

1

Integers, powers and roots



1.1 Integers

Integers are whole numbers.

They can be positive like these: 2, 17, 543

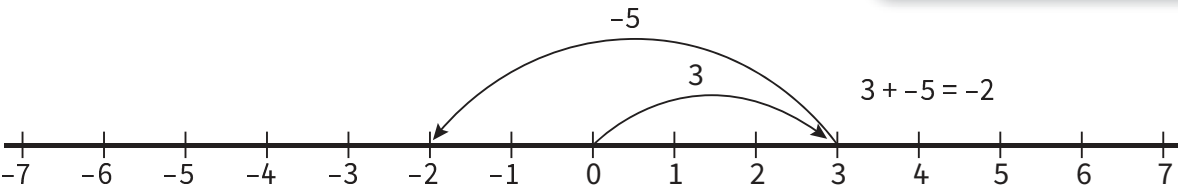
They can be negative like these: -3, -28, -921

You need to be able to add integers. For example:

$3 + -5 = -2$ $-6 + -3 = -9$ $-5 + 7 = 2$

A number line can help you:

Think of $3 + -5$ as $3 - 5$.



- 1 Complete these additions.
- a $-2 + -5 = \dots\dots$

b $5 + -7 = \dots\dots$

c $-4 + 4 = \dots\dots$

d $-2 + 8 = \dots\dots$
- 2 Draw a line from the addition to the answer. The first one has been done for you.
- 3 + 1

-6 + 2

6 + -2

-3 + 7

-2 + -2

-6 + 2

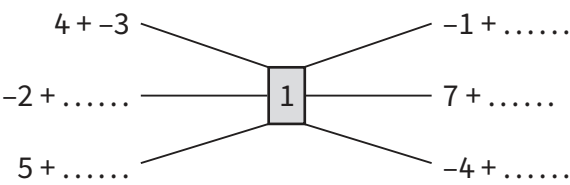
4

-4

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3 Fill in the missing numbers.

The answer is always 1.



Here are some examples of subtracting a positive number:

$4 - 3 = 1$ $4 - 5 = -1$ $-2 - 5 = -7$ $-6 - 1 = -7$

4 Complete these subtractions.

- a $4 - 6 = \dots\dots$ b $2 - 4 = \dots\dots$ c $-1 - 2 = \dots\dots$ d $-2 - 3 = \dots\dots$
e $8 - 3 = \dots\dots$ f $3 - 8 = \dots\dots$ g $-4 - 4 = \dots\dots$ h $-3 - 6 = \dots\dots$

To subtract a negative integer, change it to an addition of a positive number:

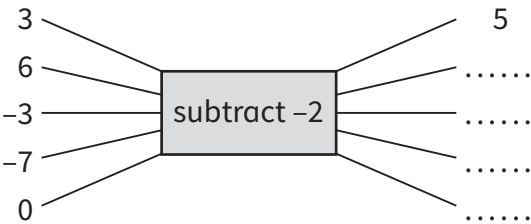
Change -2 to $+2$.
Change -5 to $+5$.

$3 - -2 = 3 + 2 = 5$ $3 - -5 = 3 + 5 = 8$ $-3 - -4 = -3 + 4 = 2$

5 Complete these subtractions.

- a $2 - -5 = 2 + 5 = \dots\dots$ b $-3 - -2 = -3 + \dots\dots = \dots\dots$
c $1 - -4 = 1 + \dots\dots = \dots\dots$ d $-5 - -6 = -5 + \dots\dots = \dots\dots$

6 Fill in the missing numbers.



Here is a rule for multiplication:

Same signs, positive answer

Different signs, negative answer

$3 \times 4 = 12$

$-3 \times 4 = -12$

$-3 \times -4 = 12$

$3 \times -4 = -12$

Now try Exercise 1.1 on page 9 of Coursebook 8.

12

Fill in the missing numbers.

-20

5 ×
-4 ×
10 × -2
-1 ×
..... × -20
..... × -10

The answer is always -20.

11

Fill in the missing numbers.

12

3 ×
-2 ×
-4 × -3
-1 ×
..... × 12
..... × -2

The answer is always 12.

10

Complete these multiplication tables.

4	-3	-2	×	-5
		-6		-4
15				

-8	-5	4	×	-6	-1	7
-56						

7

Complete these multiplications.

a

2 × -5 =

b

-2 × -5 =

c

-2 × 5 =

8

Complete these multiplications.

a

-6 × 3 =

b

5 × -5 =

c

-7 × -3 =

9

Complete these multiplications.

a

10 × -4 =

b

-6 × -7 =

c

-9 × 6 =

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1.2 Prime numbers

Look at this table, which shows **factors** of some numbers.

Number	Factors
6	1, 2, 3, 6
7	1, 7
8	1, 2, 4, 8
9	1, 3, 9

You can divide 6 by 1, 2, 3 or 6 without a remainder.

7 only has TWO factors. 7 is a **prime number**.

Is 15 a prime number?

$15 = 3 \times 5$. 3 and 5 are factors of 15. 15 is NOT a prime number.

1 Circle the prime numbers.

2 3 4 5 6 7 8 9 10

2 Circle the prime numbers.

11 12 13 14 15 16 17 18 19 20

3 Complete these lists of factors.

a Factors of 12: 1 2 3 12

b Factors of 16: 1 2 16

c Factors of 24: 1 2 3 4 24

d Factors of 20: 1 2 20

e Factors of 21: 1 21

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- 4 Look at the answers to Question 3.

Write down the HIGHEST number that is a factor of both 16 and 24.

This is the **highest common factor (HCF)** of 16 and 24.

- 5 Find the HCF of 16 and 20.

- 6 Find the HCF of 12 and 24.

- 7 Find the HCF of 12 and 21.

Look at the lists below. The lowest number to appear in BOTH lists is 10. **The lowest common multiple (LCM)** of 2 and 5 is 10.

Multiples of 2: 2 4 6 8 10 12 14 16 18 20

Multiples of 5: 5 10 15 20 25 30 35 40 45 50

- 8 a Fill in the gaps in the list of multiples of 3.

3 6 9 15 21 30

- b Find the LCM of 3 and 2

- c Find the LCM of 3 and 5

- 9 a Fill in the gaps in the lists of multiples.

Multiples of 4: 4 8 16 24 32 40

Multiples of 6: 6 18 24 36 48 54

- b Find the LCM of 4 and 6

- c Find the LCM of 4 and 5

- d Find the LCM of 5 and 6

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You can use a table like this to find prime numbers.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50

Cross out number 1.

Draw a circle round number 2. Cross out all the multiples of 2.

Cross out 2, 4, 6, ...

Draw a circle round number 3. Cross out all the multiples of 3.

Some are already
crossed out. Cross
out 9, 15, ...

Draw a circle round number 5. Cross out all the multiples of 5.

Draw a circle round number 7. Cross out all the multiples of 7.

10 Draw a circle round all the remaining numbers. List them below.

.....

These are the prime numbers less than 50.

Now try Exercise 1.2 on page 12 of Coursebook 8.