

Learner's Book

answers

Unit 1 Getting started

1 $-7, -5, 0, 3, 6, 9$

2 $9, 18, 27, 36, 45$

3 $1, 3, 5, 15$

4 5^2

Exercise 1.1

1 **a** 1 **b** -4 **c** -8 **d** 4

2 **a** -6 **b** 8 **c** -10 **d** 2

3 **a** -2 **b** 10 **c** 2 **d** -10

4 **a** 4 **b** -2 **c** -10 **d** -6

5 -9

6 **a** For example: 1 and 0; 2 and -1 ; 3 and -2 ; 4 and -3 ; 5 and -4

b One integer will be positive and the other integer will be zero or negative. If you ignore the $-$ sign, the difference between them is 1 and the $-$ sign is on the smaller integer.

7 **a** Learners could check this with some particular values for the two integers. They could use one positive integer and one negative integer or they could make them both negative integers.

b Only if the answer is zero, otherwise they have different signs.

+	-4	6	-2
3	-1	9	1
-5	-9	1	-7

8 Missing numbers from top to bottom.

a $-6, -4$ **b** $-3, -5, 2$

c $-12, -2, -10$ **d** $1, 5, -4$

e $-1, 7, -8$

Reflection: You have to work backwards from the answer or do a subtraction.

10 **a** 5 **b** -12 **c** 10 **d** -19

11 **a** -40 **b** -130 **c** 1200 **d** -700

12 **a** **i** -4 **ii** -4

iii -4 **iv** -4

b Three numbers can be added in any order. It is true for any three integers.

13	a	<table border="1"> <tbody> <tr> <td>+</td><td>-5</td><td>7</td></tr> <tr> <td>4</td><td>-1</td><td>11</td></tr> <tr> <td>-3</td><td>-8</td><td>4</td></tr> </tbody> </table>	+	-5	7	4	-1	11	-3	-8	4
+	-5	7									
4	-1	11									
-3	-8	4									

b $-1 + 11 + -8 + 4 = 6$

c $4 + -3 + -5 + 7 = 3$

d $b = 2 \times c (6 = 2 \times 3)$

Reflection: Learner's own answer.

14 **a** There are three possible answers. They are $2, -13$ and 17 .

b Learner's own check.

Exercise 1.2

1 **a** -6 **b** -35

c -40 **d** -36

2 **a** -5 **b** -5 **c** -6 **d** -3

3 **a** -2 **b** -6 **c** 7 **d** 5

4 **a** 4 **b** -2

c -16 **d** -20

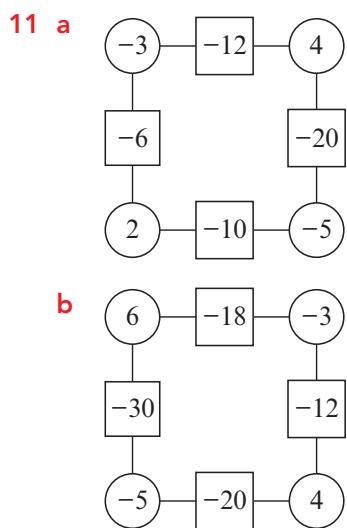
5 There are four possible pairs: 2 and -5 ; -2 and 5 ; 1 and -10 ; -1 and 10 .

Reflection: First, find all the pairs of numbers with a product of 10. Then think about if the sign is positive or negative.

6	\times	-3	-5
5		-15	-25
7		-21	-35

- 7** a -21 b -50 c -8 d -4
8 a -200 b -1800 c -360 d -100
9 a -12 b -24
 c -30 d -20

- 10** a The missing numbers are: -5, -4, -2.
 b Add $-20 \div 1 = -20$ and $-20 \div 20 = -1$.
 c The lines can be in any arrangement.
 Learner's own diagram.
 d Learner's own check.



- 12** There are four possible answers. Going clockwise from the top left-hand circle, the possible answers are: 1, -10, 3, -8; -1, 10, -3, 8; 2, -5, 6, -4; -2, 5, -6, 4.

Exercise 1.3

- 1** a 5, 10, 15, 20, 25
 b 10, 20, 30, 40, 50
 c 7, 14, 21, 28, 35
 d 12, 24, 36, 48, 60
2 a 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39
 b 5, 10, 15, 20, 25, 30, 35
 c 15, 30

- 3** a 12, 24, 36, 48 b 12
4 24
5 30
6 56
7 a $4 \times 7 = 28$ is a multiple of 4 and 7.
 b $6 \times 5 = 30$ is a multiple of 6 and 5.
 c It is always true. $A \times B$ is a multiple of A (B times) and of B (A times).
 d It is sometimes true but not always true.
 It is true when $A = 4$ and $B = 7$, then $A \times B$ is 28 and this is the LCM.
 A counterexample is when $A = 6$ and $B = 4$, then $A \times B = 24$ but the LCM is 12.

- 8** 12
9 36
10 There are two possible answers: 1 and 21; 3 and 7.
11 There are four possible answers: 1 and 30; 2 and 15; 3 and 10; 5 and 6.

Reflection: Learner's own answer.

Exercise 1.4

- 1** a 1, 2, 3, 4, 6, 8, 12, 24
 b 1, 2, 5, 10, 25, 50
 c 1, 3, 5, 9, 15, 45
 d 1, 19
2 a 1, 3, 11, 33 b 1, 2, 17, 34
 c 1, 5, 7, 35 d 1, 2, 3, 4, 6, 9, 12, 18, 36
 e 1, 37
3 a 1, 2, 3, 6 b 6
4 a 4 b 6 c 12
5 a 6 b 1 c 2 d 7
6 a 10 b 20 c 30
7 a 7 b $\frac{5}{8}$

Reflection: For example: If you divide the numerator and the denominator by the highest common factor, you have the fraction in its simplest form.

8 a 1

- b** You simplify $\frac{25}{36}$ by dividing 25 and 36 by a common factor. Since 1 is the only common factor, the fraction cannot be simplified.

9 9

- 10 a** There are four possible pairs: 12 and 28, 12 and 32, 16 and 28, 16 and 36.

- b** Learner's own answer.

11 a 4 **b** 24 **c** $8 \times 12 = 96$

- d** $HCF \times LCM = 96$

- e** The answers are equal. This is always true.

- f** Learner's own answer.

- 12 a** 3 is a factor of both numbers, so each number is a multiple of 3.

- b** 45 is a multiple of both numbers, so each number is a factor of 45.

- c** 9 and 15

- d** Learner's own answer.

Exercise 1.5

- 1 a** $2+8+5+7+2=24$; this is a multiple of 3 but is not a multiple of 9.

- b** 28575 has a total of 27, so is divisible by 9.

- 2 a** $5+7+4+2+3=21$, which is a multiple of 3. 21 is odd, so 6 is not a factor.

- b** 0 or 6

- 3 a** The final digit is even, so it is divisible by 2; the last two digits are 64 and this is divisible by 4, so the number is divisible by 4.

- b** The last three digits are 764 and $764 \div 8 = 95$ r. 4, so it is not a multiple of 8.

- 4 a** $2+5+3+2+0=12$, which is a multiple of 3; 20 is a multiple of 4.

- b** Possible answers are 2, 5, 6, 8 and 10.

- 5 a–c** Learner's own answers.

- 6 a** odd $9+4=13$; even = 2; $13-2=11$

- b** $odd = 4+0+6=10$; even = $8+1+1=10$; $10-10=0$, so it is a multiple of 11.

- 7 a** $258 - 2 \times 3 = 252$ and $252 \div 7 = 36$

- b** $385 - 2 \times 2 = 381$ and $381 \div 7 = 54$ r 3

- 8 a** The number is odd, so 2, 4, 6 and 8 are not factors. The last digit is 9, so 5 is not a factor. The sum of the digits is 27, so both 3 and 9 are factors. $22\,599 \div 7 = 3228$ r. 3, so 7 is not a factor. So, 3 and 9 are the only factors between 1 and 10.

- b** 99 522 has the same digits as 22 599 (the number in part a), so 3 and 9 are still factors. It is even, so 2 is a factor. 6 is also a factor, but 4 and 8 are not factors. 5 is not a factor. 7 is not a factor. The factors are 2, 3, 6 and 9.

Number	Factors between 1 and 10
12	2, 3, 4, 6
123	3
1234	2
12 345	3, 5
12 3456	2, 3, 4, 6, 8

- 10** For example: 4675 because $4+7=6+5=11$. There are seven other possibilities.

- 11 a** 2521 is odd and so not divisible by 2, 4, 6, 8 or 10. The sum of the digits is 10, so it is not divisible by 3 or 9. The last digit is 1, so it is not divisible by 5; $2521 \div 7 = 360$ r. 1. $1+5=6$ and $2+2=4$, so it is not divisible by 11.

- b** Any number with these digits that ends in 5.

- c** Any number with these digits that ends in 12 or 52.

- d** 2512 or 2152

- e** 2526

- f** 2530

- 12 a** Because the last digit is 4, it is even and is divisible by 4.

- b** The last digit is always 4 and never 0 or 5.

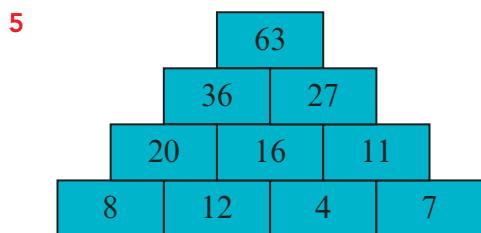
- c i** 444 is possible.

- ii** 444444 or 44444444 and so on because the sum of the digits is 24 and so on. Always a multiple of 3.

d i	44 is possible.	d	Impossible
ii	4444 or 444444 or . . . If there is an even number of digits, the difference calculated in the test is 0.	e	No; a counterexample is 8, which is 2^3 and has four factors, 1, 2, 4 and 8.
13 a	It is false. 12 is divisible by 2 and 4, but it is not divisible by 8.	f	Learner's own answer.
b	It is true. A number divisible by 10 has a last digit of 0. Hence, it is even and also divisible by 5.	Reflection:	Learner's own answer.
c	It is true. Learner's own answer.	12 a	The differences are 3, 5, 7, 9, 11, . . .
		b	They are odd numbers. They increase by two each time. Add the two numbers that are squared to find the difference.
		c	The differences are 7, 19, 37, 61, 91, . . .
Exercise 1.6		13 a	i 1 ii 3 iii 6
1 a	9	b	25
d	100	e	225
2 a	$\sqrt{9} = 3$	b	$\sqrt{25} = 5$
c	$\sqrt{64} = 8$	d	$\sqrt{100} = 10$
e	$\sqrt{225} = 15$		
3 a	6	b	9
c	11	d	12
4 a	1	b	8
c	27	d	64
e	125		
5 a	$\sqrt[3]{1} = 1$	b	$\sqrt[3]{8} = 2$
c	$\sqrt[3]{27} = 3$	d	$\sqrt[3]{64} = 4$
e	$\sqrt[3]{125} = 5$		
6 a	4	b	8
c	12		
7 a	$9^2 = 81$ and $10^2 = 100$		
b	13 and 14	c	4 and 5
8 a	289	b	$\sqrt{289} = 17$
9 a	$\sqrt{324} = 18$	b	$\sqrt{400} = 20$
c	$\sqrt{529} = 23$	d	$\sqrt{676} = 26$
10 a	$\sqrt[3]{343} = 7$	b	$\sqrt[3]{729} = 9$
c	$\sqrt[3]{1000} = 10$	d	$\sqrt[3]{1728} = 12$
11 a	The factors are 1, 36, 2, 18, 3, 12, 4, 9, 6.		
b i	1, 9, 3	ii	1, 16, 2, 8, 4
iii	1, 25, 5		
c	Usually factors come in pairs. For example, $2 \times 18 = 36$ gives two factors, 2 and 18. Only for a square number can you get a single factor from a product. $6 \times 6 = 36$, so the total number is odd.		
14 a	$\sqrt{1+3+5} = 3$	b	$\sqrt{1+3+5+7} = 4$
c	$\sqrt{1+3+5+7+9} = 5$ and so on.	d	The numbers in each part are $1+3+5+7=16$, which equals a 4 by 4 square. Compare with part b.
		Check your progress	
1 a	-4	b	-10
c	-12	d	-5
2 a	5 and -3	b	10 and -7
3 a	-3	b	6
4	1, 2, 4, 8		
5 a	54, 60, 66	b	30
6 a	13	b	$\frac{2}{5}$
7 a	\sqrt{N} is an integer, so $\sqrt{N} \times \sqrt{N} = N$ is a square number.	b	$N=64$
8 a	32 is divisible by 4.	b	1 or 4 or 7
c	9		
9	$9^3 = 27^2$ and $16^3 = 64^2$		

Unit 2 Getting started

- 1 a 19 b 14 c -2 d -3
 e 32 f 5 g -16 h -12
 2 a 13 b 84 c 13 d 1
 e 21 f 4 g -20 h 0
 3 a 2 b 6 c 10 d 11
 e -5 f 3
 4 a \$9.14 b \$12.20


Exercise 2.1

- 1 a $n+2$ b $n-3$
 2 Learner's own answers.
 3 a $t+2$
 b $2t$
 c $\frac{t}{2}$ or $t \div 2$
 4 a $x+6$ b $m+b$ c $3g$
 5 a $6x+1$ b $4x-9$
 c $\frac{x}{6}-1$ d $\frac{x}{2}+7$
 e $25-2x$
 6 a i $3y$
 ii $\frac{y}{2}$ or $y \div 2$
 iii $4y+1$
 iv $2y-5$
 v $52-5y$
 vi $\frac{y}{4}+3$ or $y \div 4+3$
 b Learner's own answers.

Activity 2.1

- Learner's own answers.
- 7 a order of operations
 b Equivalent to $2n+3$ is: A, D, G, K.
 Equivalent to $2n-3$ is: B, I.
 Equivalent to $3n+2$ is: C, H, J, L.
 Equivalent to $3-2n$ is: E, F.
 8 a Pedro multiplied instead of adding.
 Correct answer is $\$t+\s .
 b He has confused two T-shirts and four shirts with four T-shirts and two shirts.
 Correct answer is $\$4t+\$2s$.
 9 a $2t+4b$, where t = cost of a taco, b = cost of a burrito.
 b $8x+5y$, where x = cost of a lemon cake, y = cost of a carrot cake.
 c $12g$, where g = cost of a gold coin.
 d $15s$, where s = cost of a silver coin.
 10 a $x+y$ or $y+x$ b $y-x$
 c $m+2n$ or $2n+m$ d $3b-a$
 e pq f $4gh$
 11 $6x-(2y+3)$ or $6x-2y-3$

Exercise 2.2

- 1 a 22 b 8 c 7 d 20
 e 35 f 40
 2 a 8 b 11 c 11 d 75
 e 15 f 11 g 31
 h 8 i 3 j 15
 3 a For every day, there are 24 hours.
 b $h=24d$ c 120 hours
 4 a i number of minutes = $60 \times$ number of hours
 ii $m=60h$
 b 300 minutes

- 5** **a** **i** Amount each pays = total cost \div five

ii $a = \frac{c}{5}$ or $a = c \div 5$

b \$17

- 6** **a** $T = \text{total pay}$, $h = \text{hours worked}$

b Total pay = $9 \times \text{number of hours worked}$

c \$270

- 7 a C =cost per week, p =cost of petrol,
 i =cost of insurance

b Cost per week = cost of petrol + cost of insurance

c \$32

- 10 a** If x is the cost of an adult ticket, then y is the cost for a child ticket. But if x was actually the cost of a child ticket, then y would be the cost for an adult ticket.

x can represent the cost of either the adult ticket or the child ticket, and y represents the other ticket.

- b** $C=a+c$, or still use x and y , but write down what each letter represents.

11 a No; p has to be the large piece because the small piece is taken (i.e. subtracted) from it.

b $W=l-s$, or still use p and q , but write down what each letter represents.

12 $k=5$

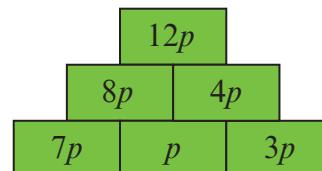
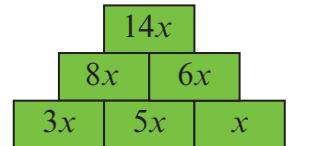
Reflection: Learner's own answers.

Exercise 2.3

- 1 a $4a$ b $3b$ c $2a+b$
d $2a+2c$ or $2(a+c)$
e $3a+2b$

- 2** a and v; b and iv; c and i; d and vi; e and ii;
f and iii;

- | | | | | | | | | |
|----------|----------|--------|----------|-------|----------|------|----------|-------|
| 3 | a | $5x$ | b | $6y$ | c | $8d$ | d | $13t$ |
| | e | $14g$ | f | $16p$ | g | $3w$ | h | $7n$ |
| | i | $4b^2$ | j | $5f$ | k | $3j$ | l | k^3 |



- | | | | | | | |
|----------|----------|----------------|----------|----------------|----------|----------|
| 5 | a | $10x + 15y$ | b | $2d + 2h$ | c | $5g + 3$ |
| | d | $5p + 13t$ | e | $3a + 2b - 3c$ | | |
| 6 | a | $5a + 5b$ | b | $8c + 3d$ | | |
| | c | $7t + 10$ | d | $4m + 4n$ | | |
| | e | $6k + 3f$ | f | $5q + 8$ | | |
| | g | $5r + 3s + 5t$ | h | $6 + 3h + 5k$ | | |

- 7** xy means $x \times y$ and yx means $y \times x$,
so $xy = yx$.

a $7xy$ or $7yx$

b $5pq + 4de$ or $5qp + 4ed$

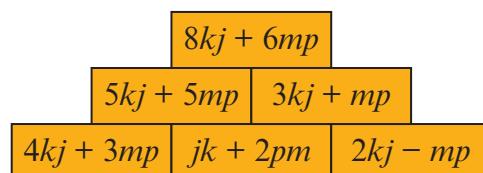
8 **b** $8st + 16pu$ **c** $6bv + 2ad$

d $9rt + 2gh$ **e** $11xy + 3xz$

f $4a + 8ac$ **g** mn

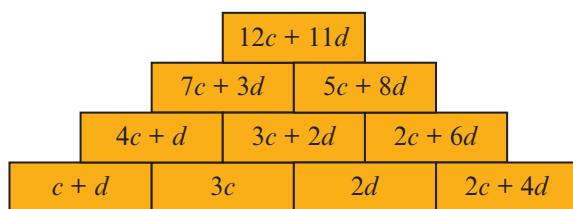
9 **a** The ‘ $8x + 4$ ’ is correct, but you cannot add
 $8x$ to 4, so $8x + 4$ is the answer.

b Dai added $2bc$ to the $3bc$, when he should
have subtracted. Also, you can simplify
 $5bd + 3db$ to $8bd$. Correct answer is
 $bc + 8bd$.



Activity 2.2

Learner's own answers.

11

Marcus is incorrect. Every block can be filled in by working backwards.

12 a Learner's own answers.

b i $\frac{9a}{8}$ ii $\frac{y}{3}$ iii $\frac{x}{4}$

13 a $\frac{5a}{4}$ **b** $\frac{16b}{15}$ **c** $\frac{7c}{3}$

Exercise 2.4

1 a $2x+18$ **b** $3y-3$

c $28+4p$ **d** $5q-15$

2 a Advantages: good if you like multiplication boxes, easy method to follow.

Disadvantage: takes a long time to draw the grid.

b Advantages: quick way to show workings, easy method to follow.

Disadvantages: must draw the arcs to show workings and to check all parts have been multiplied.

c Advantages: easy method to follow.

Disadvantages: takes a long time to show all workings.

d Learner's own answer.

3 a $3y+18$ **b** $4w+8$

c $5z+25$ **d** $3b-3$

e $6d-54$ **f** $2e-16$

g $12+6f$ **h** $2+2g$

i $27+9i$ **j** $12-6x$

k $2-2y$ **l** $35-5p$

4 a $4x+2$ **b** $15y-10$

c $14g+63p$ **d** $16q-44+4r$

5 a $6x+3$ **b** $12y+20$

c $10w+15$ **d** $24z+42v+54$

e $6b-8$

f $8c-12$

g $30d-6$

h $24e-48+16f$

i $3a+6f$

j $15b+20g$

k $42c-49h$

l $45+27h-36i$

- 6 a** Bethan did $4+4$ when it should be 4×4 .
Correct answer is $4x+16$.

- b** Bethan forgot to multiply the -3 by 2.
Correct answer is $12x-6$.

- c** Changed the $-$ to a $+$. Correct answer is $6-15x$.

- d** You can't subtract $6x$ from 12. Correct answer is $12-6x$.

Reflection: Learner's own answer.

7 No; three of the expanded expressions give $30+24x$, but $4(6x+26)$ expands to give $104+24x$.

8 a $3(4b+5)$ and $3(5+4b)$ are the same as $12b+15=15+12b$.

b $2(5c-1)$ and $2(1-5c)$ are not the same as $10c-2 \neq 2-10c$.

9 a $24y+32\text{ cm}^2$ **b** $6y+24\text{ cm}$

10 $(8k-14m)^\circ$

11 a $4x+27$ **b** $12x+21$ **c** $3+6x$

Exercise 2.5

1 a $x=4, 4+6=10$

b $x=16, 16-6=10$

c $x=5, 2 \times 5=10$

2 a $x=7$ **b** $x=3$ **c** $x=13$

d $x=12$ **e** $x=13$ **f** $x=10$

g $x=26$ **h** $x=48$ **i** $x=4$

j $x=6$ **k** $x=10$ **l** $x=6$

3 a $y=12$ **b** $y=7$ **c** $y=18$

d $y=28$ **e** $y=3$ **f** $y=7$

4 a $n+3=18, n=15$

b $n-4=10, n=14$

c $4n=24, n=6$

- 5 a i** I think of a number and subtract 8. The answer is 3.
- ii** I think of a number and add 5. The answer is 12.
- iii** I think of a number and multiply my number by 8. The answer is 96.
- b i** $n=11$ **ii** $n=7$ **iii** $n=12$
- 6 a** $2-7=-5$, but $-2-7=-9$; $x=-9$
- b** Should have added 6, not subtracted; $x=4$
- c** $35 \div 5=7$, but $-35 \div 5=-7$; $x=-7$
- 7 a** $a=5$ **b** $a=4$ **c** $a=5$
- d** $c=6$ **e** $c=4$ **f** $c=8$
- 8 a i** $2a+8=20$ **ii** $3b+3=24$
- b i** $a=6$ **ii** $b=7$
- c** Learner's own answer.
- 9 a i** $2p+1=14$ **ii** $p=6.5$
- b i** $4p-5=37$ **ii** $p=10.5$
- c i** $6p-10=26$ **ii** $p=6$
- 10 a i** $n-3=26$ **ii** $n+5=18$
- iii** $2n=48$ **iv** $2a+3=35$
- b i** 29 **ii** 13
- iii** 24 km **iv** 16 years old

Activity 2.3

Learner's own answers.

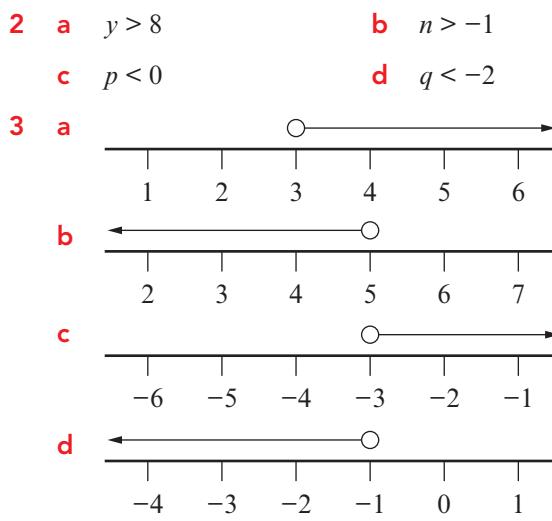
- 11 a** $2m-6$ and 44 to give $m=25$.
- b** $6m+2$ and 20 to give $m=3$.

All solutions are in this table.

	32	44	20
4m+4	$m=7$	$m=10$	$m=4$
2m-6	$m=19$	$m=25$	$m=13$
6m+2	$m=5$	$m=7$	$m=3$

Exercise 2.6

- 1 a** x is less than 10.
- b** x is greater than 10.
- c** x is less than -4 .
- d** x is greater than -4 .



- 4 a** $x > 2$ **b** $x < 9$
- c** $x > -1$ **d** $x < -4$
- 5 a** In part **i**, the smallest integer must be greater than 7, which is 8.
In part **ii**, x could be any integer greater than 7, which is 8, 9, 10, 11, ...
b Learner's own answer.
- 6 a i** 5 **ii** 5, 6, 7, ...
b i -6 **ii** -6, -5, -4, ...
c i 3 **ii** 3, 4, 5, ...
7 a i -7 **ii** -7, -8, -9, ...
b i 11 **ii** 11, 10, 9, ...
c i 4 **ii** 4, 3, 2, ...
- 8 a** There is not a greatest integer because as long as y is greater than the values shown, it can be any integer.
b There is not a smallest integer because as long as n is less than the values shown, it can be any integer.
- 9 g** a and C and ii; b and E and i; c and A and iv; d and D and vi; e and F and iii; f and B and v
h Advantage: easy to see the answer; disadvantage: takes a long time.
i Learner's own answer.

Check your progress

- 1** a $4n$ b $n - 6$
 c $n + 12$ d $3n + 5$
- 2** a 19 b 6 c 4
- 3** a i The cost each is the total electricity bill divided by four.
 ii $C = \frac{b}{4}$
 b \$24
- 4** a $3n$ b $8c$
 c $8x^2$ d $xy + 8yz$
- 5** a $3x + 6$ b $18 - 6w$
 c $12x + 8$ d $21 - 12v + 18w$
- 6** a $n = 5$ b $m = 16$
 c $p = 8$ d $h = 9$
- 7** a $n + 3 = 22, n = 19$
 b $2n + 4 = 28, n = 12$
- 8** $x > 6$

Unit 3 Getting started

- 1** a 20 b 400 c 7000
 d 130 e 3500 f 81 000
- 2** a C b A c B
 d C e A f C
- 3** a T
 b F (correct answer: 0.12)
 c T
 d F (correct answer: 3.46)
 e T
 f F (correct answer: 4.25)
- 4** 150, 15, 15 000, 150, 0.15, 1.5, 150
- 5** a 7 b 4 c 18
 d 145 e 12 f 89
 g 254 h 124
- 6** a B b A c B
 d B e A
- Exercise 3.1**
- 1** a i 1000 ii one thousand
 b i 100 000
 ii one hundred thousand
 c i 10 000 000 ii ten million
 d i 10 ii ten
- 2** a 10^2 b 10^8 c 10^4 d 10^{10}
- 3** a 30 000 b 5 000 000
 c 4 500 000 d 291 000
- 4** Yes
- 5** a 2300 b 7 680 000 c 9 000 000
- 6** a 420 b 65 000
 c 12 700 d 287 000
- 7** a–c Learner's own answers.
 d Marcus' method doesn't work because the number being multiplied has decimal places.
- 8** a 47 000
 b 91 500
 c 3 300 000
- 9** a 1500 b 10^2 c 6.12 d 6
- 10** a 8 b 805
- 11** Yes, as long as there are enough zeros to cross off.
- 12** a 8 b 510 c 84 600
- 13** Learner's own answers.
- 14** a 23 b 2.3 c 0.23
 d 0.023 e 6.5 f 0.65
 g 0.065 h 0.0065 i 0.9
 j 0.09 k 0.009 l 0.0009
- 15** a B b A c C
- 16** a 80 b 150
 c 7000 d 3400
 e 9 000 000 f 600 000
 g 124 h 32 250 000

- 17** a 8 km
 b number of km = number of mm $\div 10^6$
 c i 90 ii 15.6 iii 0.77

- 18** a Group 1: $78000 \div 10^3$, $780 \div 10$, 0.0078×10^4 ; group 2: 7.8×10^3 , $78000000 \div 10^4$, 780×10 ; group 3: 0.00078×10^6 , $7800000000 \div 10^7$, 78×10 .
 The left-over card is $780 \div 10^2$.
 b For example: 0.078×10^2 , 0.78×10 , $78 \div 10$, $7800 \div 10^3$

Reflection: Learner's own answers.

Exercise 3.2

- 1** b 8.42 c 39.56 d 0.49
 e 138.22 f 0.07

- 2** a Sofia
 b Arun rounded to one decimal place, as he has only written one digit after the decimal place.

- 3** Any distance from 9.545 km to 9.554999999... km.

- 4** a 12.894 b 127.997
 c 0.201 d 9.350

5 a Learner's own answers.

- b Easy to follow method that shows workings.
 More difficult to make a mistake because the rounding is done in easy steps.

c Learner's own answers.

- d Draw a line after the digit in the sixth decimal place, circle the digit in the seventh decimal place, then decide whether to increase the digit before the line by 1 (if the circled number is 5, 6, 7, 8 or 9) or leave it unchanged (if the circled number is 0, 1, 2, 3 or 4).

- 6** a B b C c A

- 7** a 126.9923 b 0.8
 c 782.030 d 3.1415927
 e 4.00 f 100.0

- 8** a A and c and iv; B and a and iii; C and e and i; D and b and vi; E and f and ii; F and d and v

- b Advantage: you will get all the answers;
 disadvantage: this method takes a long time.
 c You could start by matching the rounded numbers to the degree of accuracy. This is easy, just by counting the number of decimal places. You could then find which original number rounds to 6 d.p., then 5 d.p., then 4 d.p., etc.

- 9** a 1.29 b 4.5333 c 1.310

Activity 3.1

Learner's own answers.

- 10** a Sofia = \$15, Marcus = \$15.50,
 Arun = \$15.49

- b Marcus, as his is the only amount that covers the bill.

Sofia's way is $3 \times 15 = \$45$ (not enough);
 Marcus' way is $3 \times 15.50 = \$46.50$ (enough); Arun's way is $3 \times 15.49 = \$46.47$ (not enough).

- c Learner's own answers. For example: You could round up to \$16 each, which would leave a small tip.

Check your progress

- | | |
|-------------------|----------------|
| 1 a 10 000 | b ten thousand |
| 2 a 10^3 | b 10^6 |
| 3 a 40 000 | b 12 000 000 |
| c 890 000 | d 4660 |
| 4 a 7 | b 340 |
| c 1.4 | d 0.312 |
| 5 a 78.93 | b 0.6674 |
| c 154.829 | d 6.505050 |

Unit 4 Getting started

- | | | |
|---------------------------------|-----|-----|
| 1 b < | c > | d > |
| e > | f < | |
| 2 15.0, 15.3, 15.6, 15.9 | | |
| 3 a F | b T | c T |
| d F | e F | f T |

- 4** a 12.91 b 14.18
 c 1.85 d 3.97

5 $5 \times 5.42 = 27.1$, $8 \times 3.3 = 26.4$, $4 \times 6.9 = 27.6$,
 $12 \times 2.4 = 28.8$, $6 \times 4.25 = 25.5$

- 6** a 2.1 b 0.7
 c 3.11 d 2.75

Exercise 4.1

- 1** a 9.99 b 3.67 c 12.56
 d 127.06 e 0.67 f 3.21
 g 18.45 h 0.043 i 0.09

- 2** a 10.49, 10.64, 10.65, 10.73, 10.74, 10.75
 b Shelly-Ann Fraser

3 No; looking at the tenths, 2 is less than 4.

- 4** a < b < c < d >
 e > f < g > h >
 5 a = b ≠ c ≠
 d = e = f ≠

- 6** a 2.009, 2.15, 2.7
 b 3.2, 3.342, 3.45
 c 17.05, 17.1, 17.125, 17.42
 d 0.52, 0.59, 0.71, 0.77
 e 5.199, 5.2, 5.212, 5.219
 f 9.03, 9.08, 9.7, 9.901, 9.99
 g Advantage: easy method; disadvantage: could take a long time

Reflection: Learner's own answer.

- 7** a 300 mL, 38.1 cL, 0.385 L
 b 7.3 cm, 0.705 m, 725 mm
 c 519 000 mg, 530 g, 5.12 kg, 0.0058 t
 d 0.45 m, 4450 mm, 0.0046 km, 461.5 cm
8 a Any three numbers between 3.071 and 3.082.
 b 12

- c** All of the three decimal numbers are between 3.07 and 3.083 (but not including 3.070 and 3.083); i.e. 3.071, 3.072, 3.073, 3.074, 3.075, 3.076, 3.077, 3.078, 3.079, 3.080, 3.081, 3.082.

Exercise 4.2

- 1** a 7.7 b 17.2
 c 3.4 d 8.0

- 2** Learner's own answer.
3 $1 - 0.36 = 0.64$, $1 - 0.78 = 0.22$, $1 - 0.44 = 0.56$,
 $1 - 0.284 = 0.716$, $1 - 0.432 = 0.568$

- 4** a 4.8 b 5.4 c 2.7 d 9.4
5 No, she must subtract the extra 0.2 to give 12.3.

- 6** a 12.2 b 18.5 c 26.1
 d 3.5 e 10.5 f 14.4
7 a 34.21 b 4.66 c 29.13
8 a July b 86.53 kg
9 a 17.28 b 33.342

- 10** a Marcus' method: Advantage is that it works with numbers of all sizes; disadvantage is that it is still time-consuming even for simple numbers.

Arun's method: Advantage is that it is a quick method to use for numbers that have a small number of decimal places; disadvantage: can be confusing to use for numbers that have lots of decimal places.

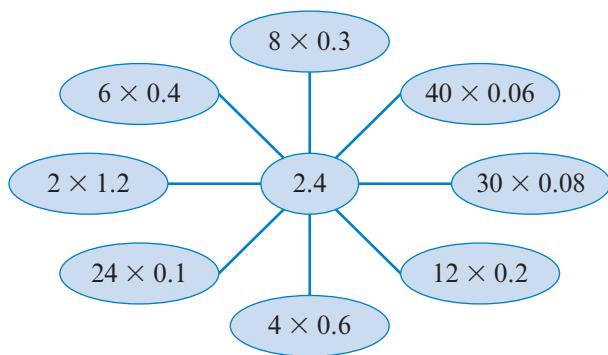
- b** Learner's own answer.

- c** Learner's own answer.

- 11** a 3.58 b 7.17
 c 25.45 d 23.218
12 a \$7.35 b \$2.65
13 a 8.6 m b 1.4 m
14 a -4.14 b -7.28
 c -5.88 d -2.979
15 a -15 b -23.52
 c 4.14 d 7.28

Exercise 4.3

- 1 a 0.8 b 2.5 c 1.8
 2 a 0.12 b 1.2 c 0.012 d 12
 3



- 4 a 2761.3 b 276.13
 5 a $52.1 \times 53 = 2761.3$, the answers are the same.
 b 521 is 100×5.21 and 0.53 is $53 \div 100$, so the $\times 100$ and $\div 100$ cancel each other out.
 6 a 5508
 b i 550.8 ii 55.08 iii 5.508
 iv 550.8 v 55.08 vi 5.508

Activity 4.1

Learner's own answers.

- 7 a Advantages: simple step-by-step method, easy to see any mistakes; disadvantages: a slow method.
 b Learner's own answer.

Reflection: Learner's own answer.

- 8 a 166.4; check: $3 \times 50 = 150$
 b 3110.4; check: $8 \times 400 = 3200$
 c 31.98; check: $0.8 \times 40 = 32$
 9 a An approximate answer of $50 \times 20 = 1000$. 85.23 is too far from 1000 for it to be correct.
 b 852.3
 10 8.28 g
 11 He will get \$354.75, which is just over \$350, so yes he is correct.
 12 $\$91 + \$97.75 + \$88 + \$108 = \$384.75$

Exercise 4.4

- 1 a 2.138 b 1.877 c 0.816
 d 1.308 e 1.092 f 0.094

- 2 a 4.327 b 1.487
 c 6.585 d 7.364
 3 \$1.16
 4 \$3.65
 5 \$24.25
 6 a 2.321 b 3.125 c 31.313
 7 a Lara forgot to write the '0' above the 4.
 b 7.025

- 8 a Kyle forgot to add a '0' to the end of 251.55 to put the remainder next to.
 b 9.675
 9 a Rounding or approximating; for example: $60 \div 10$, $56 \div 9$, $54 \div 9$
 b For example: Work out 9×6.258 and it should equal 56.322.
 10 a 14, 28, 42, 56, 70, 84, 98, 112, 126
 b 9.028
 c $126 \div 14 = 9$; $9.028 \times 14 = 126.392$

- 11 a i 235 ii 23.5
 iii 2.35 iv 0.235
 b Learner's own answer.
 c i 4.7 ii 0.47 iii 0.047
 d Learner's own answer.

- 12 a 1.5 b 1.35 c 0.662

$$\begin{array}{r} 3.982 \\ \hline 2 | 7.1964 \\ \quad 1.507 \\ \hline \end{array}$$

 13 a
$$\begin{array}{r} 69.042 \\ \hline 5 | 8.3495 \\ \quad 1.699 \\ \hline \end{array}$$

 b Learner's own answer.

Exercise 4.5

1 **a** $= 7 \times 18$
 $= 7 \times 10 + 7 \times 8$
 $= 70 + 56$
 $= 126$

b $= 4 \times 76$
 $= 4 \times 70 + 4 \times 6$
 $= 280 + 24$
 $= 304$

2 **a** 246 **b** 288 **c** 64 **d** 424

3 For example, when you multiply two numbers together:

- If you multiply one of the numbers by 10 and divide the other number by 10, it keeps the value of the calculation the same.
- If you multiply one of the numbers by 100 and divide the other number by 100, it keeps the value of the calculation the same.

4 **a** 2070, 1035, 345

b $2070 + 1035 + 345 = 3450$

5 **a** $46 - 4.6 = 41.4$

b $73 - 7.3 = 65.7$

6 **a** 61.2 **b** 42.3 **c** 113.4

7 Learner's own answers.

8 **a** 25.2 **b** 39 **c** 50.4

9 34.4 cm

10 **a** $\frac{1.455}{3} = 0.485$

b $\frac{67.35 \div 10}{50 \div 10} = \frac{6.735}{5} = 1.347$

c $\frac{0.4585}{7} = 0.0655$

d $\frac{893.6 \div 100}{200 \div 100} = \frac{8.936}{2} = 4.468$

11 When you divide both the numerator and the denominator by 10, it is equivalent to dividing the fraction by 1 and so it keeps the answer the same, but makes the calculation easier to do.

$$\frac{45.6 \div 10}{30 \div 10} = \frac{4.56}{3}$$

12 **a** **i** \$28.21 **ii** \$28

b \$28.21 is better, as it gets closer to the actual bill (but $20 \times \$28.21 = \564.20 , so will be 5 cents below the actual bill).

Check your progress

1 6.09, 6.45, 6.481, 6.5, 6.549

2 **a** 18.3 **b** 2.5

3 **a** 5.229 **b** 35.65

4 **a** 0.326 **b** 4.22

5 **a** 0.08 **b** 0.021

6 **a** 1339.8 **b** 133.98

7 254.93

8 7.356

9 **a** 13, 26, 39, 52, 65, 78, 91, 104, 117

b 18.365

c $18.365 \times 13 = 238.745$

10 **a** 63 **b** 77.4 **c** 1.16

Unit 5 Getting started

1 **a** 130° **b** 40°

c 90° **d** 250°

2 **a** obtuse **b** acute

c right **d** reflex

3 $180^\circ - (54^\circ + 20^\circ) = 180^\circ - 74^\circ = 106^\circ$

4 **a** 58°

b The three angles add up to 180° .

Exercise 5.1

1 **a** 64° **b** 125° **c** 96° **d** 56°

2 **a** 110° **b** 168° **c** 204° **d** 228°

3 **a** 120° **b** 72°

4 **a** 74° **b** 62° **c** 117°

5 110°

6 **a** 92° **b** 223° **c** 53°

7 The angles must all be 90° . It must be a square or a rectangle.

- 8 a** $125^\circ + 160^\circ + 90^\circ = 375^\circ$. This is impossible. The sum of the three angles should be less than 360° .

b Learner's own answer.

9 $66\frac{2}{3}^\circ$

- 10** Opposite angles are equal, so $y = 68^\circ$, $x = z = 112^\circ$.

- 11** By symmetry, $D = 50^\circ$, so $C = 360^\circ - (50^\circ + 50^\circ + 60^\circ) = 200^\circ$.

- 12 a** The only possibility is $30^\circ, 60^\circ, 120^\circ, 150^\circ$.

b Six possible sets of angles: $30^\circ, 30^\circ, 90^\circ, 210^\circ$; $30^\circ, 90^\circ, 90^\circ, 150^\circ$; $30^\circ, 90^\circ, 120^\circ, 120^\circ$; $60^\circ, 60^\circ, 90^\circ, 150^\circ$; $60^\circ, 90^\circ, 90^\circ, 120^\circ$; $90^\circ, 90^\circ, 90^\circ, 90^\circ$

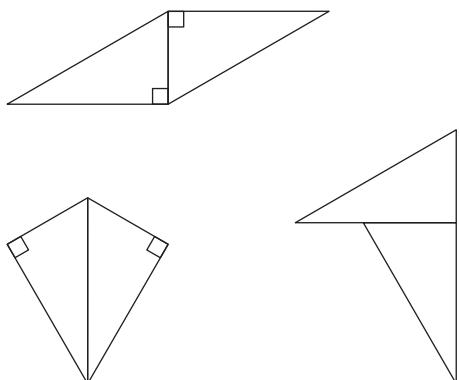
13 $a = 110^\circ, b = 110^\circ, c = 120^\circ, d = 100^\circ, e = 140^\circ$

Reflection: Learner's own answer.

14 a i $60^\circ, 120^\circ, 60^\circ, 120^\circ$

ii $60 + 120 + 60 + 120 = 360$

b Possible shapes:



c $30^\circ + 150^\circ + 30^\circ + 150^\circ = 360^\circ$;
 $90^\circ + 120^\circ + 90^\circ + 60^\circ = 360$;
 $30^\circ + 60^\circ + 30^\circ + 240^\circ = 360^\circ$

Reflection: Learner's own answer.

Exercise 5.2

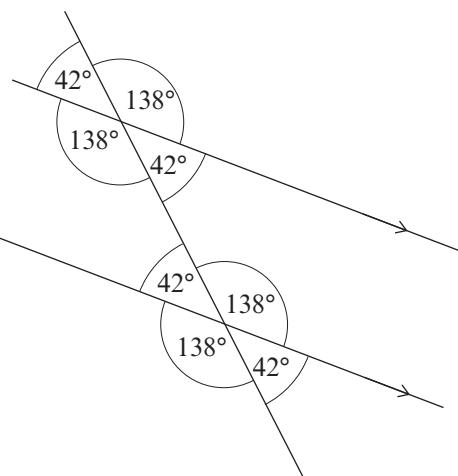
1 a $x = 53^\circ, y = 127^\circ$

b $w = 114^\circ, z = 66^\circ$

2 $87^\circ, 93^\circ, 93^\circ$

- 3** $a = 180^\circ - (61^\circ + 46^\circ) = 73^\circ$, angles on a straight line; $b = 61^\circ$, opposite angle; $c = 46^\circ$, opposite angle; $d = 73^\circ$, opposite a

4



5 $a = 113^\circ, b = 67^\circ, c = 67^\circ$

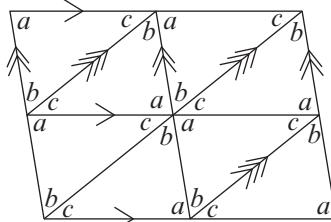
6 $a = 77^\circ, b = 77^\circ, c = 103^\circ$

7 $s = 75^\circ, t = 105^\circ$

- 8 a** For example: If the lines are parallel, the angles add up to 180° . But $56^\circ + 126^\circ = 182^\circ$, so the lines are not parallel. Other explanations are possible.

b Learner's own answer.

9 a, b



There are three sets of three parallel lines.

10 a 75°

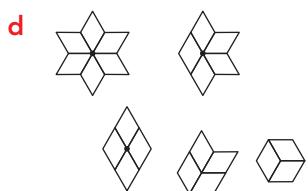
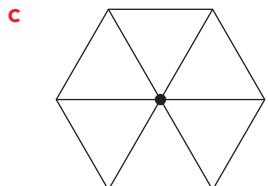
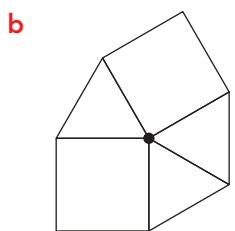
b 30°

c 1°

- d** Yes; the two marked angles in the triangle must add up to less than 180° . If one angle is 60° , X must be less than 120° . This angle could be a fraction more than 119° , such as 119.5° , but it cannot be 120° or more.

11 $C = 113^\circ, D = 135^\circ$

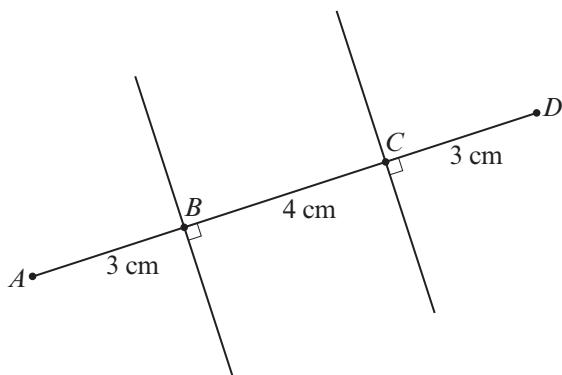
- 12 a** The angles add up to $90^\circ + 90^\circ + 60^\circ + 60^\circ + 60^\circ = 360^\circ$.



Reflection: Learner's own answer.

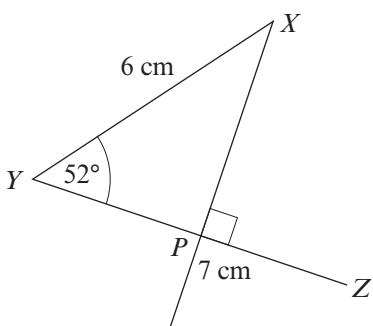
Exercise 5.3

1 a-c



d Learner's own answer.

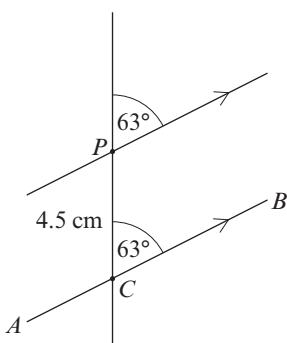
2 a, b



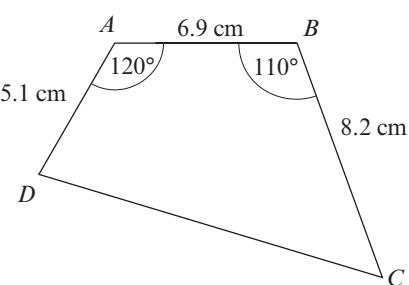
c i 4.7 cm ii 3.7 cm

d Learner's own answer.

3 a, b



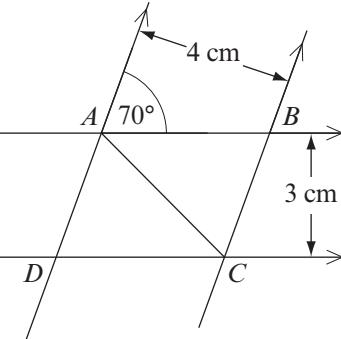
4 a



b 13.3 cm

c Learner's own answer.

5 a



b 5.4 cm

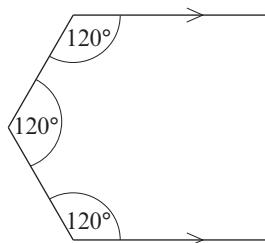
c Learner's own answer.

6 a 95°

b, c Many answers possible.

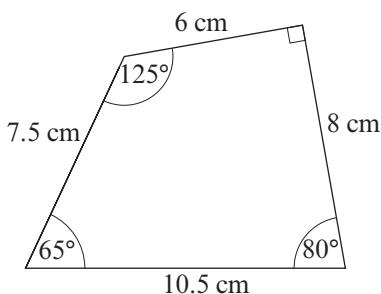
Reflection: Learner's own answer.

7 Because $120^\circ + 120^\circ + 120^\circ = 360^\circ$, the diagram will look similar to this:



The two lines are parallel.

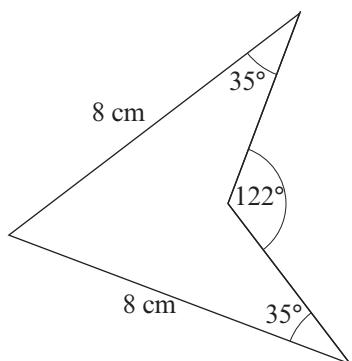
8 a



b five

c It can be done with three angles and two sides or two angles and three sides. These measurements need to be chosen carefully.

9

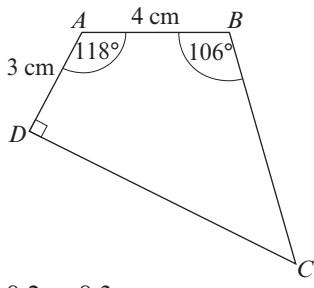


Check your progress

 1 100° and 160° or 130° and 130°

 2 a 46°

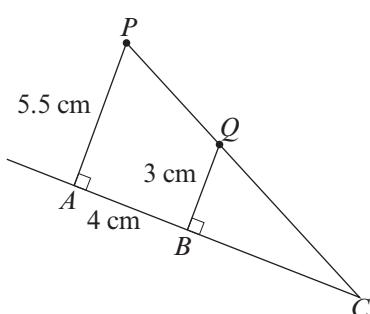
b



c 8.2 or 8.3 cm

 3 $a = 108^\circ$, $b = 72^\circ$, $c = 55^\circ$, $d = 125^\circ$

4 a


 b 32°

Unit 6 Getting started

- 1 a A set of questions used in a survey.
- b To investigate a statistical question or to test a prediction.
- 2 a For example: What type of vehicles use the road? How busy is the road? How many people are in each vehicle? How fast are the vehicles travelling? How old are the vehicles?
- b For example: There are more cars than trucks. There are more than ten cars each minute. Most cars have only one person. All the vehicles are travelling under the speed limit. Most of the cars are less than 4 years old.
- 3 a You need to choose some 12-year-old girls and some 12-year-old boys and measure their masses and heights. You could have two tables, one for boys and one for girls.
- b You could put the masses of the boys and the masses of the girls in a comparative bar chart. You could do the same thing for the heights. You could also find the mean mass or modal mass for the boys and compare it with the same average for the girls. You could do the same thing with the heights.

 4 a 18 b 15 c $290 \div 20 = 14.5$

Exercise 6.1

1 a continuous b categorical

c discrete

2 a discrete b discrete

c continuous d continuous

e categorical

3 For example:

a colour, type of brakes, fuel used

b number of doors, number of cylinders, number of seats

c length, width, engine size, fuel consumption

4 a It does not say whether 1 means very clean or very dirty.

b 53 c 5

- 5 a** For example: too vague, no time period, does not include less than 1 hour
- b** For example: *How many hours of homework did you do on Monday? Tick one box.*

Less than 1 hour

At least 1 hour but less than 2 hours

At least 2 hours but less than 3 hours

3 hours or more

- 6 a–c** Learner's own answers.

- 7 a i** The gender and the estimate for each person. These need to be recorded together.

ii The teacher could have two separate tally charts: one for boys and one for girls.

iii The teacher could draw a joint bar chart for the boys and girls. She could calculate an average for the boys and another for the girls.

- b** Learner's own answer.

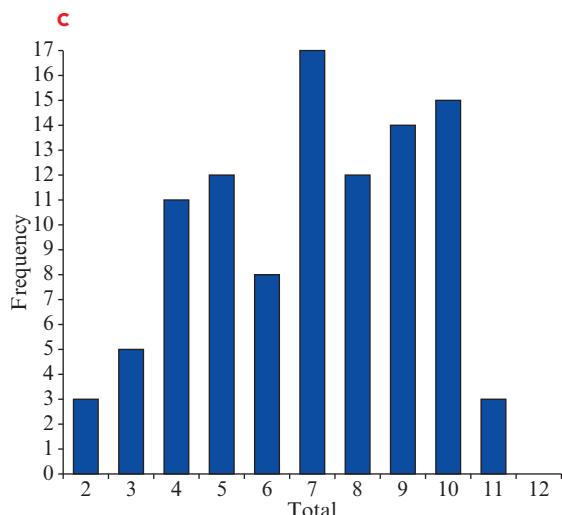
- 8 a** For example: ask friends, use a questionnaire, send emails to contacts, use social media.

b For example: bar chart, waffle diagram, pie chart.

- 9 a** It is difficult to see the frequency for each number.

b You could use a tally chart. Here are the frequencies:

Total	2	3	4	5	6	7	8	9	10	11	12
Frequency	3	5	11	12	8	17	12	14	15	3	0



- d** Sofia's prediction is correct. 7 is the mode.
- e** Zara's prediction is not correct. There are big differences.

- 10 a–d** Learner's own answers.

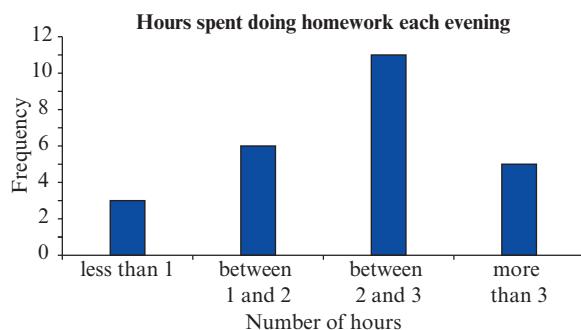
Exercise 6.2

- 1 a** Wei can ask people or she can give them a questionnaire.

b A sample takes less time. It might be difficult to see everyone in the population.

c How much time each person took to do their homework. Wei should ask about a particular evening or perhaps several particular evenings.

- d** For example:



- e** 16 out of 25 learners took at least 2 hours, which is 64%. This supports Wei's prediction.

- 2 a** The whole population is too large.

b Sofia needs to know the month of birth. She could get the data from school records.

c Sofia wants to know the total for each season. It would be better to use a tally chart, as shown here. Each season is three months.

Season	Tally	Frequency
Spring		
Summer		
Autumn		
Winter		

- d** 820

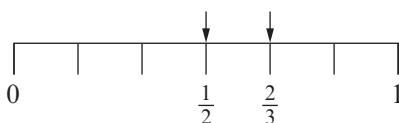
- e** The numbers are similar for each season. It does not support Sofia's prediction.

- 3 a** For example: ‘The service was helpful’ or ‘The service was not helpful’.
- b** Numbers are easier to analyse than words. You can find the frequency for each score. You can find an average score.
- c** Not everyone will fill in the questionnaire. Only those people who used the helpline during a particular time period can be asked.
- d** Depends on learner’s prediction. The majority of users of the helpline are not satisfied. The mode is 2 out of 5. 22 out of 33 users or 67% gave a score of only 1 or 2. Only five users out of 33 or 15% gave a score of 4 or 5.
- 4 a** All the words in book A and all the words in book B.
- b** For example: Dakarai could open the book to a page at random. He could ask a friend to give him a page number in the correct range. He could use a calculator or a spreadsheet to generate a random page number.
- c** Dakarai could use a tally chart. If he has a partner’s help he can call out the length and the partner can fill in the tally.
- d** For example: bar chart or pie chart.
- e** The mean is the best average to use because it uses all the word lengths. The median could also be used because it is easier to calculate.
- f** If book A has a larger average than book B, then Dakarai’s prediction is probably correct.
- g** A typical page in a book could have about 300 words. That is probably enough. If there are a lot fewer words for some reason, then Dakarai should use more than one page.
- 5 a** There is not enough data to say whether the prediction is correct or not. A sample size of 20 is too small.
- b** If the dice is fair the frequencies should be similar. The average of 100 throws would be 16 or 17. There is variation in these frequencies but not enough to give support to Emily’s prediction.
- c** Learner’s own answer.
- d** 100 is quite a small sample in this case. A larger sample would be better.
- 6 a** A large sample will be more representative of all the patients. A small sample might not represent all opinions.
- b** A large sample will take longer and will cost more.
- c** Learner’s own answer.
- d** For example: find an average or draw a chart.
- e** Learner’s own answer.
- 7 a** Learner’s own answer.
- b** For example: by email or in person when they come to the theatre or using social media.
- c** Learner’s own answer.
- d** Learner’s own answer. For example: discuss the type of chart they will draw or an average they will calculate.
- Reflection:**
- a** A large sample size will be more representative.
- b** Plan how you will analyse and present the data before you start. Decide how much time it will take and how much it will cost. Make some predictions to test.
- Check your progress**
- 1 a** continuous **b** discrete
- c** categorical **d** continuous
- 2** For example:
- a** number of brothers; shoe size; age, in years
- b** height, mass, time spent doing homework
- c** hair colour, eye colour, favourite sport
- 3 a** For example: The meal was good value. The customers enjoyed the meal. The service was good. The customers liked the atmosphere in the restaurant. The customers will recommend the restaurant to their friends.
- b** The numbers can be analysed in a way that words cannot.
- c** You can draw a chart, such as a bar chart. You can calculate an average, for example, the mean number of stars.

- 4** **a** The 10 people might not be representative of all the members.
- b** This would take a long time. You might not be able to see members who do not come to the gym often.
- c** For example: You could choose members at random from the membership list. You could ask a few members at different times of day. You could choose every 10th or 20th member until you have 50.
- d** For example: You could give members a paper questionnaire when they visit the gym. You could send a questionnaire electronically, using an email or social media.

Unit 7 Getting started

1 **a**



b $\frac{2}{3}$

- 2** **b** $<$ **c** $>$ **d** $<$
e $<$ **f** $<$

- 3** **a** $1\frac{2}{3}$ **b** $1\frac{2}{5}$ **c** $1\frac{2}{9}$ **d** $3\frac{3}{4}$

- 4** **a** $1\frac{1}{10}$ **b** $1\frac{7}{12}$

- 5** **a** 6 **b** 10 **c** 18

Exercise 7.1

- 1** **a** \neq **b** $=$ **c** \neq
d \neq **e** $=$ **f** \neq

- 2** **b** $<$ **c** $<$ **d** $>$
f $<$ **g** $>$ **h** $>$

- 3** **a** Marcus. Advantage: have to compare only simple fractions; disadvantage: have to first convert both fractions to mixed numbers.

Arun. Advantage: have to convert the fractions to give only a common denominator; disadvantage: might end up with large numbers to calculate.

b Learner's own answers.

Reflection: Learner's own answers.

- 4** **a** $\frac{47}{6}$ **b** $\frac{42}{5}$ **c** $\frac{33}{10}$

- 5** Learner's own answer. Order of cards:
 $\frac{1}{4}, \frac{7}{12}, \frac{13}{10}, \frac{7}{5}$

- 6** As many decimal places as are needed to put the decimals in order of size.

- 7** **a** **i** 0.8̄
ii 0.7̄2, 1.7̄2.
iii 0.8̄, 1.8̄

- b** $\frac{19}{11}, \frac{11}{6}, \frac{17}{9}$

- 8** **a** $\frac{7}{3} = 2.33\dots, \frac{16}{7} = 2.28\dots, \frac{58}{25} = 2.32, \frac{9}{4} = 2.25$

- b** $\frac{9}{4}, \frac{16}{7}, \frac{58}{25}, \frac{7}{3}$

- 9** $\frac{37}{10}, 3\frac{5}{7}, \frac{15}{4}, 3\frac{4}{5}$

- 10** First mark: any two of $\frac{5}{3}, \frac{13}{8}, \frac{17}{10}, \frac{27}{16}, \frac{33}{20}, \frac{67}{40}, \frac{69}{40}, \frac{129}{80}, \frac{131}{80}, \frac{133}{80}, \frac{137}{80}, \dots$

- Second mark: any two of $\frac{9}{5}, \frac{11}{6}, \frac{15}{8}, \frac{16}{9}, \frac{43}{24}, \frac{65}{36}, \frac{67}{72}, \frac{127}{72}, \frac{131}{72}, \frac{133}{72}, \dots$

Exercise 7.2

- 1** **a** $3\frac{8}{9}$ **b** $10\frac{1}{2}$ **c** $8\frac{2}{7}$

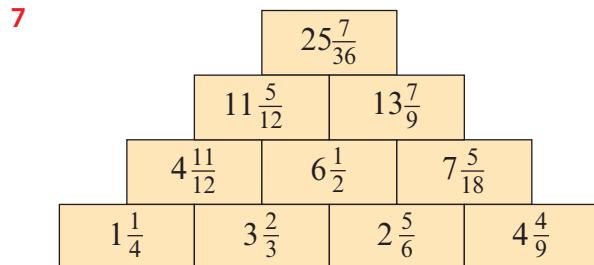
- 2** $16\frac{2}{3}\text{m}$

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

- 4** **a** $4\frac{3}{8}\text{ m}$ **b** Yes, $4\frac{3}{8} < 4\frac{1}{2}$

- 5** $18\frac{5}{12}\text{ km}$

- 6** **a** $\frac{29}{24} = 1\frac{5}{24}$, not $1\frac{4}{24}$ **b** $13\frac{5}{24}$



- 8** **a** $5\frac{1}{2}x$ **b** $9\frac{1}{10}y + 2\frac{2}{3}x$
c $8\frac{13}{24}a + 9\frac{1}{14}b$ **d** $1\frac{13}{15}p + 10\frac{7}{40}q$

- 9** **a** $5\frac{2}{3}$ is between 5 and 6, $7\frac{7}{8}$ is between 7 and 8. So $5\frac{2}{3} + 7\frac{7}{8}$ is between $5+7$ (12) and $6+8$ (14). Zara is correct.

b-d Learner's own answers.

- 10** $13\frac{11}{36}\text{ m}$

Exercise 7.3

1 **a** $\frac{1}{8}$ **b** $\frac{3}{16}$ **c** $\frac{2}{15}$

d $\frac{8}{25}$ **e** $\frac{9}{28}$ **f** $\frac{14}{27}$

2 **a** $\frac{3}{10}$ **b** $\frac{1}{2}$ **c** $\frac{3}{10}$

d $\frac{2}{9}$ **e** $\frac{1}{4}$ **f** $\frac{2}{11}$

- 3** $\frac{1}{3}$ cup cashew nuts, $\frac{1}{6}$ cup of water, $\frac{1}{8}$ cup of vinegar, 1 tablespoon of honey, $\frac{1}{4}$ teaspoon of salt

4 $\frac{2}{45}\text{ m}^2$

5 $\frac{9}{16}\text{ m}^2$

- 6** For example: $\frac{3 \times 3}{4 \times 4}$ or $\frac{3^2}{4^2}$ or 0.75×0.75 , etc.

7 **a** $\frac{4}{9}$ **b** $\frac{4}{7}$ **c** $\frac{5}{21}$ **d** $\frac{20}{63}$

8 **a** $\frac{9}{20}$ **b** $\frac{3}{20}$

9 $\frac{1}{6}$

- 10** Yes; a proper fraction is always less than 1. Multiplying two numbers that are both smaller than 1 will always give a number smaller than 1.

- 11** **a** Estimate $\frac{2}{3}$ is greater than $\frac{1}{2}$, but is less than 1.

$\frac{1}{2}$ of $\frac{1}{8}$ is $\frac{1}{16}$ and $1 \times \frac{1}{8} = \frac{1}{8}$.

So, the answer to $\frac{2}{3} \times \frac{1}{8}$ must be greater than $\frac{1}{16}$ but is smaller than $\frac{1}{8}$.

Accurate $\frac{2}{3} \times \frac{1}{8} = \frac{2 \times 1}{3 \times 8} = \frac{2}{24} = \frac{1}{12}$

$\frac{1}{12}$ is greater than $\frac{1}{16}$ but is smaller than $\frac{1}{8}$. ✓

- b** Estimate $\frac{2}{9}$ is greater than zero, but is less than $\frac{1}{2}$.

$0 \times \frac{1}{4} = 0$ and $\frac{1}{2}$ of $\frac{1}{4}$ is $\frac{1}{8}$.

So, the answer to $\frac{2}{9} \times \frac{1}{4}$ must be greater than zero but is smaller than $\frac{1}{8}$.

Accurate $\frac{2}{9} \times \frac{1}{4} = \frac{2 \times 1}{9 \times 4} = \frac{2}{36} = \frac{1}{18}$

$\frac{1}{18}$ is greater than zero but is smaller than $\frac{1}{8}$. ✓

- c** Estimate $\frac{5}{8}$ is greater than $\frac{1}{2}$, but is less than 1.

$\frac{1}{2}$ of $\frac{4}{9}$ is $\frac{2}{9}$ and $1 \times \frac{4}{9} = \frac{4}{9}$.

So, the answer to $\frac{5}{8} \times \frac{4}{9}$ must be greater than $\frac{2}{9}$ but is smaller than $\frac{4}{9}$.

Accurate $\frac{5}{8} \times \frac{4}{9} = \frac{5 \times 4}{8 \times 9} = \frac{20}{72} = \frac{5}{18}$

$\frac{5}{18}$ is greater than $\frac{2}{9} = \frac{4}{18}$ but is smaller than $\frac{4}{9} = \frac{8}{18}$. ✓

- 12** Mental maths is fun

13 $\frac{73}{80}\text{ m}^2$

Reflection: Learner's own answers.

Exercise 7.4

1 a $\frac{4}{15}$ b $\frac{7}{9}$

2 a $\frac{3}{8}$ b $\frac{5}{6}$ c $\frac{21}{32}$
d $7\frac{1}{5}$ e $3\frac{3}{10}$ f $2\frac{7}{10}$

3 a $1\frac{1}{2}$ b $2\frac{2}{3}$ c $1\frac{1}{4}$
d $1\frac{1}{3}$ e 2 f $1\frac{1}{6}$

- 4 a Isaac did not turn the second fraction upside down.
Isaac turned the first fraction upside down rather than the second.

b $1\frac{1}{9}$

5 $\frac{4}{9}m$

6 $\frac{5}{6}$

7 a–c Learner's own answers.

Activity 7.1

Learner's own answers.

- 8 No; any number divided by a larger number gives an answer smaller than 1. Any number divided by a smaller number gives an answer greater than 1.

9 $\frac{1}{2} \times \frac{1}{3} \div \frac{1}{4} \times \frac{1}{5} \div \frac{1}{6} \times \frac{1}{7} \div \frac{1}{8} \times \frac{1}{9} \div \frac{1}{10} = 1\frac{1}{63}$

Exercise 7.5

1 a 14 b 130 c 15 d 50

2 Learner's own answer.

3 a 27 b 25 c 35 d 12

4 a 68 b 64

5 a 54 b 64 c 126 d 128

6 a 55 b 285

c 315 d 3850

7 a $\frac{5}{9}$ b $\frac{6}{17}$

8 a $\frac{5}{16}$ b $\frac{13}{35}$ c $\frac{14}{25}$ d $\frac{8}{19}$

9 No; $8 \times 3 = 24$, not 8×4 . The answer is $\frac{5}{33}$.

10 a Arun works out $\frac{1}{6}$ and multiplies that answer by the numerator (5) to give $\frac{5}{6}$ of 180.

b Sofia works out $\frac{1}{6}$ and takes it away from the whole to leave $\frac{5}{6}$ of 180.

c i 240 ii 840

d Learner's own answer.

e Arun. Advantage: by dividing first, you use small numbers; disadvantage: doing this mentally could be difficult, especially the multiplication.

Sofia. Advantage: subtraction might be easier than multiplication; disadvantage: not so easy for more complicated fractions, such as when the numerator is 2 or is smaller than the denominator.

f Learner's own answer.

g i 1710 ii 768 iii 2080

11 a Zara

b Sofia did not use order of operations rules and did the addition before the multiplication.

12 a $1\frac{1}{8}$ b $\frac{11}{15}$ c $\frac{11}{32}$

Check your progress

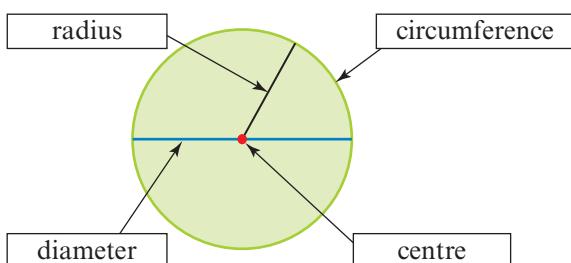
1 a \neq b $=$ c \neq

2 a $>$ b $<$ c $>$

3 a $7\frac{3}{4}$ b $8\frac{7}{20}$

4 a $\frac{7}{15}$ b $1\frac{1}{9}$

5 a 125 b 168 c 5800

Unit 8 Getting started
1

2
a same

b same

3
a 2

b 2

c 90

d 2

e 2

4
a cube

b cuboid

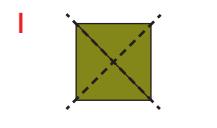
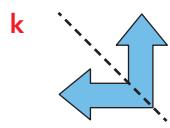
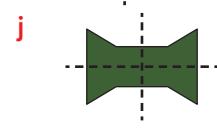
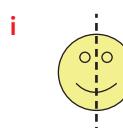
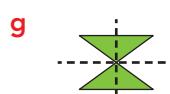
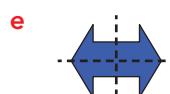
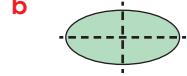
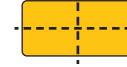
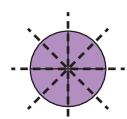
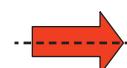
c cylinder

d sphere

e cone

f tetrahedron

g square-based pyramid

h triangular prism

Exercise 8.1
1

c

2
a 2

b 2

c 1

d 4

e 2

f 1

g 2

h 1

i 1

j 2

k 1

l 2

3
a 6

b 0

c 8

d 0

e 8

f 5

g 4

h 0

4
a 6

b 1

c 8

d 1

e 8

f 5

g 4

h 2

5

Shape	square	rectangle	rhombus	parallelogram	kite	trapezium	isosceles trapezium
Number of lines of symmetry	4	2	2	0	1	0	1
Order of rotational symmetry	4	2	2	2	1	1	1

6 a i 3 **ii** 3

b i 1 **ii** 1

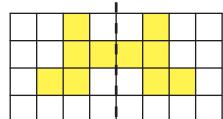
c i 0 **ii** 1

d i 1 **ii** 1

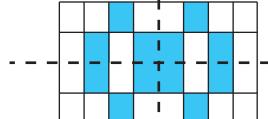
7 a A circle has an infinite number of lines of symmetry.

b A circle has an infinite order of rotational symmetry.

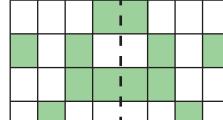
8 a i



ii



iii

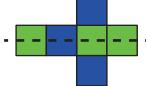


b i 1 **ii** 2 **iii** 1

9 a Ritesh

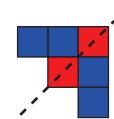
b Ali didn't reflect all of the shape. Some of the shape has just been redrawn.

10 a i, ii



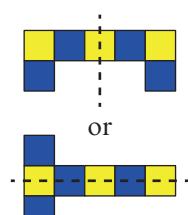
iii horizontal

b i, ii



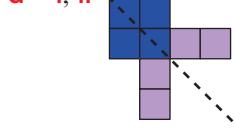
iii diagonal

c i, ii



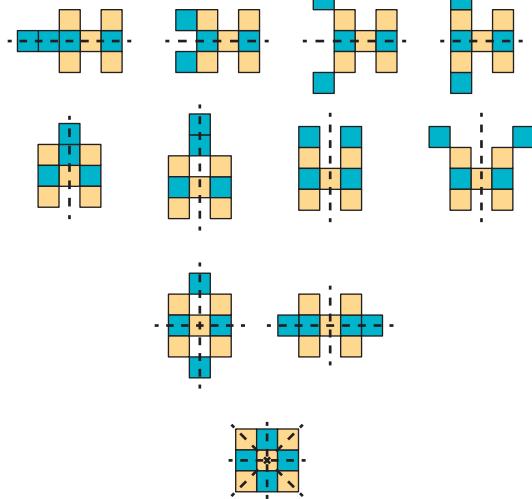
iii vertical or horizontal

d i, ii



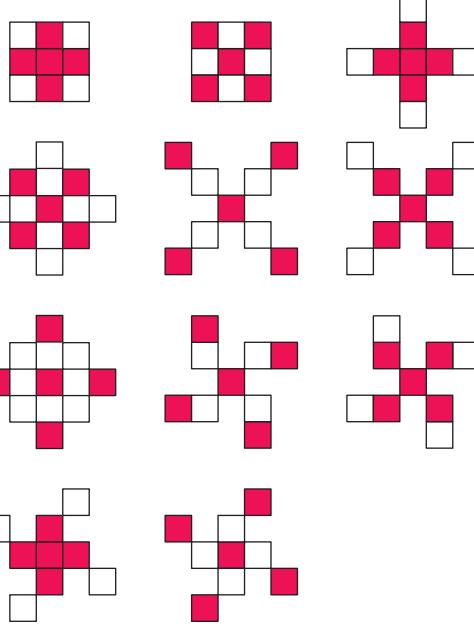
iii diagonal

11



12 a, b Learner's own answers.

13 a



b 4

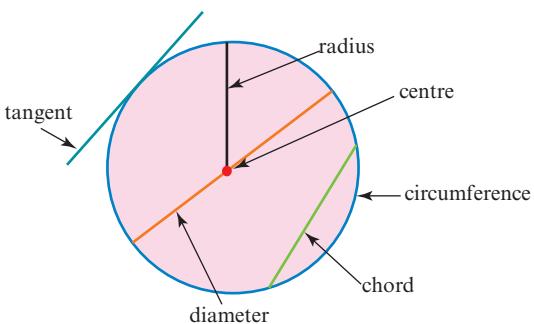
Activity 8.1
a

Road sign	a	b	c	d	e	f	g	h	i	j	k	l
Number of lines of symmetry	4	2	0	4	0	1	1	2	0	1	INF	2
Order of rotational symmetry	4	2	1	4	3	1	1	2	1	1	INF	2

b Learner's own answer.

Exercise 8.2
1 a A, B, G

b C, D, E, F

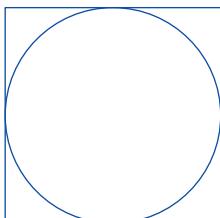
2

3 a-d Learner's own answers.

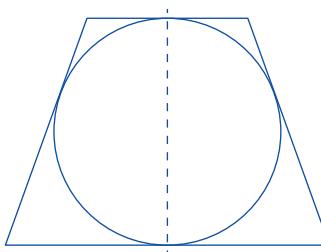
e The angle between a tangent and a radius is always 90° .

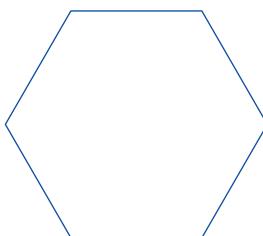
4 a-c Learner's own diagrams.

5 a-c Learner's own answers.

d The longest chord is always the diameter.

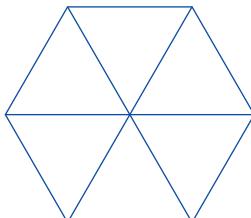
6 a

b Two pairs of parallel sides; four sides of equal length; all angles are 90° ; four lines of symmetry; rotational symmetry of order 4.

7 a

b Different length sides; one pair of parallel sides; different-sized angles; order 1 rotational symmetry.

8 a

b Six sides the same length; six angles the same size; six lines of symmetry; order 6 rotational symmetry

9 10, 10, 10, 10

10 Learner's own answers.

11 a


There are six identical triangles.

b

Name of regular polygon	Number of identical triangles inside
pentagon	5
hexagon	6
heptagon (7 sides)	7
octagon	8
nonagon (9 sides)	9
decagon	10

c Learner's own answer.

Reflection: A tangent is on the outside of the circle (touching the circumference just once).
A chord is on the inside of the circle (touching the circumference at the start and end of the line).
It's inside the circle, and it touches the circumference at the start and end of the line.
It's not on the outside of the circle and touches the circumference twice.

Exercise 8.3

- 1 D, G
- 2 D, G
- 3 a 8 cm b 3 cm
- 4 a i 5 cm ii 12 cm iii 13 cm
b 55°
c i 55° ii 35°
d ii EF iii DF iv DEF
v EDF vi DFE
- 5 a i 3.1 cm ii 6.5 cm iii 7.8 cm
b i 23° ii 62° iii 95°
- 6 $180^\circ - 57^\circ - 42^\circ = 81^\circ$, not 84° , which is what it would be if they were congruent.
- 7 Sofia is incorrect. Even though all the angles are the same size, the side lengths of the equilateral triangles can be different and so the triangles are not congruent.
- 8 Sofia is correct. If all the sides are the same length, then the triangle has to be congruent because the angles will all be the same.

5 a	Original shape	Number of sides	Shape of prism	Number of faces	Number of vertices	Number of edges
	triangle	3	triangular	5	6	9
	rectangle	4	rectangular	6	8	12
	pentagon	5	pentagonal	7	10	15
	hexagon	6	hexagonal	8	12	18
	heptagon	7	heptagonal	9	14	21
	octagon	8	octagonal	10	16	24

9 a Yes, Arun is correct. Congruent shapes are identical in shape and size, so they must have the same perimeter.

b The areas of congruent shapes are the same.

10 There are different ways to group the shapes. For example:

Group 1, circles: A, I, L

Group 2, squares: B, N, P

Group 3, congruent hexagons: E, J

Group 4, congruent isosceles triangles: C, G, K

Group 5, congruent trapezia: H, Q

Group 6, right-angled triangles: D, F, M

Exercise 8.4

- 1 b, A and iii
c, D and i
d, B and iv
- 2 six congruent square faces; 12 edges; eight vertices

Activity 8.2

a–c Learner's own answers.

- 4 a J b G c K
d I e L f H

b Yes; a face for each edge of the front face of the prism (e.g. 3 for a triangle) + 2 (the two congruent front faces, e.g. two triangles).

c **i** Double the number of sides to give the number of vertices.
ii $2S = V$ or $V = 2S$.

d **i** Triple the number of sides to give the number of edges.
ii $3S = E$ or $E = 3S$.

e The number of edges of a prism is always a multiple of 3.

6 Learner's own answers.

7 a cuboid

b pentagonal prism

c cone

d square-based pyramid

8 top view front view side view



9 cube, sphere

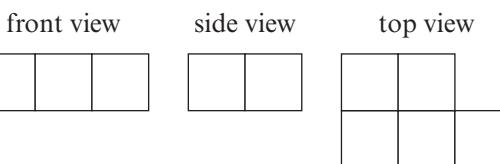
10 A: pentagonal prism because it has only two faces showing.

B: octagonal prism. C: hexagonal prism;
 the centre face for both the octagonal and hexagonal prisms are the same, but the faces either side of the centre face are at different angles, where the octagonal prism has the steeper faces, so appear narrower from above.

11 a i side view **ii** top view

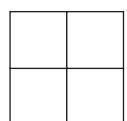
iii front view

b i

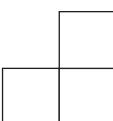


ii

front view



side view

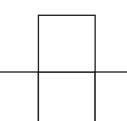


top view

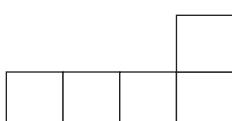


iii

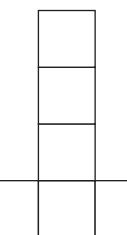
front view



side view

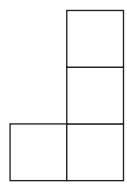


top view

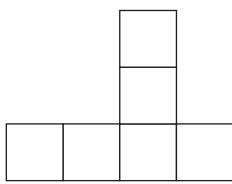


iv

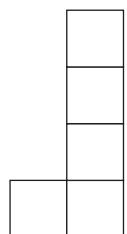
front view



side view



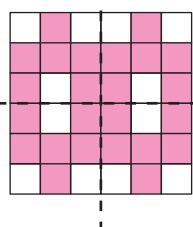
top view



Reflection: Learner's own answers.

Check your progress

- | | | | |
|--------------|---|-----------|---|
| 1 a i | 1 | ii | 2 |
| iii | 0 | iv | 6 |
| b i | 1 | ii | 2 |
| iii | 1 | iv | 6 |

2

3 $7, 7, 7, 7$

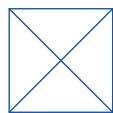
4 a 7.2 cm

b 33°

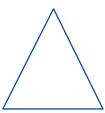
c 120°

5 a five faces (one square and four isosceles triangles); eight edges; five vertices

b top view



front view



side view

**Unit 9 Getting started**

1 a 14 b 12 c 4 d -3

e 35 f 4 g -18 h -5

2 a 7 b 5 c 9

d 6 e 3 f 14

g 4 h 8 i 10, -5

3 a 17 b 27 c 8 d 5

e 13 f 7 g 4 h -7

4 a 10 b 18 c 11 d -2

Exercise 9.1

1 a Add 4; 23, 27

b Subtract 5; 20, 15

2 a i Add 2. ii 10, 12

b i Add 3. ii 13, 16

c i Add 4. ii 21, 25

d i Add 5. ii 23, 28

e i Subtract 2. ii 22, 20

f i Subtract 3. ii 5, 2

3 a 1, 6, 11 b 45, 38, 31

c 6, 12, 24 d 60, 30, 15

4 a 8, 14

c 20, 17, 11

e 16, 24, 48, 56

5 a infinite

c finite

d infinite

6 a 4, 9, 19

c 24, 16, 12

7 A, c and iv; B, d and ii; C, f and v; D, a and vi; E, b and i; F, e and iii**8** Multiply by 2 would give 4, 8, 16 (and the third term is 20). Add 4 would give 4, 8, 12 (and the third term is 20). Sofia and Zara must look further than the first two terms and check that their rule works for the whole sequence and not just the first two terms. Term-to-term rule: Multiply by 3 then subtract 4.

9 a You need at least three terms.

b For example:

2, 6, ... could be +4 or $\times 3$ or $\times 4$ then -2 or $\times 5$ then -4, etc.3, 10, ... could be +7 or $\times 2$ then +4 or $\times 3$ then +1 or $\times 4$ then -2, etc.

10 a 19, 19, 55

b For example: Add 4: 12, 16. Multiply by 2: 16, 32. Multiply by 3 then subtract 4: 20, 56. Divide by 2 then add 6: 10, 11.

c For example: Add 7: 16, 23. Multiply by 2 then add 5: 23, 51. Multiply by 3 then add 3: 30, 93. Multiply by 4 then add 1: 37, 149.

d For example: Add 10: 27, 37. Multiply by 2 then add 3: 37, 77. Multiply by 3 then subtract 4: 47, 137. Add 1, then multiply by 2, then add 1: 37, 77.

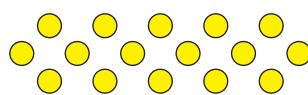
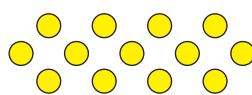
11 8

Reflection: Learner's own answer.**Activity 9.1**

Learner's own answer.

Exercise 9.2

1 a

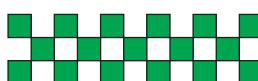
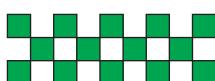


b 4, 7, 10, 13, 16, ...

c Add 3.

d Three extra dots are added to the end of the previous pattern.

2 a



b 14, 17

c Add 3.

d i 20 ii 26

3 a Sofia adds two dots to each pattern to get the next pattern. She counts the number of dots in each pattern and records the numbers in the table.

b Advantage: easy way to show each pattern and the number of dots; disadvantage: takes a long time to draw and fill in the grid.

c Learner's own answer.

4 Learner's own answers.

5 a 4, 8, 12, 16, 20

b No, 42 is not a multiple of 4.

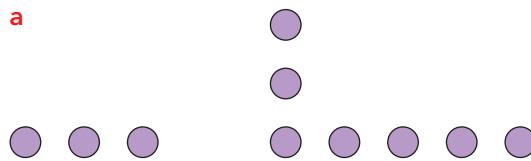
c 93 is an odd number and no odd number is a multiple of 4.

d For example: multiple of 4.

Activity 9.2

Learner's own answers

6 a



b 15

7 Marcus; $1 \times 2 + 3 = 5$, $2 \times 2 + 3 = 7$, $3 \times 2 + 3 = 9$, $4 \times 2 + 3 = 11$, and so $20 \times 2 + 3 = 43$.

Exercise 9.3

1 a 6; n th term = $6n$

b i 60 ii 90

2 a $5n$ **b** $8n$

c $15n$

3 a i 40 ii 100

b i 64 ii 160

c i 120 ii 300

4 a 5; $n+5$

b i 25 ii 40

5 a $n+9$ **b** $n+4$

c $n+21$ **d** $n+42$

6 a i 17 ii 29

b i 12 ii 24

c i 29 ii 41

d i 50 ii 62

7 Yes; $1 - 6 = -5$, $2 - 6 = -4$, $3 - 6 = -3$

8 Learner's own answer.

9 a -3, -2, -1, 0, 1, ...

b 9, 10, 11, 12, 13, ...

c 10, 20, 30, 40, 50, ...

10 A and iii; B and v; C and i; D and vi; E and ii; F and iv

11

<i>n</i>th term rule	5th term in sequence	10th term in sequence	20th term in sequence
<i>nth term</i> = $n + 12$	17	22	32
<i>nth term</i> = $n - 5$	0	5	15
<i>nth term</i> = $4n$	20	40	80
<i>nth term</i> = $n + 35$	40	45	55
<i>nth term</i> = $n - 15$	-10	-5	5
<i>nth term</i> = $16n$	80	160	320

- 12 a** B; $20 = 14\text{th}$, $22 = 16\text{th}$, $36 = 30\text{th}$,
 $40 = 34\text{th}$, $63 = 57\text{th}$, $100 = 94\text{th}$ term.

- b** 36 and 63. A: $9 \times 4 = 36$ and $9 \times 7 = 63$;
 B (see part a); C: $16 + 20 = 36$ and
 $43 + 20 = 63$.

Also 40 and 100. B (see part a);
 C: $20 + 20 = 40$ and $80 + 20 = 100$;
 D: $20 \times 2 = 40$ and $20 \times 5 = 100$.

- c** A has only 36 and 63; B has all the numbers; C has 22, 36, 40, 63 and 100;
 D has 20, 40 and 100.

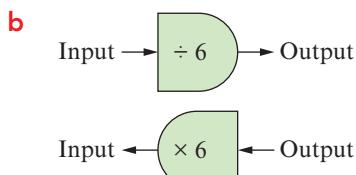
Reflection: Learner's own answer.

Exercise 9.4

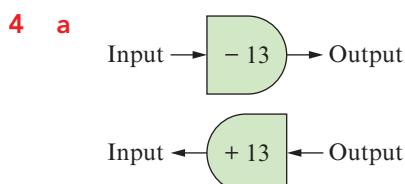
- 1 a** 8 and 9 **b** 5 and 3
c 18 and 30 **d** 5 and 10

- 2 a** inputs: 5, 9; output: 9
b inputs: 10, 15; output: 2
c inputs: 5, 10; output: 12
d inputs: 12, 18; output: 4

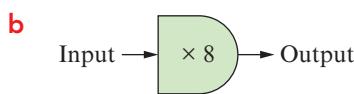
- 3 a** Learner's own answers.



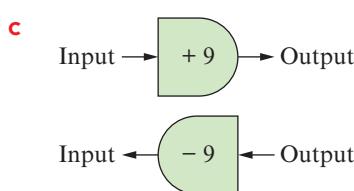
Input	24	54	120
Output	4	9	20



Input	20	25	51
Output	7	12	38

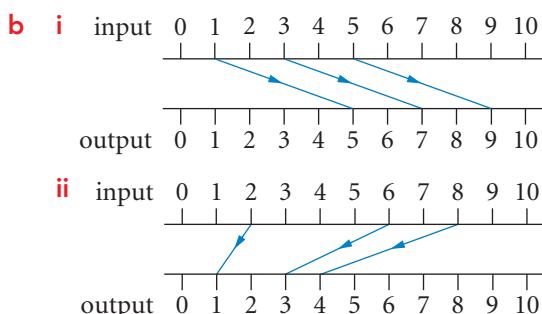


Input	3	7	15
Output	24	56	120



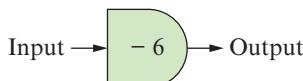
Input	8	15	36
Output	17	24	45

- 5 a i** $+ 4$ **ii** $\div 2$



6

Input	7	8	10
Output	1	2	4



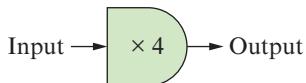
Learner's own answer. Example: I filled in the table of values first, using the mapping diagram. Then I compared the input values and output values and noticed that the output values were all 6 less than the input values.

- 7 a** $4 + 8 = 12$ **b** $\times 3$

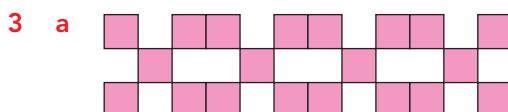
- c** Two. Learner's own answer. Example: If you only have one input and output value there could be at least two possible functions. As soon as you have two input and output values, only one of the possible functions will work and the other(s) won't.

- d** Learner's discussions.

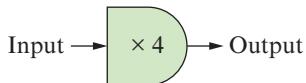
8	Input	0	1	2
	Output	0	4	8



Check your progress

- 1 a i Add 2. ii 14, 16 iii 24
 b i Add 6. ii 33, 39 iii 63
 c i Subtract 3 ii 16, 13
 iii 1
- 2 5, 10, 25, 70
- 3 a 
 b
- | | | | | | |
|-------------------|---|----|----|----|----|
| Pattern number | 1 | 2 | 3 | 4 | 5 |
| Number of squares | 5 | 10 | 15 | 20 | 25 |
- c Add 5. d 50
- 4 a $3n$ b $n+7$
- 5 a 30 b 17
- 6 a 5, 10, 15, 20 b $-6, -5, -4, -3$
- 7 input: 8; outputs: 5, 7

8	Input	0	1	2
	Output	0	4	8



Unit 10 Getting started

- 1 a $\frac{3}{5}$ b $\frac{5}{6}$ c $\frac{4}{3}$ d $\frac{1}{3}$
- 2 a 0.625 b 1.6
- 3 a 9 b 9
- 4 a 30 people b \$36

Exercise 10.1

- 1 a Divide the numerator and the denominator by 10, or by 5 and then 2, or by 2 and then 5.
 b Learner's own answers.
- 2 a $\frac{3}{5}$ b $\frac{61}{100}$ c $\frac{31}{50}$
 d $\frac{16}{25}$ e $\frac{13}{20}$ f $\frac{7}{10}$
- 3 a Because $0.3 = \frac{3}{10} = \frac{30}{100} = 30\%$.
 b $0.03 = \frac{3}{100} = 3\%$
- 4 a 0.4 and $\frac{2}{5}$ b 0.04 and $\frac{1}{25}$
 c 0.09 and $\frac{9}{100}$ d 0.9 and $\frac{9}{10}$
 e 0.05 and $\frac{1}{20}$
- 5 a 25% b 40% c 80%
 d 14% e 35% f 28%
- 6 a $\frac{3}{10}, 30\%, 0.3$ b $\frac{2}{5}, 40\%, 0.4$
 c $\frac{12}{25}, 48\%, 0.48$ d $\frac{4}{25}, 16\%, 0.16$
 e 13.5 cm^2 f 12 cm^2
- 7 $4\% = \frac{1}{25} = 0.04$; $6\% = \frac{3}{50} = 0.06$; $30\% = \frac{3}{10} = 0.3$;
 $40\% = \frac{2}{5} = 0.4$; $60\% = \frac{3}{5} = 0.6$
- 8 a–c Learner's own answers.
- 9 a 30 g b 45 g c 48 g
 d 42 g e 33 g
- 10 a \$150 b \$60 c \$90 d \$45
- 11 a $25\% = 10 \text{ m}$; $50\% = 20 \text{ m}$; $20\% = 8 \text{ m}$;
 b, c Learner's own answers.
- 12 a You could say 60% is $2 \times 30\%$ and so 60% of \$70 is $2 \times \$21 = \42 .
 b, c Learner's own answers.
- 13 a 25% b 12.5% (i.e. half of 25%)
 c $\frac{3}{8} = 37.5\%$; $\frac{5}{8} = 62.5\%$; $\frac{7}{8} = 87.5\%$

Exercise 10.2

1 Learner's own answers.

2 a $0.075 = \frac{3}{40}$ b $0.625 = \frac{5}{8}$

c $0.015 = \frac{3}{200}$ d $0.475 = \frac{19}{40}$

e $0.325 = \frac{13}{40}$

3	100%	\$80	\$300	\$90	\$64
	50%	\$40	\$150	\$45	\$32
	5%	\$4	\$15	\$4.50	\$3.20
	0.5%	\$0.40	\$1.50	\$0.45	\$0.32

4 a $\frac{1}{50}$ b $\frac{1}{500}$ c $\frac{2}{25}$

d $\frac{1}{125}$ e $\frac{7}{100}$ f $\frac{7}{1000}$

- 5** a i 6kg ii 9kg
iii 21kg iv 13.2kg

b The other answers are easy to find when you know 1%.

- 6** a 70m
b i 140m ii 35m
iii 7m iv 21m

7 Learner's own answer.

8 a $33\frac{1}{3}$ or $33.333\dots$ b $33\frac{1}{3}\%$

c The answer is rounded to the nearest whole number.

d The answer is rounded to one decimal place.

e $66\frac{2}{3}\%$ or $66.666\dots\%$

9 b 125% c 175% d 130%
e 170% f 225%

- 10** a 20%
b i 120% ii 160%
iii 180% iv 260%

- 11** a \$18
b, c Learner's own answers.
d 170%

12 a 80%

b 125%

13 a 40% b 24% c 36%

14 a 62.5% b 20% c 17.5%

15 a 38% b 36%

- 16** a i \$80 ii \$120
b 3

17 a i 15g ii 20g

b 4

18 a 105% b 180%

19 160% because $125 \times 1.6 = 200$.

20 Learner's own answers.

Check your progress

1 a $\frac{7}{10}$ b 0.09

c 62.5% d 105%

2 a \$34.50 b \$11.40

3 a \$46.35 b \$1.35

4	100%	30	2500	800	48
	120%	36	3000	960	57.6
	12.5%	3.75	312.5	100	6
	0.5%	0.15	12.5	4	0.24

Reflection: Write 80% as $\frac{4}{5}$ and then

$\frac{4}{5} \times 65 = 65 \div 5 \times 4 = 52$ kg

Learner's own answers.

5 a 75% b 10%

6 5

Unit 11 Getting started

1 a A(7, 3), B(2, 3), C(2, -2), D(7, -2)

b (2, 0)

c (-4, -2)

2 a 9 b 6.5

c 3 d -4

3 a 8 b 28

c -12 d -20