Workbook answers

Exercise 1.1

1

Number	Rational	Irrational
$\sqrt{36}$	✓	
$\sqrt{48}$		✓
$\sqrt{64}$	✓	
$\sqrt{84}$		✓
$\sqrt[3]{100}$		✓

2 **a** $\sqrt{27}, \sqrt{500}$ **b** $-36, -\sqrt[3]{8}$

3 **a** integer **b** surd **c** surd
d integer **e** integer **f** surd

4 **a** irrational because $\sqrt{3}$ is irrational
b rational because it is equal to $\sqrt{9} = 3$
c rational because it is equal to $8 + 4 = 12$
d irrational because it is $2 +$ an irrational number

5 **a** 2.25
b it is equal to 1.5
c yes, it is equal to 4.5
d yes, it is equal to 1.1

6 **a** $3^3 = 27$ and $4^3 = 64$
b $9^3 = 729$ and $10^3 = 1000$
c $1.1^2 = 1.21$ and $1.2^2 = 1.44$

7 Learner's own answers. For example:
a $\sqrt{5}$
b a square root between $\sqrt{36}$ and $\sqrt{49}$
c $\sqrt{2}$

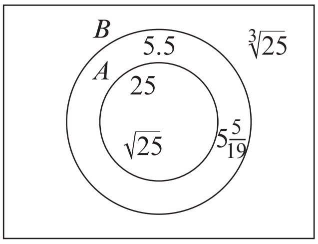
8 **a** 12 **b** 7

9 **a** No. All fractions are rational. In fact, the repeating sequence is nine digits long.
b It is rational. It is $1\frac{4}{9}$.

10 **a** The answer is 8.
b **i** $\sqrt{2} \times \sqrt{18}$ is a possible answer.
ii $\sqrt{3} \times \sqrt{27}$ is a possible answer.
iii $\sqrt{5} \times \sqrt{20}$ is a possible answer.

11 **a** The number is 7.142… and there is no repeating pattern.
b Learner's own answer. For example: $\sqrt{2}$ and $5 - \sqrt{2}$.
c Because the sum of two rational numbers must be rational.
d No, because the product of two rational numbers is rational.

12



13 **a** **i** $\sqrt{20} + 2 = 6.4721\ldots$
ii $\sqrt{20} - 2 = 2.4721\ldots$
iii 16
b She is correct. Substitute different values to see that $(\sqrt{n} + 2)(\sqrt{n} - 2) = n - 4$ seems to be true.

Exercise 1.2

1 **a** 2.6×10^6 **b** 9.2×10^8
c 4.62×10^5 **d** 2.08×10^7

2 **a** 5.5×10^4 **b** 5.5×10^7
c 6.4×10^8 **d** 4.06×10^8

3 **a** 53 000 **b** 53 800 000
c 711 000 000 000 **d** 133 100 000

4 9.46×10^{12} km

5 **a** 3×10^{-5} **b** 6.66×10^{-7}
c 5.05×10^{-5} **d** 4.8×10^{-10}

6 **a** 0.0015
b 0.000 012 34
c 0.000 000 079
d 0.000 900 3

7 **a** 0.000 008
b 0.000 000 482
c 0.000 061
d 0.000 000 070 07

8 4×10^{-7} m and 8×10^{-7} m

9 C, E, A, B, D

10 **a** 22 **b** 5.98×10^{23} kg

11 **a** Copy and complete this sentence: 6.2×10^7 is 10 times larger than 6.2×10^6.

b 10^6 or one million.

12 **a** 4.5×10^7 **b** 2.8×10^9

c 3×10^6 **d** 9.95×10^9

13 **a** 4.3×10^{-4} **b** 1.25×10^{-6}

c 7×10^{-6} **d** 8×10^{-9}

14 **a** 1.75×10^6 **b** 1.34×10^8

c 6.5×10^{-5} **d** 1.146×10^{-4}

Exercise 1.3

1 **a** $\frac{1}{7}$ **b** $\frac{1}{49}$ **c** $\frac{1}{125}$

d $\frac{1}{81}$ **e** $\frac{1}{225}$ **f** $\frac{1}{400}$

2 **a** 4^{-1} **b** 4^{-3} **c** 4^0

d 4^4 **e** 4^{-4} **f** 4^{-2}

3 **a** 5^{-1} **b** 5^2 **c** 5^{-2} **d** 5^{-3} **e** 5^0

4 **a** $\frac{1}{8}$ **b** $\frac{1}{27}$

c $\frac{1}{125}$ **d** $\frac{1}{1000}$ or 0.001

5 **a** 12^2 **b** 12^{-1}

c 12^{-3} **d** 12^3

6 **a** 5^3 **b** 4^{-6}

c 8^{-5} **d** 15^0 or 1

e 5^{-12}

7 **a** 7^3 **b** 7^{-1} **c** 7^6 **d** 7^{-1}

8 **a** 12^5 **b** 5^{-7}

c 3^{-4} **d** 25^1 or 25

9 **a** 6 **b** −4 **c** −2 **d** 4

10 **a** −2 **b** 4 **c** 6 **d** 7

11 **a** 3 **b** $1\frac{3}{4}$ **c** $1\frac{4}{9}$

12 **a** $11^6 = 1\,771\,561$ **b** $11^2 = 121$

c $11^{-3} = \frac{1}{1331}$

13 7

Exercise 2.1

1 **a** $2 \times x + 3 = 2 \times 10 + 3$
$= 20 + 3 = 23$

b $x \div 2 - 4 = 10 \div 2 - 4$
$= 5 - 4 = 1$

c $4 \times x^2 = 4 \times 10^2$
$= 4 \times 100 = 400$

d $3 \times (x + 2) = 3 \times (10 + 2)$
$= 3 \times 12 = 36$

2 **A** and **iii**, **B** and **v**, **C** and **i**, **D** and **vi**, **E** and **ii**, **F** and **iv**

3 **a** $x + y = 6 + -2 = 6 - 2 = 4$

b $x - y = 6 - -2 = 6 + 2 = 8$

c $x^2 + y^2 = 6^2 + (-2)^2 = 36 + 4 = 40$

d $3x + y = 3 \times 6 + -2 = 18 - 2 = 16$

e $x + 4y = 6 + 4 \times -2 = 6 - 8 = -2$

f $3x + 4y = 3 \times 6 + 4 \times -2 = 18 - 8 = 10$

4 **a** 2 **b** −14 **c** 35

d 13 **e** 7 **f** 100

5 **a** −4 **b** 5 **c** −8

d −26 **e** 94 **f** $-4\frac{1}{2}$

g 12 **h** −11

6 **a** Incorrect. He has worked out -1^2 and not $(-1)^2$.

Correct solution is
$-4 \times (-1)^2 - 3 \times -4 = -4 + 12 = 8$

b Incorrect. He has worked out that $(-4)^3 = 64$ and not -64.

Correct solution is $(-4)^3 - \frac{-4}{2 \times -1} = -64 - \frac{-4}{-2}$
$= -64 - 2$
$= -66$

7 Learner's own values. For example:

a $x = 3$ and $y = 7$, $x = 4$ and $y = 44$, $x = 5$ and $y = 105$

b $x = -1$ and $y = -21$, $x = -2$ and $y = -28$, $x = -3$ and $y = -47$

c $x = 0$ and $y = -20$, $x = 1$ and $y = -19$, $x = 2$ and $y = -12$

8 **a** 15 **b** 20 **c** −20
d 11 **e** 8 **f** −64
g 2 **h** −7 **i** 8
j 2 **k** −25 **l** 4

9 Learner's own counter-examples. For example:

a Let $x=2$, so $10x^2=10\times2^2=10\times4=40$ and $(10x)^2=(10\times2)^2=20^2=400$

$40\neq400$, so $10x^2\neq(10x)^2$.

b Let $y=2$, so $(2y)^3=(2\times2)^3=4^3=64$ and $2y^3=2\times2^3=2\times8=16$

$64\neq16$, so $(2y)^3\neq2y^3$.

c Let $x=4$ and $y=2$, $3x-3y=3\times4-3\times2=12-6=6$ and $3(y-x)=3(2-4)=3\times-2=-6$

$6\neq-6$, so $3x-3y\neq3(y-x)$.

10 **a** 18 kg **b** 14 kg

c

Age (*A* years)	1	2	3	4	5
Mass using expression ①	10.5	13	15.5	18	20.5
Mass using expression ②	10	12	14	16	18

d Expression ②, 13.5 kg is closer to 14 kg than 15.5 kg.

11 **a** 99 **b** 18

12 $4d^2-\frac{100}{c^2}-3cd-c(c-d)$

$=4\times(-3)^2-\frac{100}{5^2}-3\times5\times-3-5(5--3)$

$=36-4+45-40$

$=37$

$d^3+\frac{8c}{(c+d)^2}+\left(\frac{3c}{d}\right)^2-(-4-c^2)$

$=(-3)^3+\frac{8\times5}{(5+-3)^2}+\left(\frac{3\times5}{-3}\right)^2-(-4-5^2)$

$=-27+10+25+29$

$=37$

Exercise 2.2

1 **a** 6 **b** 12
c $x+2$ **d** $z+2$

2 **a** 2 **b** 5
c $y-3$ **d** $z-3$

3 **a** 10 **b** 20
c $5a$ **d** $5b$

4 **a** 3 **b** 6
c $\frac{a}{5}$ **d** $\frac{b}{5}$

5 **A** and **iii**, **B** and **vi**, **C** and **i**, **D** and **vii**, **E** and **viii**, **F** and **ii**, **G** and **iv**, **H** and **v**

6 **a** $n-10$ **b** $\frac{n}{1000}$
c $2n+3$ **d** $\frac{n}{4}-5$
e $\frac{1}{n}-1$ **f** $\frac{10}{2n}$
g $3(n+20)$ **h** $\sqrt{3n}$
i $(4n)^2-3$ **j** $6\sqrt[3]{n}+10$
k $\left(\frac{n}{5}\right)^3-9$

7 **a** $6x$ **b** $3x+10$
c $12x-2$ **d** $13x-4$

8 **a** xy **b** y^2
c x^3 **d** $16x^2$

9 **a** $g^2=25$, $g(8-g)=15$, $2g(3g-11)=40$
b 80
c $g^2+g(8-g)+2g(3g-11)=g^2+8g-g^2+6g^2-22g=6g^2-14g$.
d $6g^2-14g=80$

10 **a** **i** $2a+16$ **ii** $5a+15$
when $a=3$,
i $2a+16=22$ **ii** $5a+15=30$

b **i** $2b+2$ **ii** $5b-20$
when $b=12$,
i $2b+2=26$ **ii** $5b-20=40$

c **i** $4c-16$ **ii** c^2-8c
when $c=10$,
i $4c-16=24$ **ii** $c^2-8c=20$

d **i** $2d^2+14d$ **ii** $7d^3$
when $d=5$,
i $2d^2+14d=120$ **ii** $7d^3=875$

11 **a** **i** $2(a+3)+2(3a+1)=8a+8$, $4(2a+2)=8a+8$
ii $3(a+3)+3(3a+1)=12a+12$, $6(2a+2)=12a+12$

iii $5(a+3)+5(3a+1)=20a+20$, $10(2a+2)=20a+20$

b n black rods $+\ n$ striped rods $=2n$ white rods (or similar explanation given in words)

c i $4(a+3)+2(2a+2)=8a+16$, $8(a+2)=8a+16$

ii $6(a+3)+3(2a+2)=12a+24$, $12(a+2)=12a+24$

iii $8(a+3)+4(2a+2)=16a+32$, $16(a+2)=16a+32$

d $2n$ black rods $+\ n$ white rods $=4n$ grey rods (or similar explanation given in words)

12 a i \$26 ii \$46

b \$10 c \$16

d $16+10d$

13 a When $a=4$, $\frac{a^2}{2}+3a=\frac{4^2}{2}+3\times 4=20$ and when $b=5$, $2b(b^2-4b-3)=$ $2\times 5(5^2-4\times 5-3)=10(25-20-3)=20$

As the side lengths are both 20, it must be a square.

b 80

c i $2a^2+12a$

ii $8b^3-32b^2-24b$

d When $a=4$, $2a^2+12a=80$ and when $b=5$, $8b^3-32b^2-24b=80$

e Yes. Learner's own explanations.

For example: When a is a positive integer, a^2 is positive, so $\frac{a^2}{2}$ is positive. Also $3a$ is positive. When you add two positive numbers, you will get a positive answer, so the perimeter of the rectangle will always be positive.

f i -10 ii -16

iii -18

g No, because the perimeter cannot be a negative number.

For $a<-6$ the perimeter is positive, so is a valid measurement.

14 a $2(4x^2+3x)+2(2x^2-5x)=$ $8x^2+6x+4x^2-10x=12x^2-4x$

b $12x^2-4x=4x(3x-1)$

c Arun is incorrect. When $x=3$, perimeter $=96$ and when $x=-3$ perimeter $=120$.

15 a Side length $=\sqrt[3]{27}=3$ cm, cube has 12 edges, so total length of edges $=12\times 3=36$ cm

b 48 cm c $12\sqrt[3]{x}$

Exercise 2.3

1 **A** and **ii**, **B** and **iv**, **C** and **i**, **D** and **iii**

2 **A** and **iii**, **B** and **iv**, **C** and **ii**, **D** and **i**

3 a True b False $y^5\times y^4=y^9$

c True d False $y^9\div y^3=y^6$

4 a g^8 b h^{30}

c i^{21} d j^{20}

5 a $8x^2$ b $16x^3$

c $4y^4$ d $11y^6$

6 a a^7 b b^{10} c c^8

d d^4 e e^4 f f^7

g g^{32} h y^{14} i i^{72}

j $13j^2$ k k^3 l $-3l^5$

7 a $6a^4$ b $16b^7$ c $36c^{12}$

d $10e^{11}$ e $8g^8$ f $3h^6$

g $5x^8$ h $5x^4$

8 a **B** b **A** c **A** d **D**

9 a When the terms are simplified, one group has x^6 terms and one group has x^9 terms.

x^6 terms: $3x^3\times 2x^3$, $9x^9\div 3x^3$, $2x\times 3x^5$

x^9 terms: $x^6\times 3x^3$, $12x^{12}\div 4x^3$, $6x^6\times x^3$

b $9x^{12}\div x^9=9x^3$: this is the only card, which when simplified, has an x^3 term; all others have x^6 terms or x^9 terms.

10 a Zara is correct. $(2x^3)^2=2^2\times x^{3\times 2}=4x^6$

b i $9x^{14}$ ii $64y^{27}$ iii $32z^{15}$

11 a **C** b **A** c **B** d **D**

12 a $4^{-4}=\frac{1}{4^4}$ b $5^{-3}=\frac{1}{5^3}$

c $8^{-5}=\frac{1}{8^5}$ d $x^{-4}=\frac{1}{x^4}$

e $y^{-7}=\frac{1}{y^7}$ f $z^{-1}=\frac{1}{z^1}=\frac{1}{z}$

13 a $x^{-3}=\frac{1}{x^3}$ b $y^{-4}=\frac{1}{y^4}$

c $m^{-8}=\frac{1}{m^8}$ d $n^{-5}=\frac{1}{n^5}$

14 a **A** and **v**, **B** and **iii**, **C** and **i**, **D** and **vii**, **E** and **ii**, **F** and **iv**

b Any expression that simplifies to give $\frac{5}{2y^7}$.

For example: $10y^3 \div 4y^{10}$

15 $\frac{2n^2 \times 3n^5}{(2n^2)^3} = \frac{6n^7}{8n^6} = \frac{3n}{4}$

16 Yes, $\frac{6x^2 \times 3x^6 \times 2x^9}{4x^{13}} = \frac{36x^{17}}{4x^{13}} = 9x^4$ and

$\frac{(3x^4)^4}{3x \times x^2 \times 3x^9} = \frac{81x^{16}}{9x^{12}} = 9x^4$

Exercise 2.4

1 a 23×34

×	20	3
30	600	90
4	80	12

$600 + 90 + 80 + 12 = 782$

b 18×42

×	10	8
40	400	320
2	20	16

$400 + 320 + 20 + 16 = 756$

2 a $(x + 2)(x + 3)$

×	x	+2
x	x^2	$+2x$
+3	$+3x$	+6

$x^2 + 2x + 3x + 6 = x^2 + 5x + 6$

b $(x + 1)(x + 4)$

×	x	+1
x	x^2	$+x$
+4	$+4x$	+4

$x^2 + x + 4x + 4 = x^2 + 5x + 4$

c $(x + 5)(x + 6)$

×	x	+5
x	x^2	$+5x$
+6	$+6x$	+30

$x^2 + 5x + 6x + 30 = x^2 + 11x + 30$

d $(x + 3)(x + 9)$

×	x	+3
x	x^2	$+3x$
+9	$+9x$	+27

$x^2 + 3x + 9x + 27 = x^2 + 12x + 27$

3 a $(x + 5)(x - 3)$

×	x	+5
x	x^2	$+5x$
−3	$-3x$	−15

$x^2 + 5x - 3x - 15 = x^2 + 2x - 15$

b $(x + 6)(x - 2)$

×	x	+6
x	x^2	$+6x$
−2	$-2x$	−12

$x^2 + 6x - 2x - 12 = x^2 + 4x - 12$

c $(x - 7)(x + 4)$

×	x	−7
x	x^2	$-7x$
+4	$+4x$	−28

$x^2 - 7x + 4x - 28 = x^2 - 3x - 28$

d $(x - 8)(x + 2)$

×	x	−8
x	x^2	$-8x$
+2	$+2x$	−16

$x^2 - 8x + 2x - 16 = x^2 - 6x - 16$

4 a $(x - 1)(x - 3)$

×	x	−1
x	x^2	$-x$
−3	$-3x$	+3

$x^2 - x - 3x + 3 = x^2 - 4x + 3$

b $(x - 4)(x - 8)$

×	x	−4
x	x^2	$-4x$
−8	$-8x$	+32

$x^2 - 4x - 8x + 32 = x^2 - 12x + 32$

5 Learner's own answer.

6 **a** $x^2+7x+10$ **b** x^2+2x-8
c $x^2-3x-18$ **d** x^2-6x+9
e $x^2+15x+50$ **f** $x^2-13x+40$
g $x^2+5x-50$ **h** $x^2-3x-40$

7 **a** B **b** A **c** C **d** C

8 **1** $(x+4)(x+3)=x^2+7x+12$ Rohan had the final term incorrect – he added 4 and 3 to get 7, not multiplied 4 by 3 to get 12.

2 $(x+5)(x-9)=x^2-4x-45$ Rohan simplified $5x-9x$ to be $4x$ not $-4x$.

3 $(x-3)(x-2)=x^2-5x+6$ Rohan had the final term incorrect – he multiplied -3 by -2 to get -6, and it should be $+6$.

9 **a** **i** a^2+4a+4 **ii** a^2-4a+4
iii $b^2+8b+16$ **iv** $b^2-8b+16$
v c^2+2c+1 **vi** c^2-2c+1

b Learner's own answer. For example: The first and last terms are the same, the middle terms have different signs.

c $(x+y)^2=x^2+2xy+y^2$ so $(x-y)^2=x^2-2xy+y^2$

10 **a** **i** a^2-1 **ii** a^2-16
iii a^2-81

b There is no term in a, and the number term is a square number.

c a^2-64

d a^2-b^2

11 $$\begin{aligned}(x+4)(x-3)+x(5-x) &= x^2-3x+4x-12+5x-x^2\\ &= 6x-12\\ &= 6(x-2)\end{aligned}$$

12 **a** **i** $x^2+12x+36$
ii $x^2+12x+35$

b Learner's own answer. For example: There is a difference of 1.

13 **a** **i** $x^2+14x+49$
ii $x^2+14x+48$

b Learner's own answer. For example: There is a difference of 1.

14 Learner's own answer. For example:

$(x+5)^2$ and $(x+4)(x+6)$ giving $x^2+10x+25$ and $x^2+10x+24$

$(x+8)^2$ and $(x+7)(x+9)$ giving $x^2+16x+64$ and $x^2+16x+63$.

There is still a difference of 1.

15 **a** $(2x+1)(3x+2)=6x^2+4x+3x+2=6x^2+7x+2$

b **i** $12x^2+19x+5$
ii $8y^2-14y-15$

Exercise 2.5

1 **a** $\frac{1}{3}+\frac{1}{3}=\frac{2}{3}$ **b** $\frac{1}{5}+\frac{2}{5}=\frac{3}{5}$
c $\frac{2}{7}+\frac{3}{7}=\frac{5}{7}$ **d** $\frac{1}{8}+\frac{3}{8}=\frac{4}{8}=\frac{1}{2}$
e $\frac{1}{2}+\frac{2}{9}=\frac{3}{9}=\frac{1}{3}$ **f** $\frac{3}{10}+\frac{3}{10}=\frac{6}{10}=\frac{3}{5}$

2 **a** $\frac{x}{3}+\frac{x}{3}=\frac{2x}{3}$ **b** $\frac{x}{5}+\frac{2x}{5}=\frac{3x}{5}$
c $\frac{2y}{7}+\frac{3y}{7}=\frac{5y}{7}$ **d** $\frac{y}{8}+\frac{3y}{8}=\frac{4y}{8}=\frac{y}{2}$
e $\frac{m}{9}+\frac{2m}{9}=\frac{3m}{9}=\frac{m}{3}$ **f** $\frac{3n}{10}+\frac{3n}{10}=\frac{6n}{10}=\frac{3n}{5}$

3 **a** $\frac{1}{4}+\frac{3}{8}=\frac{2}{8}+\frac{3}{8}=\frac{5}{8}$ **b** $\frac{1}{3}+\frac{2}{9}=\frac{3}{9}+\frac{2}{9}=\frac{5}{9}$
c $\frac{2}{3}-\frac{1}{6}=\frac{4}{6}-\frac{1}{6}=\frac{3}{6}=\frac{1}{2}$
d $\frac{11}{12}-\frac{1}{6}=\frac{11}{12}-\frac{2}{12}=\frac{9}{12}=\frac{3}{4}$

4 **a** $\frac{5x}{8}$ **b** $\frac{5y}{9}$ **c** $\frac{p}{2}$ **d** $\frac{3b}{4}$

5 **a** $\frac{x}{2}$ **b** $\frac{4x}{5}$ **c** $\frac{12}{x}$ **d** $\frac{6x}{7}$
e $\frac{5}{4x}$ **f** $\frac{y}{6}$ **g** $\frac{2y}{9}$ **h** $\frac{y}{18}$
i $\frac{5}{16y}$ **j** $\frac{17}{24y}$

6 **a** A, D, F all equal $\frac{1}{4}x$ or $\frac{x}{4}$ and B, C both equal $\frac{1}{2}x$ or $\frac{x}{2}$.

b E, which equals $\frac{1}{3}x$ or $\frac{x}{3}$.

7 **a** $\frac{x+y}{2}$ **b** $\frac{2x+y}{6}$
c $\frac{9x+y}{12}$ **d** $\frac{15x-y}{18}$
e $\frac{7x-8y}{12}$ **f** $\frac{21a+4b}{28}$

g $\frac{10a+15b}{18}$ h $\frac{ab-35}{7b}$

i $\frac{8ab-45}{36b}$

8 a 17 b 32

c $17 \neq 32$.

Learner's own explanation. For example: She has just crossed the 2s off and not cancelled properly.

d $\frac{8x+2}{2}=\frac{2(4x+1)}{2}=\frac{\cancel{2}^1(4x+1)}{\cancel{2}^1}=4x+1$

9 a $2x+1$ b $5x+1$

c $3x-4$ d $3x-4$

10 Evan is correct.

$\frac{7x-14}{7}+\frac{8x+6}{2}=\frac{\cancel{7}^1(x-2)}{\cancel{7}^1}+\frac{\cancel{2}^1(4x+3)}{\cancel{2}^1}=$

$x-2+4x+3=5x+1$

11 a $\frac{8x+24}{4}=\frac{\cancel{4}^1(2x+6)}{\cancel{4}^1}=2x+6$ and

$\frac{8x+24}{4}=\frac{\cancel{8}^2(x+3)}{\cancel{4}^1}=2(x+3)$

b i $2x+4$ and $2(x+2)$

ii $3x+9$ and $3(x+3)$

iii $6x-9$ and $3(2x-3)$

iv $4-6x$ and $2(2-3x)$

12 a $\frac{2x+3}{2}$ b $\frac{2x+3}{5}$

c $\frac{2x-3}{4}$ d $\frac{5-7x}{2}$

13 a $\frac{y+x}{xy}$ or $\frac{x+y}{xy}$ b $\frac{d+c}{cd}$ or $\frac{c+d}{cd}$

c $\frac{y-x}{xy}$ d $\frac{2b+a}{ab}$ or $\frac{a+2b}{ab}$

e $\frac{5n-2m}{mn}$ f $\frac{3h-4g}{gh}$

Exercise 2.6

1 **A** and **v**, **B** and **iv**, **C** and **ii**, **D** and **iii**, **E** and **vi**, **F** and **i**

2 a i 24 ii 48

iii 72 iv $24d$

b $H=24d=24\times d=24\times 10=240$

3 a i 7 ii 14

iii 21 iv $7w$

b $=7w$, 56 days

4 a i 9 ii 25

iii $7w+d$

b i 19 ii 45

5 a $A=bh$ $A=b\times h$ swap sides:

$b\times h=A$ reverse the $\times$: $b=\frac{A}{h}$

b $F=bg$ $F=b\times g$ swap sides:

$b\times g=F$ reverse the $\times$: $b=\frac{F}{g}$

c $T=mb$ $T=m\times b$ swap sides:

$m\times b=T$ reverse the $\times$: $b=\frac{T}{m}$

d $X=b+rt$ swap sides: $b+rt=X$

reverse the $+$: $b=X-rt$

e $M=b-kn$ swap sides: $b-kn=M$

reverse the $-$: $b=M+kn$

6 a i $D=150$ ii $D=180$

b $S=\frac{D}{T}$, $S=20$ c $T=\frac{D}{S}$, $T=5.5$

7 a Polly's age: $d+3$, Max's age: $d-2$

b $T=3d+1$ c $T=25$

d $d=\frac{T-1}{3}$ e $d=11$

8 a $F=25$ b $F=54$

c $I=40$ d $e=5$

e $a=7$

9 a 50% b 8%

c 110%

10 a 450 m b 1303 m

c 1078 m d 1615 m

11 a **A** b **B**

c **A** d **C**

12 a $n=\frac{p+8}{3}$ b $n=7(q-k)$

c $n=2pw-r$ d $n=\frac{hr^2+2}{5}$

13 Arun is correct. 20 °C = 68 °F and 68 °F > 65 °F.

14 F = 120. Learner's own explanation and working. For example:

Use the formula $a=\frac{v-u}{t}$ to find the value of a.

So $a=\frac{v-u}{t}=\frac{32-12}{5}=4$.

Then use the formula $F=ma$ to work out the value of F. So $F=30\times 4=120$.

15 **a** $r = \sqrt{\frac{2A}{\pi}}$ **b** 4.8 cm

16 **a** $A = a^2 + \frac{bh}{2}$ **b** $A = 61$

c $a = \sqrt{A - \frac{bh}{2}}$ **d** $a = 12$

17 **a** side length of the larger cube $= 2x$

b $V = 9x^3$ **c** $x = \sqrt[3]{\frac{V}{9}}$

d Learner's explanation and working. Example:

Used the formula $x = \sqrt[3]{\frac{V}{9}}$ to work out the value of x. $x = \sqrt[3]{\frac{576}{9}} = 4\,\text{cm}$

Side length of larger cube is $2 \times 4 = 8\,\text{cm}$

Area of one face of larger cube $= 8 \times 8 = 64\,\text{cm}^2$

Surface area of larger cube $= 6 \times 64 = 384\,\text{cm}^2$