

# Answers to Coursebook exercises

## 1 Integers, powers and roots



### Exercise 1.1 Arithmetic with integers

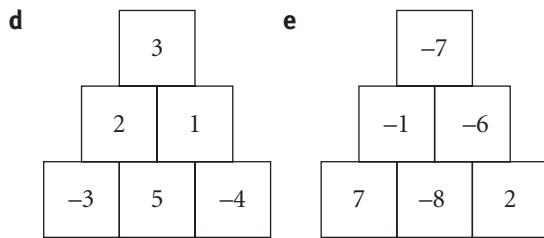
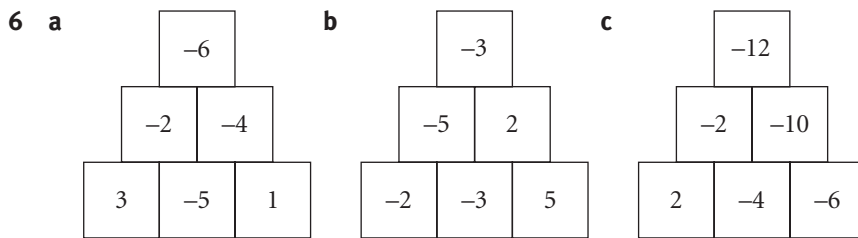
1 a -3      b -11      c -6      d -17      e 8

2 a 10      b -180      c -15      d -100      e 5

3 a -2      b -10      c 2      d -12      e -12

4 a  $4 + 6 = 10$       b  $-4 + 6 = 2$       c  $8 + 2 = 10$       d  $-4 + 6 = 2$       e  $12 + 10 = 22$

5 a 9      b -2      c 16      d 0      e 8



7

|       |    | Second |    |    |    |    |   |
|-------|----|--------|----|----|----|----|---|
|       |    | -      | -4 | -2 | 0  | 2  | 4 |
| First | 4  | 8      | 6  | 4  | 2  | 0  |   |
|       | 2  | 6      | 4  | 2  | 0  | -2 |   |
|       | 0  | 4      | 2  | 0  | -2 | -4 |   |
|       | -2 | 2      | 0  | -2 | -4 | -6 |   |
|       | -4 | 0      | -2 | -4 | -6 | -8 |   |

8 a -20      b -48      c 20      d 60      e -40

9 a -2      b -5      c 3      d 10      e -4

10 a -40      b -4      c -100      d 5      e 48

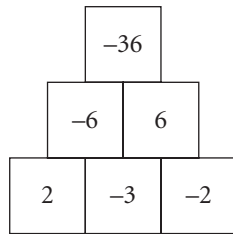
11 a  $-15 \div 5 = -3$  and  $-15 \div -3 = 5$       b  $32 \div -8 = -4$  and  $32 \div -4 = -8$       c  $-42 \div -6 = 7$  and  $-42 \div 7 = -6$

12

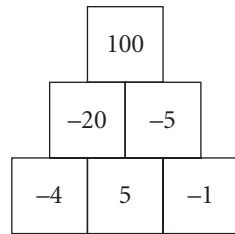
| x  | -3 | -2 | -1 | 0 | 1  | 2  | 3  |
|----|----|----|----|---|----|----|----|
| 3  | -9 | -6 | -3 | 0 | 3  | 6  | 9  |
| 2  | -6 | -4 | -2 | 0 | 2  | 4  | 6  |
| 1  | -3 | -2 | -1 | 0 | 1  | 2  | 3  |
| 0  | 0  | 0  | 0  | 0 | 0  | 0  | 0  |
| -1 | 3  | 2  | 1  | 0 | -1 | -2 | -3 |
| -2 | 6  | 4  | 2  | 0 | -2 | -4 | -6 |
| -3 | 9  | 6  | 3  | 0 | -3 | -6 | -9 |

## Unit 1 Answers to Coursebook exercises

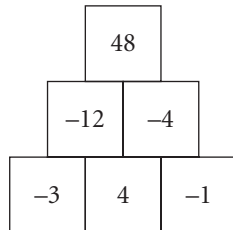
13 a



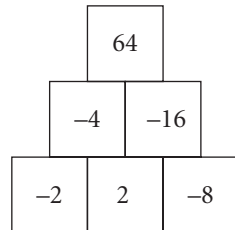
b



c



d



14 a, b There are six different pairs: 1 and -12; -1 and 12; 2 and -6; -2 and 6; 3 and -4; -3 and 4.

15 a -15    b 2    c 1    d 6    e 16    f -14

16 a -5    b 12    c -7    d -4    e 4    f 1

### Exercise 1.2 Multiples, factors and primes

1 a 1, 2, 4, 5, 10, 20    b 1, 3, 9, 27    c 1, 3, 5, 15, 25, 75    d 1, 23  
e 1, 2, 4, 5, 10, 20, 25, 50, 100    f 1, 2, 7, 14, 49, 98

2 a 8, 16, 24, 32    b 15, 30, 45, 60    c 7, 14, 21, 28    d 20, 40, 60, 80  
e 33, 66, 99, 132    f 100, 200, 300, 400

3 a 24    b 36    c 28    d 60    e 32    f 77

4 8

5 a 1, 2, 3, 4, 6, 8, 12, 24    b 1, 2, 4, 8, 16, 32    c 1, 2, 4, 8    d 8

6 a 1, 5    b 1, 2, 3, 6    c 1, 7    d 1, 2, 4, 8    e 1    f 1

7 a 2    b 6    c 10    d 20    e 1    f 15

8 24 and 56

9 37

10 61 and 67

11 Alicia is correct.  $91 = 7 \times 13$

12 1

13 Because 7 will be a factor.

14 a 2, 3    b 3, 5    c 3, 7    d 7    e 2, 3, 5    f 7, 11

15 a Any three from 2, 4, 8, 16, 32, ..., ...    b Any three from 3, 9, 27, 81, ..., ...  
c Any three from 5, 25, 125, 625, ..., ...

16 The first one is 16. The next is 25. Any square number has an odd number of factors.

17 The smallest is 30 ( $2 \times 3 \times 5$ ). You could also have 42 ( $2 \times 3 \times 7$ ), 66 ( $2 \times 3 \times 11$ ), etc.

**Exercise 1.3 More about prime numbers**

- 1 Different trees are possible.
- 2 a Many different trees are possible. They should end with the same primes as the trees in question 1.  
 b i  $2^4 \times 3$     ii  $2^2 \times 5^2$     iii  $2^2 \times 3^3$
- 3
- |     |   |   |                           |
|-----|---|---|---------------------------|
| 20  | — | • | $2^2 \times 5$            |
| 24  | — | • | $2 \times 3 \times 7$     |
| 42  | — | • | $2^2 \times 3^2 \times 5$ |
| 50  | — | • | $2 \times 5^2$            |
| 180 | — | • | $2^3 \times 3$            |
- 4 a 60    b 54    c 363    d 392    e 144    f 325
- 5 a  $2^3 \times 3$     b  $2 \times 5^2$     c  $2^3 \times 3^2$     d  $2^3 \times 5^2$     e  $3 \times 5 \times 11$     f  $2^3 \times 17$
- 6 a i  $3^2 \times 5$     ii  $3 \times 5^2$     b 225    c 15
- 7 a i  $2 \times 3^2 \times 5$     ii  $2^2 \times 5 \times 7$     b 1260    c 10
- 8 a 1    b 1739

**Exercise 1.4 Powers and roots**

- 1 a 9    b 27    c 81    d 243
- 2 a 100    b 1000    c 10 000
- 3 1 000 000 and 1 000 000 000
- 4 a  $3^5$     b  $2^6$     c  $4^5$
- 5 a 3    b 4
- 6 Possible values are 2 and 4.
- 7 a 3 and  $-3$     b 6 and  $-6$     c 9 and  $-9$     d 14 and  $-14$     e 15 and  $-15$     f 20 and  $-20$
- 8 256, 289 or 324
- 9 343
- 10 a 10    b 20    c 3    d 5    e 10
- 11 The smallest possible value is 64. Other possible values are 729 and 4096.
- 12 a 2048    b 4096    c 512
- 13 a i 9    ii 3    b 6    c 10    d 15 (Compare the sequence of triangular numbers.)

## Unit 1 Answers to Coursebook exercises

### End-of-unit review

1 a 2      b -8      c -15      d -10      e -14

2 a 7      b 1      c 17      d 7      e 0

3 a 27      b -2      c -80      d 6      e -2

4

| x  | -2  | 3   | 5   |
|----|-----|-----|-----|
| -4 | 8   | -12 | -20 |
| -3 | 6   | -9  | -15 |
| 6  | -12 | 18  | 30  |

5 -8 and 32

6 a 1, 2, 3, 6, 7, 14, 21, 42      b 1, 2, 4, 13, 26, 52      c 1, 5, 11, 55      d 1, 29  
e 1, 2, 4, 8, 16, 32, 64      f 1, 3, 23, 69

7 a, b, c There are three pairs: 3 and 37; 11 and 29; 17 and 23.

8 a  $2 \times 3^2$       b  $2^5 \times 3$       c  $2^3 \times 5^2$       d  $2^4 \times 3 \times 5$       e  $3^3 \times 5$       f  $5^2 \times 7$

9 a 40      b 5      c 288      d 1200

10 a 5 and -5      b 9 and -9      c 13 and -13      d 16 and -16

11 a 8      b 4

12 a 1024      b 2048      c 4096

13 a Shen worked out  $3 \times 5$  and  $5 \times 3$ ; both equal 15.      b  $3^5 = 243$  and  $5^3 = 125$

14 18