 195$

(b) (i) Let a = Mei Lee's age now
(ii) $\frac{a}{2} = a - 8$

(c) (i) Let B = Beths' age; let D = dad's age
(ii) $B + 10 = \frac{D}{2}$

(d) (i) Let number of goals = g;
let number of penalty goals = p
(ii) $8g + p = 100$

6 (a) Let d = distance travelled on first day.
(b) $2d$ (c) $d + 480$ (d) $d + 480 = 3d$

Open-ended – Sample answers

7 (a) Number of goals scored is g and number of behinds is b.
(b) $6g + b = 114$
(c) An example is 12 goals and 42 points.

8 (a) 4 tries, 1 penalty goal to 4 penalty goals. 2 converted tries, 3 penalty goals to 2 tries, 1 conversion goal.
(b) $P = 5t + 2g + 3p$

Exercise 5.3 (p. 264)

1 (a) $x \rightarrow \boxed{+2} \rightarrow y$

$y = x + 2$

x	13	11	7	28	1
y	15	13	9	30	3

(b) $x \rightarrow \boxed{-5} \rightarrow y$

$y = x - 5$

x	6	18	9	85	5
y	1	13	4	80	0

(c) $x \rightarrow \boxed{\times 2} \rightarrow y$

$y = 2x$

x	2	3.4	10	11	101
y	4	6.8	20	22	202

(d) $x \rightarrow \boxed{\div 3} \rightarrow y$

$y = \frac{x}{3}$

x	18	12	30	9	0
y	6	4	10	3	0

(e) $x \rightarrow \boxed{\times 5} \rightarrow \boxed{-3} \rightarrow y$

$y = 5x - 3$

x	4	2	0	5	20
y	17	7	-3	22	97

(f) $x \rightarrow \boxed{+5} \rightarrow \boxed{\div 10} \rightarrow y$

$y = \frac{x + 5}{10}$

x	5	25	45	10	33
y	1	3	5	1.5	3.8

(g) $x \rightarrow \boxed{\div 2} \rightarrow \boxed{-1} \rightarrow y$

$y = \frac{x}{2} - 1$

x	10	6	24	9	15
y	4	2	11	3.5	6.5

(h) $x \rightarrow \boxed{\times x} \rightarrow y$

$y = x^2$

x	3	11	7	6	10
y	9	121	49	36	100

2 (a) A (b) A (c) D

3 (a) $y = 4x - 9$ (b) $y = 5(x + 11)$ or $y = (x + 11) \times 5$

(c) $b = \frac{a}{2} - 7$ (d) $b = \frac{a + 3}{6}$

(e) $q = p^2 + 8$ (f) $q = \sqrt{p}$

4 (a) $y = x - 18$ (b) $y = 60x$

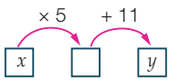
(c) $y = \frac{x}{7}$ (d) $y = 20(x + 43)$ or $y = (x + 43) \times 20$

(e) $y = 100x - 50$ (f) $y = \frac{x}{16} + 13$

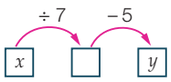
(g) $y = x^2$ (h) $y = \frac{x - 12}{9}$

(i) $y = x^2 - 37$

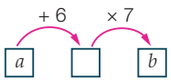
5 (a)



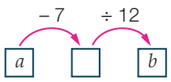
(b)



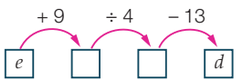
(c)



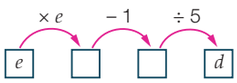
(d)



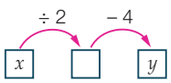
(e)



(f)



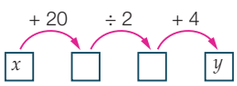
6 (a)



(b) $y = \frac{x}{2} - 4$

(c) $y = \frac{20}{2} - 4 = 6$ lollies left

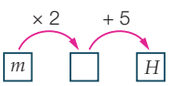
7 (a)



(b) $y = \frac{x + 20}{2} + 4$ (c) $y = \frac{12 + 20}{2} + 4 = 16 + 4 = 20$

Anita spent $20.

8 (a)



(b) $H = 2m + 5$ (c) $H = 2 \times 12 + 5 = 24 + 5 = 29$

9 (a)

Number of pairs of jeans, n	10	50	150	200
Cost to produce the jeans, C	\$315	\$595	\$1295	\$1645

(b) $C = 7n + 245$

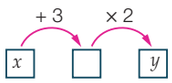
10 (a)

x	2	5	7	4	10
y	5	11	15	9	21

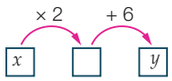
(b)

x	10	1	2	4	18
y	52	16	20	28	84

11 (a) (i)



(ii)



(b) (i) $y = 2(x + 3)$ or $y = (x + 3) \times 2$

(ii) $y = 2x + 6$

(c) (i)

x	2	5	3	4	7
y	10	16	12	14	20

(ii)

x	2	5	3	4	7
y	10	16	12	14	20

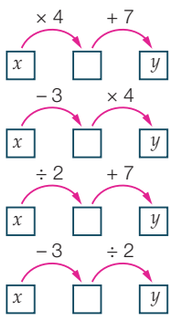
(d) The two tables of values are the same, which means the two rules are equivalent. In the first rule, both x and 3 are doubled in the second step, which gives $2x + 6$.

Open-ended – Sample answers

12 One possible table for the rule $y = \frac{x}{2} + 3$ is:

x	1	2	3	4	5
y	3.5	4	3.5	5	5.5

13 (a) Some possible two-step flowcharts are:



(b) The rules that correspond to the above flowcharts are:

$y = 4x + 7$

$y = 4(x - 3)$

$y = \frac{x}{2} + 7$

$y = \frac{x - 3}{2}$

14 Kim's statement that they are 'different ways of writing the same thing' is incorrect. Both boys have the correct operations of ÷ 2 and + 3 in their flowcharts, but the order in which they are used is important. The rule states that x is first divided by 2, then 3 is added, so Jai's flowchart is correct.

Exercise 5.4 (p. 270)

1 **(a)** 7 **(b)** $5\frac{1}{2}$ **(c)** -1 **(d)** 23

(e) 2.6 **(f)** 25 **(g)** 4 **(h)** 28

(i) 2 **(j)** 32 **(k)** 18 **(l)** 120

(m) 4 **(n)** 0.5 **(o)** 66 **(p)** 84

2 **(a)** \$270 **(b)** 22.15

(c) 70 kilometres per hour

3 **(a)** True **(b)** True **(c)** False

(d) True **(e)** False **(f)** True

4 **(a)**

a	11	20	5	9	50
b	44	80	20	36	200

(b)

x	6	4	10	20	101
y	42	28	70	140	707

(c)

m	1	2	10	6	5
n	5	8	32	20	17

(d)

j	2	5	11	10	100
k	15	27	51	47	407

(e)

p	11	15	10	20	100
q	12	20	10	30	190

(f)

r	1	2	3	0	200
s	6	14	22	-2	1598

(g)

u	5	3	1	201	6
v	16	8	0	800	20

(h)

m	5	10	11	102	52
n	9	24	27	300	150

5 **(a)** D **(b)** C **(c)** C

6 **(a)** $p = \frac{7}{100}d$ **(b)** $f = \frac{11}{100}d$

(c) $p = 28$ litres, $f = 44$ litres

(d) $C = 1.30y$ **(e)** \$20.80

7 **(a)** $\$350 + 10n = p$ **(b)** \$500

(c) \$550

8 **(a)** $D = 3l + 2.6$

(b) $D = 3 \times 3.25 + 2.6$
$= 9.75 + 2.60$
$= 12.35$

9 **(a)** $s = 2n + 10$ **(b)** $b = \frac{n}{8}$

(c) Jasmine will need 90 sausages and 5 bowls of salad.

10 Substituting $a = 4$ into $b = 3(a + 5)$ gives $b = 27$.

Substituting $a = 4$ into $b = 3a + 5$ gives $b = 17$.

In the first formula, the order of operations is add 5, then multiply by 3. In the second formula, the order of operations is multiply by 3, then add 5.

Open-ended – Sample answers

11 One possible formula is: $y = 3x + 5$

x	7	20	13	101
y	26	65	44	308

Another possible formula is: $y = 2(x + 4)$

x	7	20	13	101
y	22	48	34	210

12 Tania has substituted correctly. Suri has forgotten that $7x$ means $7 \times x$. In the future, Suri could include this in the first step of her working.

Exercise 5.5 (p. 276)

1 **(a)**

Number of squares (s)	1	2	3	4	5	6	7	8
Number of matches (m)	4	7	10	13	16	24	28	32

(b) Let s = number of squares, m = number of matches.
$m = 4s$

(c) 400 matches are needed to make 100 squares.

2 **(a)**

B	1	2	3	4	5
S	4	7	10	13	16

(b) $S = 3B + 1$

(c) $B = 21$ gives $S = 64$

3 **(a)**

T	1	2	3	4	5
P	3	5	7	9	11

(b) $P = 2T + 1$

(c) $T = 203$ gives $P = 407$
Clarence would need 407 pieces of wood.

4 **(a)**

Number of houses (h)	1	2	3	4	5	6	7	8
Number of matches (m)	6	11	16	21	26	31	36	41

(b) $m = 5h + 1$

(c) If $h = 20$

$m = 5 \times 20 + 1$
$= 101$

101 matches are needed to build 20 houses.

5 **(a)**

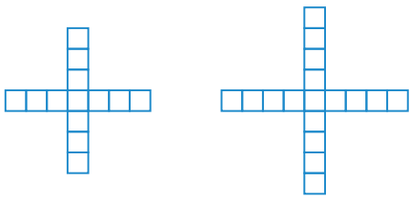
Height of L (H)	2	3	4	5	6
Number of globes (G)	3	5	7	9	11

(b) $G = 2H - 1$

(c) $H = 120$ gives $G = 239$. So, 239 globes would be needed.

6 B

7 (a)



(b)

a	1	2	3	4
b	5	9	13	17

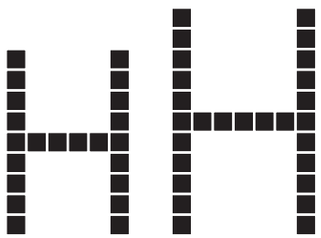
(c)

a	1	2	3	4	5	6
b	5	9	13	17	21	25

(d) $b = 4a + 1$

(e) $a = 52$ gives $b = 209$
209 bricks would be needed.

8 (a)



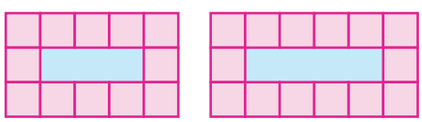
(b)

Width of the H (w)	3	4	5	6	7
Number of tiles (t)	7	12	17	22	27

(c) $t = 5w - 8$

(d) If $w = 12$, $t = 52$

9 (a)

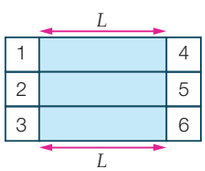


(b)

l	1	2	3	4
p	8	10	12	14

(c) $p = 2l + 6$

(d)



The constant is for the 3 pavers at each end of the pool. The coefficient of the pronumeral '2' is the number of pavers needed to increase the length each time.

(e) $p = 2(l + 3)$

(f) $l = 345$ gives $p = 696$
696 paving blocks are needed.

(g) The spa is 17 paving blocks long.

10 (a) **(i)** $m = 3s$ **(ii)** $m = 4s$
(iii) $m = 2s + 1$ **(iv)** $m = 3s + 1$

(b) In patterns **(i)** and **(ii)**, the number of matchsticks that are required to make each new shape is the same as the number of sides of the shape (3 for triangles and 4 for squares). In patterns **(iii)** and **(iv)** 1 less matchstick is required, because the new triangle or square joins on to an existing shape. This is shown in the formula of $2s + 1$ and $3s + 1$ instead of $3s$ and $4s$.

11 (a) 16

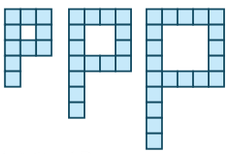
(b) 25

(c)

Large triangle	1	2	3	4	5	6
Number of triangles	1	4	9	16	25	36

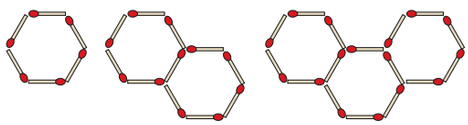
Open-ended – Sample answers

12

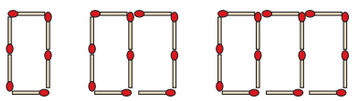


Width of P = w
Number of squares = s
$s = 5w - 5$

13 (a)



(b)



Half-time 5 (p. 283)

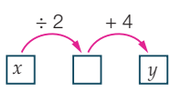
1 B

2 (a) 2 **(b)** -40 **(c)** 81

3 A

4 (a) $p + 7 = 28$ **(b)** $7x - 4 = 20$ **(c)** $w + g - 4 = 14$

5 (a)



(b) $y = 4 + \frac{x}{2}$

(c)

x	2	8	10	5	13
y	5	8	9	6.5	10.5

6 $6n + 11$

7 D

8 (a) $C = 35m + 50$ (cost in cents)

(b) 260 cents = \$2.60

(c) When $n = 20$, $C = 750$ (\$7.50), so yes, he has enough money.

Exercise 5.6 (p. 287)

1 (a) Yes **(b)** No **(c)** No **(d)** Yes **(e)** No
(f) Yes **(g)** Yes **(h)** Yes **(i)** No

2 (a) $7x$ (b) $16y$ (c) $13a$ (d) $4y$
(e) $4m$ (f) $-11x$ (g) $5mn$ (h) $5xy$
(i) $z + 4$ (j) $7x + 4y$ (k) $14w + 3z$ (l) $12a + 2b$

3 (a) $10e - 2f$ (b) $8p - 4q$ (c) $-8t + 12s$
(d) $9x - 4y + y^2$ (e) $15w - 2z - 3z^2$ (f) $10m + 8n - 5m^2$
(g) $7a + 9$ (h) $8x + 5$ (i) $20y - 53$

4 (a) A (b) D

5 (a) $13e + 14f + 6$ (b) $18x + 2y + 2$
(c) $1 + 6x + 5y$ (d) $2x - 3y + 4$
(e) $9m - 2n + 3mn$ (f) $6a + 11b - 5c - 7$

6 (a) Rule 1: $4x + 6x$
Rule 2: $10x$
True
(b) Rule 1: $15y - 10y$
Rule 2: $5y$
True

7 (a) (i) $2x$ (ii) $4x$ (iii) $32x$
(b) $x + 2x + 4x + 8x + 16x + 32x = 63x$
(c) $\$63xv$
(d) $63 \times 6 = 378$. $x = 3$, $v = 2$

8 (a) $\$27d$ (b) $d + 3d + 9d + 27d = \$40d$
(c) \$320 (d) $81d = 567$, $d = 7$. She received \$7.

9 C

Open-ended – Sample answers

10 (a) $6x + 11y$ (b) $15x + 25y$
(c) x and y are either both even or both odd; e.g. $x = 1$, $y = 3$: $15x + 25y = 90$; $x = 2$, $y = 4$: $15x + 25y = 130$.
(d) Students' own answers.

11 (a) $N = 4L$ (b) $N = 2L + 2W$
(c) Square garden bed of length 4 sleepers. Rectangular garden bed length 8 sleepers, width 7 sleepers.
(d) $L = 2W$, $N = 2 \times 2W + 2W = 6W$
(e) 10×5, 8×4, 6×3

Exercise 5.7 (p. 294)

1 (a) $A(4, 3)$, $B(1, -3)$, $C(-4, 5)$, $D(-4, -4)$, $E(-5, 0)$, $F(0, 0)$, $G(2, 0)$, $H(0, 4)$
(b) A quadrant 1, C quadrant 2, D quadrant 3, B quadrant 4, E–H not in a quadrant

2 (a) (i) quadrant 2 (ii) quadrant 4 (iii) quadrant 3
(iv) quadrant 1 (v) quadrant 2 (vi) quadrant 4
(vii) quadrant 3 (viii) quadrant 2
(b) (i) y-axis (ii) y-axis (iii) both (iv) x-axis (v) x-axis

3 (3, -3), (-2, -2), (-3, 0), (1, -1), (3, 1), (-1, 1), (-4, 3), (2, 4), (5, 2)

4 (a) C (b) A (c) B

5 (a) D (b) D (c) C

6 (a) C (b) D

7 The result is a butterfly.

8 The result is a castle.

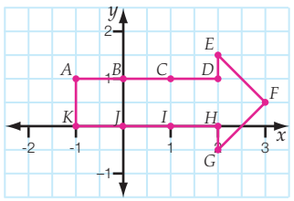
9 (a) C (b) A

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

11 Join (7, 3) (1, 6) (-5, 3) (7, 3) STOP
Join (-4, 3) (-4, -3) (6, -3) (6, 3) STOP
Join (0, -3) (0, -1) (1, -1) (1, -3) STOP
Join (-3, 2) (-1, 2) (-1, 1) (-3, 1) (-3, 2) STOP
Join (-2, 1) (-2, 2) STOP
Join (4, 1) (4, 2) (2, 2) (2, 1) (4, 1) STOP
Join (3, 1) (3, 2) STOP
Join (4, -2) (4, -1) (2, -1) (2, -2) (4, -2) STOP
Join (3, -2) (3, -1) STOP
Join (-1, -2) (-1, -1) (-3, -1) (-3, -2) (-1, -2) STOP
Join (-2, -2) (-2, -1) STOP

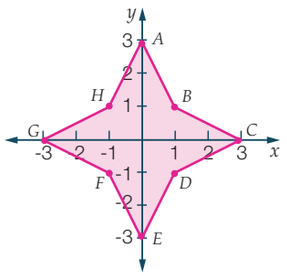
Open-ended – Sample answers

12



A (-1, 1), B (0, 1), C (1, 1), D (2, 1), E (2, 1.5), F (3, 0.5), G (2, -0.5), H (2, 0), I (1, 0), J (0 ,0), K (-1, 0)

13 (a)

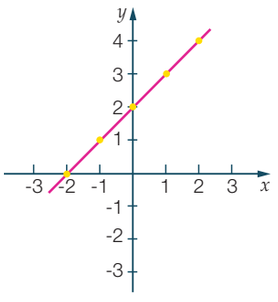


(b) Join the following points with straight lines.
$A(0, 3)$, B(1, 1), $C(3, 0)$, $D(1, -1)$, $E(0, -3)$, $F(-1, -1)$, $G(-3, 0)$, $H(-1, 1)$

(c) Colour the inside of the shape. Student to give to another student.

Exercise 5.8 (p. 306)

1 (a,b)



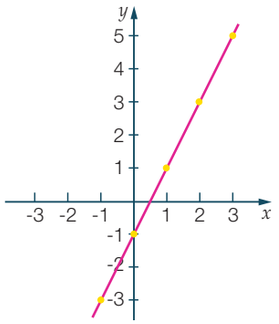
(c)

x	-2	-1	0	1	2
y	0	1	2	3	4

(d) $y = x + 2$

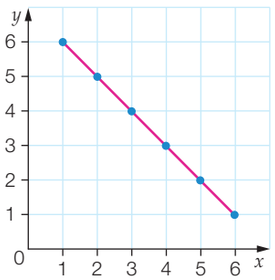
2 **(a)** (-1, -3), (0, -1), (1, 1), (2, 3), (3, 5)

(b,c)



(d) $y = 2x - 1$

3 **(a,b)**



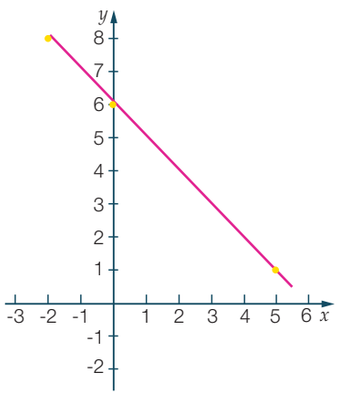
(c)

x	1	2	3	4	5	6
y	6	5	4	3	2	1

(d) $y = 7 - x$

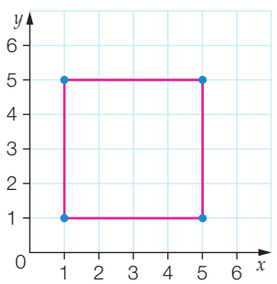
4 C

5 **(a,b)**



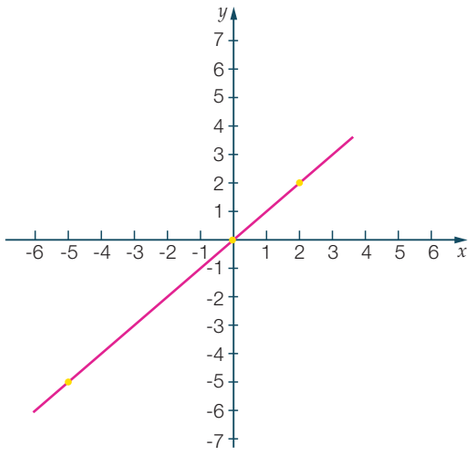
(c) $y = 7$ **(d)** $x = 1$

6 **(a)**



(b) square

7 **(a,b)**



(c) Any three of: (1, 1), (3, 3), (-1, -1), (-2, -2), (-3, -3), (-4, -4),

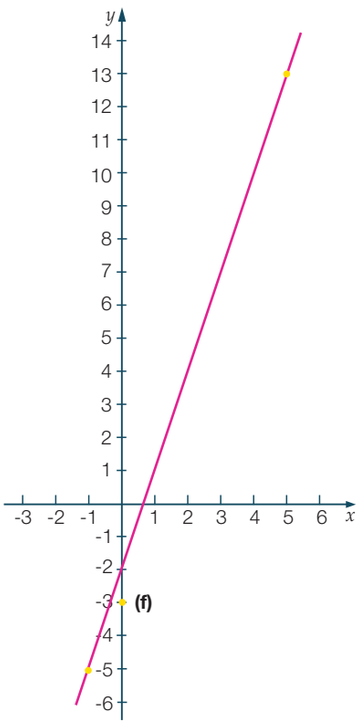
(d)

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

(e) $y = x$

(f) When $x = -3$, $y = -3$, therefore (-3, -3) does lie on the line.

8 **(a)**



(b) (2, 4), (3, 7), (4, 10)

(c)

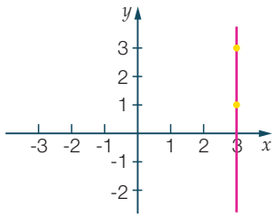
x	-1	2	3	4	5
y	-5	4	7	10	13

(d) $y = 3x - 2$

(e) When $x = 0$, $y = -2 \neq -3$, therefore (0, -3) does not lie on the line.

Open-ended – Sample answers

9 **(a,b)**

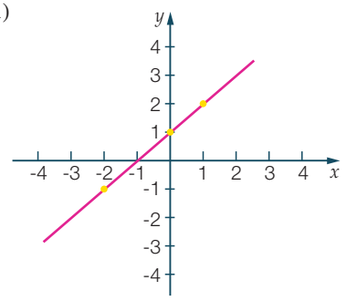


(c) (3, -1) and (3, 2)

(d) $x = 3$

(e) (0, -3), (1, -1) and (2, 1); $y = 2x - 3$

10 **(a)** (0, 1)

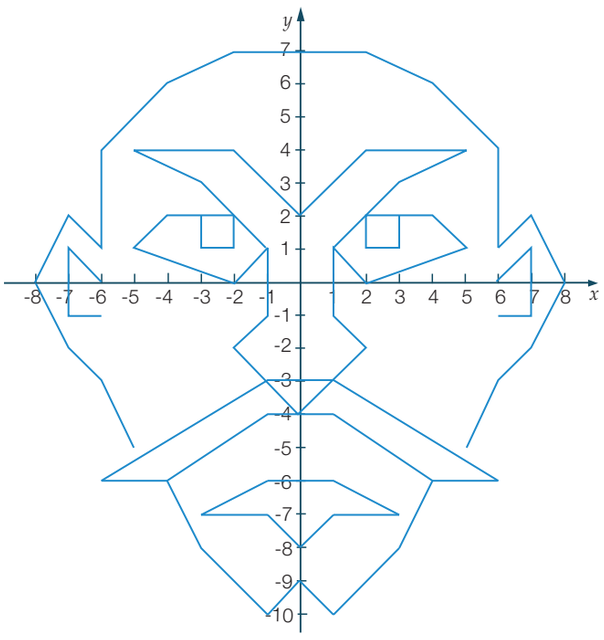


(b) (-2, -1) and (1, 2)

(c) $y = x + 1$

Mathspace (p. 304)

Task 1



Task 2

Guard B

Exercise 5.9 (p. 308)

1 **(a)** False **(b)** True **(c)** True **(d)** True

2 **(a)** (0, 0) **(b)** 12 km **(c)** $\frac{1}{2}$ h **(d)** 1 h

(e) 6 km **(f)** $\frac{1}{2}$ h

(g) They were away for 3 hours.

(h) They rode the fastest from Jim to Terry's house.

3 **(a)** Yiannis

(b) Meg

(c) Yiannis and Alex take the same shoe size.

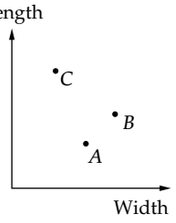
(d) Meg and Alex are the same age.

4 *A*: elephant; *B*: giraffe; *C*: kangaroo

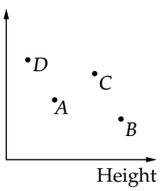
5 D

6 **(a)** *A*: salmon; *B*: John Dory; *C*: pike

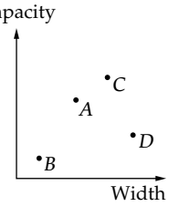
(b)



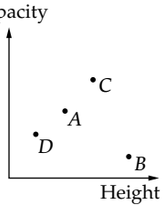
7 **(a)**

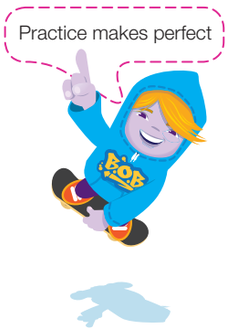


(b)



(c)





8 **(a)** 57%

(b) It rained heavily.

(c) It usually rains a lot during winter in Melbourne. Melting snow also increases water storage levels.

(d) Melbourne's rainfall was well below average—very little rain.

(e) June–July 2007, ≈ 28%

9 **(a)** Yes, although the start of 2009 was a bit lower than the others. Highest ≈ 39%, lowest ≈ 35%, so difference ≈ 4%.

(b) 54 – 38 = 16% increase

(c) Oct–Dec 2010

(d) Jun–Aug 2009

10 **(a)** Yes, the covers reduce water temperature, so evaporation would also be reduced.

(b) The suspended cover seems to be slightly better (≈ 200 days).

(c) in winter

(d) They reduce water temperature by ≈ 10°C.

11 **(a)** height and shoe size

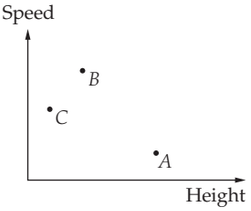
(b) The greater the height, the larger the shoe size.

Open-ended – Sample answers

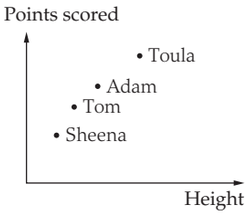
12 **(a)** The first graph shows that *C* has moderate speed and low height, whereas the second graph shows *C* to have low speed and moderate height. A simple swap of *A* and *B* can only happen when the coordinates of *A* are opposite to the coordinates of *B*.

(b) Its height must be the same as its speed.

(c)



13 Students' own answers. For example:



14 Student's own answers.

Challenge 5 (p. 313)

1 Trial and error. As 8 + 7 = 15, start with these numbers as they are nearly the same.

$8 \times 50c = \$4$, $7 \times 20c = \$1.40$. Value = \$5.40.
Reverse numbers: $7 \times 50c = \$3.50$, $8 \times 20c = \$1.60$.

Value = \$5.10. This is 30c less, so, to have more, you need fewer 50c pieces.

$6 \times 50c = \$3$, $9 \times 20c = \$1.80$. Value = \$4.80.
Reverse numbers: $9 \times 50c = \$4.50$, $6 \times 20c = \$1.20$.

Value = \$5.70. This is 90c more, need fewer 50c pieces.

$4 \times 50c = \$2$, $11 \times 20c = \$2.20$. Value = \$4.20.
Reverse numbers: $11 \times 50c = \$5.50$, $4 \times 20c = 80c$.

Value = \$6.30. This is \$2.10 more, as required.

George has four 50c pieces.

2 $2 ✹ 8 = 3(2 + 8) = 3 \times 10 = 30$

$5 ✹ (2 ✹ 8) = 5 ✹ 30 = 3(5 + 30) = 3 \times 35 = 105$

3 As house numbers go up by 2 and are even on one side of the street and odd on the other, you have to find two numbers that differ by two and multiply to give 483.
As the product is odd, then each of the numbers is odd.
As $400 = 20 \times 20$, try the next two odd numbers.
$21 \times 23 = 483$. The house numbers are 21 and 23.

4 If $x > 4$, then $\frac{x}{4} > 1$ and $\frac{x+1}{4} > 1$

As $x + 1 > x$, then $1 < \frac{x}{4} < \frac{x+1}{4}$.

The reverse applies with x in the denominator. If $x > 4$, then $\frac{4}{x} < 1$ and $\frac{4}{x+1} < 1$. As $x + 1 > x$, then the fraction with denominator x is larger than the fraction with denominator $x + 1$, so $\frac{4}{x+1} < \frac{4}{x} < 1$.

Hence, $\frac{4}{x+1} < \frac{4}{x} < 1 < \frac{x}{4} < \frac{x+1}{4}$ and the order is $\frac{4}{x+1}, \frac{4}{x}, \frac{x}{4}, \frac{x+1}{4}$.

5 B If M = 1, then L = N and K = P, which is not possible as the letters are different numbers.

If L = 1, then M = N, not possible.

N can't be 1 as none of the products of the pairs of numbers ends in 1.

P > 1 as K × M > 1. Hence, K = 1.

L, M, and N can't equal 5. If L = 5 or M = 5, then N = 0 or 5. Hence, P = 5.

Using 2, 3 and 4 the only multiplication is $3 \times 4 = 12$.

Hence, N = 2 and P = 5 = 1 + 4, so M = 4, L = 3.

6 $a = 1$, and b can be any number.
(Note: zero is neither positive nor negative.)

7 **(a)** 15 correct means 15 wrong. Marks = $15 \times 9 - 15 \times 5 = 60$

(b) 14 correct means 16 wrong, Marks = $14 \times 9 - 16 \times 5 = 46$ is the most.

(c) By trial and error getting more wrong than correct.

12 correct, 18 wrong:
Marks = $12 \times 9 - 18 \times 5 = 108 - 90 = 18$

11 correct, 19 wrong:
Marks = $11 \times 9 - 19 \times 5 = 99 - 95 = 4$

10 correct, 20 wrong:
Marks = $10 \times 9 - 20 \times 5 = 90 - 100$ = less than zero (-10)

It is not possible to score zero on the test.

For better students you could discuss the following.

x correct means $(30 - x)$ wrong, and the
marks = $9 \times x - 5 \times (30 - x)$, = $14x - 150$

As 14 is not a factor of 150 you can never score 0.

8 The important thing to realise here is that the numbers 1 and 8 have only one number next to them, so they should be put in the middle two squares.

	5	3	
7	1	8	2
	4	6	

9 If half of x is 24, then x is 48, so twice x is 96.

10 B $90 \div 3 = 30$, take integers either side.

11 This is based on the result $2 \times 5 = 10$, so one of the numbers has only factors of 2 and the other only factors of 5. As there are six zeroes, the numbers are 2^6 and 5^6; that is, 64 and 15 625.

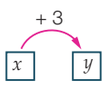
Chapter review 5 (p. 314)

1 **(a)** $12n$ **(b)** $\frac{p}{2} - 3$ **(c)** $7p - 9$ **(d)** $\frac{11 - g}{5}$

2 **(a)** Joe's age is represented as J; Beth's age is represented as B; $J = 3B + 4$

(b) Cost of a bottle of juice = j(\$); cost of a salad roll = r(\$). $3j + 5r = 18.60$

3 **(a)** **(i)**

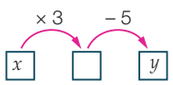


(ii) $y = x + 3$

(iii)

x	57	34	12	4	1.1	64
y	60	37	15	7	4.1	67

(b) **(i)**



(ii) $y = 3x - 5$

(iii)

x	4	3	$2\frac{1}{2}$	9	10	12
y	7	4	$2\frac{1}{2}$	22	25	31

4 **(a)** B **(b)** C

5 **(a)** **(i)** -54 **(ii)** 26

(b) **(i)** 7 **(ii)** -7

6 C

7 **(a)**

x	7	9	12	20	8.1	107
y	0	2	5	13	1.1	100

(b)

x	4	$5\frac{1}{2}$	13	7	78	54
y	10	25	100	40	750	510

8 **(a)**

No. triangles (t)	1	2	3	4	5
No. girders (g)	3	5	7	9	11
No. bolts (b)	3	4	5	6	7

(b) $g = 2t + 1$

(c) $b = t + 2$

(d) **(i)** 2

(ii) In the table of values, as the number of triangles increases by 1, the number of girders increases by 2. In the rule, 2 is the coefficient of t.

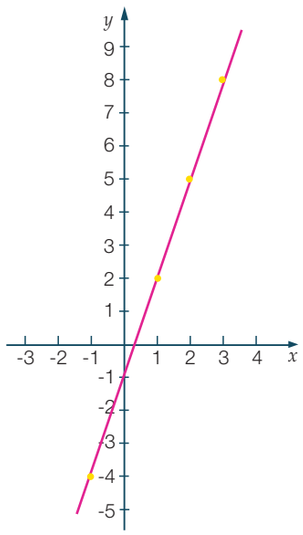
(e) **(i)** 1

(ii) In the table of values, as the number of triangles increases by 1, so does the number of bolts. In the rule, the coefficient of t is 1.

9 **(a)** $5a$ **(b)** $-a + 23b$ **(c)** $4x + y$

10 **(a)** (2, 3) **(b)** (-2, 1) **(c)** (3, -2) **(d)** (-4, -3)

11 **(a)**



(b)

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

(c) $y = 3x - 1$

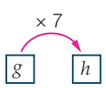
12 **(a)** \$3.50

(b) 3 L is the best value because it costs less per litre than the other sizes (\$1.67 compared to \$1.75 and \$2.00).

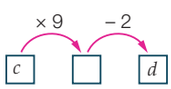
(c) This information is given as a point graph to enable comparison of prices of different sizes.

13 **(a)** $8n + 3$ **(b)** $\frac{8n + 3}{15}$ **(c)** $n = 9$

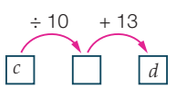
14 **(a)**



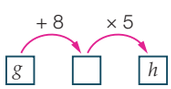
(b)



(c)



(d)



15 **(a)** $b = \frac{n}{4} + 5$ **(b)** 9

16 **(a)** $5a - 7b + 2$ **(b)** $5a + 9b - 7$ **(c)** $x + y + xy$

17 B

18 (a)

x	10	-35	100	5	0	-30
y	2	-7	20	1	0	-6

(b)

x	6	10	3	-1	0	5
y	72	120	36	-12	0	60

19 (a) $y = x - 7$ (b) $y = 2x + 4$

20 (a) $1.4c + 1.8d = 21$

(b) 7 apples and 6 oranges

(c) $6.80

21 (a) 1 500 000 ML

(b) Aug 98

(c) Jan 07

(d) It rained heavily.

(e) There was very little rain—well below average.

(f) from April 2004 to April 2007

NAPLAN practice 5

1 7

2 B

3 (a) 24 (b) -6

4 (a) 2, 1, 3 (b) 3, 1, 2 or 2, 3, 1

5 $11.00

6 D

Chapter 6

Recall 6 (p. 322)

1 (a) 16.5 (b) 40.32 (c) 39.26

(d) 25.2 (e) 56.12 (f) 18 960

(g) 27.8 (h) 0.3 (i) 0.0459

2 (a) (i) 13 mm (ii) 1.3 cm

(b) (i) 28 mm (ii) 2.8 cm

3 (a) 16 cm (b) 12 cm^2

4 (a) 2000 m (b) 3 cm (c) 500 cm

(d) 1.5 kg (e) 4000 mL (f) 20 000 g

(g) 0.25 L (h) 1750 mm (i) 0.5 kg

5 12 cubes

Exercise 6.1 (p. 325)

1 (a) 4 m (b) 5–6 m (c) 8–10 m (d) 20 mm

2 (a) 5000 m (b) 3600 m (c) 8 m

(d) 6500 cm (e) 55 cm (f) 120 cm

(g) 29 mm (h) 61 mm (i) 3.5 mm

(j) 0.9 m (k) 0.003 m (l) 37.5 m

(m) 4.2 km (n) 0.57 km (o) 0.0092 km

(p) 8 cm (q) 25.5 cm (r) 0.18 cm

3 (a) 3200 mm (b) 4950 mm (c) 0.09 km

(d) 0.345 km (e) 300 cm (f) 0.56 m

(g) 0.097 m (h) 342 000 mm (i) 0.0078 km

(j) 192 000 cm (k) 0.024 km (l) 890 mm

4 (a) cm (b) km (c) m

(d) cm (e) km (f) m

5 (a) B (b) C (c) B (d) C

6 (a) 4 cm, 0.4 m, 4000 mm, 0.04 km

(b) 360 m, 290 000 cm, 3100 m, 3.2 km

(c) 5600 cm, 71.4 m, 0.64 km, 820 000 mm

(d) 0.9 cm, 90 mm, 0.095 m, 0.0089 km

7 5.96 m

8 2.745 km

9 about 4.7 m

10 length = 8.9 cm, leg span = 25.4 cm

11 2.29 m across, 36 m long

12 596 mm, 59.6 cm

13 (a) 1100 km (b) 2500 km (c) 3700 km

14 2.5 m

15 (a) (i) The lines are the same length.

(ii) The central circles are the same size.

(iii) Yes, the hat is as wide as it is tall.

(b) (i) The external arrows make the lines appear longer.

(ii) Being surrounded by bigger dots makes the central dot appear smaller.

(iii) The vertical distance appears bigger by contrast.

Open-ended – Sample answers

16 Decimal points are not needed and conversions are not necessary.

17 (a) used division instead of multiplication; 2700 cm

(b) divided by 100 instead of 10; 76.5 cm

(c) zero added between 3 and 8; 3.8 km

(d) divided by 1000 instead of 100; 13.56 m

18 Inaccurate measuring with the ruler. The student with the longer length could be including the ends of the ruler before 0 and after 30.

Exercise 6.2 (p. 331)

1 (a) 16 cm (b) 22 cm (c) 28 m

(d) 86 mm (e) 100 m (f) 60 m

2 (a) 42 m (b) 40 cm (c) 24 cm

(d) 120 mm (e) 14.4 m (f) 68 mm

3 (a) C (b) C

4 (a) 140 mm (b) 122 mm

(c) 390 cm (d) 6000 m or 6 km

5 8.1 km

6 648 m

7 $384

8 Students' own answers.

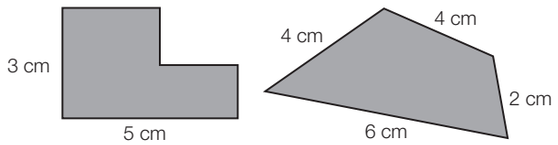
9 A

10 82 m

Open-ended – Sample answers

11 21 cm and 21 cm; 22 cm and 20 cm; 30 cm and 12 cm

12



Exercise 6.3 (p. 335)

1 **(a)** 5 cm^2 **(b)** 15 cm^2 **(c)** 4 cm^2
(d) 28.2 cm^2 **(e)** 24 cm^2 **(f)** 36 cm^2
(g) 36 m^2 **(h)** 87 mm^2 **(i)** 80 km^2
(j) 240 m^2 **(k)** 1.44 m^2 **(l)** 9 cm^2

2 **(a)** cm^2 **(b)** mm^2 **(c)** cm^2 **(d)** m^2
(e) m^2 **(f)** km^2 **(g)** mm^2 **(h)** m^2

3 **(a)** C **(b)** D

4 **(a)** **(i)** 20 cm **(ii)** 9 cm^2
(b) **(i)** 18 cm **(ii)** 8 cm^2
(c) **(i)** 24 cm **(ii)** 14 cm^2
(d) **(i)** 32 cm **(ii)** 20 cm^2

5 **(a)** **(i)** 28 km **(ii)** 45 km^2
(b) **(i)** 36 m **(ii)** 65 m^2
(c) **(i)** 42 cm **(ii)** 80 cm^2
(d) **(i)** 58 cm **(ii)** 100 cm^2

6 2.4 km^2

7 3150 cm^2

8 4 cm

9 5.2 m

10 **(a)** 20 cm^2 **(b)** 36 cm^2

11 **(a)** 5.04 m^2 **(b)** 30.24 m^2 **(c)** 196.56 kW h

12 **(a)** 3519 grams **(b)** 30.8 m

13 525 bricks

14 4418 cm^2

15 **(a)** 330 000 m^2 **(b)** 19 800 kg **(c)** 3350 m

16 **(a)** 8 cm^2 **(b)** 8 cm^2
(c) 12 cm^2 **(d)** 14 cm^2 (approx.)

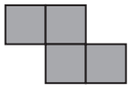
17 Approximate answers are:
(a) 131 m^2 **(b)** 45 km^2

18 Possible answers: 5 cm by 4 cm, 10 cm by 2 cm; 20 cm by 1 cm

19 12 m long, 5 m wide

Open-ended – Sample answers

20 Ethan's shape



Magda's shape

21 Possible dimensions: 1 m by 2.4 m, perimeter = 6.8 m; 1.2 m by 2 m, perimeter = 6.4 m.

22 **(a)** Panel 2: rectangle's perimeter is 16 m.

(b) Perimeter is the length around a shape, whereas area is the space inside a flat shape.

(c) The 'little 2' means 'squared'. Area is measured in squares.

23 wood, carpet, turf (lawn)

Half-time 6 (p. 341)

1 **(a)** **(i)** 19 m **(ii)** 21 m^2
(b) **(i)** 14 m **(ii)** 12.25 m^2

2 **(a)** 0.45 m **(b)** 15 m **(c)** 0.307 km
(d) 60 000 cm **(e)** 196 km **(f)** 0.0264 km

3 **(a)** 11.7 kg **(b)** 16.4 m

4 **(a)** m^2 **(b)** mm^2 **(c)** cm^2 **(d)** km^2

5 length 10 cm, width 3 cm

6 **(a)** 457.5 m **(b)** 465.125 m^2 **(c)** 310.1 m^2

Exercise 6.4 (p. 346)

1 **(a)** 65 cm^2 **(b)** 60 m^2 **(c)** 176 mm^2
(d) 350 mm^2 **(e)** 144 m^2 **(f)** 80 cm^2

2 **(a)** 132 cm^2 **(b)** 64 cm

3 **(a)** B **(b)** C

4 7.5 cm

5 20 cm

6 1040 m^2

7 **(a)** 8 **(b)** 442 cm^2

8 **(a)** 20 m^2 **(b)** same amount of shade

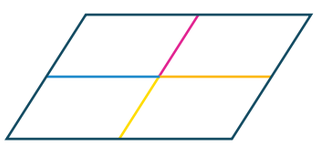
9 **(a)**

(b) 15 cm^2

Open-ended – Sample answers

10 Possible dimensions: base 8 cm, height 4 cm; base 16 cm, height 2 cm; base 1 cm, height 32 cm

11 **(a)**



(b) base 4 cm, height 2 cm gives total area of 32 cm^2; base 7 cm, height 3 cm gives total area of 84 cm^2

Exercise 6.5 (p. 351)

1 **(a)** 48 cm^2 **(b)** 35 mm^2 **(c)** 42 m^2
(d) 88 mm^2 **(e)** 180 m^2 **(f)** 60 cm^2
(g) 9 m^2 **(h)** 19.2 mm^2 **(i)** 33.88 cm^2

2 **(a)** 19 cm^2 **(b)** 36 cm^2 **(c)** 85 cm^2
(d) 87 cm^2 **(e)** 281.65 cm^2 **(f)** 51 cm^2
(g) 279 cm^2 **(h)** 126 cm^2

3 **(a)** A **(b)** D

4 4.76 m^2

5 1600 cm^2

6 3

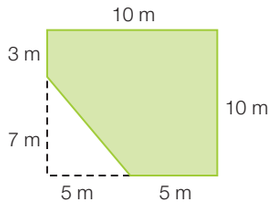
7 172 cm^2

8 **(a)** 144 cm^2 **(b)** 115.5 cm^2 **(c)** 320 cm^2 **(d)** 105.5 cm^2

9 **(a)** 10.36 m^2 **(b)** 4.82 m **(c)** 1.64 L

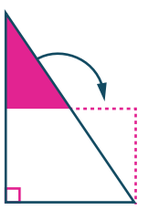
10 Find the area of the big square and subtract the area of the small triangle.

$A = (10 \times 10) - (\frac{1}{2} \times 5 \times 7)$
$= 100 - 17.5$
$= 82.5\ m^2$



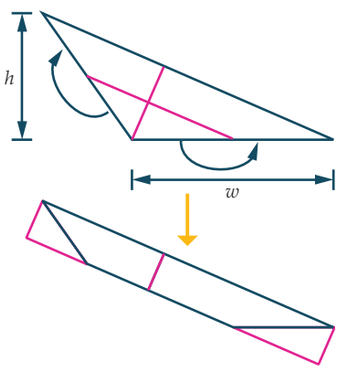
11 **(a)** The cut should be made exactly halfway up the height, parallel to the base or exactly halfway along the base, parallel to the height.

(b)



12 **(a)** Rule a line from the apex to the bottom side that is perpendicular (at right angles) to the bottom side. Halfway along this line, rule a second line parallel to the bottom line. Cut along these two lines.

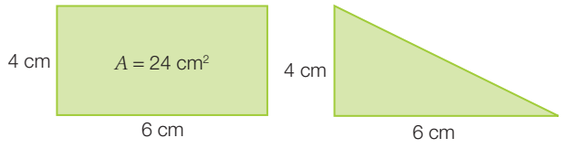
(b)



Open-ended – Sample answers

13 9 cm and 8 cm; 6 cm and 12 cm

14



Exercise 6.6 (p. 357)

1 **(a)** 4 cm^3 **(b)** 16 cm^3 **(c)** 40 cm^3
(d) 24 cm^3 **(e)** 54 cm^3 **(f)** 60 cm^3

2 **(a)** 60 cm^3 **(b)** 60 cm^3 **(c)** 48 cm^3
(d) 120 cm^3 **(e)** 125 cm^3 **(f)** 320 cm^3

3 12 m^3

4 216 cm^3

5 **(a)** D **(b)** D

6 **(a)** 28 cm^3 **(b)** 10 cm^3 **(c)** 18 cm^3
(d) 20 cm^3 **(e)** 6 cm^3 **(f)** 4 cm^3
(g) 4 cm^3 **(h)** 7 cm^3 **(i)** 10 cm^3

7 3.2 m^3 **8** 2352 cm^3 **9** 0.69 m^3

10 100 **11** 12 cm

Open-ended – Sample answers

12 3 cm × 2 cm × 5 cm; 6 cm × 5 cm × 1 cm

13 **(a)** 900 jelly beans

(b) Calculate the dimensions of the jar (length, width and height) in terms of jelly beans, and then calculate the volume in terms of jelly beans.

(c) More jelly beans would be able to fit into the jar, as they would pack closely together with less space between them.

14 The side length of the large cube must be 4 cm, to give a volume of 64 cm^3. The 3 smaller cubes must have side lengths of 1 cm, 2 cm and 3 cm, giving volumes of 1 cm^3, 8 cm^3 and 27 cm^3 respectively.

Volume of smaller cube	Volume of empty space in large cube
1 cm^3	63 cm^3
8 cm^3	56 cm^3
27 cm^3	37 cm^3

Mathspace (p. 360)

Police station: 400 cm

Telephone booth: 1.28 m^3

Train carriage: 2000 cm

Bank: 670 m

Library: 16 m^3

Train map: 4.6 km

L'Hotel: 320 cm

Museum: 24 m^2

Rubbish bin: 0.36 m^3

Newspaper stand: 0.075 m^3

Challenge 6 (p. 366)

1 2 mm ↔ \$2

2 m ↔ \$2000

2 km ↔ \$2 000 000

1 km ↔ \$1 000 000

2 C Sides of square are 200 m each. Each rectangle is 100 m by 50 m. Perimeter = $2 \times (100 + 50)$ m

3 D

4 Let square have sides of $2x$ cm. Rectangle has sides $2x$ cm and x cm. Perimeter of rectangle = $6x$ cm.

$6x = 39$, $x = 6.5$ cm. Area of paper = $13 \times 13 = 169$ cm^2

5 The colours are only used to make it easy to see the tiles.

The second pattern can occur 5 ways because the horizontal tiles can be in 5 different places.

The third pattern can occur in 3 ways because the vertical tiles can be in 3 places.

There are 9 different ways in total.

6 B

7 A

8 60 cm edge vertical,
volume of water = $200 \times 100 \times 60 - 100 \times 80 \times 60 = 720\,000$ cm^3

After block removed,
depth of water = $720\,000 \div (200 \times 100) = 36$ cm

80 cm edge vertical,
volume of water = $200 \times 100 \times 80 - 100 \times 80 \times 60 = 1\,120\,000$ cm^3

After block removed,
depth of water = $1\,120\,000 \div (200 \times 100) = 56$ cm

100 cm edge vertical,
volume of water = $200 \times 100 \times 100 - 100 \times 80 \times 60 = 1\,520\,000$ cm^3

After block removed,
depth of water = $1\,520\,000 \div (200 \times 100) = 76$ cm

9 Area of each face of bottom cube = $4 \times 4 = 16$ cm^2

Area of each face of middle cube = $2 \times 2 = 4$ cm^2

Area of each face of top cube = $1 \times 1 = 1$ cm^2

Visible area = $5 \times 16 - 4 + 5 \times 4 - 1 + 5 \times 1$
$= 76 + 19 + 5$
$= 100$ cm^2

Chapter review 6 (p. 367)

1 (a) B (b) C

2 (a) 45 900 m (b) 0.58 km (c) 9200 mm
(d) 4200 cm (e) 0.98 km (f) 6730 mm

3 (a) (i) 92 cm (ii) 448 cm^2
(b) (i) 56 mm (ii) 196 mm^2
(c) (i) 40 m (ii) 66.5 m^2
(d) (i) 80 cm (ii) 198 cm^2

4 Perimeter = 32.3 m, Area = 62.4 m^2

5 (a) 18 cm^2 (b) 24 cm^2
(c) 126 cm^2 (d) 19.5 m^2

6 (a) 210 m^3 (b) 225 cm^3

7 (a) 54 m^2 (b) 113 cm^2 (c) 4.48 m^2 (d) 94 cm^2

8 (a) 4.85 m (b) \$29.10

9 (a) 300 cm by 250 cm, area = 75 000 cm^2
(b) 120 tiles needed
(c) \$96

10 (a) 7 m (b) 0.9 m^3 (c) \$11.25

11 \$806.40

12 (a) 63 cm^3 (b) 162 cm^3

13 6.84 m^3

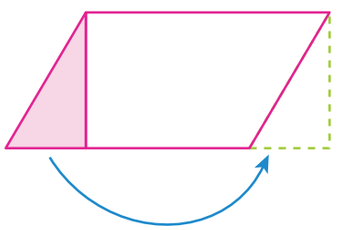
14 20 cm

15 60 cm^2

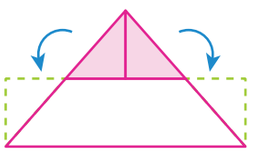
16 176 m^2

17 6750 cm^3

18 (a)



(b)



NAPLAN practice 6

1 the rectangle **2** 37.5 m^2 **3** 40 cm **4** 15 cm
5 C **6** 0.05 cm **7** B **8** B

Mixed review C (p. 372)

1 (a) $n - 8$ (b) $\frac{k}{6}$ (c) $50h$

2 (a) 2.003, 2.3, 2.302, 2.323, 2.33
(b) 0.0199, 0.089, 0.0909, 0.091, 0.129

3 (a) $\frac{1}{4}$ (b) $5\frac{1}{3}$ (c) $\frac{5}{12}$

4 (a) $2^2 \times 7$ (b) $2^3 \times 5^2$ (c) $2 \times 3^2 \times 5 \times 11$

5 (a) (i) 26 cm (ii) 36 cm^2
(b) (i) 14 m (ii) 12.25 m^2
(c) (i) 2.45 m (ii) 0.1815 m^2

6 (a) 23 (b) 34 (c) 31

7 (a) $\frac{10}{27}$ (b) $1\frac{13}{14}$ (c) $4\frac{3}{5}$ (d) 6

8 (a) 6090 m (b) 0.83 m (c) 0.054 km

9 (a) 6 (b) -3 (c) -12 (d) -11
(e) -6 (f) -3 (g) 13 (h) -17

10 (a) 1204 (b) 165 (c) 228

11 (a) 3:2:1 (b) 33.3%

12 (a) $\frac{23}{100}$ (b) $\frac{3}{50}$ (c) $\frac{101}{200}$

13 (a) 8 cm^3 (b) 360 m^3 (c) 216 cm^3

14

x	0	2	3	6	10
y	6	12	15	24	36

15 (a) 13.47 (b) 8.936 35 (c) 40.945

16 (a) 0.0031 (b) 0.000 42 (c) 2121

17 \$86.52

18 (a) 56 mm^2 (b) 36 m^2

19 Koala (a) $\frac{2}{5}$ (b) 40%

Bilby (a) $\frac{3}{10}$ (b) 30%

Wombat (a) $\frac{1}{5}$ (b) 20%

Kangaroo (a) $\frac{1}{10}$ (b) 10%

20 2^8

21 4 goals

22 8 cm by 13 cm

23 \$2.25

Chapter 7

Recall 7 (p. 376)

1 (a) False (b) True (c) False

2 (a) C (b) D (c) B

3 (a) $7 + 5 = 12$ (b) $4 \times 6 - 2 = 22$ (c) $\frac{8+6}{7} = 2$

4 (a) 9 (b) 7

5 (a) 7 (b) 2

Exercise 7.1 (p. 379)

1 (a) $3 + 7 = 10$ (b) $5 \times 5 = 25$
(c) $\frac{16}{4} = 4$ (d) $22 - 10 = 8 + 4$
(e) $3 \times 5 + 2 = 8 + 9$ (f) $1 + \frac{25}{5} = 6$

2 (a) False (b) False (c) False (d) True
(e) True (f) True (g) False (h) True
(i) True

3 (a) D (b) C (c) B

4 (a) $5 + 43 = 48$ (b) $3 \times 7 = 19 + 2$
(c) $\frac{50}{5} = 5 \times 2$ (d) $20 - (6 + 8) = \frac{12}{2}$

5 (a) $13 - 19 = 6$ False
(b) $\frac{4}{2} = 8$ False
(c) $8 - 11 = 6 - 3$ False
(d) $\frac{12}{4} = \frac{15}{5}$ True

6 $5 + 7 = 12$

7 $6 \times 60 = 4 \times 90$

8 \$25 + \$7 = \$32

9 $48 - 11 + 5 = 42$

10 (a) $16 + 17 = 33$
(b) $17 + 18 + 19 = 54$

11 (a) $\frac{60}{3} = 20$ cm (b) $\frac{60}{4} = 15$ cm
(c) $\frac{60}{5} = 12$ cm (d) $\frac{60}{6} = 10$ cm
(e) Divide 60 by 20 (f) Divide 200 by 50
(g) Three from: 5, 10, 20, 25, 50 and 100

Open-ended – Sample answers

12 $8 + 1 + 2 - 4 = 7$, $8 \times 1 - 4 + 2 = 6$, $8 - \frac{4}{2} + 1 = 7$

13 72, 80, 88, 96, 104

14 $5 + 6 \times 3 - 3 = 20$; $1 + 3 \times 8 - 5 = 20$; $6 + 4 \times 5 - 6 = 20$

15 Ruben is correct. Sam added four before multiplying; which is incorrect. The order of operations should always be followed.

16 Differences need to be kept the same on both sides. Because 12 is 4 less than 16, the missing number must also be 4 less than 38. Therefore, the first solution is correct.

Exercise 7.2 (p. 384)

1 (a) Three added to a number is equal to ten.
(b) A number added to four is equal to seven.
(c) Five added to a number is equal to six.
(d) Two subtracted from a number is equal to four.
(e) Seven subtracted from a number is equal to two.
(f) Eight subtracted from a number is equal to six.
(g) A number multiplied by five is equal to twenty.
(h) A number multiplied by seven is equal to fourteen.
(i) A number multiplied by seven is equal to twenty-one.
(j) A number divided by three is equal to four.
(k) A number divided by two is equal to six.
(l) A number divided by six is equal to twelve.

(m) Three times a number added to two is equal to seven.

(n) Six times a number added to two is equal to ten.

(o) Three times a number added to one is equal to eight.

2 (a) Yes (b) No (c) Yes (d) Yes (e) No

(f) Yes (g) No (h) Yes (i) Yes (j) No

(k) Yes (l) No (m) No (n) No (o) Yes

(p) Yes (q) Yes (r) No

3 (a) $x = 4$ (b) $x = 7$ (c) $x = 7$ (d) $x = 29$

(e) $x = 17$ (f) $x = 64$ (g) $x = 18$ (h) $x = 6$

(i) $x = -4$ (j) $x = 76$ (k) $x = 120$ (l) $x = 162$

4 D

5 (a) D (b) C (c) D

6 (a) B (b) D (c) D

7 (a) C (b) A (c) D

8 (a) $x = 10$ (b) $x = 4$ (c) $x = 11$

9 (a) D is Daniel's age.

(b) $D - 3$

(c) $D + 12$

(d) $D + 12 = 32$, Daniel is 20 years old.

10 (a) C is the amount of money Cameron has in his wallet.

(b) $C - 14$

(c) $C - 14 + 5 = 23$, Cameron had $32 to start with.

Open-ended – Sample answers

11 (a) $3c = 36$ (b) $3c = 27$ (c) 9 years old

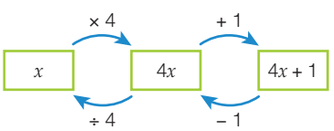
12 (a) Sean started with 14 marbles. He gave a number to his friend Sasha and was left with 11 marbles.

(b) Tali and 4 of her friends shared a packet of lollies equally between them. They received 12 lollies each.

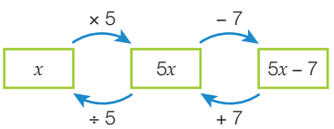
(c) The number of leaves on a tree multiplied by 6 to give 108 leaves in the early days of spring.

Exercise 7.3 (p. 391)

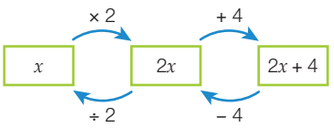
1 (a)



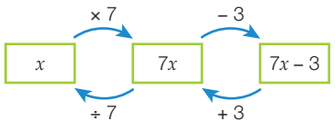
(b)



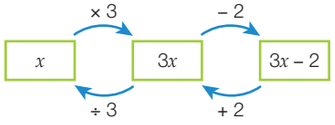
(c)



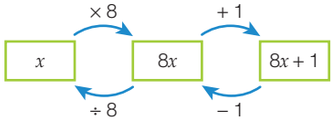
(d)



(e)



(f)



2 (a) (i) $3x - 1 = 11$ (ii) $x = 4$

(b) (i) $2x - 3 = 7$ (ii) $x = 5$

(c) (i) $\frac{x+5}{4} = 4$ (ii) $x = 11$

(d) (i) $\frac{x+7}{2} = 8$ (ii) $x = 9$

(e) (i) $\frac{x}{6} + 7 = 9$ (ii) $x = 12$

(f) (i) $\frac{x}{3} + 8 = 13$ (ii) $x = 15$

(g) (i) $\frac{x-3}{5} = 1$ (ii) $x = 8$

(h) (i) $\frac{x-2}{7} = 2$ (ii) $x = 16$

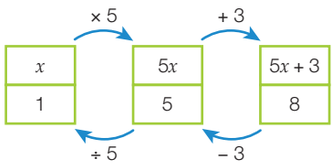
(i) (i) $2(x + 6) = 20$ (ii) $x = 4$

(j) (i) $5x - 9 = 16$ (ii) $x = 5$

(k) (i) $5(x + 2) = 30$ (ii) $x = 4$

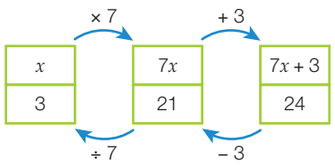
(l) (i) $7(x + 1) = 21$ (ii) $x = 2$

3 (a)



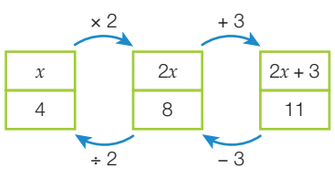
$x = 1$

(b)



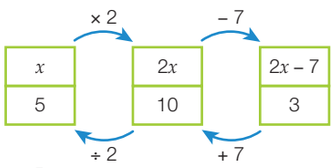
$x = 3$

(c)



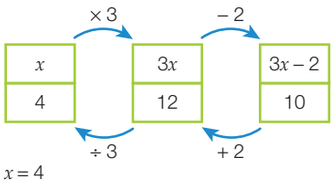
$x = 4$

(d)



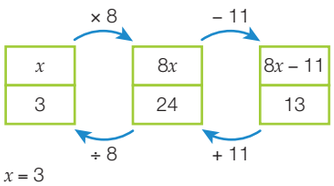
$x = 5$

(e)



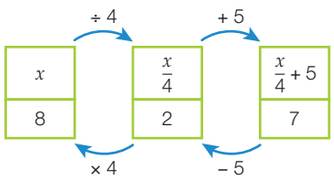
$x = 4$

(f)



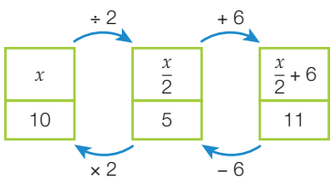
$x = 3$

4 (a)



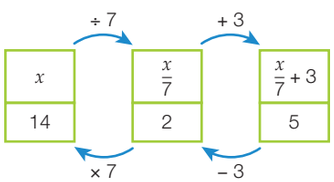
$x = 8$

(b)



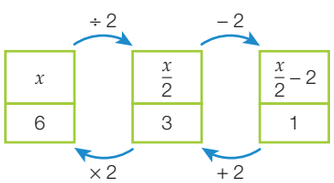
$x = 10$

(c)



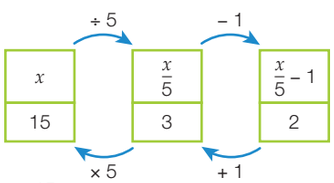
$x = 14$

(d)



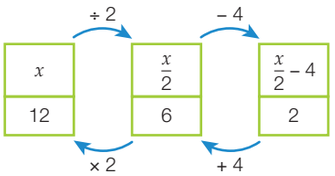
$x = 6$

(e)



$x = 15$

(f)



$x = 12$

5 (a) $x = 3$ (b) $x = 5$ (c) $x = 2$ (d) $x = 8$
(e) $x = 7$ (f) $x = 6$

6 (a) $x = 1$ (b) $x = 3$ (c) $x = 4$ (d) $x = 7$
(e) $x = 11$ (f) $x = 13$

7 (a) $x = 5$ (b) $x = 3$ (c) $x = 1$ (d) $x = 4$
(e) $x = 2$ (f) $x = 2$ (g) $x = 3$ (h) $x = 5$
(i) $x = 3$ (j) $x = 10$ (k) $x = 14$ (l) $x = 15$
(m) $x = 6$ (n) $x = 14$ (o) $x = 7$

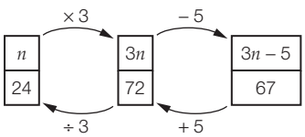
8 (a) $x = 4$ (b) $x = 5$ (c) $x = 6$ (d) $x = 5$
(e) $x = 14$ (f) $x = 4$ (g) $x = 11$ (h) $x = 2$
(i) $x = 24$

9 B

10 (a) $2n + 1 = 43$, $n = 21$ (b) $\frac{n+4}{5} = 4$, $n = 16$

(c) $\frac{7n}{3} = 21$, $n = 9$ (d) $\frac{2n+6}{10} = 2$, $n = 7$

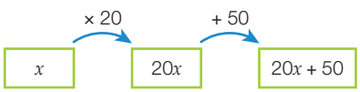
11 $3n - 5 = 67$



There were 24 pencils in each packet.

12 (a)

(b)

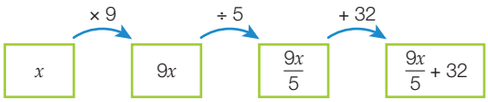


(c) Ying: \$50 Aldo: \$70 (d) $2\frac{1}{2}$ hours

(e) $2\frac{1}{4}$ hours (f) 3 hours

Open ended – Sample answers

13 (a)



(b) 5, 10, 15, 20, ...

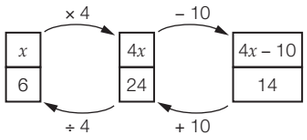
14 $\frac{2x+4}{6} + 6 = 10$

Half-time 7 (p. 395)

1 $x = 84$

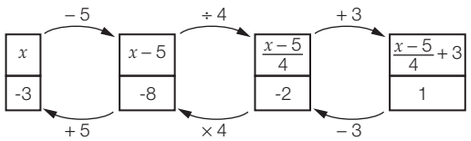
2 4 metres

3 (a)



$x = 6$

(b)



$x = -3$

4 $21 + 22 = 43$

5 (a) (i) $J - 5 = 7$ (ii) 12

(b) (i) $d + 4 = 16$ (ii) 12

6 (a) $x = \frac{7}{3}$ **(b)** $x = -16$ **(c)** $x = 13$

7 A number is multiplied by 5 and has 3 added to it. The result is 23.

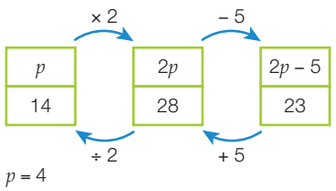
8 (a) $3 + 8 = 11$ **(b)** $4 \times 5 = 26 - 6$ **(c)** $4 + \frac{28}{2} = 18$

9 20 cm

10 (a) False **(b)** True **(c)** True

11 (a) $p - 5$ **(b)** $2p - 5 = 23$

(c)



$p = 4$

Pete's age = 14
Sam's age = 9

Exercise 7.4 (p. 399)

1 (a) right-hand side (RHS)

(b) Take one chocolate from the RHS.

(c) Take 4 chocolates from the RHS.

(d) 9 chocolates **(e)** 3 chocolates

2 (a) $x + 8 = 11$ **(b)** $x + 9 = 17$ **(c)** $x + 7 = 13$

(d) $2x + 1 = 9$ **(e)** $3x = 5$ **(f)** $6x + 3 = 9$

3 (a) $x = 1$ **(b)** $x = 4$ **(c)** $x = 2$ **(d)** $x = 5$

(e) $x = 7$ **(f)** $x = -1$ **(g)** $x = 8$ **(h)** $x = 1$

(i) $x = 3$ **(j)** $x = 5$ **(k)** $x = 5$ **(l)** $x = 8$

(m) $x = 12$ **(n)** $x = 7$ **(o)** $x = 8$ **(p)** $x = 10$

(q) $x = 20$ **(r)** $x = 11$ **(s)** $x = 12$ **(t)** $x = 6$

(u) $x = 7$

4 D

5 (a) $2t + 12 = 104$ **(b)** 46 kg

6 (a) $3p + 18 = 30$ **(b)** $p = 4$

7 34 km

8 1.25 L

Open-ended – Sample answers

9 $5x = 10$, $5x + 5 = 15$, $5x + 9 = 19$

10 (a) Vejay subtracted the 3 too early. He should have done it after multiplying by 7. The order was wrong.

(b)

$$\frac{2x+3}{7} = 3$$

$$\frac{2x+3}{7} \times 7 = 3 \times 7$$

$$2x + 3 = 21$$

$$2x + 3 - 3 = 21 - 3$$

$$2x = 18$$

$$\frac{2x}{2} = \frac{18}{2}$$

$$x = 9$$

(c) He could use a flowchart to work out the order of operations used to 'build up' the equation. He should then work backwards along the flowchart, using the inverse operations, to solve the equation.

Exercise 7.5 (p. 407)

1 (a) $x + 20 = 95$, the ice-cream costs 75 cents.

(b) $t + 1.5 = 12.8$, Tony ran the 100 m in 11.3 seconds.

2 (a) $2d + 1.6 = 8$, a sushi roll costs \$3.20.

(b) $3v + 21.5 = 59$, a DVD costs \$12.50.

3 (a) D **(b)** There are 27 seats available.

4 (a) C **(b)** The total length of the roll of fabric is 15 m.

5 (a) D **(b)** The width of the vegetable garden is 2.5 m.

6 (a) $x + 1.5$

(b) $x + 1.5 = 5.7$; $x = 4.2$; The salad sandwich costs \$4.20.

7 (a) $4x$

(b) $4x = 84$; $x = 21$; The length of the floor tile is 21 cm.

8 (a) $4x + 6$

(b) $4x + 6 = 62$; $x = 14$; Fourteen tables that seat four people each are needed.

9 $3h + 5 = 14$; $h = 3$; Natalie rollerskated on the rink for three hours.

10 $2x - 54 = 272$; $x = 163$; at age 5, Robert Wadlow's height was 163 cm.

11 (a) $8d + 15 = 63$
$d = 6$ days

(b) $48d + 15 = 111$
$d = 2$ days

(c) $13d + 15 + 24d + 15 = 178$
$d = 4$ days

12

		Length of footpath	Number of pieces of wood	
(a)	(i)	2 m	6	$(2 \times 2 + 2)$
	(ii)	3 m	8	$(2 \times 3 + 2)$
	(iii)	4 m	10	$(2 \times 4 + 2)$

(b) A footpath of length x metres would need $(2 \times x + 2)$ or $(2x + 2)$ pieces of wood.

(c) (i) 14 (ii) 22 (iii) 28

(d) If x is the length of the footpath, then the equation to solve is $2x + 2 = 36$. The longest footpath which could be poured at the one time is 17 metres in length.

Open-ended – Sample answers

13 1 hour jackhammer ($30) plus 6 hours mulcher ($132) = $162

14 $x + 5x \leq 70$
The son is 10 and the father is 50.

Mathspace (p. 412)

Practice session 1

1 $x = 3$ **2** $x = 4$
3 $x = 1$ **4** $x = 5$
5 $x = 3$ **6** $x = 6$
7 $x = 4$ **8** $x = 10$
9 $x = 3$ **10** $x = 8$

Practice session 2

1 $x = 1$ **2** $x = 8$
3 $x = 7$ **4** $x = 10$
5 $x = 6$ **6** $x = 6$
7 $x = 9$ **8** $x = 14$
9 $x = 9$ **10** $x = 30$

Practice session 3

1 $x = 1$ **2** $x = 5$
3 $x = 23$ **4** $x = 15$
5 $x = 10$ **6** $x = 6$
7 $x = 4$ **8** $x = 22$

Challenge 7 (p. 414)

1 A $49 - 15 = 34$
$34 \times 2 = 68$

2 $x + 40 + x + 40 + x + 40 = 360$, $3x + 120 = 360$, $3x = 240$, $x = 80$

3 $\frac{3x - 5}{4} = -6$, $3x - 5 = -24$, $3x = -19$, $x = -\frac{19}{3}$

4 B $x = 73 + y - 59$, $x = 14 + y$

5 (a) $3^2 = 4 + 5$

(b) $4^2 = 7 + 9$, $2^4 = 7 + 9$, $2^3 + 1 = 9$, $3^2 = 1 + 8$, $3^2 = 0 + 9$

(c) $2^3 = 9 - 1$, $3^2 = 9 - 0$, $3^2 - 5 = 4$, $3^2 - 4 = 5$, $4^2 - 9 = 7$

6 D Reciprocal of $\frac{1}{20}$ is 20. $\frac{4x}{5} = 20$, $x = 25$

7 $\frac{5 + 4}{20} + \frac{1}{y} = 1$, $\frac{1}{y} = 1 - \frac{9}{20}$, $\frac{1}{y} = \frac{11}{20}$, $y = \frac{20}{11}$

8 Let him buy x of each stamp.
$0.55x + 1.1x = 80.85$
$1.65x = 80.85$, $x = 80.85 \div 1.65 = 49$
He bought 98 stamps.

9 $\frac{1}{4} \times \frac{9}{10}x = 2700$, $x = 300 \times 40 = \$12\,000$

10 $\frac{1}{3} - \frac{1}{4} = \frac{1}{4} - \frac{1}{m}$, $\frac{1}{m} = \frac{1}{4} + \frac{1}{4} - \frac{1}{3}$, $\frac{1}{m} = \frac{1}{2} - \frac{1}{3}$, $\frac{1}{m} = \frac{1}{6}$, $m = 6$

11 C The integers end in 2 and 5, 4 and 5, or 8 and 5. As $a > b$, consider $12 - 5 = 7$, $5 - 2 = 3$, $14 - 5 = 9$, $5 - 4 = 1$, $15 - 8 = 7$, $8 - 5 = 3$. $a - b$ ends in 1, 3, 7 or 9.

Chapter review 7 (p. 415)

1 (a) $7 \times 4 = 30 - 2$ (b) $2 \times 4 + 6 = 9 + 5$

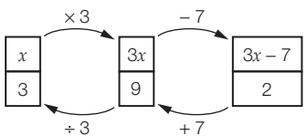
2 (a) 15 (b) 28

3 (a) $x = 9$ (b) $x = 3$ (c) $x = 15$ (d) $x = 15$
(e) $x = 12$ (f) $x = 28$

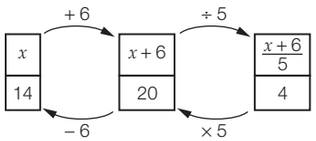
4 (a) $x = -3$ (b) $x = 84$ (c) $x = 9$

5 (a) -5 (b) $\times 3$ (c) $\div 8$ (d) $+4$

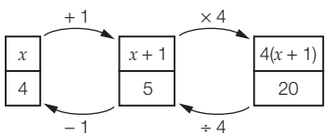
6 (a) $x = 3$



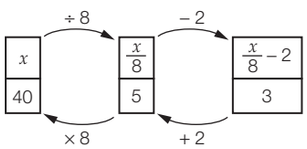
(b) $x = 14$



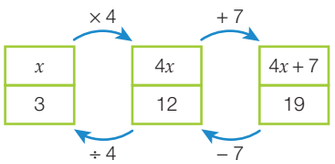
(c) $x = 4$



(d) $x = 40$

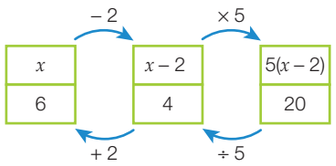


7 (a)



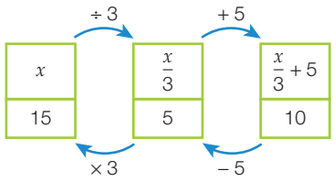
Solution is $x = 3$.

(b)



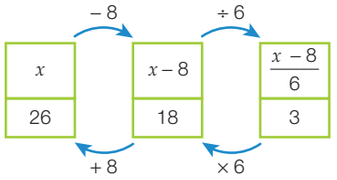
Solution is $x = 6$.

(c)



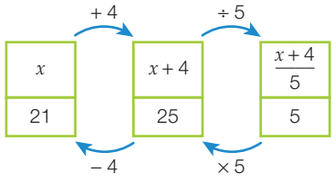
Solution is $x = 15$.

(d)



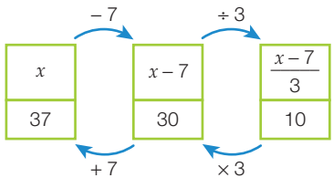
Solution is $x = 26$.

(e)



Solution is $x = 21$.

(f)



Solution is $x = 37$.

8 B

9 $5t + 27.50 = 200$, $t = \$34.50$

10 D

11 **(a)** $C = 3x + 140$

(b) $275 = 3x + 140$, $x = 45$ cents

Each dim sim costs 45 cents.

12 $t + 5 = 28$
$t = 23°C$

The temperature at 3 p.m. was 23°C.

13 **(a)** 5 **(b)** 7

(c) $2n + 1$ = number of matchsticks

(d) **(i)** $2n + 1 = 97$ **(ii)** $n = 48$

NAPLAN practice 7

1 C **2** D **3** D **4** C

5 A **6** B **7** B **8** C

Chapter 8

Recall 8 (p. 420)

1 **(a)** 55° **(b)** 160° **(c)** 235° **(d)** 339°

2 D, A, B, E, C, F

3 A and E, B and F, C and D

Exercise 8.1 (p. 424)

1 **(a)** 102° **(b)** 71° **(c)** 129° **(d)** 225°

(e) 350° **(f)** 15°

2 Students' own answers.

3 **(a)** C **(b)** B **(c)** D

4 **(a)** B **(b)** B **(c)** D

5 C **6** 21° **7** 40°

8 Draw a 40° angle and mark the reflex angle as 320°.

9 **(a)** 330° **(b)** 245° **(c)** 200°

10 Students' own answers.

11 Students' own answers.

Open-ended – Sample answers

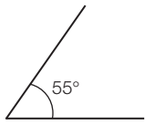
12 Students' own answers.

13 Nick has used the incorrect scale on his protractor. He should start from 0 on one arm and follow around the scale to the second arm.

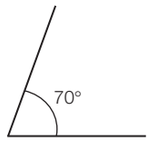
14 **(a)** 20°, 70° **(b)** 30°, 100°, 50°

(c) 110°, 120°, 80°, 50°

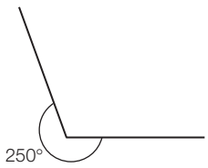
15 **(a)**



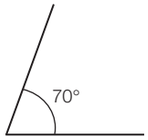
(b)



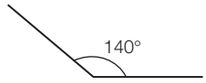
(c)



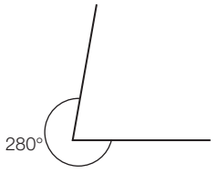
16 **(a)**



(b)



(c)



Exercise 8.2 (p. 432)

1 (a) straight (b) reflex (c) obtuse
(d) reflex (e) acute (f) acute
(g) acute (h) obtuse (i) revolution
(j) revolution (k) right (l) straight
(m) obtuse (n) straight (o) right
(p) right (q) revolution (r) reflex

2 (a) acute (b) obtuse
(c) reflex (d) revolution
(e) straight (f) acute
(g) right (h) obtuse
(i) reflex

3 (*Note:* Other forms of notation may be used.)
(a) $\angle QPR$ or $\angle RPQ$ (b) $\angle STD$ or reflex angle $\angle DTS$
(c) $\angle BOA$ or $\angle AOB$ (d) $\angle KIW$ or $\angle WIK$
(e) $\angle SHD$ or $\angle DHS$ (f) $\angle CAT$ or $\angle TAC$

4 (a) D (b) C (c) C (d) D

5 D

6 (a) (i) Students' own answers.
(ii) 360° (iii) revolution
(b) (i) Students' own answers.
(ii) 90° (iii) right angle
(c) (i) Students' own answers.
(ii) 180° (iii) straight angle
(d) (i) Students' own answers.
(ii) 360° (iii) revolution
(e) (i) Students' own answers.
(ii) 90° (iii) right angle
(f) (i) Students' own answers.
(ii) 180° (iii) straight angle

7 (a) $\angle AOD$ and $\angle AOC$ or $\angle AOC$ and $\angle BOC$ or $\angle AOD$ and $\angle BOD$ or $\angle BOC$ and $\angle BOD$
(b) $\angle AOD$ and $\angle COB$ or $\angle AOC$ and $\angle DOB$

8 C

9 (a) $\angle AOB$, $\angle BOC$, $\angle DOE$
(b) $\angle AOE$, $\angle BOD$, $\angle COE$
(c) $\angle AOB$ (reflex), $\angle AOC$ (reflex), $\angle AOE$ (reflex), $\angle BOC$ (reflex), $\angle BOD$ (reflex), $\angle COD$ (reflex), $\angle COE$ (reflex), $\angle DOE$ (reflex)
(d) $\angle AOC$, $\angle COD$
(e) $\angle AOD$, $\angle BOE$
(f) $\angle AOB$ & $\angle BOC$, $\angle BOC$ & $\angle DOE$
(g) $\angle AOB$ & $\angle BOD$, $\angle AOC$ & $\angle COD$, $\angle AOE$ & $\angle DOE$, $\angle BOC$ & $\angle COE$, $\angle BOD$ & $\angle DOE$
(h) $\angle AOB$ & $\angle DOE$, $\angle AOE$ & $\angle BOD$

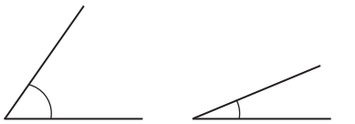
10 (a) 334°
(b) $\angle RMS$ could be an acute angle.

11 (a) $\angle B$ could refer to a number of angles.
(b) $\angle ABC$, $\angle CBD$
(c) $\angle ABD$
(d) $\angle ABD$ (reflex) or $\angle ABC$ (reflex) or $\angle CBD$ (reflex)

12 Students to provide accurate copies of the figures in the textbook.

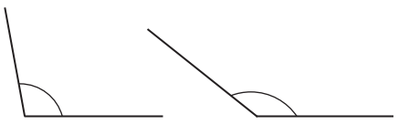
Open-ended – Sample answers

13 (a)



(b)

(c)



14 (a) 25° and 65°, 12° and 78°
(b) 112° and 68°, 92° and 88°

15 The angles given must add to 360°; 45°, 150° and 165°; 205°, 60° and 95°

Exercise 8.3 (p. 437)

1 (a) 60° (b) 10° (c) 14° (d) 23°
(e) 56° (f) 63° (g) 150° (h) 60°
(i) 175° (j) 69° (k) 53° (l) 38°

2 (a) 270° (b) 120° (c) 313° (d) 50°
(e) 145° (f) 202° (g) 50° (h) 245°
(i) 138° (j) 70° (k) 143° (l) 31°

3 (a) 33° (b) 51° (c) 172° (d) 94° (e) 89° (f) 20°

4 (a) 63° (b) 45° (c) 22° (d) 75°

5 (a) 148° (b) 90° (c) 56° (d) 4°

6 87°

7 (a) 57° (b) 45° (c) 65°

8 A

9 (a) $x° = 101°$ (vertically opposite to 101°)
$y° = z° = 79°$ (supplementary to 101°)
(b) $x° = 88°$ (vertically opposite to 88°)
$y° = z° = 92°$ (supplementary to 88°)
(c) $x° = z° = 149°$ (supplementary to 31°)
$y° = 31°$ (vertically opposite to 31°)

10 **(a)** 60° (a straight line is 180°)

(b) 45° (a straight line is 180°)

(c) 30° (a right angle is 90°)

(d) 40° (a right angle is 90°)

(e) 50° (a straight line is 180°)

(f) 30° (a right angle is 90°)

(g) 120° (a revolution is 360°)

(h) 72° (a revolution is 360°)

(i) 75° (a revolution is 360°)

11 **(a)**

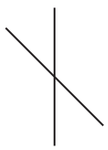
	Left leg	Right leg
a	90°	91°
b	90°	89°
c	90°	89°
d	90°	91°
e	92°	80°
f	88°	100°
g	88°	100°
h	92°	80°

(b) right leg **(c)** Yes, the differences are 11°.

Open-ended – Sample answers

12 Sabine did not use the information given in the question. She should have used the property that angles at a point add to 360°, but instead used her protractor. The key is that the diagram is not drawn accurately.

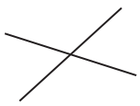
13 **(a)**



(b) 45° and 135°

(c) 45° and 135°

14



Both angles are 120°

Exercise 8.4 (p. 445)

1 **(a)** corresponding **(b)** alternate

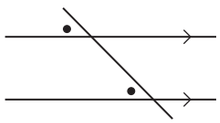
(c) co-interior **(d)** co-interior

(e) co-interior **(f)** corresponding

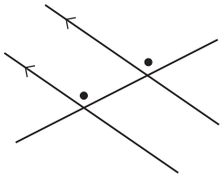
(g) alternate **(h)** corresponding

(i) alternate

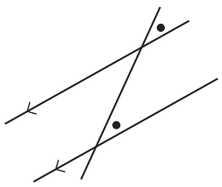
2 **(a)**



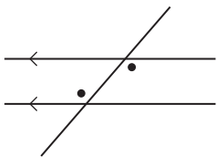
(b)



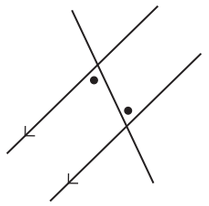
(c)



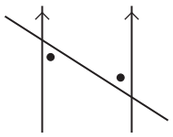
3 **(a)**



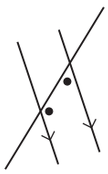
(b)



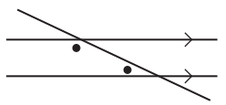
(c)



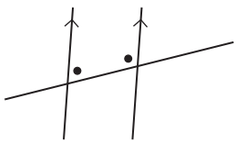
4 **(a)**



(b)



(c)



5 C

6 **(a)** **(i)** $b° = 135°$, $a° = 45°$ (co-interior)

(ii) $s° = 140°$, $t° = 140°$ (corresponding)

(iii) $m° = 130°$, $n° = 130°$ (alternate)

(iv) $e° = 151°$, $f° = 151°$ (alternate)

(v) $g° = 72°$, $h° = 72°$ (corresponding)

(vi) $x° = 144°$, $y° = 36°$ (co-interior)

(b) **(ii)**, **(iii)**, **(iv)** and **(v)** have pairs that are equal; **(i)** and **(vi)** have pairs that add to 180°.

7 **(a)** $y°$ **(b)** $w°$ **(c)** $u°$ **(d)** $v°$ **(e)** $s°$ **(f)** $x°$

8 **(a)** $a° = 37°$ (alternate angles)

(b) $c° = 110°$ (corresponding angles)

(c) $g° = 24°$ (co-interior angles)

(d) $b° = 100°$ (co-interior angles)

(e) $d° = 73°$ (alternate angles)

(f) $e° = 141°$ (corresponding angles)

(g) $f° = 115°$ (corresponding angles)

(h) $j° = 72°$ (co-interior angles)

(i) $h° = 97°$ (alternate angles)

9 18°

10 144°

11 *EF* and *GH*. Co-interior angles are supplementary.

12 **(a)** 16 **(b)** 8 **(c)** 8

13 **(a)** $a° = 146°$ (vertically opposite angle),
$b° = 34°$ (co-interior angle)

(b) $a° = 62°$ (alternate angle),
$b° = 62°$ (vertically opposite angle),
$c° = 28°$ (angles in a right angle)

(c) $a° = 80°$ (alternate angle),
$b° = 80°$ (corresponding angle),
$c° = 80°$ (corresponding angle),
$d° = 80°$ (vertically opposite angle)

(d) $a° = 44°$ (alternate angle),
$b° = 46°$ (angles in a right angle)

(e) $a° = 50°$ (co-interior angle),
$b° = 50°$ (angles in a straight line)

(f) $a° = 45°$ (alternate angle),
$b° = 135°$ (co-interior angle),
$c° = 95°$ (co-interior angle),
$d° = 95°$ (vertically opposite angle)

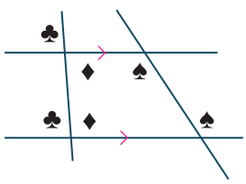
(g) $a° = 37°$ (alternate angle),
$b° = 37°$ (vertically opposite angle)

(h) $a° = 116°$ (co-interior angle),
$b° = 104°$ (co-interior angle),
$c° = 104°$ (vertically opposite angle)

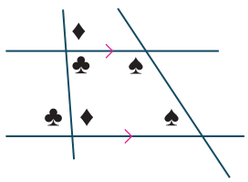
(i) $a° = 84°$ (alternate angle),
$b° = 96°$ (angles in a straight line),
$c° = 74°$ (co-interior angle),
$d° = 74°$ (vertically opposite angle)

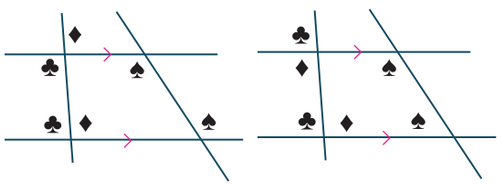
Open-ended – Sample answers

14 **(a)**



(b) Three:





15 Perspective: in a 2D representation of a 3D situation the parallel lines appear to converge on the horizon to give the impression of depth.

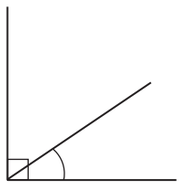
Half-time 8 (p. 449)

1 **(a)**

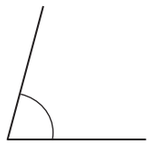
(b)

(c)

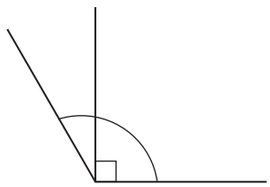
(d) About 30° is about one-third of a right angle.



(e) 75° is five-sixths of a right angle.



(f) 120° is 90° + 30°.



2 **(a)** $\angle BOC$ (or $\angle COB$), $\angle DOC$ (or $\angle COD$)

(b) $\angle BOA$ (or $\angle AOB$), $\angle AOD$ (or $\angle DOA$), $\angle BOD$ (or $\angle DOB$)

(c) $\angle BOA$

3 Students are required to draw angles for this question. The sizes match the diagrams in Question **1**.

4 **(a)** $x = 55°$ (Angles in a straight line add to 180°.)

(b) $x = 35°$ (Angles in a revolution add to 360°.)

5 30°

6 **(a)** $a = 67°$ (Alternate angles are equal.)

(b) $y = 57°$ (Co-interior angles add to 180°.)

7 **(a)** $\angle GEB$ **(b)** $\angle GDF$ **(c)** $\angle DFI$ **(d)** $\angle HGI$

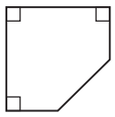
Exercise 8.5 (p. 453)

1 **(a)** pentagon (convex) **(b)** triangle (convex)
(c) hexagon (convex) **(d)** nonagon (convex)
(e) octagon (concave) **(f)** dodecagon (concave)
(g) decagon (concave) **(h)** hexagon (concave)
(i) hexagon (concave)

2 **(a)** C **(b)** C

3 **(a)** octagon **(b)** dodecagon
(c) pentagon **(d)** hexagon

4 3



5 **(a)** 3

(b) 4 and 5. The pattern is: divide the number of sides by 2.

(c) No, a pentagon and a heptagon have an odd number of sides, so they cannot be paired.

Open-ended – Sample answers

6 **(a)**  **(b)**  **(c)** 

7 50-cent piece (dodecagon), stop sign (octagon), soccer ball (pentagons & hexagons)

Exercise 8.6 (p. 461)

1 **(a)** **(i)** scalene **(ii)** obtuse **(iii)** an obtuse-angled scalene triangle

(b) **(i)** isosceles **(ii)** acute **(iii)** an acute-angled isosceles triangle

(c) **(i)** isosceles **(ii)** right **(iii)** a right-angled isosceles triangle

(d) **(i)** isosceles **(ii)** acute **(iii)** an acute-angled isosceles triangle

(e) **(i)** equilateral **(ii)** acute **(iii)** an acute-angled equilateral triangle

(f) **(i)** scalene **(ii)** obtuse **(iii)** an obtuse-angled scalene triangle

(g) **(i)** equilateral **(ii)** acute **(iii)** an acute-angled equilateral triangle

(h) **(i)** scalene **(ii)** right **(iii)** a right-angled scalene triangle

(i) **(i)** isosceles **(ii)** obtuse **(iii)** an obtuse-angled isosceles triangle

(j) **(i)** scalene **(ii)** right **(iii)** a right-angled scalene triangle

(k) **(i)** isosceles **(ii)** obtuse **(iii)** an obtuse-angled isosceles triangle

(l) **(i)** scalene **(ii)** acute **(iii)** an acute-angled scalene triangle

2 **(a)** 60° **(b)** 30° **(c)** 35° **(d)** 83° **(e)** 132° **(f)** 22° **(g)** 14° **(h)** 38° **(i)** 48°

3 **(a)** **(i)** 120° **(ii)** 137° **(iii)** 75° **(iv)** 165° **(v)** 151° **(vi)** 138° **(vii)** 133° **(viii)** 146° **(ix)** 129°

(b) **(i)** 40° **(ii)** 30° **(iii)** 74° **(iv)** 43° **(v)** 126° **(vi)** 38°

4 **(a)** isosceles, acute-angled **(b)** scalene, acute-angled **(c)** scalene, acute-angled **(d)** equilateral, acute-angled **(e)** equilateral, acute-angled **(f)** scalene, acute-angled **(g)** isosceles, acute-angled **(h)** isosceles, acute-angled **(i)** scalene, right-angled

5 **(a)** D **(b)** A **(c)** B

6 B

7 **(a)** C **(b)** A

8 **(a)** isosceles; obtuse-angled, $a = 25°$

(b) scalene; right-angled, $b = 35°$

(c) equilateral, $c = 30°$

(d) scalene; right-angled, $a = 21°$

(e) scalene; right-angled, $b = 58°$

(f) isosceles; acute-angled, $c = 48°$

(g) isosceles; obtuse-angled, $d = 130°$

9 isosceles, right-angled

10 **(a)** all sides equal

(b) Two angles will be 60°, the other two will be 120°

11 No, the three sides won't be able to meet.

12 two

13 **(a)** right-angled, scalene (third angle 90°)

(b) obtuse-angled, isosceles (third angle 28°)

(c) acute-angled, equilateral (third angle 60°)

(d) obtuse-angled, isosceles (third angle 156°)

14 **(a)** Angles add up to more than 180° (i.e. 190°).

(b) Angles add up to 165° – must be 180°.

(c) Isosceles triangles must have 2 equal angles

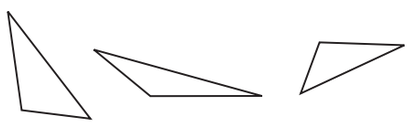
15 **(a)** $a = 65°$, $b = 135°$

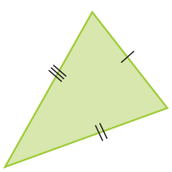
(b) $c = 100°$

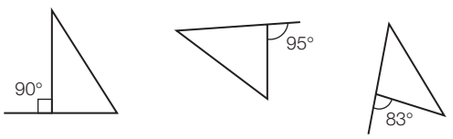
(c) $d = 57°$, $e = 57°$, $f = 66°$

16 360°

Open-ended – Sample answers

17 

18 **(a)**  **(b)** 

19 

Exercise 8.7 (p. 467)

1 **(a)** rectangle **(b)** parallelogram **(c)** kite
(d) rhombus **(e)** trapezium **(f)** quadrilateral

2 A

3 **(a)** True **(b)** False **(c)** True **(d)** False **(e)** True

4 **(a)** 77° **(b)** 87° **(c)** 54° **(d)** 55° **(e)** 69°
(f) 133° **(g)** 138° **(h)** 125° **(i)** 205°

5 **(a)** D **(b)** C **(c)** C

6 **(a)** 40° **(b)** 105° **(c)** 68° **(d)** 73° **(e)** 197°
(f) 19° **(g)** 60° **(h)** 131° **(i)** 78°

7 **(a)** trapezium **(b)** rhombus
(c) kite **(d)** parallelogram

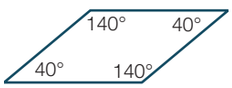
8 **(a)** $a = 70°$, angles in a quadrilateral add to 360°

(b) $b = 97°$, one pair of opposite angles in a kite are equal and angles add to 360°

(c) $c = 99°$, co-interior angle

(d) $d = 38°$, co-interior angle

9



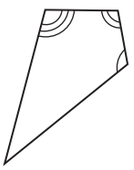
10 105°

11 Parallelograms have opposite sides parallel and equal in length, which is also the case for a rhombus. However, a rhombus has all sides equal, and that is not necessarily true for all parallelograms.

12 No, a parallelogram must have two pairs of parallel sides whereas a trapezium must only have one pair of parallel sides.

13 Yes, rectangles have all the properties of a parallelogram and more. Most parallelograms do not have 90° angles.

14 **(a)** three



(b) one

15 **(a)** 128° **(b)** kite or irregular quadrilateral

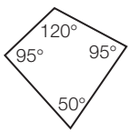
16 No. Sum of angles in a quadrilateral = 360°, not 370°.

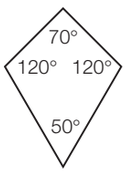
17 **(a)** 4 right angles

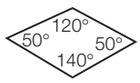
(b) 4 equal sides

(c) opposite sides are parallel

18





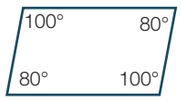


Open-ended – Sample answers

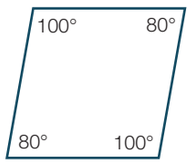
19 **(a)** Parallelogram, rhombus, kite, trapezium, or irregular quadrilateral.

(b) Five—**(i)** parallelogram, **(ii)** rhombus, **(iii)** kite, **(iv)** trapezium, or **(v)** irregular quadrilateral.

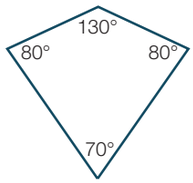
(c) **(i)**



(ii)

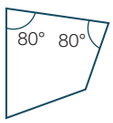


(iii)

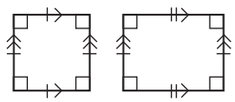


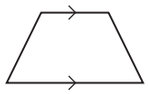
(iv)

(v)



20 Jack's diagrams lack important angle symbols, congruent and parallel line marking.





21 Parallelograms: rectangle, square, diamond, rhombus, parallelogram

Non-parallelograms: irregular quadrilateral, trapezium, kite

Mathspace (p. 472)

1 Flying thing into volcano catapulted hit large moogal paw squashed flying thing. (The ship crashed into the volcano. It catapulted out and hit a large moogal, whose paw squashed the ship.)

2 **(a)** **(i)** C

(ii) A Kwoogal is a quadrilateral containing two black circles and one clear circle.

(b) A, B & E

Fuel cells

$a = 110°$, $b = 80°$, $e = 130°$

Neutron absorber

$s = 70°$

Black hole combustion unit

$g = 25°$, $h = 100°$, $t = 335°$, $y = 155°$

Exercise 8.8 (p. 477)

1 Follow Worked Example 9 instructions to bisect a line and an angle.

2 (a) Follow Worked Example 10(a) instructions to construct an equilateral triangle.

(b) Follow Worked Example 10(b) instructions to construct a square.

3 Follow Worked Example 11 instructions to construct an angle equal to another angle and a pair of parallel lines.

4 (a) Follow the worked example instructions for bisecting a line to construct a 90° angle.

(b) Bisect the 90° angle to make a 45° angle.

5 (a) Follow the worked example instructions for constructing an equilateral triangle to construct a 60° angle.

(b) Bisect the 60° angle to make a 30° angle.

(c) Begin with a 10 cm line and follow the worked example instructions for bisecting a line.

6 Construct pairs of parallel lines.

7 Begin with an 8 cm line. Construct angles of 60° and 90° at either end. Bisect both angles and join the bisectors to find the 3rd vertex of the triangle.

8 (a) Construct angles of 60° and 90° at the same end of the same line. Bisect the angle between the 60° and 90° angles to form a 75° angle with the initial line.

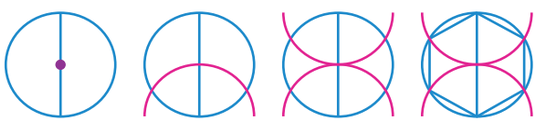
(b) Construct a 60° angle. Bisect this to give a 30° angle. Bisect the 30° angle to give a 15° angle.

(c) Construct a right angle. Bisect the adjacent right angle to give a 45° angle. The right angle and the 45° angle together form a 135° angle.

9 Using any base line of length less than 10 cm, open the compass 5 cm to make arcs from either end. Join the intersection of the arcs with the ends of the base line to construct your triangle.

10 Construct a square. Keep the compass at the same side length as the square, and use the sides of the square to construct an equilateral triangle on each side.

11 This construction works because we have constructed 6 equilateral triangles in which all the angles equal 60°.



12 This construction works because we have constructed a 90° angle, then bisected it to make a 45° angle. We have now divided the circle into 8 equal parts.

Open-ended – Sample answers

13 Use the base and sides of a polygon to start the construction of a new polygon.

Challenge 8 (p. 478)

1 B At 2.30, the hour hand is halfway between 2 and 3. Total angle is $90° + (30° \div 2) = 105°$.

2 $90° - 46° = 44°$. Small angle $= 44° \div 2 = 22°$, large angle $= 46° + 22° = 68°$.

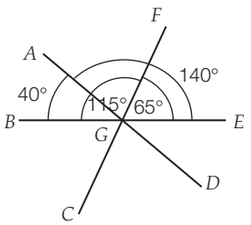
or: $90° \div 2 = 45°$, $46° \div 2 = 23°$. Small angle $= 45° - 23° = 22°$S, large angle $= 45° + 23° = 68°$.

3 $180° - 70° = 110°$. $x + x = 110°$, so $x = 55°$.

4 Draw the diagram and mark the angles on it. Use this information to work out the other angles.

From the diagram, you can get $\angle AGF = 75°$

$\angle CGD = 75°$ (vertically opposite $\angle AGF$)



5 $180° - 54° = 126°$. Small angle $= 126° \div 2 = 63°$, large angle $= 54° + 63° = 117°$.

6 D $6x° = 180°$, $x = 30°$; $y = 180° - 30° = 150°$

7 A $x = 180° - (30° + 40°) = 180° - 70° = 110°$

8 (a) At 12.10, the minute hand makes an angle of 60° with the vertical and the hour hand makes an angle of $\frac{1}{6} \times 30°$ or 5°. The angle between them is $60 - 5° = 55°$.

(b) 40 minutes later, the time is 12.50. The minute hand makes an acute angle of 60° with the vertical and the hour hand makes an angle of $\frac{5}{6} \times 30°$ or 25°. The angle between them is $60° + 25° = 85°$.

9 C $x + y = 110°$, $\angle KLM = 180° - 2x$, $\angle KML = 180 - 2y$
$\angle KLM + \angle KML = 360° - 2(x + y) = 360° - 220° = 140°$,
$\angle LKM = 40°$

Chapter review 8 (p. 480)

1 (a) 42° (b) 196° (c) 157° (d) 321°

2 (a) E (b) A (c) D (d) B (e) C (f) F

3 Students are required to draw angles for this question.

4 A

5 B

6 (a) reflex (b) revolution (c) straight
(d) acute (e) right (f) obtuse

7 (a) 163° (b) 39° (c) 127°
(d) 40° (e) 143° (f) 82°

8 (a) 136° (b) 112°

9 **(a)** irregular concave pentagon

(b) irregular convex heptagon

(c) irregular convex decagon

(d) regular concave dodecagon

10 80°

11 **(a)** 66° (angles in a quadrilateral add to 360°)

(b) 110° (opposite angles in a parallelogram are equal)

12 140°, missing angles are the equal angles in a kite.

13 Students' own diagrams.

14 292°

15 **(a)** 45° and 90°

(b) isosceles triangle

16 **(a)** 85° **(b)** 25° **(c)** 40°

17 **(a)** True **(b)** False **(c)** True **(d)** False **(e)** True

18 $\angle CFB = 90°$, vertically opposite angles are equal.
$x = 27°$, complementary angles add to 90°.

19 An obtuse angle.

20 A reflex angle.

21 An acute angle, a right angle or an obtuse angle.

NAPLAN practice 8

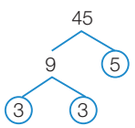
1 B **2** 150° **3** D **4** D

5 C **6** D

Mixed review D (p. 484)

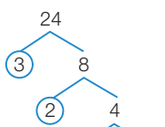
1 **(a)** $6a - 4b$ **(b)** $6a + 2b + 3c$

2 **(a)**



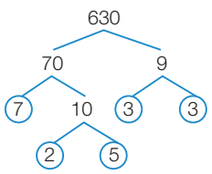
$3^2 \times 5$

(b)



$2^3 \times 3$

(c)



$2 \times 3^2 \times 5 \times 7$

3 **(a)** $\frac{3}{4}$ **(b)** $\frac{1}{2}$ **(c)** $\frac{3}{10}$ **(d)** $\frac{1}{25}$

4 **(a)** 0.253 **(b)** 2.437

5 **(a)** $x = -1$ **(b)** $x = -41$

6 **(a)** 46° **(b)** 39°

7 **(a)** $3\frac{19}{20}$ **(b)** $\frac{15}{16}$

8 **(a)** 137.7 cm^2 **(b)** 60 m^2

9 **(a)** Thursday **(b)** Wednesday **(c)** Friday

10 A **11** D **12** 11.25°

13 **(a)** 35° **(b)** 63°

14 150°, 210°

15 **(a)** Students' own answers.

(b) If they add to 360°, then they are likely to be correct.

(c) Dogs 110°, Cats 140°, Birds 30° and Fish 80°.

16 Second floor

17 $x = 45°$, $2x = 90°$, $3x = 135°$

18 **(a)** Students' own answers.

(b) Reflex angle.

(c) $\angle ABC$ (reflex)

19 Complementary angles: $\angle ABE$ & $\angle CBE$ (also $\angle ABE$ & $\angle BAE$, $\angle EBC$ & $\angle ECB$, $\angle BAE$ & $\angle BCE$, $\angle ECD$ & $\angle EDC$, $\angle EAD$ & $\angle EDA$).
Supplementary angles: $\angle AEB$ & $\angle CEB$, $\angle AED$ & $\angle CED$, $\angle AEB$ & $\angle AED$, $\angle CED$ & $\angle CEB$.
Vertically opposite angles: $\angle CEB$ & $\angle AED$, $\angle AEB$ & $\angle CED$.
Angles at a point: $\angle AEB$, $\angle CEB$, $\angle AED$ & $\angle CED$; $\angle BAE$, $\angle EAD$ and $\angle BAD$ (reflex), there are more around the edge of the kite.

Chapter 9

Recall 9 (p. 488)

1 **(a)** 0, 5, 10, 15, 20, 25, 30

(b) 16, 18, 20, 22, 24, 26, 28

(c) 1300, 1400, 1500, 1600, 1700

(d) 60, 80, 100, 120, 140, 160, 180, 200

2 **(a)** 50, 100, 150, 200, 250 **(b)** 100, 125, 150, 175, 200

(c) 1400, 1600, 1800, 2000

3 **(a)** 6, 10, 12, 14, 16, 20, 22, 24

(b) 0, 5, 15, 20, 25, 50, 55, 100

(c) 0, $\frac{1}{2}$, 1, $1\frac{1}{2}$, 2, $2\frac{1}{2}$, 3, $3\frac{1}{2}$, 4, 5, $5\frac{1}{2}$, $6\frac{1}{2}$

4 **(a)** 15, 18, 24 **(b)** 140, 160, 180, 200

(c) 250, 275, 325

5 **(a)** $\frac{1}{3}$ **(b)** $\frac{3}{4}$

Exercise 9.1 (p. 492)

1 **(a)** categorical

(b) categorical

(c) continuous

(d) continuous

(e) discrete

(f) categorical

(g) discrete

2 (a)

Number of pets owned	Tally	Frequency
0	||||	4
1	𝍸 ||	7
2	|||	3
3	|||	3
4	||||	4
5	|	1
6	|	1
7	|	1
8		0
9	|	1
		25

(b) discrete

3

Number of calls	Tally	Frequency
0–19	|	1
20–39	|	1
40–59	|||	3
60–79	𝍸 |	6
80–99	𝍸 |	6
100–119	𝍸 |	6
120–139	||	2
140–159	||	2
160–179	||	2
180–199	|	1
		30

4 (a) 82

(b)

Colour	Frequency
Black	13
White	21
Silver	25
Red	7
Blue	5
Other	11

(c) categorical

5

Hours of television watched	Tally	Frequency
0	|||	3
$\frac{1}{2}$	||||	4
1	|||	3
$1\frac{1}{2}$	||	2
2	𝍸 |	6
$2\frac{1}{2}$	𝍸	5
3	||	2
$3\frac{1}{2}$		0
4	|	1
$4\frac{1}{2}$	|	1
		27

6

Type of takeaway	Tally	Frequency
Pizza	𝍸 |||	8
Fish & chips	|||	3
Hamburgers	||||	4
Chicken	|||	3
Chinese	||	2
None	||	2
		22

7

Amount of money	Tally	Frequency
\$0.00–\$0.45	||||	4
\$0.50–\$0.95	|||	3
\$1.00–\$1.45	|||	3
\$1.50–\$1.95	||||	4
\$2.00–\$2.45	|||	3
\$2.50–\$2.95	|||	3
\$3.00–\$3.45		0
\$3.50–\$3.95	|	1
\$4.00–\$4.45	|||	3
		24

8 (a) C (b) B

9 (a) 26

(b)

Number of hours spent exercising	Tally	Frequency
0	||||	4
1	𝍸 ||	7
2	𝍸 |||	8
3	|||	3
4	|	1
5	|	1
6	|	1
7		0
8	|	1
		26

(c) 4 (d) 7

(e) 2 hours (f) 8 hours

(g) 8, 6 and 5 hours. These students will be training for more hours compared to other students.

10 (a) 35

(b)

Size	Tally	Frequency
XS	||	2
S	𝍸 ||	7
M	𝍸 ||||	9
L	𝍸 |||	8
XL	||||	4
Did not order	𝍸	5

(c) categorical (d) M (e) 9

(f) Because the students who forgot to order were all in Year 7, she should probably order 5 M size T-shirts, as the L and XL would be too big for most Year 7 students.

11 (a)

Class interval	Frequency
20–29	6
30–39	6
40–49	6
50–59	6
60–69	6

(b) Each of the intervals contains six values.

(c)

Class interval	Frequency
20–24	5
25–29	1
30–34	5
35–39	1
40–44	5
45–49	1
50–54	5
55–59	1
60–64	5
65–69	1

(d) The low-half class intervals have 5 values whereas the high-half class intervals have just 1 value. The values tend to appear at the lower end of the 10 groups.

(e) The size of the class interval can have an effect on the way we see the data.

12 (a)

Pulse rate (beats per minute)	Frequency
51–60	7
61–70	21
71–80	19
81–90	10
91–100	3

(b)

Pulse rate (beats per minute)	Frequency
51–55	3
56–60	4
61–65	8
66–70	13
71–75	10
76–80	9
81–85	10
86–90	0
91–95	3

(c) Probably (b). This table shows that the vast majority of students have a pulse rate between 61 and 85 beats per minute. When looking at table (a), the vast majority of students have a pulse rate between 61 and 90 beats per minute, but the high end of 90 might be a cause for medical concern.

13 The highest weight is 3529 g and the lowest is 2010 g. This is a difference of 1519 g. If we group in 250 g lots, we would have 7 groups. If we group in 200 g lots, we would have 8 groups. If we group in 125 g lots, we would have 14 groups —this is too many. We could choose either of the others. The table below is for lots of 250 g. It starts at 2000 g as this is a multiple of the difference being used.

Birth weight (g)	Frequency
2000–2249	5
2250–2499	2
2500–2749	5
2750–2999	8
3000–3249	6
3250–3499	1
3500–3749	3

Open-ended – Sample answers

14 (a)

Number rolled	Tally	Frequency
1	| | |	3
2	| |	2
3	| | | |	4
4	| | | |	4
5	| | |	3
6	| | | |	4

(b)

Weight of dogs (kg)	Tally	Frequency
1–5	~~||||~~ ~~||||~~ | |	12
6–10	~~||||~~ | | |	8
11–15	~~||||~~ ~~||||~~ | | | |	14
16–20	~~||||~~ ~~||||~~ | | |	13
21–25	| | |	3

15 Students' own answers.

16 Students' own answers.

Mathspace (p. 496)

1 (a) J

(b) Moving back by 5 or forward by 21.

(c) Press the yellow circle, then the red square and finally the blue triangle.

2 (a) E, T, A, O, I

(b)

Letter	A	B	C	D	E	F	G	H	I	J	K	L	M
Frequency	3	2	7	5	1	4	14	0	0	2	0	0	0

Letter	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
Frequency	9	7	2	1	5	3	2	2	2	2	4	6	0

(c) Look for the words red, yellow and blue.

(d) This time, press the blue triangle, then the yellow circle twice and finally the red square four times.

Exercise 9.2 (p. 500)

1 (a) (i) 5 (ii) 7 (iii) 7

(b) (i) 6 (ii) 5 (iii) 5

(c) (i) 6 (ii) 6 (iii) 6

(d) (i) 4 (ii) 4 (iii) 4

(e) (i) 7 (ii) 7 (iii) 7

(f) (i) 7 (ii) 6 (iii) 5

(g) (i) 6 (ii) 7 (iii) 8

(h) (i) 4 (ii) 3 (iii) 2

(i) (i) 4.9 (ii) 4.5 (iii) 4

(j) (i) 5.5 (ii) 5 (iii) 5

(k) (i) 6 (ii) 7 (iii) 9

(l) (i) 5 (ii) 5 (iii) 2

2 (a) (i) 29 (ii) 29 (iii) 29

(b) (i) 66.43 (ii) 72 (iii) No mode exists.

(c) (i) 66 (ii) 67.5 (iii) 81

(d) (i) 10.26 (ii) 9.05 (iii) 6.5

(e) (i) 13.7 (ii) 13.5 (iii) 11.4

(f) (i) 8.50 (ii) 10.11 (iii) No mode exists.

3 (a) C; only one within the range of scores

(b) C; 8 too high and 4 too low

(c) C; only one of each score, so mean will be close to median

(d) B; close to median as single results relatively evenly spread

4 (a) (i) 49 480.8 (ii) 43 369

(b) Incheon

(c) (i) 49 390 (ii) 46 000

(d) Miyagi

(e) The mean capacity is slightly higher in Korea (49 480.8 compared to 49 390), but the median capacity is higher in Japan (46 000 compared to 43 369). Half of the stadiums in each country have a capacity less than 45 000 (i.e. smaller than the mean value).

(f) (i) 49 435.4 (ii) 43 369

(g) Miyagi (again) (It is interesting to note there are two stadiums in Japan quite close to the mean—Miyagi and Osaka—but none of the Korean stadiums are very close at all.)

5 (a) No, because the mean is the sum of all the data values divided by the number of values and so it will not necessarily be a data value.

(b) 5.8, no it is not a data value.

(c) Yes, because there is an odd number of values and so the median will be the middle value.

(d) 6

6 (a) This statement means that the average number of children of all families is 2.3. Most families have 2 children, but because many families have more than two children, the average of all these numbers of children is 2.3.

(b) The middle number will always be a whole number. If there are two middle numbers, then the only decimal you can get by dividing them by 2 is one that ends in .5.

(c) No, as the mode is the value that occurs most often in a data set, and the data set only contains whole numbers.

7 (a) (i) $58 571.43 (ii) $50 000 (iii) $50 000

(b) In this case, the mode does a good job as there are so many of this category of worker—well over half. However, the mean does take account of the other workers as well.

(c) (i) $53 461.54 (ii) $50 000 (iii) $50 000

(d) The mean is the only value that changes, and it changes by a large amount (over $5000).

Open-ended – Sample answers

8 (a) 5, 6, 6, 6, 7. As the median is 6, this is the middle number and we need at least one more 6 to make it the mode. The total of the five results is 30, so we have 18 left, which we can break up any way we like as long as we don't move the median number.

(b) 4, 6, 7, 9, 9. As the median is 7, this has to be the middle number and we need two 9s after that. This adds to 25 and the total required is 35, so we only have 10 left to play with.

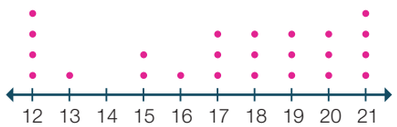
(c) 4, 5, 6, 6, 14. The middle number is 6 and one more is 6. The total is 35, so we still have 23 to play with that can be allocated in many ways.

9 While Veran is correct to say the values must be ordered first when there is an even number of values, the median is found exactly midway between two of the values. The ordered list is: 17, 19, 20, 20, 21, 22, 23, 28, so the median is midway between 20 and 21 and so is 20.5.

10 As the median is 5, we know this must be in the middle; as the mean is 6, we know that the values must add up to 54, and 4 must be the most frequent. Sample answer: 1, 4, 4, 4, 5, 6, 6, 7, 17.

Exercise 9.3 (p. 508)

1



2 (a)

STEM	LEAF
2	2 3 8
3	0 1 4 7
4	1 2 8
5	2 7

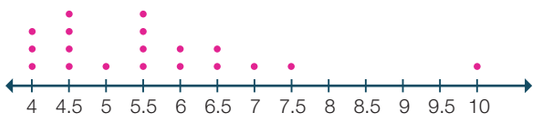
Key 2 | 3 = 23

(b)

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

Key 1 | 4 = 14

3 (a)



The median is 5.5, the range is 6 and 10 seems to be an outlier.

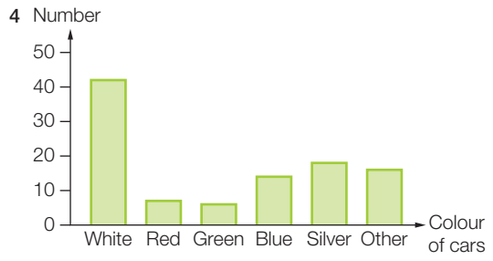
(b)

STEM	LEAF
5	5 6 9
6	7
7	5 7
8	8 8 8 9
9	9
10	0
11	0 2 5
12	1

Key 8 | 8 = 88

The median is 88, the range is 66 and there do not appear to be any outliers.

4



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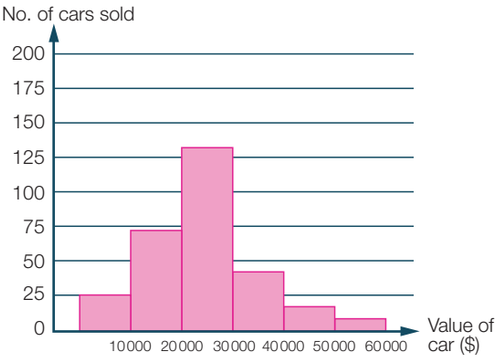


6 (a)

STEM	LEAF
2_L	0 1 2 3
2_U	7 7 8
3_L	1 4
3_U	8
4_L	2

Key 2 | 1 = 21

(b)

STEM	LEAF
4_L	2
4_U	7 7 8
5_L	1 2 3
5_U	6 7 8
6_L	1 4
6_U	8

Key 5 | 2 = 52

7 (a)

STEM	LEAF
12_L	1
12_U	5 6 6 8 8 9 9
13_L	0 3 3 4
13_U	6 8
14_L	0 2 2 3
14_U	6
15_L	0

Key 12 | 6 = 126

(b)

STEM	LEAF
12	1 5 6 6 8 8 9 9
13	0 3 3 4 6 8
14	0 2 2 3 6
15	0

Key 13 | 0 = 130

8 (a) C **(b)** C

9 (a) Thursday **(b)** 13 **(c)** 45

10 (a) 10 cm **(b)** 80 cm **(c)** 850–860 **(d)** 13 **(e)** 50

11 (a) The bars are horizontal; the scale is at the bottom.

(b) 820 million **(c)** 430 million **(d)** Spanish

(e) The first two numbers of the scale are given and then every second number is left off.

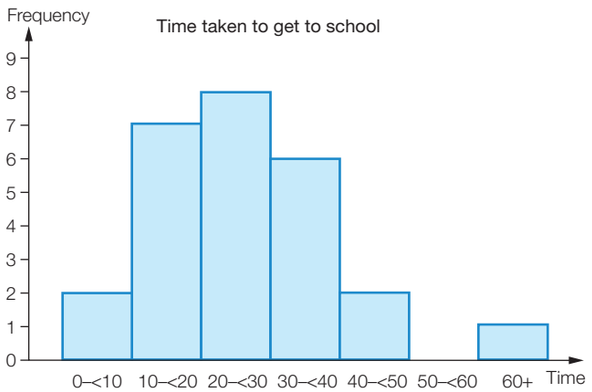
(f) Yes

12 (a) continuous

(b)

Distance	Tally	Frequency
0–<10	| |	2
10–<20	𝍸 | |	7
20–<30	𝍸 | | |	8
30–<40	𝍸 |	6
40–<50	| |	2
50–<60		0
60+	|	1

(c)



(d) Most students seem to live locally except for one student who travels 69 minutes. This could appear to be an outlier.

13 (a) Australia

(b) Canada

(c) UK

(d) Aluminium cans

(e) Plastics

(f) Australia's recycling rate for glass is $\approx \frac{1}{2}$ of Switzerland's rate.
Australia's recycling rate for plastics is $\approx \frac{1}{2}$ of Austria's rate.
Australia's recycling rate for steel cans is a little under $\frac{1}{2}$ of Japan's rate.
Australia's recycling rate for aluminium cans/packaging is $\approx \frac{2}{3}$ of Finland's rate.

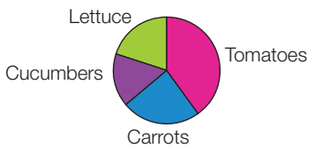
(g) Australia's recycling rate for glass is $\approx \frac{4}{3}$ Ireland's rate.
Australia's recycling rate for plastics is $\approx$ 4 times Canada's rate.
Australia's recycling rate for steel cans is over 5 times NZ's rate.
Australia's recycling rate for aluminium cans/packaging is over 4 times Ireland's rate.

Open-ended – Sample answers

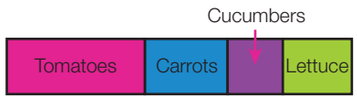
14 Students' own answers.

Exercise 9.4 (p. 522)

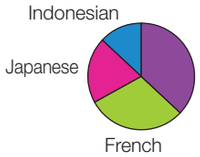
1 (a) (i)



(ii)

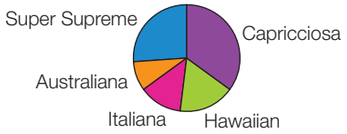


(b) (i)

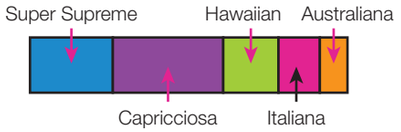


(ii)

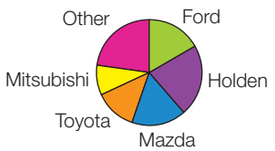
(c) (i)



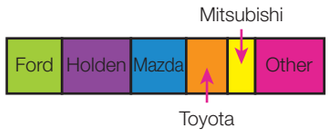
(ii)



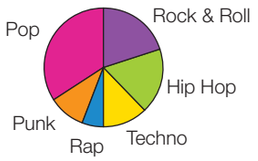
(d) (i)



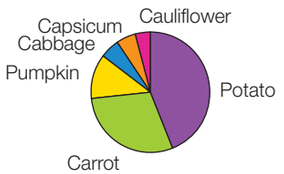
(ii)



2 (a) (i)

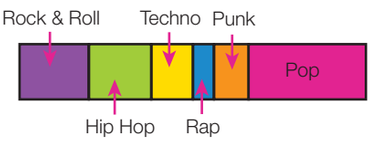


(ii)

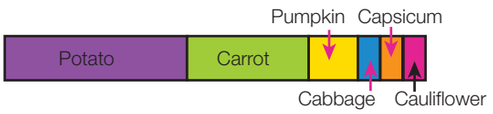


(iii)

(b) (i)



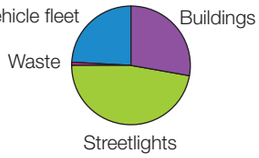
(ii)



(iii)

3 (a) A **(b)** D

4 (a)



(b)

(c) Students' own answers.

5 (a) 3.3% **(b)** 5.2% **(c)** 5–25 minutes **(d)** 94.3%

6 (a) 4% **(b)** 1% **(c)** 4%

(d) (i) non-recyclables **(ii)** 79%

(e) paper **(f)** glass **(g)** No

7 (a) bags **(b)** sheeting and film

(c) confectionery wrappers **(d)** percentages

(e) all items not included in the other categories

(f) It is important because the survey would not be of much value if only a small number of items had been collected.

(g) They divide something into sections.

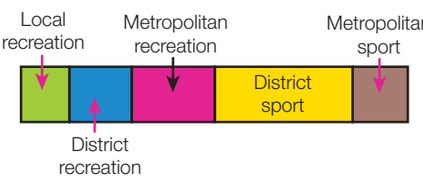
8 (a) Local recreation—70°, District recreation—90°, Metropolitan recreation—60°, District sport—100°, Metropolitan sport—40°

(b) 17% **(c)** 28% **(d)** 39%

(e) Recreation, 22% more

(f) Metropolitan sport

(g)



9 (a) English **(b)** 11%

(c) Hindi, Sinhalese, Samoan, Khmer, Macedonian, Greek

(d) Arabic

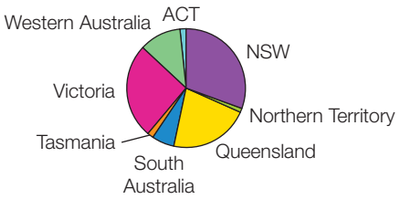
(e) There are many other languages spoken at home but each is less than 1% of the population.

(f) Students' own answers.

10 **(a)** 347 514

(b) ACT—6°, NSW—110°,
NT—4°, Qld—78°,
SA—22°, Tas—6°,
Vic—93°, WA—41°,

(c)



(d) A length of 70 mm might work reasonably well.

(e) Using this length, the pieces, in alphabetical order, would be: 1.1 mm, 21.4 mm, 0.8 mm, 15.2 mm, 4.3 mm, 1.2 mm, 18.1 mm, 8.0 mm. This is a total of 70.1 mm which is about as good as we can do. Your graph should look something like the following, although its length will probably be different.

(f) It will probably be easier to draw the sector graph, although neither is very easy. Some rounding is certainly required with the divided bar chart.

11 **(a)** Rates and garbage charges

(b) 29–30°

(c) 8% (to nearest %)

(d) Government grants; this section is the larger of the two.

Open ended – Sample answers

12 Students' own answers.

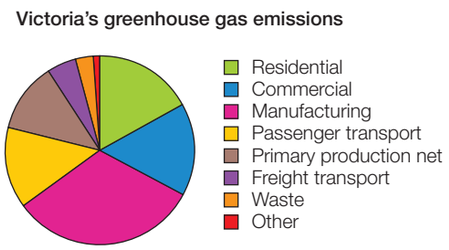
13 Students' own answers—graphs generated using Excel.

Half-time 9 (p. 522)

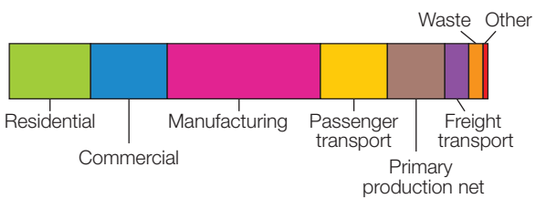
1 **(a)** **(i)** 3.7 **(ii)** 3 **(iii)** 2

(b) **(i)** 5 **(ii)** 5 **(iii)** 4 and 6

2 **(a)**



(b)



3 **(a)** This gives eight groups, which is within the 5–10 range we prefer.

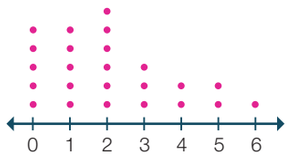
(b)

Height range	Frequency
125–129	1
130–134	1
135–139	2
140–144	7
145–149	5
150–154	6
155–159	2
160–164	1

4

Number absent	Frequency
0	8
1	6
2	4
3	2
4	1

5



6 **(a)**

STEM	LEAF
6	2 7
7	4 6
8	0 2 4 5 6
9	0 1
10	
11	
12	
13	2

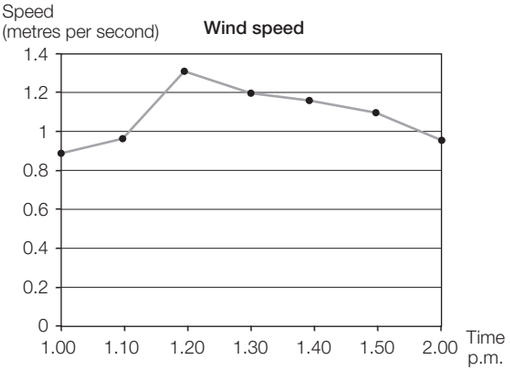
Key 6 | 2 = 62

(b) 83

(c) 132 appears to be an outlier. The rest of the data in the set is bunched together.

Exercise 9.5 (p. 526)

1 **(a)**



(b) Between 1.10 p.m. and 2.00 p.m. (not inclusive)

2 **(a)** 50 **(b)** 1 p.m. **(c)** 60

(d) 11.30 a.m. and 12.30 p.m.

3 **(a)** C **(b)** B **(c)** C

4 **(a)** **(i)** 41° **(ii)** 17 January

(b) **(i)** 19° **(ii)** 25, 26 January

(c) 22° and 38° **(d)** 19° and 27°

5 (a) Start 2008 40%, end 2008 38%

(b) 2010 (c) Feb–July 2007

(d) 3% decrease. As the storage levels drop about 3% every year, there is not a lot of rain in December in Perth.

(e) Increase of 9.5%

(f) August

(g) January

6 (a) 360 000

(b) 525 000

(c) Actual numbers were unknown because many Indigenous people live in isolated communities and many move from place to place.

(d) 705 000 and 715 000

(e) More Australians willing to be recognised as of Aboriginal descent. Better health care means less infant mortality and a longer life span.

7 (a) 22 million (b) 37 million (c) 41 million

(d) Number of births > number of deaths, immigration > migration.

(e) Overcrowding of cities, water shortages, environmental damage, not enough food produced.

(f) 37 million

(g) Immigration > migration

(h) 32–33 million

(i) Number of births + number of immigrants = number of deaths + number of migrants.

8 (a) 2.35 million (b) 2007 (c) 1995–2005

(d) 2.45 million, 2.65 million, 3 million

(e) The over 65 population of Australia has been steadily increasing since 1990. The rate of increase from 2006–2010 has been even higher than in previous years.

(f) Babies born after the War are now aged 65 and older. Immigrants who arrived after 1945 are also now aged 65 and older.

(g) ≈ 3.75 million

9 (a) Yes, 2000 (b) 150 cm (c) 175 cm

(d) 2000 (e) 2002 (f) 1999

(g) 2000 or 2003 (h) 2003 (i) 2006

(j) August (k) September

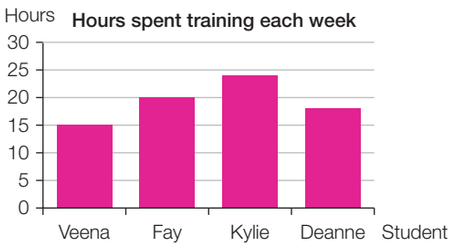
(l) Perhaps—the last 4 years have seen less snow than the previous 6 years, but it could simply be part of a longer cycle.

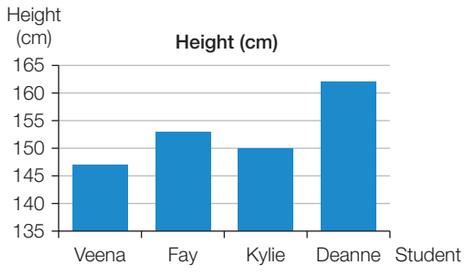
(m) Line graphs are more appropriate to show this information as the depth is changing according to time, and a large number of bars would be needed to show the daily change.

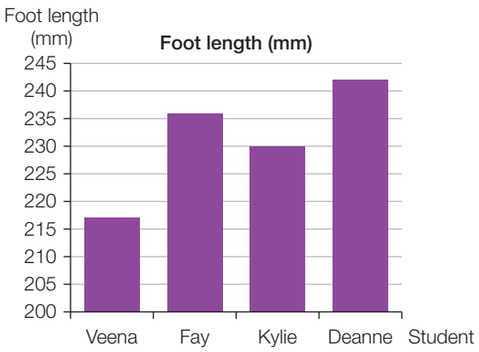
Open-ended – Sample answers

10 Students' own answers.

Exercise 9.6 (p. 538)

1 





The shape of the graph of hours spent training each week is quite different from the shape of the other two graphs. There seems to be no connection between the hours spent training and either the height or the foot length.

The shapes of the height graph and the foot length graph are very similar, so there could be a connection between these two variables.

2 (a) Islander College, 350 students

(b) Bottom part; Hilltop College

(c) Gumnut College

(d) Jinglebells College

(e) Faraway and Gumnut Colleges

3

	Mean	Median	Range
Adelaide	12.1917	11.9	9.6
Brisbane	15.4917	15.95	12.3

Both the lowest mean minimum temperature and the highest mean minimum temperature occur in Brisbane, which accounts for it having a much greater range in temperature. However, both the mean and median indicate that Brisbane is, overall, a warmer place.

4

	Mean	Median	Range
Adelaide	7.5	7	6
Brisbane	8	8	3

Although Adelaide has the individual highest value, its lack of consistency means that Brisbane has a higher mean and median number of sunshine hours. Adelaide's range is about double that of Brisbane.

5 (a) Glass

(b) Paper

(c) 2002/03

(d) 2001/02

(e) No apparent change in the amount recycled.

(f) A steady increase in the amount recycled, but the amount is still very small.

6 (a)

	Mean	Median	Mode	Range
Set A	5.7	6.5	7	9
Set B	5.55	5	2 & 9	7

The numbers in Set A are, on average, slightly larger and more spread out. The mode does not really give us any useful information.

(b)

	Mean	Median	Mode	Range
Set A	3.75	3.5	2	7
Set B	5.75	6.5	7, 8 & 9	8

Although the range of both sets is very close, the numbers in Set A appear, on average, to be quite a bit smaller than those in Set B. Again, the mode gives us no useful information.

7 April paid a mean price of $47.78 for her fruit, whereas Izzy paid $50.71. April bought 9 cases compared to 7 for Izzy with the range of prices paid by both friends being the same. Due to the small numbers, neither the median nor the mode will tell us anything useful.

8 (a) NSW

(b) 8 000 000 t

(c) NSW, Vic, SA, ACT

(d) ACT

(e) NT

(f) SA

9 (a) No

(b) Japan, because they have many more hospital beds per 10 000 people than the other countries.

(c) Because Japan has one of the highest GDPs, the amount it spends on health facilities is to be expected.

(d) Indonesia

(e) Because Indonesia has one of the lowest GDPs, the amount it spends on health facilities is to be expected.

(f) Australia's health-care facilities do not seem to be as good as they should be given its GDP, which is the highest of all the countries shown.

(g) Vietnam's health-care facilities seem to be very good given its GDP, which is the lowest of all the countries shown.

10 (a) (i) Paper/cardboard, plastic bottles, glass.

(ii) Easiest to collect, easiest to recycle.

(b) Steel cans

(c) Paper/cardboard, plastic bottles and glass

11 (a) The number of mobile phones in developed countries is 10 times that of developing countries. Half the population of developed countries has a mobile phone.

(b) The number of mobile phones doubled to nearly 100%.

(c) The number has increased 9 times from 2000 to 2007 to almost 50%.

(d) The population in the developing world is much greater than the population of the developed world.

(e) 1999–2000

(f) 80%–90%

12 (a) The following table summarises the results.

	Mean	Median	Range
2009	36 666.1	37 070.5	27 623
2005	31 656.8	31 432	21 282
2000	27 406.5	26 874	25 041

The total membership numbers have been increasing across the time period shown. This is supported by considerable increases in both the mean and the median values. The range has been a bit variable, which may have been caused by the high membership number for Hawthorn in 2009. However, these figures clearly indicate that the AFL should be quite happy about the trend in membership numbers.

(b) The mode is not useful because it is unlikely that any particular data value is going to be repeated when the range of values is over 20 000 and we only have 16 values.

(c) The following table summarises the results.

	Mean	Median	Range
Victorian	37 530.6	37 070.5	24 371
Non-Victorian	35 225.3	34 905.5	21 599

On average, the Victorian teams seem to have higher memberships, but this is assisted by the very low numbers for Brisbane Lions and Sydney Swans, which are the two smallest totals overall. Also, Hawthorn's very high total has boosted Victorian numbers. The range for non-Victorian clubs is smaller, indicating more even results for these clubs, although there are still significant differences.

(d) The biggest raw increase is Hawthorn, which has increased by 25 617 members (which is more than the total Brisbane Lions membership in 2009). This also represents the biggest percentage increase of 95.3%, which is followed by St Kilda at 78.7%. The best increase for a non-Victorian club is Fremantle, which increased

by 57.3%. The only clubs to decline over this time period were Port Adelaide and Sydney Swans.

(e) You would also need to know how many people call themselves fans and then decide what percentage of them actually take out memberships.

Open-ended – Sample answers

13 (a) mean: 1.611 m median: 1.65 m mode: 1.67 m

(b), (c) Students will produce their own answers but will need to consider the following. The sum of the existing girls is 16.11, so the new total needs to be either 21.132 m or 17.532 m. The new girls cannot be the same height as any of the existing girls unless they are 1.65 m (the median).

14 Set A: 13, 10, 13, 21, 5, 12, 19, 12, 25, 20, 16, 3, 10, 10, 18, 17
Set B: 4, 2, 10, 19, 1, 23, 18, 17, 10, 3, 16, 18, 10, 14, 18, 17

Set A: median: 13, mode: 10, mean: 14, range: 22
Set B: median: 15, mode: 10, mean: 12.5, range: 22

Exercise 9.7 (p. 547)

1 (a) $\frac{1}{2}$ **(b)** $\frac{2}{11}$ **(c)** $\frac{1}{6}$ **(d)** $\frac{1}{4}$

(e) $\frac{1}{13}$ **(f)** $\frac{1}{26}$ **(g)** $\frac{1}{26}$ **(h)** $\frac{1}{52}$

2 (a) impossible **(b)** certain

(c) not likely **(d)** certain

(e) certain **(f)** not likely

(g) impossible **(h)** not likely

(i) certain

3 (a) A **(b)** C **(c)** D **(d)** C **(e)** B

4 (a) {1, 2, 3, 4, 5, 6, 7, 8, 9, 10}

(b) {a, b, i, l, o, p, r, t, y}

(c) {HH, HT, TH, TT}

5 (a) (i) $\frac{1}{3}$ **(ii)** $\frac{1}{5}$ **(iii)** $\frac{2}{5}$

(b) (i) $\frac{2}{7}$ **(ii)** $\frac{3}{14}$ **(iii)** $\frac{3}{7}$

6 (a) (i) Yes **(ii)** 50

(b) (i) No **(ii)** 200

(c) (i) No **(ii)** Simon

7 (a) No

(b) Nicky's winning colour is two times the area of Steve's.

8 (a) Yes **(b)** No **(c)** Yes **(d)** No **(e)** No

9 Sample answer: impossible, virtually impossible, almost never, most unlikely, sometimes, maybe, even chance, quite frequently, more often than not, quite often, often, likely, usually, very likely, almost always, sure thing.

10 (a) 4 (Possible: Brown, Brown, Blue, Blue)

(b) 8 (Possible: Blue, Blue, Blue, Blue, Blue, Blue, Brown, Brown)

(c) 3 (Possible: Blue, Brown, Blue)

(d) 7 (all 6 Blues could come out first, then Brown)

Open-ended – Sample answers

11 (a) Monday will follow Tuesday. Humans will run 100 m in under 5 seconds.

(b) It will reach 50°C in Australia next year. Australia will win the most gold medals at the next Olympics.

(c) It will rain in Sydney in the next month. Australia will win a swimming gold medal at the next Olympics.

(d) The Sun will rise tomorrow. Someone will be born in Australia today.

12 Students' own answers.

Challenge 9 (p. 553)

1 C If the dice are arranged so that the one-dot and the two-dot faces can't be seen, then the greatest number of dots will be viewable; that is, $42 - 6 = 36$.

Opposite dots on a die total 7
i.e. $1 + 6$, $2 + 5$, $3 + 4$, $4 + 3$, $5 + 2$, $6 + 1$,
there are 6 lots, $6 \times 7 = 42$.

Or: $2 \times (6 + 5 + 4 + 3) = 36$

2 The reason Mr Black is wearing the white tie and not the green tie is because in the passage, Mr Black is talking to the man wearing the green tie. Therefore, Mr Black must be wearing the white tie. Mr Green cannot be wearing the white tie so he must be wearing the black tie. Therefore, Mr White is wearing the green tie.

3 D 4 of the six faces will contain odd numbers.

4 D The shortest time wins the race, so the shortest bar is Maggie.

5 B $3B + 6G + 2R + 6Y = 17$ marbles. As the probability is $\frac{3}{7}$, the number of marbles in the bag must be a multiple of 7, so at least 21. There are 9 blue or green marbles, $9 = 3 \times 3$, so need 21 marbles in the bag. Vijay adds 4 white marbles to the bag.

6 A $15 + 10 + 20 + 30 = 75$. $100 - 75 = 25$

7 C Has won 19 of the 20 games, needs to win 24 out of 25 games to reach 96%, hence next 5 games.

Chapter review 9 (p. 554)

1

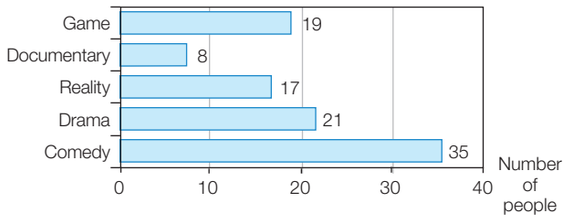
Number of television sets owned	Tally	Frequency
0	|||	3
1	𝍸 𝍸 |	11
2	𝍸	5
3	||	2
4	|	1
5	|	1
		23

2 (a) mean = 3.55, median = 3, mode = 2

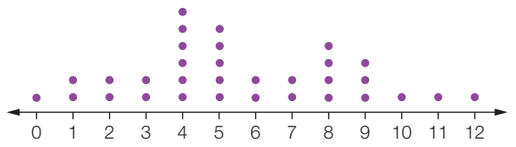
(b) mean = 35, median = 35, there is no mode

(c) mean = 3.72, median = 3.9, mode = 4.1

3



4 (a)



(b) 5

(c) No, the data set seems well spread out.

5 (a)

STEM	LEAF
0	0 0 0 0 0 1 2 2 2 3 4 5 5 6 7 7
1	1 4 5 7 7 7 8 8 9
2	0 1
3	1
4	0 1 2 2 6
5	0 0 2 6 8
6	1 3 4
7	7
8	8
9	
10	
11	5

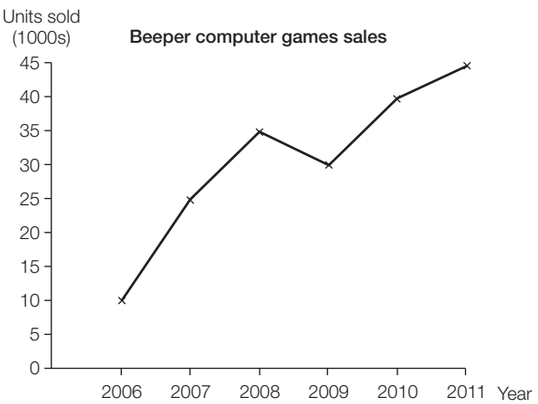
Key 2 | 0 = 20

(b) 17.5

(c) The score of 115 appears to be an outlier.

6 (a) D **(b)** D

7

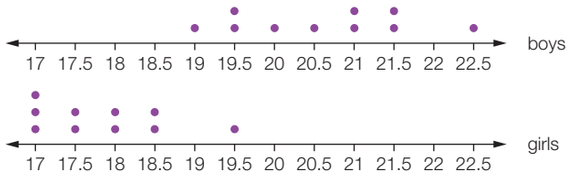


8

	Mean	Median	Range
Cairns	167.7	92.4	425.5
Brisbane	78.9	73.35	95.7

These two cities both receive a lot of rain, although Cairns clearly receives more rain than Brisbane. The wettest month for Cairns is far wetter than the wettest month for Brisbane, as reflected in the mean and range results. The driest months are almost identical. Cairns has a wet summer and a dry winter, whereas Brisbane follows a similar pattern but has a wetter spell in May and June. The median results are not that far apart which is, again, a reflection of the similar patterns, but still shows Cairns to be wetter.

9



The boys clearly have larger handspans. The median for boys is 20.75 and for girls it is 17.75. The range for boys is 3.5 compared to 2.5 for girls, so the data for boys are slightly more spread out. The most telling feature, however, is that only one girl has a handspan larger than the boy with the smallest handspan.

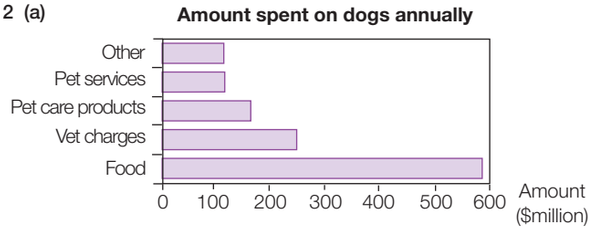
10 (a) B **(b)** B

11 (a)

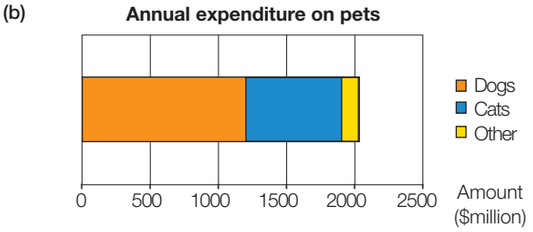
Shoe size	Frequency
1	2
$1\frac{1}{2}$	2
2	2
$2\frac{1}{2}$	3
3	3
$3\frac{1}{2}$	5
4	3
$4\frac{1}{2}$	3
5	3
$5\frac{1}{2}$	3
6	1

(b) $3\frac{1}{2}$ **(c)** 6

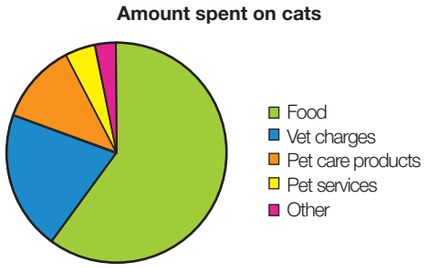
12 (a)



(b)



(c)



(d) The data sets were not compared over a period of time.

13 (a) column graph (b) July (c) 30 cm

(d) December, January, February, March

14 Yes, it is fair.

15 (a) 0 (b) 1 (c) the second

(d) Probabilities can't be greater than 1.

16 (a)

Height (cm)	Frequency
140	4
141	1
142	1
143	1
144	2
145	1
146	1
147	2
148	3
149	2
150	1
151	2
152	2
153	1
154	1

(b) (i) 140 (ii) 147 (iii) 146.6

(c)

Height (cm)	Frequency
138	1
141	1
142	1
143	2
144	2
145	2
146	2
148	2
150	2
151	1
152	1
154	3
156	2
157	3

(d) (i) 154, 157 (ii) 148 (iii) 148.8

(e) On all measures of centre, the girls are taller than the boys. The shortest student, however, is a girl, as is the tallest. The girls' heights are clustered more at the top of the range of values.

(f)

Height (cm)	Frequency
138	1
140	4
141	2
142	2
143	3
144	4
145	3
146	3
147	2
148	5
149	2
150	3
151	3
152	3
153	1
154	4
156	2
157	3

(g) (i) 148 (ii) 148 (iii) 147.7

(h) The three measures for the combined group are very close to each other. The average student is about 148 cm tall, the shortest is 138 cm and the tallest is 157 cm.

17 (a) Don't place any counters on 1, 2, 19 or 20 as these totals will never appear as the sum of the three dice.

(b) The scores 10 and 11 should appear more often than any other total.

(c) The results obtained on any particular game could be quite different from the next game.

NAPLAN practice 9

1 B **2** D **3** C **4** C

5 (a) Friday (b) 30 (c) Thursday

6 C

Chapter 10

Recall 10 (p. 562)

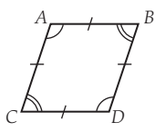
1 (a) 56° (b) 150° (c) 50°

2 (a) 20° (b) 60° (c) 40°

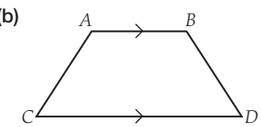
3 (a) 66° (b) $a° = 110°$, $b° = 70°$, $c° = 70°$

(c) $a° = 120°$

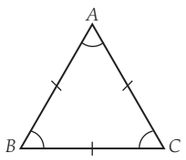
4 (a)



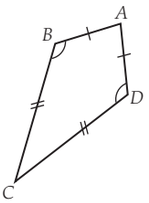
(b)



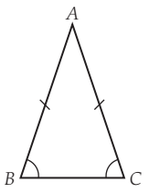
(c)



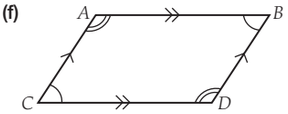
(d)



(e)



(f)



Exercise 10.1 (p. 565)

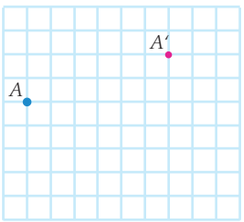
1 **(a)** 5 units left

(b) 5 units down

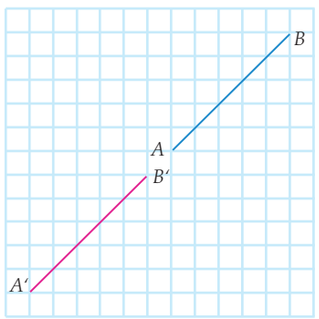
(c) 5 units right and 3 units down

(d) 7 units left and 2 units up

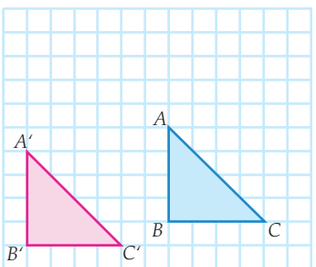
2 **(a)**



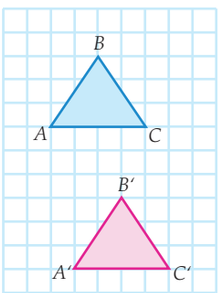
(b)



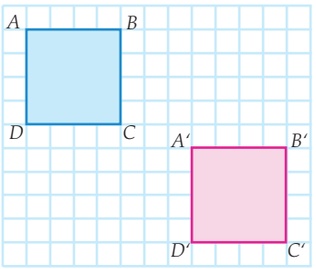
(c)



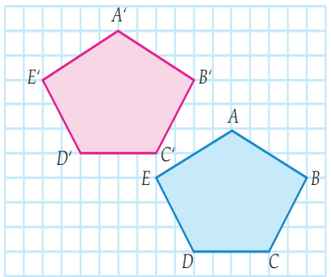
(d)



(e)

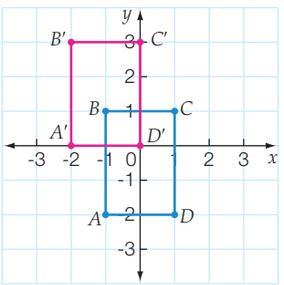


(f)



3 **(a)** $A(-1, -2)$, $B(-1, 1)$, $C(1, 1)$, $D(1, -2)$

(b)



(c) $A'(-2, 0)$, $B'(-2, 3)$, $C'(0, 3)$, $D'(0, 0)$

(d) Subtracting 1 from the x-coordinates of the original and adding 2 to the y-coordinates of the original will give the image coordinates.

4 B

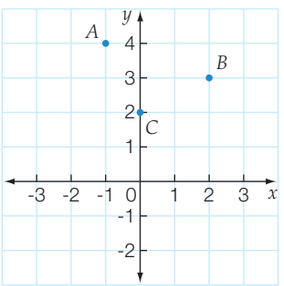
5 D

6 2 units left and 6 units up

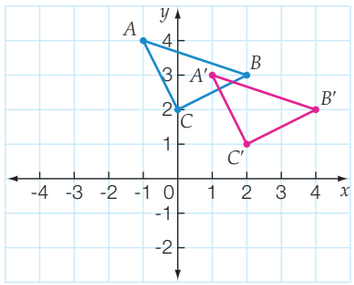
7 [-3, -4]

8 [-10, -4]

9 **(a)**



(b)



(c) $A'(1, 3)$, $B'(4, 2)$, $C'(2, 1)$

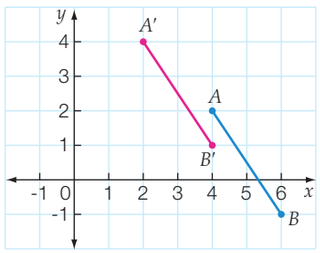
10 10 units left and 4 units up

11 4 units down

12 [0, 9]

13 (a) $A'(2, 4)$, $B'(4, 1)$

(b)

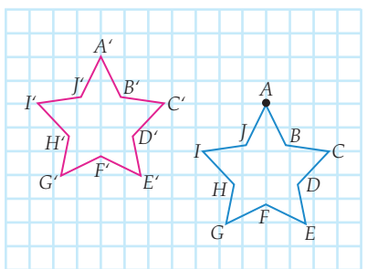


14 200 units right

15 (a) 7 units left and 2 units up

(b) 7 units right and 2 units down

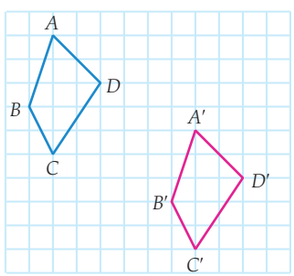
(c)



Open-ended – Sample answers

16 Students' own answers.

17

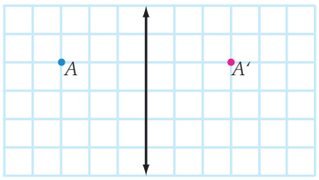


The reverse translation is 6 units left and 4 units up.

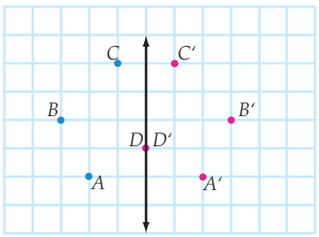
18 The statement is correct, because the order in which you do translations does not affect the result of the final image. This is because when translating a shape you add or subtract units, and adding or subtracting can be done in any order.

Exercise 10.2 (p. 570)

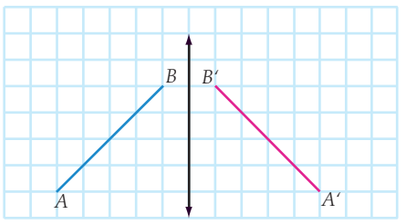
1 (a)



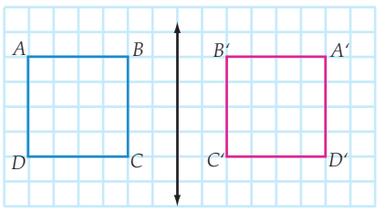
(b)



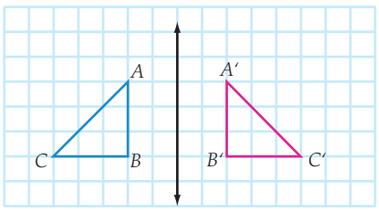
(c)



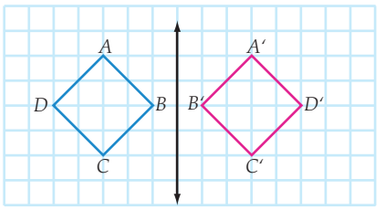
(d)



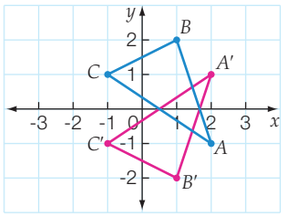
(e)



(f)



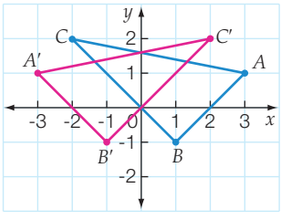
2 (a) (i) $A(2, -1)$, $B(1, 2)$, $C(-1, 1)$



(iii) $A'(2, 1)$, $B'(1, -2)$, $C'(-1, -1)$

(iv) The x-coordinates of the image are the same as the x-coordinates of the original but the y-coordinates of the image are the negative of the y-coordinates of the original.

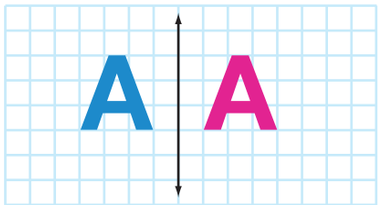
(b) (i) $A(3, 1)$, $B(1, -1)$, $C(-2, 2)$



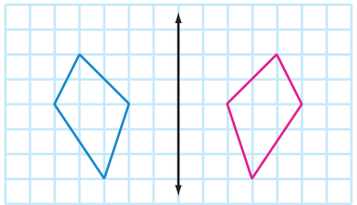
(iii) $A'(-3, 1)$, $B'(-1, -1)$, $C'(2, 2)$

(iv) The x-coordinates of the image are the negative of the x-coordinates of the original but the y-coordinates of the image are the same as the y-coordinates of the original.

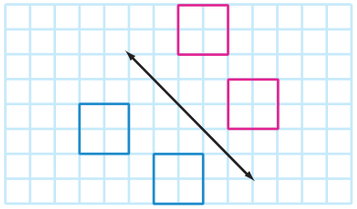
3 (a)



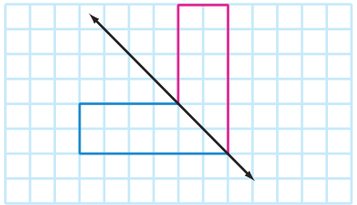
(b)



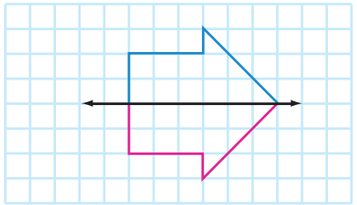
(c)



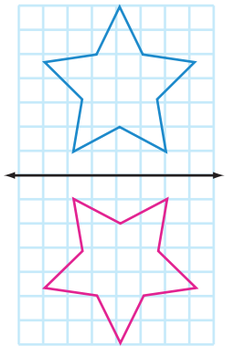
(d)



(e)

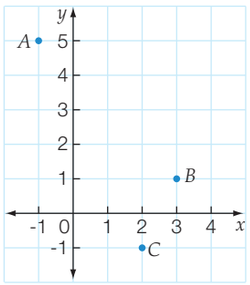


(f)

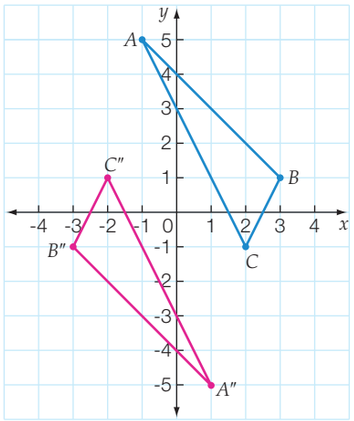


4 B

5 (a)

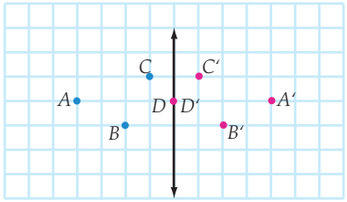


(b)

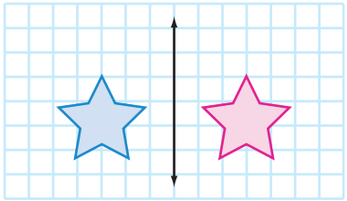


(c) $A''(1, -5)$, $B''(-3, -1)$, $C''(-2, 1)$

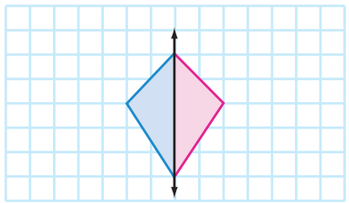
6 (a)



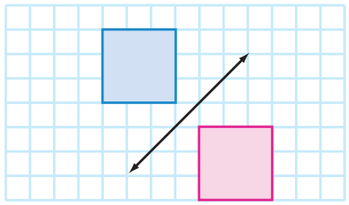
(b)



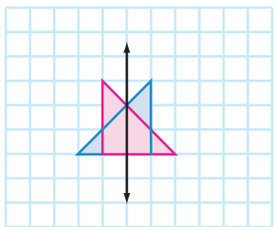
(c)



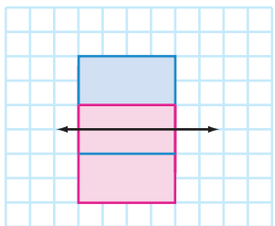
(d)



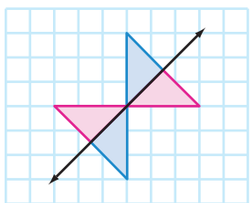
7 (a)



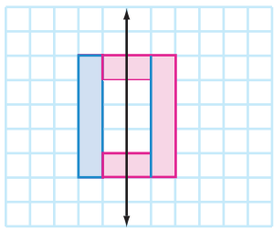
(b)



(c)

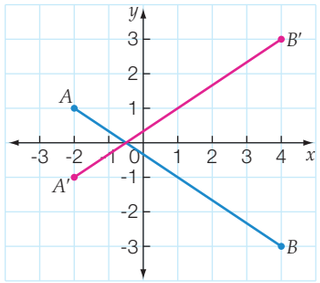


(d)



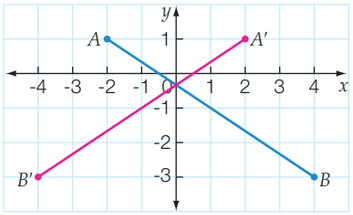
8 (a) $A'(-2, -1)$, $B'(4, 3)$

(b)



(c) $A'(2, 1)$, $B'(-4, -3)$

(d)



9 (a) 0, 1, 3, 8, 10, 11, 13, 18, 30, 31, 33, 38

(b) 0.00, 1.00, 3.00, 8.00, 10.00, 11.00

(c) 72

(d) 96

(e) No, in a 24-hour mode, there are only two more hours (13.00 and 18.00) than the 12-hour mode when the time is correctly reflected.

Open-ended – Sample answers

10 Students' own answers.

11 Students' own answers.

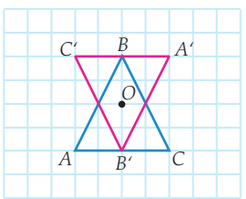
12 Students' own answers.

13 (a), (b) Students' own diagrams.

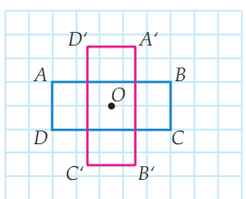
(c) The images found in parts (a) and (b) are the same.

Exercise 10.3 (p. 577)

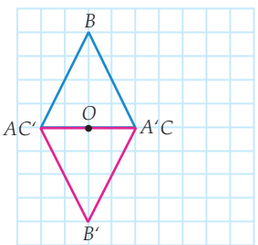
1 (a)



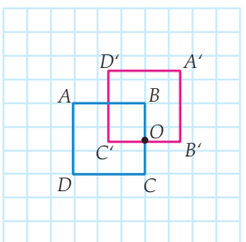
(b)



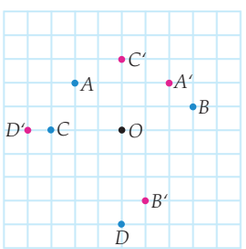
(c)



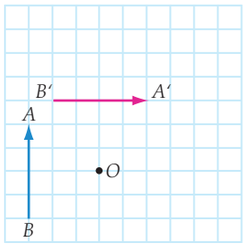
(d)



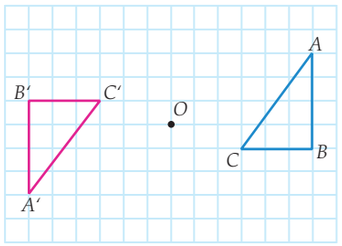
2 (a)



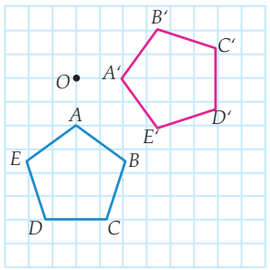
(b)



(c)

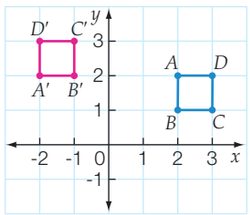


(d)



3 (a) $A(2, 2)$, $B(2, 1)$, $C(3, 1)$, $D(3, 2)$

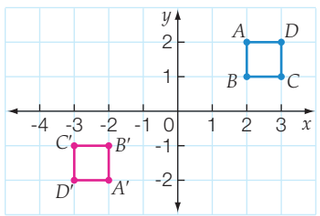
(b) (i)



(ii) $A'(-2, 2)$, $B'(-1, 2)$, $C'(-1, 3)$, $D'(-2, 3)$

(iii) The x-coordinates of the image are the negative of the y-coordinates of the original vertices and the y-coordinates of the image are the x-coordinates of the original vertices.

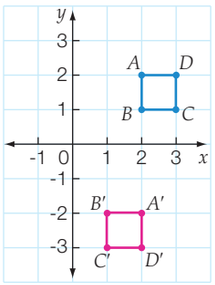
(c) (i)



(ii) $A'(-2, -2)$, $B'(-2, -1)$, $C'(-3, -1)$, $D'(-3, -2)$

(iii) All the coordinates of the image vertices are the negative of the original coordinates of the vertices.

(d) (i)



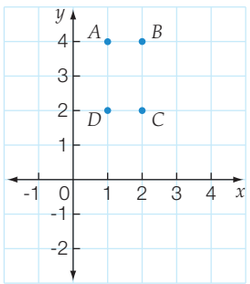
(ii) $A'(2, -2)$, $B'(1, -2)$, $C'(1, -3)$, $D'(2, -3)$

(iii) The x-coordinates of the image vertices are the y-coordinates of the original vertices and the y-coordinates of the image vertices are the negative of the x-coordinates of the original vertices.

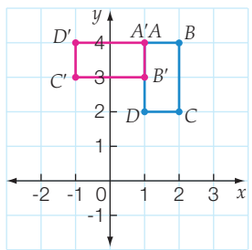
4 C

5 B

6 (a)



(b)



(c) $A'(1, 4)$, $B'(1, 3)$, $C'(-1, 3)$, $D'(-1, 4)$

7 240°

8 (a) Rotated 180° about O.

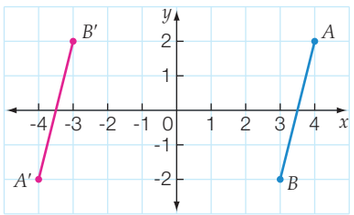
(b) Rotated 90° in an anticlockwise direction or 270° in a clockwise direction about O.

(c) Rotated 90° in an anticlockwise direction or 270° in a clockwise direction about O.

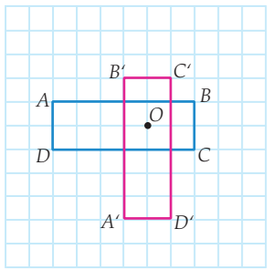
(d) Rotated 180° about O.

9 (a) $A'(-4, -2)$, $B'(-3, 2)$

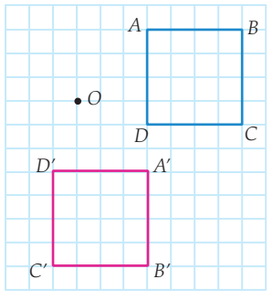
(b)



10 (a)



(b)



11 (a) H, I, N, O, S, X, Z

(b) All of these letters are perfectly symmetrical.
H, I, O, X

12 (a) 120° **(b)** 180° **(c)** 90°

(d) 72° **(e)** 22.5° **(f)** 36°

13 This is a reflection, because the orientation of the red square's vertices is completed in a manner that indicates a direct reflection. If it was rotated, the order of the vertices would also be rotated.

Open-ended – Sample answers

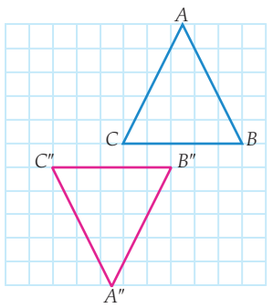
14 Students' own answers.

15 Disagree, as the order of the vertices of a figure is shifting in the same direction that the rotation is taking place. In a reflection, the vertices stay in a similar orientation, each an equivalent distance from the line of reflection.

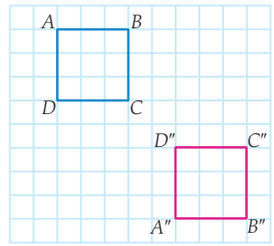
16 (e) The images in parts **(b)** and **(d)** are the same as the original polygons.

Exercise 10.4 (p. 586)

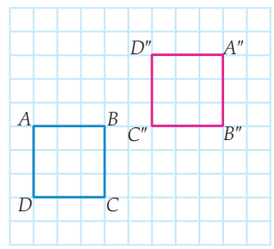
1 (a)



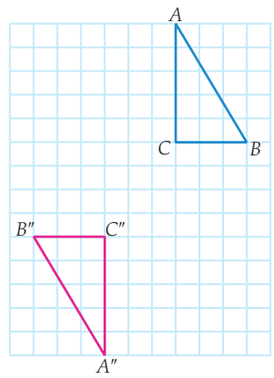
(b)



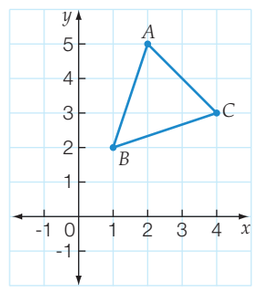
(c)



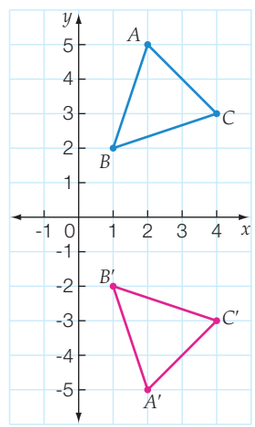
(d)



2 (a) $A(2, 5)$, $B(1, 2)$, $C(4, 3)$

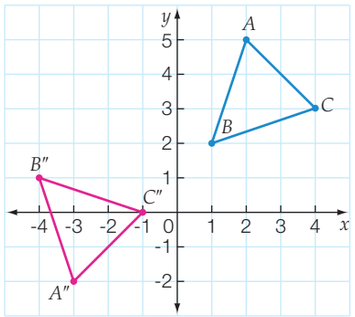


(b)



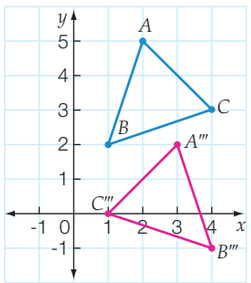
(c) $A'(2, -5)$, $B'(1, -2)$, $C'(4, -3)$

(d)



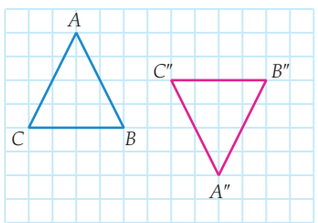
(e) $A''(-3, -2)$, $B''(-4, 1)$, $C''(-1, 0)$

(f)

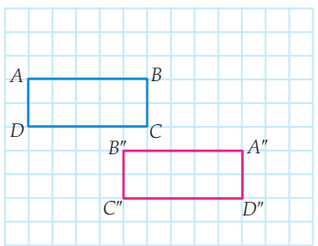


(g) $A'''(3, 2)$, $B'''(4, -1)$, $C'''(1, 0)$

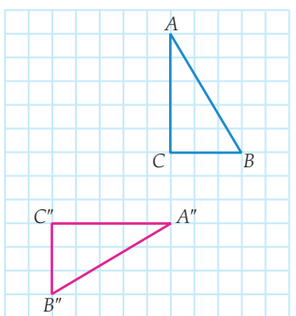
3 (a)



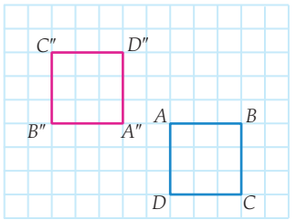
(b)



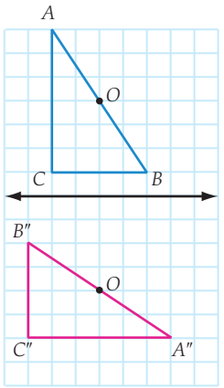
(c)



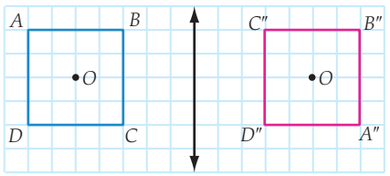
(d)



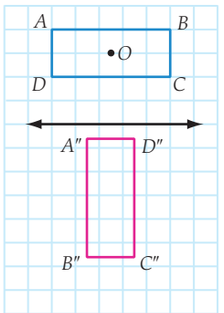
(e)



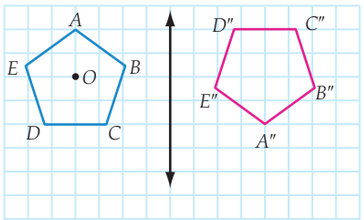
(f)



(g)



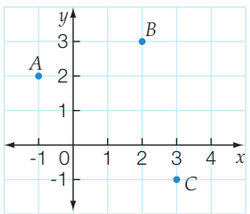
(h)



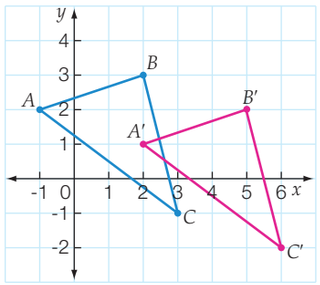
4 B

5 D

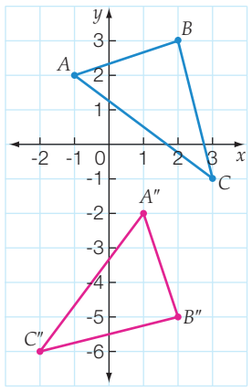
6 (a)



(b)



(c)



(d) $A''(1, -2)$, $B''(2, -5)$, $C''(-2, -6)$

7 (a) Reflect along the line $C''B''$ and translate 3 units right and 1 unit up.

(b) Reflect along the line $D''C''$ and translate 2 units up and 5 units left.

(c) Rotate 90° in an anticlockwise direction about B'' and translate 5 units left.

(d) Rotate 180° about C'' in either direction and translate 4 units up and 3 units right.

8 (a) Reflected along the axis of reflection and then translated 4 units right and 2 units down.

(b) Translated 8 units down and then reflected along the vertical line of reflection.

(c) Rotated 180° about point A and then translated 5 units right and 3 units up.

(d) Reflected along the axis of reflection and then rotated 90° in an anticlockwise direction about point B'.

(e) Rotated 45° in a clockwise direction about point C and then translated 8 units down and 3 units right.

(f) Rotated 180° about point C and reflected along the axis of reflection.

9 (a) Translate 4 units left and 2 units up and reflect along the axis of reflection.

(b) Reflect along the axis of reflection and translate 8 units up.

(c) Translate 3 units down and 5 units left and rotate 180° about point A'.

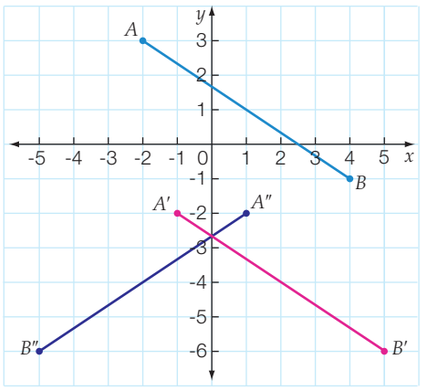
(d) Rotate 90° about point B'' in a clockwise direction and reflect in the axis of reflection.

(e) Translate 8 units up and 3 units left and rotate 45° in an anticlockwise direction about point C'.

(f) Reflect along the axis of reflection and rotate 180° about point C'.

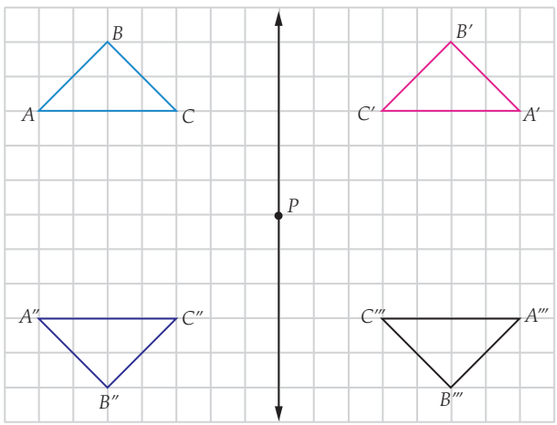
10 (a) $A''(1, -2)$, $B''(-5, -6)$

(b)



11 B1—Rotate 90° clockwise and then rotate 90° clockwise.
B2—Reflect vertically.

12

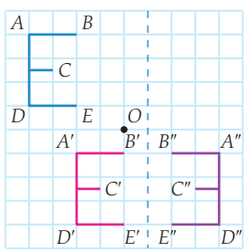


Rotation 180° about point P.

Open-ended – Sample answers

13 Students' own answers.

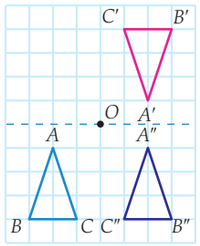
14 (a)



(b) Rotation 180° clockwise about O.

(c) Rotation 180° clockwise about O.

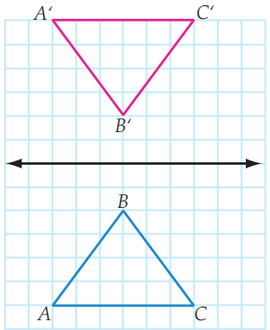
15 (a)



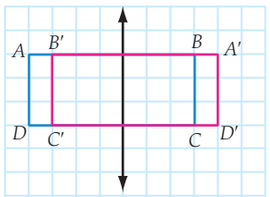
(b) A reflection in a vertical line of reflection passing through O.

Half-time 10 (p. 591)

1 (a)



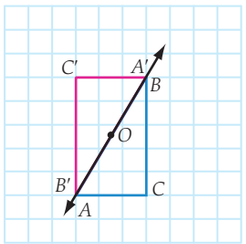
(b)



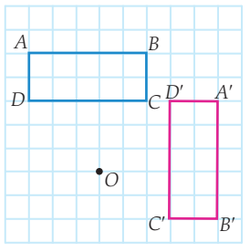
2 (a) Translated 5 units right and 4 units down.

(b) Translated 3 units left and 2 units up.

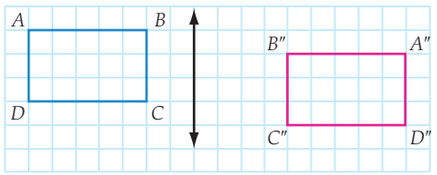
3 (a)



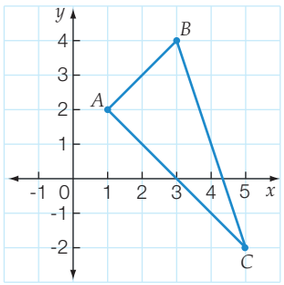
(b)



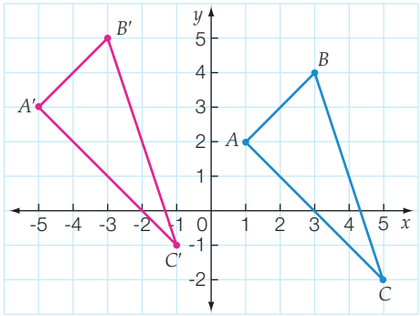
4



5 (a)

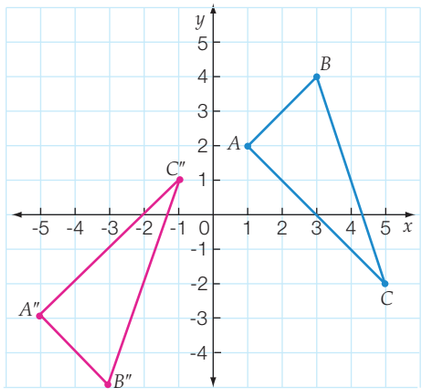


(b)



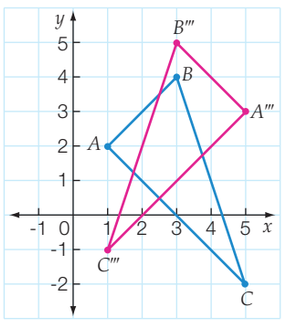
(c) $A'(-5, 3)$, $B'(-3, 5)$, $C'(-1, -1)$

(d)



(e) $A''(-5, -3)$, $B''(-3, -5)$, $C''(-1, 1)$

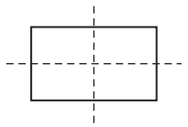
(f)



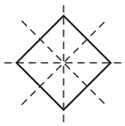
(g) $A'''(5, 3)$, $B'''(3, 5)$, $C'''(1, -1)$

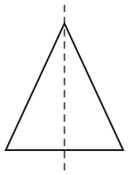
Exercise 10.5 (p. 597)

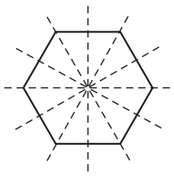
1 (a) (i) Yes



(ii) Order = 2

(b) (i) Yes  (ii) Order = 4

(c) (i) Yes  (ii) Order = 1

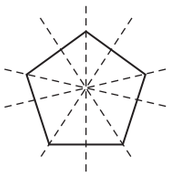
(d) (i) Yes  (ii) Order = 6

(e) (i) Yes  (ii) Order = 1

(f) No 

(g) No 

(h) (i) Yes  (ii) Order = 2

(i) (i) Yes  (ii) Order = 5

2 (a) (i) Yes (ii) 2 (iii) 180°

(b) (i) Yes (ii) 4 (iii) 90°

(c) (i) No Does not have rotational symmetry.

(d) (i) Yes (ii) 6 (iii) 60°

(e) (i) No Does not have rotational symmetry.

(f) (i) No Does not have rotational symmetry.

(g) (i) No Does not have rotational symmetry.

(h) (i) Yes (ii) 2 (iii) 180°

(i) (i) Yes (ii) 5 (iii) 72°

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

4 D

5 C

6 A

7 (a) a, b, d, e, f, g, h, j, k, m, n, p, q, r, s, t, u, y, z

(b) c, i, v, w,

(c) l, o, x

8 (a) F, G, J, K, L, N, P, Q, R, S, Z

(b) A, B, C, D, E, M, T, U, V, W, Y

(c) H, I, O, X

9 Yes —H, I, N, O, S, X, Z

10 (a) Order 1 reflectional symmetry and no rotational symmetry

(b) Order 1 reflectional symmetry and no rotational symmetry

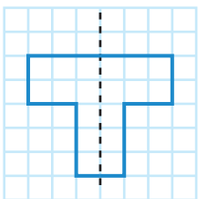
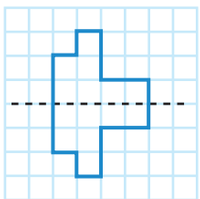
(c) Order 5 reflectional symmetry and order 5 rotational symmetry

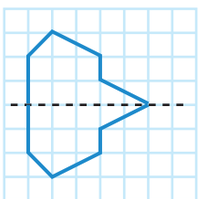
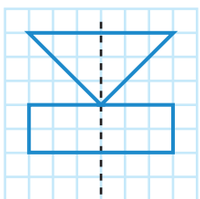
(d) Order 5 reflectional symmetry and order 5 rotational symmetry

(e) Order 1 reflectional symmetry and no rotational symmetry

(f) Order 1 reflectional symmetry and no rotational symmetry

11 (a) No (b) Yes (c) No (d) No (e) Yes (f) Yes

12 (a)  (b) 

(c)  (d) 

13 rectangle and rhombus

14 equilateral triangle

Open-ended – Sample answers

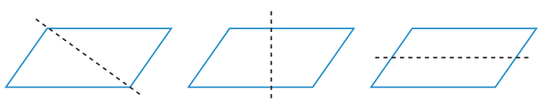
15 O is the axis of symmetry. Other words TOOT, MUM, MOM, HUH.

16 (a) Rotation: 1001, 1111, 1691, 1881, 1961

(b) Reflection: 1001, 1111, 1331, 1881

(c) Rotation and reflection: 1001, 1111, 1881

17 A parallelogram has reflectional symmetry if it is a rhombus, a rectangle or a square. Otherwise, it has no reflectional symmetry.



Mathspace (p. 602)

1 (a) swims, horizontal reflectional symmetry

(b) HIDE, horizontal reflectional symmetry

(c) vertical reflectional symmetry

(d) horizontal reflectional symmetry

(e) vertical reflectional symmetry

(f) suns, rotational symmetry

2 (a) m and w, d and p, n and u

(b) o, s, x, z, H, I, N

(c) sample rotational: mow
sample vertical reflectional: wow

3 (a) sample: 18181

(b) sample: 3018

(c) sample: 80108

4 (a) 0, 1, 2, 5, 8

(b) 1 (rotational, horizontal and vertical reflectional), 25 (rotational), 81 (horizontal reflectional), 100 (horizontal reflectional)

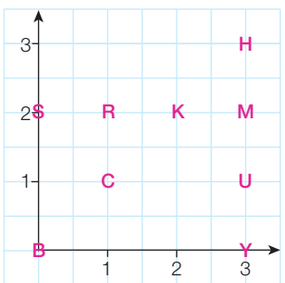
(c) (i) 8888

(ii) 9966

(d) (i) 88888

(ii) 99866

Grid symmetry



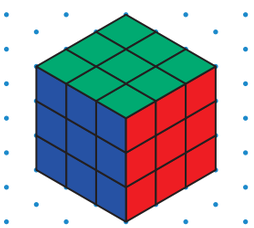
Exercise 10.6 (p. 605)

1 Check your shapes carefully against the ones in the question.

2 (a) 4 (b) 12 (c) 12 (d) 9 (e) 8 (f) 10

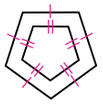
3 B

4 A

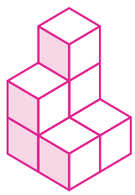
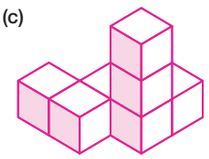
5 

6 (a) 8 (b) 12 (c) 9 (d) 10 (e) 21 (f) 12

7 D

8 (a)  (b) 

(c) No, each side is a rectangle with the same length and height.

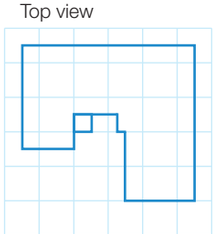
9 (a)  (b)  (c) 

10 (a) It is not a rectangle, as one side has 6 blocks and another has four blocks. It is not possible to make this shape.

(b) Students' own answers.

(c) Students' own answers.

11 Top view



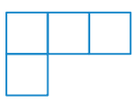
Open-ended – Sample answers

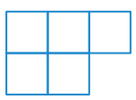
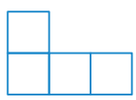
12 Students' own answers.

13 Students' own answers.

14 Students' own answers.

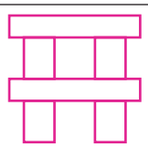
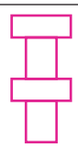
Exercise 10.7 (p. 610)

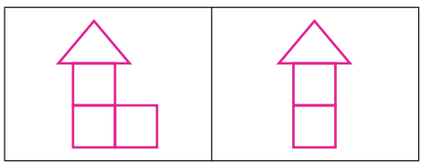
1 (a) (i)  (ii)  (iii) 

(b) (i)  (ii)  (iii) 

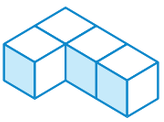
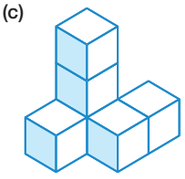
2 D

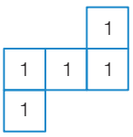
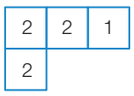
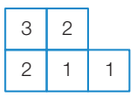
3

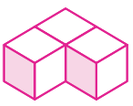
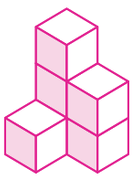
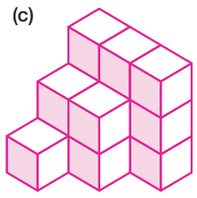
	Front	Side
(a)		
(b)		
(c)		

(d) 

4 (a) A (b) B

5 (a)  (b)  (c) 

6 (a)  (b)  (c) 

7 (a)  (b)  (c) 

8 (a, b) Students' own drawings.

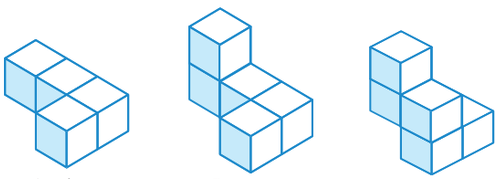
(c) 1; 3; 3 or 5; 3 or 5; 6 or 7

(d) Depending on the way they are shaded, the orientation of the cubes can appear differently. Some cubes may look like concave spaces. The answer to (c) gives the alternative numbers of cubes.

(e) Answers may vary.

Open-ended – Sample answers

9 Possible answers include:



10 Students' own answers.

Challenge 10 (p. 613)

1 (a) Rotation through 180° in either direction.

(b) Reflection in the y-axis followed by reflection in the x-axis, or reflection in the x-axis followed by reflection in the y-axis.

(c) B'

2 2.30

3 One copy is fixed at C and D is rotated counterclockwise through 90°. Another copy is fixed at D and C is rotated clockwise through 90°. The third copy is translated upwards through a distance equal to the length of CD.

4 B

5 'A BOILED EGG IS HARD TO BEAT'. The whole message needs to be reflected in a line.

6 (a) Translate 8 cm to the right.

(b) Rotate 90° anticlockwise about the bottom corner, then translate 11 cm to the right.

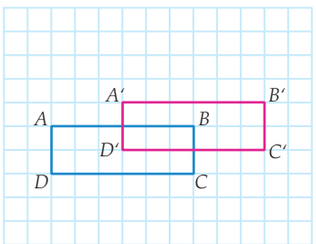
(c) Reflect in the 4 cm side, then translate 4 cm to the right.

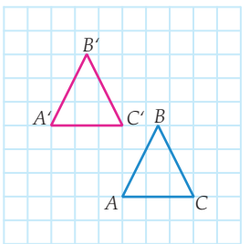
(d) Rotate 180° about the vertex located between the 4 cm and 5 cm sides.

Chapter review 10 (p. 614)

1 (a) Translated 4 units right and 4 units down.

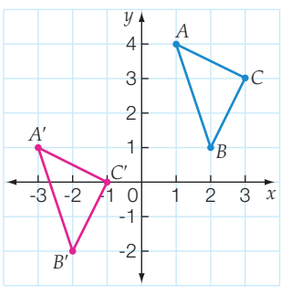
(b) Translated 4 units left and 3 units up.

2 (a) 

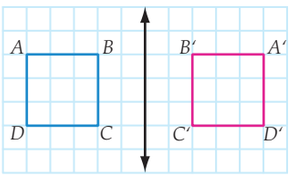
(b) 

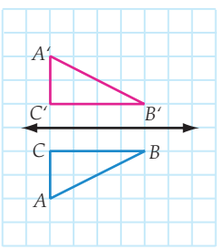
3 B

4 (a) $A(1, 4)$, $B(2, 1)$, $C(3, 3)$

(b) 

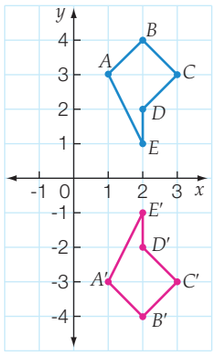
(c) $A'(-3, 1)$, $B'(-2, -2)$, $C'(-1, 0)$

5 (a) 

(b) 

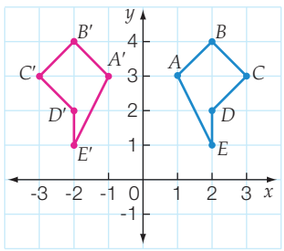
6 **(a)** $A(1, 3)$, $B(2, 4)$, $C(3, 3)$, $D(2, 2)$, $E(2, 1)$

(b)



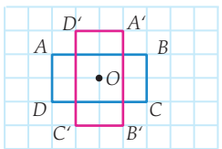
(c) $A'(1, -3)$, $B'(2, -4)$, $C'(3, -3)$, $D'(2, -2)$, $E'(2, -1)$

(d)

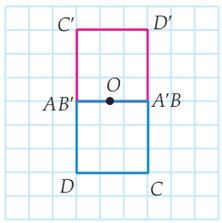


(e) $A'(-1, 3)$, $B'(-2, 4)$, $C'(-3, 3)$, $D'(-2, 2)$, $E'(-2, 1)$

7 **(a)**



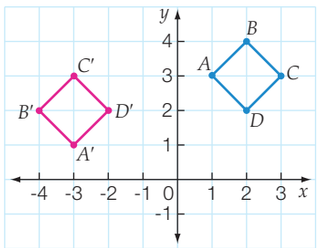
(b)



8 D

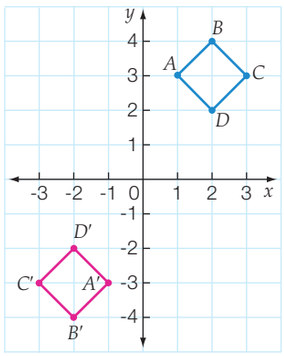
9 **(a)** $A(1, 3)$, $B(2, 4)$, $C(3, 3)$, $D(2, 2)$

(b)



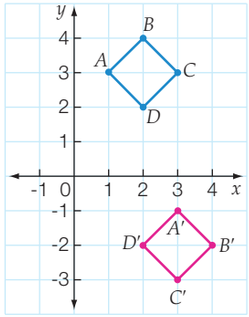
(c) $A'(-3, 1)$, $B'(-4, 2)$, $C'(-3, 3)$, $D'(-2, 2)$

(d)



(e) $A'(-1, -3)$, $B'(-2, -4)$, $C'(-3, -3)$, $D'(-2, -2)$

(f)



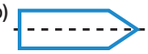
(g) $A'(3, -1)$, $B'(4, -2)$, $C'(3, -3)$, $D'(2, -2)$

10 C

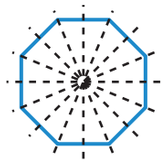
11 C

12 **(a)**

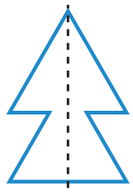
(b)



(c)



(d)



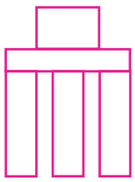
(e)

(f)

13 **(c)** and **(e)** have rotational symmetry.

14 Check your drawing carefully against the question.

15

	Front elevation	Side elevation
(a)		
(b)		

16 Check your drawing carefully against the question.

17

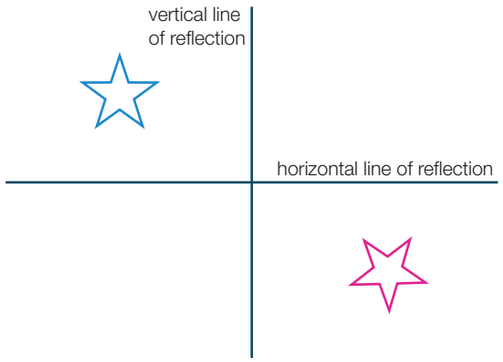

front


top


side

18 4 units right

19 (a)

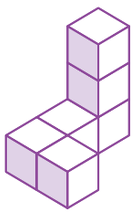


(b) Yes

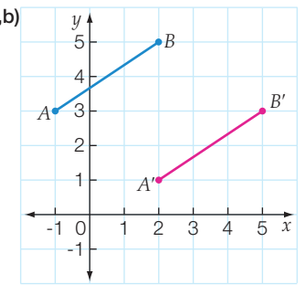
20 Rotating either 180° in a clockwise or anticlockwise direction about the intersection point of the axes.

21 None

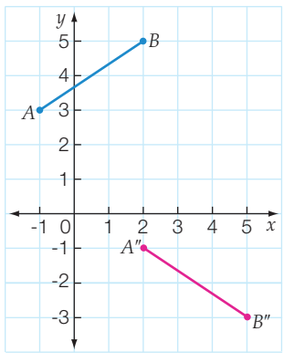
22



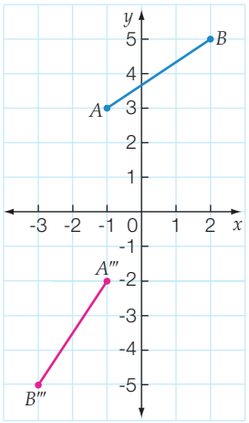
23 (a,b)



(c)

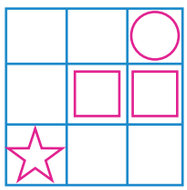


(d)

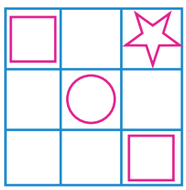


(e) $A'''(-1, -2)$, $B'''(-3, -5)$

24 (a)



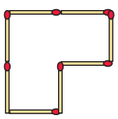
(b)



25 (a)

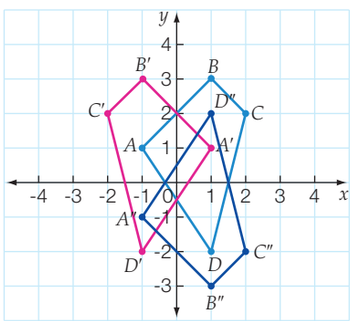
(b)

26 one match



27 19

28



Yes, Matt is correct. These two transformations could be replaced by a reflection in the x-axis.

NAPLAN practice 10

1 B **2** B **3** C **4** A

5 D **6** A **7** A

Mixed review E (p. 620)

1 (a) 12 (b) 64 (c) 25

2 (a) 7 (b) 2700 (c) 99 000

3 (a) 17.515 (b) 0.0072 (c) 1.99

4 (a)

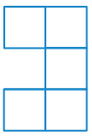
m	4	0	11	25	15
n	12	0	33	75	45

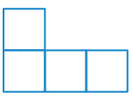
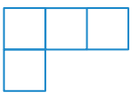
(b)

s	18	100	12	22	312
t	6	88	0	10	300

5 (a) 220 cm^2 (b) 60 cm^2

6 (a) $\frac{1}{6}$ (b) $\frac{1}{26}$ (c) $\frac{1}{4}$

7 (a) (i)  (ii) 

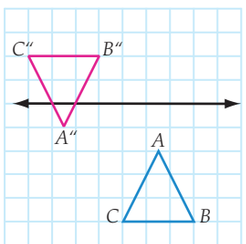
(b) (i)  (ii) 

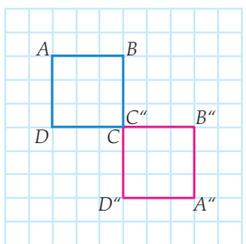
8 (a) $x = 3$ (b) $x = 24$ (c) $x = 3$

9 (a) 145° (b) 53° (c) 90°

10

Height (cm)	Frequency
145–149	1
150–154	2
155–159	5
160–164	7
165–169	2
170–174	3
Total	20

11 (a) 

(b) 

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

13 mean = 30.6, median = 31.5, mode = 34, range = 39, outlier = 6

14 1 unit right and 1 unit down

15 (a) $24 = 2 \times 2 \times 2 \times 3$ (b) $30 = 2 \times 3 \times 5$

(c) 6 (d) 120

16 (a) 60° (b) 126°, 54°, 54°

17 O, X

18 (1, 1)

19 (a) Students' own answers.

(b) Work out what the numbers need to total using the mean, and then set out some boxes, putting 6 in place to make it the median. The other numbers can then be filled in around the set number(s).

(c) It is easier to use an odd number of values because the median is then only one single value.

20 (a) There are eight possible results: HHH, HHT, HTH, HTT, THH, THT, TTH, TTT.

(b) You win with half of the results, and win more than you lose on the other results. So, the game is not fair, but it is not fair to the operator!