Mathematics

Unit 1: Integers, powers and roots.

The student's book

Chapter 1

Check in

1 a $^-1$ b $^-2$ c $^-3$ d $^-1$
   e $^-6$ f $^-3$

2 a 16   b 125   c 1   d 27

3 a 25   b 13   c 25

4 a 2500   b 2460   c 2000

Exercise 1A

1 b $2, 0, ^-2$

2 a 3   b 3   c $^-2$ d 0   e $^-1$ f 1

3 a $^-3$ b $^-5$ c $^-7$ d $^-6$ e $^-10$ f

4 a $^-6$ b $^-2$ c $^-5$ d $^-7$ e $^-79$ f $^-511$
   g $^-675$ h $^-682$

5 a 0   b $^-1$ c $^-7$ d $^-7$ e 3   f $^-1$

6 a $^-2$ b 2   c 1   d $^-2$ e 8   f 0

7 a 7   b 12   c 13   d 4   e $^-5$ f $^-5$
   g 3   h 11

8 a 8   b 1   c 4   d 11   e 0   f $^-1$
   g 6   h 5   i 7   j 11   k $^-1$ l $^-13$

9 $110

10 $^-1°C$

11

$^-1$	$^-4$	23
30	6	$^-18$
11	16	13

12 a Wrong, that rule only applies when the signs are next to
each other when adding and subtracting, the correct answer
is $^-7$

   b Wrong, he has subtracted the wrong way round $8 - 10 = ^-2$

   c correct

   d Wrong, $7 - ^-4 = 7 + 4 = 11$, he has subtracted 7 from 4

   e Wrong, he should have done $7 - 4 + 2 = 3 + 2 = 5$ as there
are no brackets around the $4 + 2$
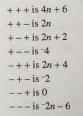
14 a

$-$	2	$^-1$
3	1	4
4	2	5

other answers are possible

   b

$-$	$^-1$	0
3	4	3
4	5	4

other answers are possible

Investigation page 10

If you use algebra and call the numbers $n, n + 1, n + 2$ and
$n + 3$ you can soon work out the formula relating all the answers
to the starting number n.

e.g. $n - (n + 1) + (n + 2) - (n + 3) = n - n - 1 + n + 2 - n - 3$
     $= ^-2$

$+ + +$ is $4n + 6$

$+ + -$ is $2n$

$+ - +$ is $2n + 2$

$+ - -$ is $^-4$

$- + +$ is $2n + 4$

$- + -$ is $^-2$

$- - +$ is 0

$- - -$ is $^-2n - 6$

Exercise 1B

1 a $^-8$ b $^-20$ c $^-12$

2 a $^-12$ b $^-16$ c $^-18$ d $^-20$ e $^-6$ f $^-56$

3 b $^-20$ c $^-12$ d $^-30$ e $^-2$

4 a $^-24$ b $^-21$ c $^-4$ d $^-8$ e $^-16$ f $^-100$
   g $^-28$ h $^-18$ i $^-27$

5 a $^-54$ b $^-32$ c $^-40$ d $^-24$ e $^-24$ f $^-33$
   g $^-3$ h $^-9$ i $^-36$

6 a 2   b 3   c 5   d $^-4$ e $^-4$ f $^-3$

7 a 2   b 3   c 5   d $^-4$ e $^-4$ f $^-3$

8 a $3 \times \square = 18$ b $2 \times \square = ^-8$ c $^-3 \times \square = 12$
   d $^-3 \times \square = 9$ e $^-4 \times \square = 16$ f $^-1 \times \square = ^-4$

9 a 6   b $^-4$ c $^-4$ d $^-3$ e $^-4$ f 4

10 a $^-60$ b $^-36$ c $^-4$ d $^-14$

11 multiple answers, e.g. $^-735 = 15 \times ^-49$,
   $^-735 \div ^-49 = 15$

12 a $^-2852$ b $^-630$ c 816   d $^-17\,856$ e $^-72$ f 17

13 When you multiply or divide two negative numbers you get a
positive answer.

14 No, because to get a negative answer when multiplying one
value must be positive and one value must be negative so it
won't be the same number multiplying by itself

Exercise 1C

1 a 240   b 1000   c 600   d 200
   e 3000   f $^-6$

2 $2 \times 35 = 70$ km

3 no

4 5

5 $^-116, 134, 213, 32, ^-9408, 69, ^-53, 3811, 26.25$

Exercise 1D

1 a 4   b 23   c 11   d 64   e 19
   f $^-5$ g 3   h 0   i $^-5$

2 a 25   b 10   c 17   d 6   e 17
   f 9   g 16   h 13   i $^-30$

3 a $(6 + 4) \times 10 = 100$ b $3 + 12 \div (2 + 1) = 7$
   c $100 - 10 \times (6 - 4) = 80$

4 He has added the 2 to the 8 instead of to the 15, then
subtracted 10. The correct answer is 9.

5 a 9   b $^-20$ c 10   d 29

6 a $^-10$ b $^-50$ c 76   d 6   e $^-5$

7 a 4   b 4   c 12   d 2   e 8   f 5

8 If you do not get the same answers check both methods again,
then check with a friend. If you still are unsure ask your teacher.

9 No, he is incorrect because you have to work out the indices
first so $10 - 2^2 = 10 - 4 = 6$

10 a $(6 + 2^2) \times 10 = 100$ b $3 + 12 \div (2 - ^-1) = 7$
   c $10^2 - 10 \times (6 - 4) = 80$

11 $= 20 - 8 + 2$ Then Addition
     $= 20 - 10$ Then Subtraction
These shouldn't be two separate steps. Odaro has worked out
$20 - (8 + 2)$ or $20 - 8 - 2$ by mistake.

12 a 25   b $^-14$ c $^-54$

Exercise 1E

1 a i   12: 1, 2, 3, 4, 6, 12 and 18: 1, 2, 3, 6, 9, 18
   ii   10: 1, 2, 5, 10 and 15: 1, 3, 5, 15
   iii   13: 1, 13 and 17: 1, 17
   iv   36: 1, 2, 3, 4, 6, 9, 12, 18, 36 and 48: 1, 2, 3, 4, 6, 8, 12,
16, 24, 48
   v   25: 1, 5, 25 and 30: 1, 2, 3, 5, 6, 10, 15, 30

b i 1, 2, 3, 6   ii 1, 5   iii 1   iv 1, 2, 3, 4, 6, 12
v 1, 5
c i 6 ii 5   iii 1   iv 12   v 5

2 a i

Multiples of 3	Multiples of 7
3	7
6	14
9	21
12	28
15	35
18	42
21	49
24	56
27	63
30	70

ii

Multiples of 4	Multiples of 9
4	9
8	18
12	27
16	36
20	45
24	54
28	63
32	72
36	81
40	90

iii

Multiples of 6	Multiples of 8
6	8
12	16
18	24
24	32
30	40
36	48
42	56
48	64
54	72
60	80

iv

Multiples of 3	Multiples of 12
3	12
6	24
9	36
12	48
15	60
18	72
21	84
24	96
27	108
30	120

v

Multiples of 8	Multiples of 16
8	16
16	32
24	48
32	64
40	80
48	96
56	112
64	128
72	144
80	160

b i 21 ii 36   iii 24   iv 12   v 16
3 180 cm
4 18 cm
5 a 408   b 1260
6 a 60   b 54
7 a LCM   b 39 more years   c 52 years
9 a 7   b 4   c 12
10 a 20   b 36   c 8
11 60
12 30, 3150; 90, 1050; 150, 630; 210, 450

Exercise 1F

1 a yes   b yes   c yes   d yes
e yes   f no   g no   h yes
i yes   j yes

3 a no   b yes   c yes   d no
e no   f yes

4 a yes   b no   c yes

5 a yes   b yes   c no

6 02 563, 46 563 or 42 163

7 a no
b There is a decimal answer when you divide 8484 by 24
c 6 and 4 both have a common factor of 2 so it won't necessarily work when this is the case

Exercise 1G

1 a 7   b 9   c 11   d 13
2 a 36, 6   b 49, 7   c 64, 8
3 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144, 169, 196, 225, 256, 289, 324, 361
4 a 8   b 1   c 10
d 20   e 15   f 2
5 a 17   b 14   c 40
d 60   e 90   f 18
g 19   h 80   i 30

Exercise 1H

1 a 9   b 12   c 13   d 16
2 a 37   b 80   c 2   d 3
3 a 7 cm   b 15 cm   c 16 cm   d 17 cm
4 a 9^2 is a short way of writing 'nine times nine'.
b The small raised ^{2} is called the power or index.
c The symbol $\sqrt{}$ stands for the words 'the square root'.
d The x^2 key on a calculator is pressed to find the square of a number.
5 The answer must be less than 5 as 17.5 is less than 25

6

between 5 and 6, 5.23
between 8 and 9, 8.83
between 6 and 7, 6.65
between 9 and 10, 9.91

7 a $\frac{3}{5}$ b $\frac{7}{10}$ c 3

8 a 0.9   b 0.4   c 0.2

Exercise 1I

1 a 27   b 2   c 1   d 5
e 64   f 1
2 a 0.216   b 1.1   c 79.507   d 2.8
3 a 2.9   b 1.6   c 39.3   d 3.0
4 a 531.441 mm³   b 0.343 m³   c 4.913 cm³
5 a 4.9 cm   b 3.2 mm   c 0.8 m
6 a 27   b 93
7 It must be smaller than 2 as the cube root of 8 is 2 and 7.8 is smaller than 8

8

between 2 and 3, 2.92
between 1 and 2, 1.95
between 3 and 4, 3.20

9 a $\frac{1}{4}$ b $\frac{2}{3}$ c $\frac{3}{10}$

Exercise 1

1 a ⁻6   b 4   c ⁻2   d ⁻7   e ⁻75   f ⁻84

2 a 8   b ⁻4   c 15   d ⁻13   e ⁻2   f 90

3 a 14   b 4   c 8

4 a ⁻12   b ⁻12   c ⁻20   d ⁻14   e ⁻132

5 a ⁻5   b ⁻5   c ⁻4   d ⁻14

6 a 2   b ⁻4   c ⁻14

7 There are multiple answers. Check with your teacher or check on a calculator.

8 a 24   b 17   c ⁻27   d 8   e 25
   f ⁻3   g 11   h 32   i 4

9 a 25   b ⁻14   c 16   d 5   e 67

10 She has worked out 49 − 8 − 3 instead of 49 − 8 + 3. The correct answer is 44.

11 a 7   b 9   c 4   d 5   e 16.5   f 1

12 c i 4   ii 6   iii 12
       iv 12   v 5   vi 36

13 b i 15   ii 14   iii 24
       iv 36   v 36   vi 24

14 a after 15 min 10 s   b 14

15 2, 3, 4, 6, 7, 8 and 9

16 a no   b yes   c no
    d yes   e no

17 a 25   b 6   c 100
    d 13   e 1   f 121

18 12 cm

19 a 27   b 2   c 5   d 3

20 a 20   b 9

Check out

1 a ⁻2   b ⁻11   c 7   d 10

2 a ⁻12   b ⁻12   c 15

3 a ⁻5   b ⁻5   c ⁻6   d ⁻6   e ⁻4

4 a 1   b 12   c 16   d 2

5 a 4, 80   b 9, 54   c 4, 360   d 5, 420

6 a no   b yes   c yes   d no   e yes

7 a 11   b 13   c 15   d 9

8 a 5   b 2   c 1   d 3

The homework book answers.

1A

1 a $^-3, ^-5, ^-7$ b $2, ^-5, ^-12$ c $^-16, ^-11, ^-6$

2 a 2 b 1 c 0 d $^-2$
  e 6 f 6 g $^-2$ h $^-7$
  i $^-8$ j $^-8$ k $^-9$ l $^-27$
  m $^-13$ n $^-17$ o $^-13$ p $^-12$

3 a 10 b 11 c 13 d 2
  e 2 f $^-6$ g 0 h 3
  i $^-6$ j $^-2$ k 23 l $^-28$

4 a 1 b $^-5$ c 10
  d $^-16$ e 12 f 49
  g $^-6$ h 0 i $^-5$

5 a 9 b $^-30$ c $^-9$
  d $^-5$ e $^-26$ f 24

6 $^-1$

7 possible answer: $^-5, ^-2, ^-1, 1, 4$

8 a $1, ^-13, ^-5$ b $^-12, ^-9, 5$ c $^-1, 7, ^-4$

1B

1 a $^-24$ b $^-56$ c $^-25$ d $^-80$
  e $^-27$ f $^-112$ g $^-48$ h $^-18$
  i $^-32$ j $^-55$ k $^-27$ l $^-80$

2 a $^-24$ b $^-30$ c $^-12$
  d $^-54$ e $^-56$ f $^-110$

3 0

4 a 4 b $^-12$

5 a $^-2$ b $^-5$ c $^-9$ d $^-2$
  e $^-3$ f $^-5$ g $^-8$ h $^-3$
  i $^-6$ j $^-7$ k $^-14$ l $^-15$

6 a $^-4$ b $^-8$ c $^-4$ d $^-5$

7 a $^-3$ b $^-12$ c $^-18$ d $^-2$
  e $^-2$ f $^-5$ g 3 h $^-15$

1C

1 a 430 b 2500 c 400 d 4
  e 800 f 4200 g 2 h 270

2 80 km

3 $60 000

4 $^-300, ^-330$
  $^-700, ^-725$
  $^-40, ^-45.277 . . .$
  600, 596
  $^-49000, ^-48422$

5 0.01 cm

1D

1 a 3 b 26 c 2 d 13
  e 29 f 26 g $^-62$ h $^-13$
  i $^-11$ j 11 k 14 l 9
  m 5 n 9 o 62 p 17
  q 17 r $^-3$

2 a 14 b 9 c 27 d 10
  e 24 f $^-27$ g 280 h 6
  i 480

3 a 17 b $^-1$ c 56 d 10
  d 46 e $^-400$ f 10
  g $^-10$ h 0 i 50

4 a $5 \times (6 + 7) = 65$
  b $(20 - 12) \div 4 = 2$
  c $12 \times (9 - 8) \times 2 = 24$
  d $(7 \times 2 - 10) \div 2 = 2$
  e $(14 - 10) \div 2 = 2$
  f $(9 + 6) \times (8 - 5) = 45$

1E

1 a 4, 8, 12, 16, 20 b 7, 14, 21, 28, 35
  c 10, 20, 30, 40, 50 d 12, 24, 36, 48, 60
  e 17, 34, 51, 68, 85 f 25, 50, 75, 100, 125

2 a 12, 24, 36 b 28, 56, 84
  c 45, 90, 135 d 42, 84, 126

3 a 30, 60, 90 b 60, 120, 180
  c 90, 180, 270

4 a 1, 7
  b 1, 2, 5, 10
  c 1, 2, 4, 8, 16
  d 1, 2, 3, 4, 6, 8, 12, 24
  e 1, 2, 4, 7, 8, 14, 28, 56
  f 1, 2, 4, 5, 8, 10, 20, 40
  g 1, 2, 4, 8, 16, 32
  h 1, 41
  i 1, 3, 7, 9, 21, 63
  j 1, 3, 5, 15, 25, 75
  k 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60
  l 1, 2, 4, 8, 16, 32, 64

5 a 4 b 4 c 6 d 8
  e 8 f 6 g 24 h 2
  i 15 j 12 k 25 l 12
  m 15 n 5 o 16 p 14

6 a 5 b 3 c 4 d 3
  e 14 f 17

7 a 6 b 10 c 12 d 18
  e 12 f 20 g 15 h 25
  i 30 j 56 k 28 l 30
  m 99 n 72 o 35 p 36

8 a 12 b 120 c 210 d 30
  e 56 f 90

9 10.24 am

1F

1 a, d, e and h

2 b, e and h

3 b, c, e and h

4 a, b, d, f and h

5 a, d and g

6 a, b, c and g

7 Work out **first digit + last digit − middle digit**. If the answer is 0 or 11 then the original number is divisible by 11.

1G–1I

1 a 5 b 9 c 4 d 17

2 a 4 b 9 c 49 d 225
  e 4 f 9 g 49 h 225

3 a 6 b 8 c 10 d 12
  e 11 f 3 g 6 h 5
  i 5 j 7 k 8 l 4
  m 10 n 10 o 3 p 3

4 a 9 cm b 13 cm

5 a 3 b 2 c $^-4$ d $^-10$

6 a 1.728 b 15.625 c $^-226.981$ d $^-0.027$
  e 4.2 f 0.7 g 16 h 2.4

7 a 19.683 b 3.1

8 **a** $\dfrac{3}{7}$ **b** $\dfrac{4}{5}$ **c** 0.6 **d** 0.3

   e $\dfrac{2}{3}$ **f** $\dfrac{4}{5}$ **g** $\dfrac{1}{4}$ **h** 0.2