

# 1 Working with integers

In this chapter you will learn how to ...

- use formal written methods to calculate with positive and negative integers.
- perform operations in the correct order based on mathematical conventions.
- recognise inverse operations and use them to simplify and check calculations.



For more resources relating to this chapter, visit GCSE Mathematics Online.

## Using mathematics: real-life applications

Everyone uses numbers on a daily basis often without really thinking about them. Shopping, cooking, working out bills, paying for transport and measuring all rely on a good understanding of numbers and calculation skills.



Tip

You probably already know most of the concepts in this chapter. They have been included so that you can revise them if you need to and check that you know them well.



"Number puzzles and games are very popular and there are mobile apps and games available for all age groups. I use an app with my GCSE classes where they have to work in the correct order to solve different number puzzles."

(Secondary school teacher)

## Before you start ...

KS3	You should be able to add, subtract, multiply and divide positive and negative numbers.	<b>1</b> Copy and complete each statement to make it true. Use only $<$ , $=$ or $>$ . <b>a</b> $2 + 3 \square 4 - 7$ <b>b</b> $-3 + 6 \square 4 - 7$ <b>c</b> $-1 - 4 \square 20 \div -4$ <b>d</b> $-6 \times 2 \square -7 - (-5)$
KS3	You should know the rules for working when more than one operation is involved in a calculation (BODMAS).	<b>2</b> Spot the mistake in each calculation and correct the answers. <b>a</b> $3 + 8 + 3 \times 4 = 56$ <b>b</b> $3 + 8 \times 3 + 4 = 37$ <b>c</b> $3 \times (8 + 3) \times 4 = 130$
KS3	You should understand that addition and subtraction, and multiplication and division are inverse operations.	<b>3</b> Identify the inverse operation by choosing the correct option. <b>a</b> $14 \times 4 = 56$ A $56 \times 4 = 14$ B $14 \div 4 = 56$ C $56 \div 4 = 14$ <b>b</b> $200 \div 10 = 20$ A $200 \div 20 = 10$ B $200 = 10 \times 20$ C $10 \times 200 = 2000$ <b>c</b> $27 + 53 = 80$ A $80 = 4 \times 20$ B $80 - 27 = 53$ C $80 + 27 = 107$




Find answers at: [cambridge.org/ukschools/gcsemaths-studentbookanswers](http://cambridge.org/ukschools/gcsemaths-studentbookanswers)

## Assess your starting point using the Launchpad

**STEP 1**

**1** Calculate without using a calculator and show your working.

**a**  $647 + 786$       **b**  $1406 - 289$   
**c**  $45 \times 19$       **d**  $414 \div 23$



**STEP 2**

**2** Choose the correct answer.


**a**  $9 \div (2 + 1) - 2$   
 A 9                  B  $3\frac{1}{2}$                   C 1                  D 0

**b**  $(3 \times 8) \div 4 + 8$   
 A 2                  B 30                  C 16                  D 14

**c**  $12 - 6 \times 2 + 11$   
 A 78                  B 23                  C 1                  D 11

**d**  $[5 \times (9 + 1)] - 3$   
 A 53                  B 47                  C 40                  D 43

**e**  $(6 + 5) \times 2 + (15 - 2 \times 3) - 6$   
 A 40                  B 20                  C 32                  D 25




**STEP 3**

**3** The perimeter of a square is equal to four times the length of a side.  
 If the perimeter is 128 cm, what is the length of a side?

**4** What should you add to 342 to get 550?

**5** A number divided by 45 is 30.  
 What is the number?



**GO TO**  
 Chapter review

**GO TO**  
**Section 1:**  
 Basic calculations

**GO TO**  
**Section 2:**  
 Order of operations

**GO TO**  
**Section 3:**  
 Inverse operations

## Section 1: Basic calculations

You will not always have a calculator so it is useful to know how to do calculations using mental and written strategies.

It is best to use a method that you are confident with and always **show your working**.

When a question asks you to find the:

- **sum**, you need to add
- **difference**, you need to subtract the smaller number from the larger number
- **product**, you need to multiply
- **quotient**, you need to divide.



Tip

Some examination papers will not allow you to use your calculator.

## WORK IT OUT 1.1

Look at these calculations carefully.

Discuss with a partner what methods these students have used to find the answer.

Which method would you use to do each of these calculations? Why?

①  $489 + 274$

$$\begin{array}{r} 400 + 200 \rightarrow 600 \\ 80 + 70 \rightarrow 150 \\ 9 + 4 \rightarrow 13 \\ \hline 763 \end{array}$$

②  $284 - 176$

$$\begin{array}{r} 284 \\ - 176 \\ \hline 108 \end{array}$$

③  $29 \times 17$

$$\begin{aligned} &= 30 \times 17 - 17 \\ &= 3 \times 170 - 17 \\ &= 510 - 17 \\ &= 493 \end{aligned}$$

④  $15 \times 62$

$$\begin{aligned} &= 30 \times 31 \quad 310 \\ &= 930 \quad 310 \\ &= 3 \times 310 \quad 310 \\ &= 930 \end{aligned}$$

⑤  $207 \times 47$

x	200	0	7
40	8000	0	280
7	1400	0	49
9400 + 0 + 329			
= 9729			

⑥  $2394 \div 42$

2394	$42 \times 10 = 420$
- 1680	$42 \times 20 = 840$
714	$42 \times 40 = 1680$
- 420	$42 \times 5 = 210$
294	$42 \times 2 = 84$
- 210	
84	
- 84	
0	57



### Problem-solving strategies

The problem-solving framework below outlines the steps that you can take to break down most problems to help you solve them.

Follow these steps each time you are faced with a problem to help you become more skilled at problem solving and more able to self-check.

These are important skills both for your GCSE courses and for everyday life.

### Problem-solving framework

Sally had a budget of £60 to buy items.

Sally bought:

- a table for £32 and
- a bench for £18.

She spent £12 to repair them.

She then sold the two items for £69.

How much profit did she make?

Steps for solving problems	What you would do for this example
<b>Step 1:</b> Work out what you have to do. Start by reading the question carefully.	Find the profit.
<b>Step 2:</b> What information do you need? Have you got it all?	Cost of items = £32 + £18 Cost of repairs = £12 Selling price = £69
<b>Step 3:</b> Is there any information that you don't need?	You don't need to know her budget. You just need to know how much she spent. Many problems contain extra information that you don't need to test your understanding.
<b>Step 4:</b> Decide what maths you can do.	Profit = selling price – cost
<b>Step 5:</b> Set out your solution clearly. Check your working and make sure your answer is reasonable.	Cost = £32 + £18 + £12 = £62 Profit = £69 – £62 = £7 Sally made £7 profit.
<b>Step 6:</b> Check that you have answered the question.	Yes. You needed to find the profit and you have found it.

## EXERCISE 1A

Solve these problems using written methods.

You **must** show your working.

- 1 A pack of pens cost £3.90 for three.  
Nola bought fifteen pens.
    - a i How much did she pay in total?
    - ii What is the cost per pen?
  - b How many packs of pens did Nola buy? Why do you need to know this?
  - c What operation would you do to find the total cost? Why?
  - d How would you work out the cost per pen?
  - e Does a price of £1.50 per pen seem reasonable?
- 2 A pair of jeans costs £34.  
A scarf costs £9.50.  
A top costs £20.  
Sandra saved £100 to buy these items.  
How much money does she have left?
- 3 How many 16-page brochures can you make from 1030 pages?
- 4 Jason can type 48 words per minute.
    - a How many words can he type in an hour and a half?
    - b Approximately how long would it take him to type 2000 words?
- 5 At the start of a year the population of Greenside Village was 56 309.  
During the year:  
617 people died,  
1835 babies were born,  
4087 people left the village  
and 3099 people moved into the village.  
What was the population at the end of the year?
- 6 The Amazon River is 6448 km long.  
The Nile River is 6670 km.  
The Severn River is 354 km long.
    - a How much longer is the Nile River than the Amazon River?
    - b How much shorter is the Severn River than the Amazon River?
- 7 What is the result when you combine the sum of 132 and 99 with the product of 36 and 127?
- 8 Find the result when the difference between 8765 and 3087 is added to the result of 1206 divided by 18.



## Tip

You don't always need to write something for the first few steps in the problem-solving framework, but you should still consider these steps mentally when approaching a problem in order to help you decide what to do. You should **always** show how you worked to solve the problem.



## Did you know?

The Severn is the longest river in the UK.



Find answers at: [cambridge.org/ukschools/gcsemaths-studentbookanswers](http://cambridge.org/ukschools/gcsemaths-studentbookanswers)



### Key vocabulary

**integers:** whole numbers in the set  $\{\dots, -3, -2, -1, 0, 1, 2, 3, \dots\}$ ; when they have a negative or positive sign they can be referred to as **directed numbers**.



### Tip

You will be expected to work with negative and positive values in algebra, so it is important to make sure you can do this early on in your GCSE course.

## Working with positive and negative integers

When doing calculations involving positive and negative **integers**, you need to remember the following:

- Adding a negative number is the same as subtracting the number:  
 $4 + -3 = 1$
- Subtracting a negative number is the same as adding a positive number:  
 $5 - -3 = 8$
- Multiplying or dividing the same signs gives a positive answer:  
 $-4 \times -2 = 8$  and  $\frac{-4}{-2} = 2$
- Multiplying or dividing different signs gives a negative answer:  
 $4 \times -2 = -8$  and  $\frac{-4}{2} = -2$

### EXERCISE 1B

1 Calculate:

- |                          |                          |                           |
|--------------------------|--------------------------|---------------------------|
| <b>a</b> $12 - 5 + 8$    | <b>b</b> $-3 - 4 - 8$    | <b>c</b> $3 + 5 - 6$      |
| <b>d</b> $-2 - 8 + 5$    | <b>e</b> $14 - 3 - 9$    | <b>f</b> $9 - 3 - 4$      |
| <b>g</b> $-34 + 18 - 12$ | <b>h</b> $25 - 19 - 42$  | <b>i</b> $-9 - (-7)$      |
| <b>j</b> $-3 - (-10)$    | <b>k</b> $-4 - (-12)$    | <b>l</b> $8 - (-9)$       |
| <b>m</b> $9 - (-8)$      | <b>n</b> $-3 - 8 - (-9)$ | <b>o</b> $-12 + 4 - (-8)$ |

2 Calculate:

- |                                   |                                  |                                  |
|-----------------------------------|----------------------------------|----------------------------------|
| <b>a</b> $-2 \times -4 \times -4$ | <b>b</b> $-4 \times 3 \times -6$ | <b>c</b> $-3 \times -4 \times 3$ |
| <b>d</b> $-4 \times -8 \times 3$  | <b>e</b> $3 \times 6 \times -4$  | <b>f</b> $12 \times 2 \times -3$ |
| <b>g</b> $1 \times -1 \times 10$  | <b>h</b> $-3 \times -8 \times 9$ | <b>i</b> $24 \div 3$             |
| <b>j</b> $-24 \div 3$             | <b>k</b> $-28 \div 2$            | <b>l</b> $-48 \div -6$           |
| <b>m</b> $-300 \div -10$          | <b>n</b> $400 \div -40$          | <b>o</b> $42 \div -7$            |
| <b>p</b> $-22 \div -22$           | <b>q</b> $-33 \div 11$           | <b>r</b> $-27 \div -3$           |
| <b>s</b> $45 \div -9$             | <b>t</b> $-64 \div -8$           |                                  |

3 Calculate:

- |                          |                            |                             |                            |
|--------------------------|----------------------------|-----------------------------|----------------------------|
| <b>a</b> $\frac{-40}{5}$ | <b>b</b> $\frac{-28}{-4}$  | <b>c</b> $\frac{30}{-5}$    | <b>d</b> $\frac{12}{-2}$   |
| <b>e</b> $\frac{65}{-5}$ | <b>f</b> $\frac{-48}{-6}$  | <b>g</b> $\frac{-330}{-10}$ | <b>h</b> $\frac{-400}{40}$ |
| <b>i</b> $\frac{-63}{7}$ | <b>j</b> $\frac{-60}{-20}$ | <b>k</b> $\frac{60}{-6}$    | <b>l</b> $\frac{-36}{6}$   |

4 The final score in a card game is worked out by allocating points to each card as follows:

Hearts +2      Diamonds -3      Clubs +4      Spades -5

- a** A player is left holding 3 diamonds, 2 hearts, a spade and 4 clubs. Choose the correct score from the following options.  
 A 16      B 11      C 6      D -6
- b** Choose the card combination that will give the score closest to 0.  
 A 2 diamonds      B 2 hearts, 1 diamond  
 C 2 clubs, 1 spade      D 2 diamonds, 1 spade

- 5 Apply the operations in the first row to the given number to complete each table.

a

	$-10$	$\times -2$	$+4$	$\div -2$	$-8$	$+1$
$-5$						

b

	$\times -4$	$\div -5$	$+8$	$-3$	$\times 2$	$-9$
$10$						

c

	$-10$	$\times -2$	$+4$	$\div -2$	$-8$	$+1$
$0$						

- 6 Here are some bank transactions.

Calculate the new balance in each case.

- a Balance of £230.  
Withdraw £100.
- b Balance of £250.50.  
Withdraw £300.
- c Balance of -£450.  
Deposit £900.  
Withdraw £300.
- d Balance of -£100.  
Deposit £2000.  
Withdraw £550.

- 7 In 2010, there was an oil spill from a well in the Gulf of Mexico.

The opening of the oil well was 5000 feet below sea level.

The oil well itself extended to a depth of 13 000 feet.

Express the answers to these questions as positive or negative numbers.

- a How deep was the deepest part of the oil well below the sea bed?
- b How far did oil travel from the bottom of the well to reach the surface of the water?
- c The oil company estimated that they were losing money at the rate of \$15 000 000 per day. Use an integer to express the money lost after:
- i one week                      ii thirteen weeks.

- 8 Here is a set of integers.

$-8, -6, -3, 1, 3, 7$

- a Write down two numbers with a difference of 9.
- b Write down three numbers with a sum of 1.
- c Write down two numbers whose product is  $-3$ .
- d Write down two numbers which, when divided, will give an answer of  $-6$ .

- 9 One more than  $-6$  is added to the product of 7 and 6 less than 3.

What is the result?

- 10 The temperature in Inverness is  $4^\circ\text{C}$  at 7 pm at night.

By 2 am the same night, it has dropped by 12 degrees.

- a What is the temperature at 2 am?
- b What is the average hourly change in the temperature?
- c By noon the next day, the temperature is  $7^\circ\text{C}$ .  
How many degrees warmer is this than it was at 2 am?



### Tip

Your bank balance is how much money you have in your account. Taking money out is a withdrawal. Putting money in is a deposit.








### Tip

Feet is a standard unit of **imperial** measurement for length. The metric measurement for length is metres. You will learn about **metric** measurements in Chapter 21.

## Section 2: Order of operations

Jose posted this calculation on his wall on social media.

	<b>JOSE:</b> $24 + 6 \div 2 - 1 \times 4 = ?$
COMMENT    ✓ LIKE    ↻ SHARE	
	<b>JOANNA:</b> 56
	<b>PETER:</b> 11
	<b>LUCIA:</b> 23
	<b>DIPAK:</b> 104



### Tip

Many people remember these rules using the letters **BODMAS** (or sometimes BIDMAS).

**B**rackets

**O**f ('powers of' or 'fractions of', in BIDMAS I stands for indices)

**D**ivide and/or **M**ultiply

**A**dd and/or **S**ubtract

Which one of Jose's friends (if any) do you think is correct? Why?

There is a set of rules that tell you the order in which you need to work when there is more than one operation.

The order of operations is:

- 1 Do any operations in brackets first.
- 2 If there are any '**powers of**' or '**fractions of**' in the calculation, do them next.
- 3 Do division and multiplication next, working from left to right.
- 4 Do addition and subtraction last, working from left to right.

### Brackets

Brackets are used to group operations. For example:

$$(3 + 7) \times (30 \div 2)$$

When there is more than one set of brackets, work from the **innermost set** to the **outermost set**.

#### WORKED EXAMPLE 1

Work out  $2((4 + 2) \times 2 - 3(1 - 3) - 10)$ .

$$2((4 + 2) \times 2 - 3(1 - 3) - 10)$$

Highlight the different pairs of brackets to help if you need to.

$$\begin{aligned} &2((4 + 2) \times 2 - 3(1 - 3) - 10) \\ &= 2((6) \times 2 - 3(-2) - 10) \\ &= 2(6 \times 2 - 3 \times -2 - 10) \end{aligned}$$

The red highlighted brackets are the innermost, so do the calculations inside these brackets first. There are two lots, so work from left to right. **Note** that you can leave  $-2$  inside brackets if you prefer because  $3(-2)$  is the same as  $3 \times -2$ .

$$\begin{aligned} &2(6 \times 2 - 3 \times -2 - 10) \\ &= 2(12 - -6 - 10) \\ &= 2(8) \\ &= 2 \times 8 \\ &= 16 \end{aligned}$$

Yellow highlighted brackets are next. Do the multiplications first from left to right, then the subtractions from left to right.



Different styles of bracket can be used to make it easier to identify each pair.

For example, the following different types of brackets have been used below:

$( ), [ ], \{ \}$ .

$$\{2 - [4(2 - 7) - 4(3 + 8)] - 2\} \times 8$$

Other symbols can also be used to group operations.

For example:

Fraction bars:  $\frac{5 - 12}{3 - 8}$

Roots:  $\sqrt{16 + 9}$

These symbols are treated like brackets when you do a calculation.



### Tip

$\frac{5 - 12}{3 - 8}$  is the same calculation as  
 $(5 - 12) \div (3 - 8)$ .

### WORK IT OUT 1.2

Which of the solutions is correct in each case?

Find the mistakes in the incorrect option.

	Option A	Option B
1	$7 \times 3 + 4$ $= 21 + 4$ $= 25$	$7 \times 3 + 4$ $= 7 \times 7$ $= 49$
2	$(10 - 4) \times (4 + 9)^2$ $= 6 \times 16 + 81$ $= 96 + 81$ $= 177$	$(10 - 4) \times (4 + 9)^2$ $= 6 \times (13)^2$ $= 6 \times 169$ $= 1014$
3	$45 - [20 \times (4 - 3)]$ $= 45 - [20 \times 1]$ $= 45 - 21$ $= 24$	$45 - [20 \times (4 - 3)]$ $= 45 - 20 \times 1$ $= 45 - 20$ $= 25$
4	$30 - 4 \div 2 + 2$ $= 26 \div 2 + 2$ $= 13 + 2$ $= 15$	$30 - 4 \div 2 + 2$ $= 30 - 2 + 2$ $= 30$
5	$\frac{18 - 4}{4 - 2}$ $= \frac{18}{2}$ $= 9$	$\frac{18 - 4}{4 - 2}$ $= \frac{14}{2}$ $= 7$
6	$\sqrt{36 \div 4 + 40 \div 4 + 1}$ $= \sqrt{9 + 10 + 1}$ $= 3 + 11$ $= 14$	$\sqrt{36 \div 4 + 40 \div 4 + 1}$ $= \sqrt{9 + 40 \div 5}$ $= 3 + 8$ $= 11$



### Calculator tip

Most modern calculators are programmed to use the correct order of operations. Check your calculator by entering  $2 + 3 \times 4$ . You should get 14.

If a calculation is written with brackets, you need to enter the brackets into the calculator to make sure it does these first.



Find answers at: [cambridge.org/ukschools/gcsemaths-studentbookanswers](http://cambridge.org/ukschools/gcsemaths-studentbookanswers)

## EXERCISE 1C

1 Choose the correct answer.

a  $18 + 2 \times -3 + 5 - 2 =$

A 18                      B 53                      C 0                      D 15

b  $-5 \times 8 \div 2 \times -2 - 6 \times -3 =$

A -12                      B -22                      C -58                      D 58

2 Calculate the following:

Show the steps in your working.

a  $5 \times 10 + 3$

b  $5 \times (10 + 3)$

c  $2 + 10 \times 3$

d  $(2 + 10) \times 3$

e  $23 + 7 \times 2$

f  $6 \times 2 \div (3 + 3)$

g  $10 - 4 \times 5$

h  $12 + 6 \div 2 - 4$

i  $3 + 4 \times 5 - 10$

j  $18 \div 3 \times 5 - 3 + 2$

k  $5 - 3 \times 8 - 6 \div 2$

l  $7 + 8 \div 4 - 1$

m  $\frac{15 - 5}{2 \times 5}$

n  $(17 + 1) \div 9 + 2$

o  $\frac{16 - 4}{4 - 1}$

p  $17 + 3 \times 21$

q  $48 - (2 + 3) \times 2$

r  $12 \times 4 - 4 \times 8$

s  $15 + 30 \div 3 + 6$

t  $20 - 6 \div 3 + 3$

u  $10 - 4 \times 2 \div 2$

3 Check whether these answers are correct.

If the answer is wrong, work out the correct answer.

a  $12 \times 4 + 76 = 124$

b  $8 + 75 \times 8 = 698$

c  $12 \times 18 - 4 \times 23 = 124$

d  $(16 \div 4) \times (7 + 3 \times 4) = 76$

e  $(82 - 36) \times (2 + 6) = 16$

f  $(3 \times 7 - 4) - (4 + 6 \div 2) = 12$

4 Use the numbers listed to make each number sentence true.

a  $\square - \square \div \square = \square$

0, 2, 5, 10

b  $\square - \square \div \square = \square$

9, 11, 13, 18

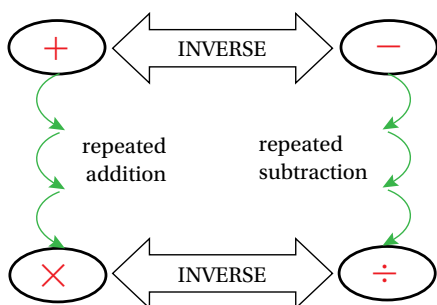
c  $\square \div (\square - \square) - \square = \square$

1, 3, 8, 14, 16

d  $(\square + \square) - (\square - \square) = \square$

4, 5, 6, 9, 12

## Section 3: Inverse operations



The four operations, add, subtract, multiply and divide, are related to each other.

Operations are inverses of each other if one undoes (cancels out) the effect of the other.

- Adding is the inverse of subtracting, for example, add 5 is undone by subtract 5.
- Multiplying is the inverse of dividing, for example, multiply by 2 is undone by divide by 2.
- Taking a square root is the inverse of squaring a number, for example,  $4^2$  is undone by  $\sqrt{16}$ .
- Taking the cube root is the inverse of cubing a number, for example,  $2^3$  is undone by  $\sqrt[3]{8}$ .

**When you add a number to its inverse, the answer is always 0**, for example,

$$1 + -1 = 0$$

$-1$  is known as the **additive inverse** of 1.

**When you multiply a number by its inverse, the answer is always 1.**

$$2 \times \frac{1}{2} = 1$$

$\frac{1}{2}$  is known as the **multiplicative inverse** of 2.

Inverse operations are useful for checking the results of your calculations.

For example, is  $4320 - 500 = 3820$  correct?

Check by doing the inverse operation, that is, adding 500 back to the result to see if you get 4320.

$3820 + 500 = 4320$ , so the original calculation is correct.

### EXERCISE 1D

- Find the additive inverse of each of these numbers.
 

<b>a</b> 5	<b>b</b> 2	<b>c</b> 100
<b>d</b> $-3$	<b>e</b> $-16$	<b>f</b> $-12$
- By what number would you multiply each of these to get an answer of 1?
 

<b>a</b> 5	<b>b</b> 10	<b>c</b> $-3$
<b>d</b> $\frac{1}{3}$	<b>e</b> 9	<b>f</b> $\frac{1}{9}$
- Use inverse operations to check each calculation.  
 Correct those that are wrong. (You can correct the question or the answer.)
 

<b>a</b> $6172 - 3415 = 2757$	<b>b</b> $488 - 156 = 322$	<b>c</b> $219 - 361 = -142$
<b>d</b> $264 + 469 = 723$	<b>e</b> $4019 + 217 = 4235$	<b>f</b> $617 + 728 = 1345$
<b>g</b> $512 \div 4 = 43$	<b>h</b> $672 \div 12 = 56$	<b>i</b> $1274 \div 15 = 85$
<b>j</b> $3840 \div 30 = 128$	<b>k</b> $30 \times 125 = 3770$	<b>l</b> $214 \times 8 = 1732$
<b>m</b> $\sqrt{900} = 30$	<b>n</b> $\sqrt{15\,625} = 120$	<b>o</b> $400^2 = 16\,000$
- Use inverse operations to find the missing values in each of these calculations.
 

<b>a</b> $\square + 217 = 529$	<b>b</b> $\square + 388 = 490$	<b>c</b> $\square - 218 = 182$
<b>d</b> $121 \times \square = -605$	<b>e</b> $-6 \times \square = 870$	<b>f</b> $\square \div 40 = 5400$
- Which operation can be used to check that  $500 \times 38 = 19\,000$ ?
 

A $19\,000 - 500$	B $1900 \div 5$
C $190 \div 5$	D $19\,000 \div (500 + 38)$



#### Tip

The multiplicative inverse of a number is also called its **reciprocal**. For example,  $\frac{1}{3}$  is the reciprocal of 3.



#### Tip

You will use inverse operations to solve equations and when you deal with functions, so it is important that you understand how they work.





### Checklist of learning and understanding

#### Basic calculations

- Written methods are important for when you do not have a calculator.
- You can use any method as long as you show your working.
- Negative and positive numbers can be added, subtracted, multiplied and divided as long as you apply the rules to get the correct sign in the answer.

#### Order of operations

- In maths there is a conventional order for working when there is more than one operation:
  - Always work out brackets (or other grouping symbols) first,
  - then powers,
  - multiply and/or divide next,
  - then add and/or subtract.

#### Inverse operations

- An inverse operation undoes the previous operation.
- Addition is the inverse of subtraction.
- Multiplication is the inverse of division.
- Squaring is the inverse of taking the square root.



For additional questions on the topics in this chapter, visit [GCSE Mathematics Online](#).



### Chapter review

- Choose the correct answer.
  - What is the first operation you would do in this calculation:  
 $4 \times [20 \div (5 - 3)] - 8 + 2$ ?  
 A +    B -    C  $\times$     D  $\div$
  - To make the statement  $5 - 3 \times 8 - 6 \div 2 = 2$  correct, you would need to insert brackets as follows:  
 A  $5 - (3 \times 8) - 6 \div 2 = 2$   
 B  $5 [- 3 \times (8 - 6)] \div 2 = 2$   
 C  $(5 - 3) \times 8 - 6 \div 2 = 2$   
 D  $(5 - 3) \times (8 - 6) \div 2 = 2$
- Look at the grid at the top of the next page. These are the solutions to a cross-number puzzle.  
 The clues are all calculations that involve using the correct order of operations.  
 Write a set of clues that would give these results.

	<sup>1</sup> 2	<sup>2</sup> 7						<sup>3</sup> 3		
<sup>4</sup> 1	4	8	<sup>5</sup> 6			<sup>6</sup> 1	9	7	<sup>7</sup> 4	
<sup>8</sup> 3	0		7							5
	<sup>9</sup> 4	<sup>10</sup> 9			<sup>11</sup> 3	2	7		<sup>12</sup> 2	<sup>13</sup> 4
		2			1					8
		0		<sup>14</sup> 4	<sup>15</sup> 2	5		<sup>16</sup> 2	6	
	<sup>17</sup> 4	1	<sup>18</sup> 7			1				0
<sup>19</sup> 2	3		<sup>20</sup> 3	<sup>21</sup> 2	0	4		<sup>22</sup> 9	0	
<sup>23</sup> 7	9	4		1			<sup>24</sup> 7	9		

- 3 Use integers and operations to write ten different questions that give an answer of  $-17$ .
- 4 On a page of a magazine there are three columns of text. Each column contains 42 rows. In each column row there is an average of 32 letters. Approximately how many letters are there on a page?
- 5 A stadium has seats for 32 000 people. There are 125 seats in a row. How many rows are there in the stadium?
- 6 This grid follows two rules.  
 Rule 1: The sums of each row are equal.  
 Rule 2: The products of each column are equal.

			Sum of rows
5	32	80	117
96	15	6	117
Product of columns	480	480	480

The grid below follows the same two rules. Work out the missing numbers.

			Sum of rows
	5	6	
Product of columns	60		

(3 marks)  
 © AQA 2013

- 7 Two numbers have a sum of  $-15$  and a product of  $-100$ .  
What are the numbers?
- 8 The sum of two numbers is  $1$ , and their product is  $-20$ .  
What are the numbers?
- 9 Jenna's bank account was overdrawn.  
Then she deposited  $\pounds 1000$ .  
Her new balance is  $\pounds 432$ .  
By how much was her account overdrawn to start with?