1 Integers, powers and roots

1.1 Directed numbers

To subtract a negative number, you add the inverse. Look at these examples:

3 – –2 = 3 + 2 = 5 –2 – –5 = –2 + 5 = 3 –6 – –4 = –6 + 4 = –2

1 Fill in the missing numbers.

a 5 – –1 = 5 + ... = ...

b 2 – –4 = 2 + ... = ...

c 8 – –1 = 8 + ... = ...

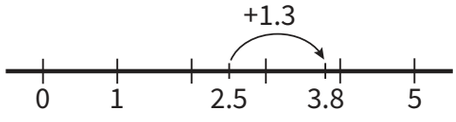
d –3 – –1 = –3 + ... = ...

e –1 – –5 = –1 + ... = ...

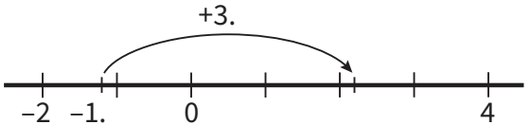
f –7 – –5 = –7 + ... = ...

The numbers can be decimals:

2.5 – –1.3 = 2.5 + 1.3 = 3.8



–1.2 – –3.4 = –1.2 + 3.4 = 2.2



2 Fill in the missing numbers.

a 3.5 – –1.2 = 3.5 + ... = ...

b 2.2 – –3.4 = 2.2 + ... = ...

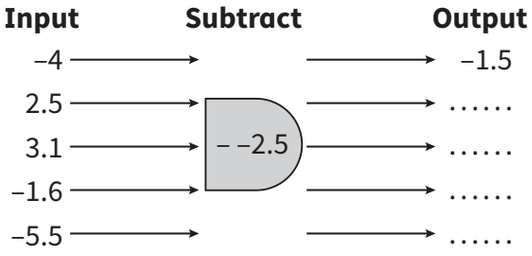
c 2.7 – –2.2 = 2.7 + ... = ...

d –4.6 – –2 = –4.6 + ... = ...

e –2 – –3.5 = –2 + ... = ...

f –6 – –2.3 = –6 + ... = ...

3 Fill in the missing outputs.



The rule for multiplication is:

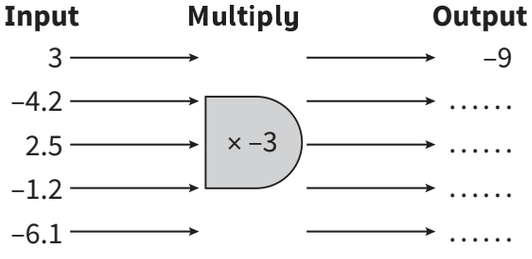
Same signs	3 × 4 = 12	positive answer
	–2 × –7 = 14	
Different signs	3 × –4 = –12	negative answer
	–2 × 7 = –14	

4 Complete these multiplications.

a 3 × –4 = ... **b** –2 × –3 = ... **c** –5 × 4 = ...

d 2.4 × –2 = ... **e** –3.2 × 3 = ... **f** –4.1 × –5 = ...

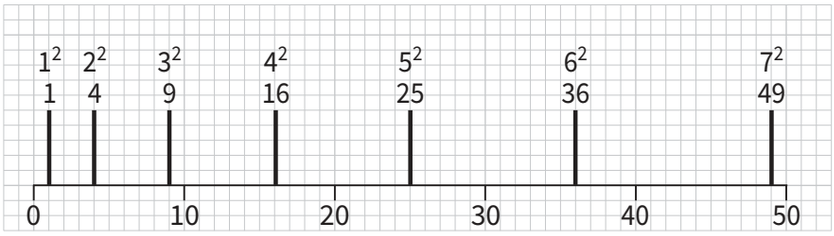
5 Fill in the missing outputs.



Now try Exercise 1.1 on page 8 of Coursebook 9.

1.2 Square roots and cube roots

This number line shows the squares of whole numbers from 1 to 7.



The square of 3 is 9 $3^2 = 9$ The square root of 9 is 3 $\sqrt{9} = 3$

1 Fill in the missing numbers.

a The square of 6 is ..... $6^2 =$ ..... The square root of ..... is 6 $\sqrt{.....} = 6$

b The square of ..... is 25 $.....^2 = 25$ The square root of 25 is ..... $\sqrt{25} =$ .....

2 Fill in the missing numbers.

a $\sqrt{49} =$ ..... **b** $\sqrt{4} =$ ..... **c** $\sqrt{16} =$ ..... **d** $\sqrt{1} =$ .....

What is $\sqrt{30}$? Look at the number line above.

30 is between 25 and 36.

So $\sqrt{30}$ is between 5 and 6.

25 is 5^2 and 36 is 6^2.

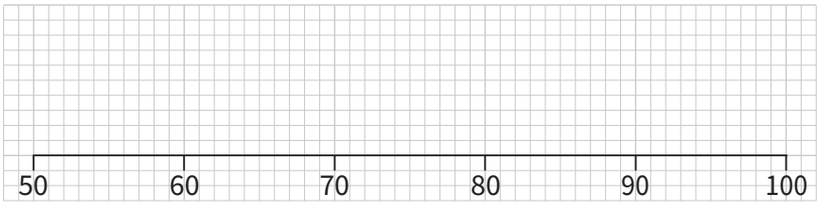
3 Fill in the missing numbers.

a $\sqrt{20}$ is between ..... and ..... **b** $\sqrt{45}$ is between ..... and .....

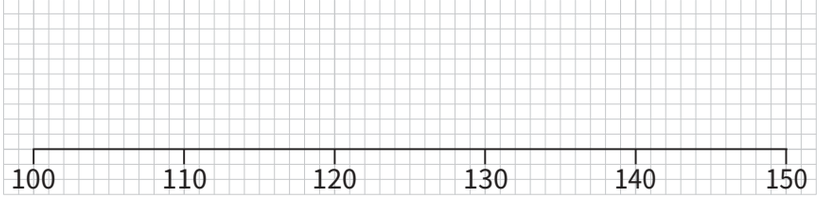
c $\sqrt{14}$ is between ..... and ..... **d** $\sqrt{6}$ is between ..... and .....

e $\sqrt{27}$ is between ..... and ..... **f** $\sqrt{39}$ is between ..... and .....

4 Mark 7^2, 8^2, 9^2 and 10^2 on this number line.



5 Mark 10^2, 11^2 and 12^2 on this number line.



6 Fill in the missing numbers.

a $\sqrt{60}$ is between ..... and .....

b $\sqrt{93}$ is between ..... and .....

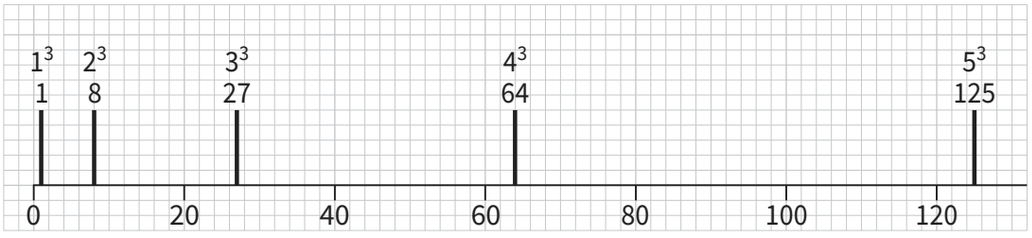
c $\sqrt{129}$ is between ..... and .....

d $\sqrt{108}$ is between ..... and .....

e $\sqrt{52}$ is between ..... and .....

f $\sqrt{77}$ is between ..... and .....

This number line shows the first five cube numbers.



The cube of 4 is 64 $4^3 = 64$

$4^3 = 4 \times 4 \times 4$.

The cube root of 64 is 4 $\sqrt[3]{64} = 4$

7 Fill in the missing numbers.

a $\sqrt[3]{27}$ = ... **b** $\sqrt[3]{8}$ = ... **c** $\sqrt[3]{125}$ = ... **d** $\sqrt[3]{1}$ = ...

8 Fill in the missing numbers.

a $\sqrt[3]{40}$ is between ..... and .....

b $\sqrt[3]{85}$ is between ..... and .....

c $\sqrt[3]{121}$ is between ..... and .....

d $\sqrt[3]{20}$ is between ..... and .....

e $\sqrt[3]{5}$ is between ..... and .....

f $\sqrt[3]{100}$ is between ..... and .....

Now try Exercise 1.2 on page 10 of Coursebook 9.

1.3 Indices

3^{-1} is another way of writing the fraction $\frac{1}{3}$

7^{-1} is another way of writing the fraction $\frac{1}{7}$

When you write 3^{-1}, the -1 is called an **index**. The plural is **indices**.

1 Write these numbers as fractions.

a 2^{-1} ..... **b** 6^{-1} ..... **c** 8^{-1} ..... **d** 10^{-1} .....

2 Write these fractions using indices.

a $\frac{1}{5}$ = ... **b** $\frac{1}{12}$ = ... **c** $\frac{1}{9}$ = ... **d** $\frac{1}{4}$ = ...

$5^2 = 25$

You can write $\frac{1}{25} = 5^{-2}$

3 Fill in the missing numbers. The first one has been done for you.

a $4^2 = 16$ so $\frac{1}{16} = 4^{-2}$

b $6^2 = 36$ so $\frac{1}{36}$ = ...

c $10^2 = 100$ so .....

d $9^2 = 81$ so .....

e $7^2 = 49$ so .....

f $8^2 = 64$ so .....

Now try Exercise 1.3 on page 11 of Coursebook 9.