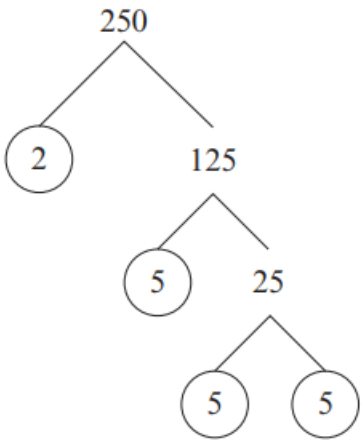
Workbook answers

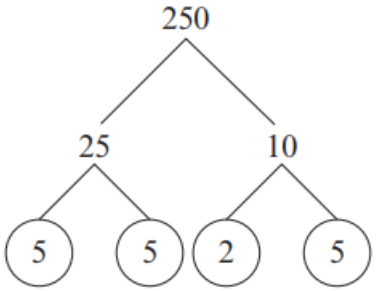
Exercise 1.1

1 a



b No. The 125 can only become 5×25 and 25 as a factor of primes must be 5×5.

c



7 a $70 = 2 \times 5 \times 7$

b $70^2 = 2^2 \times 5^2 \times 7^2$

c $70^3 = 2^3 \times 5^3 \times 7^3$

8 a

i	3^2	**ii**	$2^2 \times 3^2$
iii	3^4	**iv**	$2^4 \times 3^2$
v	$3^2 \times 5^2$	**vi**	$2^6 \times 3^2$
vii	5^4	**viii**	7^4

b There is an even number of each prime factor.

c Using the result of part b, it is the square of $2^2 \times 3 \times 5 \times 7$.

9 a $3^2 \times 7 = 63$

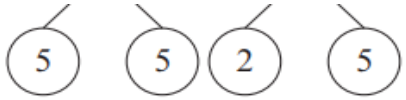
b $3 \times 5 = 15$

c $2^2 \times 3 = 12$

10 a 360 **b** 300 **c** 1800

11 a $104 = 2^3 \times 13$

b $130 = 2 \times 5 \times 13$



d $250 = 2 \times 5^3$

2 **a & b** Many trees are possible but all end with 2, 2, 3, 5, 5.

c $300 = 2^2 \times 3 \times 5^2$

3 **a** **i** 2×3 **ii** $2 \times 3 \times 5$

iii $2 \times 3 \times 5 \times 7$

b $2 \times 3 \times 5 \times 7 \times 11 = 2310$; multiply the last number by the next prime

4 **a** 42

b 1764

c 74 088

5 **a** Many trees are possible

b $8712 = 2^3 \times 3^2 \times 11^2$

6 **a** $96 = 2^5 \times 3$

b 97 is a prime number

c $98 = 2 \times 7^2$

d $99 = 3^2 \times 11$

11 **a** $104 = 2^3 \times 13$

b $130 = 2 \times 5 \times 13$

c 26

d 520

12 **a** $135 = 3^3 \times 5$

b $180 = 2^2 \times 3^2 \times 5$

c 45

d 540

13 **a** $343 = 7^3$

b $546 = 2 \times 3 \times 7 \times 13$

c 7

d 26 754

14 630

15 **a** 24 **b** 1848

16 **a** $48 = 2^4 \times 3$ and $25 = 5^2$; there are no common prime factors, therefore the LCM is 1.

b 1200

17 18 and 24

Exercise 1.2

1 $-1 \times -4 = 4$; $-3 \times -4 = 12$; $-5 \times -4 = 20$

2 **a** -40 **b** 40 **c** 99 **d** 120

3 A, B, D, F in one group and C, E in the other

4

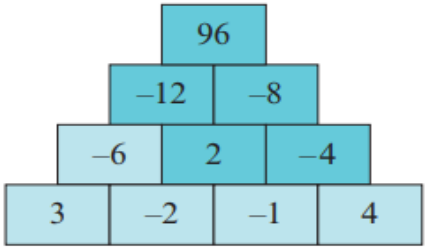
×	2	−4	−9
−6	−12	24	54
5	10	−20	−45
−8	−16	32	72

5 **a** 35 **b** -5 **c** 35 **d** 5

6 **a** 24 **b** -66 **c** 81 **d** 16

7 $(-6)^2 + (-8)^2 - (-10)^2 = 36 + 64 - 100 = 0$

8 **a**



b If 3 and −2 are swapped and −1 and 4 are swapped, then the top number will be 3456.

9 **a** 1×-6 or -1×6 or 2×-3 or -2×3

b 1×6 or -1×-6 or 2×3 or -2×-3

9 **a** 1×-6 or -1×6 or 2×-3 or -2×3

b 1×6 or -1×-6 or 2×3 or -2×-3

10 **a** $63 \div -9 = -7$ or $63 \div -7 = -9$

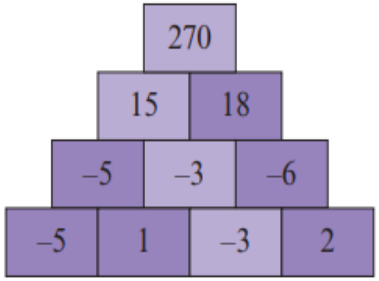
b $-84 \div 12 = -7$ or $-84 \div -7 = 12$

11 **a** -6 **b** 5 **c** -9 **d** 13

e -12

12 **a** -3 **b** 2 **c** -8 **d** -4

13



14 **a** -6 **b** 12 **c** -12 **d** 8

15 **a** 32 **b** -40 **c** -4 **d** -5

16 **a** True. $-3 \times (-6 \times -4) = -3 \times 24 = -72$ and $(-3 \times -6) \times -4 = 18 \times -4 = -72$

b False. $-24 \div (-4 \div -2) = -24 \div 2 = -12$ and $(-24 \div -4) \div -2 = 6 \div -2 = -3$

Exercise 1.3

1 **a** 196 **b** 196 **c** 400 **d** 900

2 **a** 64 **b** -216 **c** -1000 **d** 0

3 **a** impossible **b** -4

c -5 **d** -9

4 **a** $x = 5$ or -5 **b** $x = 15$ or -15

c $x = 9$ or -9 **d** no solution

5 **a** $x = 6$ **b** $x = -6$

c $x = -10$ **d** $x = -20$

6 **a** $x = 23$ or -23 **b** no solution

c $x = 23$ **d** $x = -23$

7 **a** true **b** false **c** true

d true **e** true

8 **a**

x	-3	-2	-1	0	1	2
$x^2 + x$	6	2	0	0	2	6
$x^3 + x$	-30	-10	-2	0	2	10

b **i** $x = -2$ or 1

ii $x = 1$

9 **a** Yes. If $x = 5$ then
$x^3 - x = 5^3 - 5 = 125 - 5 = 120$

b No. If $x = -5$ then
$x^3 - x = -125 - -5 = -120$

10 **a** $64 = 2^6$

b $2^6 = (2^3)^2 = 8^2$ and $(2^2)^3 = 4^3$

c $729 = 3^6$

d $3^6 = (3^3)^2 = 27^2$ and $(3^2)^3 = 9^3$

e 1 is both a square number and a cube number. So is $4^6 = 4096$ or $5^6 = 15\,625$; other answers are possible.

11 $x^6 = 64$

So $(x^3)^2 = 64$

So $x^3 = 8$ or -8

If $x^3 = 8$ then $x = 2$

If $x^3 = -8$ then $x = -2$

There are two possible answers, $x = 2$ or -2

Exercise 1.4

1 **a** 3^3 **b** 7^4 **c** 12^6 **d** 15^5

2 **a** 6^6 **b** 10^7 **c** 3^9 **d** 14^7

3 **a** $2^0+2^1+2^2+2^3=1+2+4+8=15=16-1=2^4-1$

b 2^6-1

c No. $3^0+3^1+3^2+3^3=1+3+9+27=40$ and $3^4-1=81-1=80$ so they are not equal.

4 **a** 5^6 **b** 15^6 **c** 7^9 **d** 3^{20}

5 **a** 2^2 **b** 2^6 **c** 3^6

6 **a** 5^8 **b** 5^{12} **c** 5^{16}

7 **a** 4^3 **b** 7^2

c 15^3 **d** 15^0 or 1

8 **a** 8^2 **b** 5^4 **c** 2^8 **d** 3^3

e 12^0 or 1

7 **a** 4^3 **b** 7^2

c 15^3 **d** 15^0 or 1

8 **a** 8^2 **b** 5^4 **c** 2^8 **d** 3^3

e 12^0 or 1

9 **a** 6^3 **b** 6^4 **c** 6^8 **d** 6^6

10 **a** 2^7 **b** 3^3

c 2^4 or 4^2 **d** 3^0 or 1

11 **a** 5^3 **b** 5^6 **c** 5^{12}

12 **a** 12^8 **b** 12^{12} **c** 12^2

13 No, Marcus is not correct.

$2^4=2\times2\times2\times2=16$ and $4^2=4\times4=16$ so these are equal.

However $3^4=3\times3\times3\times3=81$ and $4^3=4\times4\times4=64$ and these are not equal.