Adding and subtracting

You need to be able to add and subtract numbers without a calculator.

Mental methods
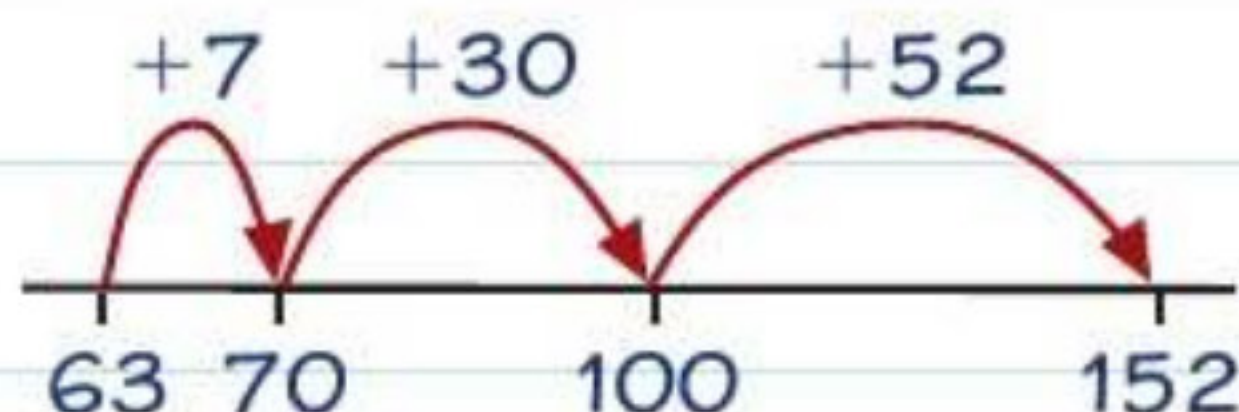
Try these methods for adding and subtracting quickly in your head.

213 + 79

$+70$ $+9$

213   283 292

Add the tens first
then the units.
213 + 79 = 292

152 − 63

$+7$ $+30$ $+52$

63 70   100   152

Count on in steps from 63 up to 152.
Add up the steps to work out the
difference between 152 and 63.
7 + 30 + 52 = 89
152 − 63 = 89

Worked example   Target grade **1**

Work out 285 + 56 + 1091

(2 marks)

$$\begin{array}{r} 285 \\ 56 \\ +\ 1091 \\ \hline 1432 \\ {\scriptstyle 2\ 1} \end{array}$$

1. **Always** add the units column first:
   5 + 6 + 1 = 12. Write down the 2 and carry the **1**
   over to the tens column.

2. Add the tens column: 8 + 5 + 9 + 1 = 23.
   Make sure you include any numbers you carried over.
   Write down the 3 and carry the **2** over to the
   hundreds column.

3. Add the hundreds column: 2 + 0 + **2** = 4.
   Write down 4.

4. There is only one digit in the thousands column.
   Write this in your answer.

Worked example   Target grade **1**

Work out 418 − 62

(2 marks)

$$\begin{array}{r} {\scriptstyle 3}\;{\scriptstyle 1} \\ \cancel{4}18 \\ -\ \ 62 \\ \hline 356 \end{array}$$

1. **Always** subtract the units column first:
   8 − 2 = 6.
   Remember it is (top number) − (bottom number).

2. Look at the tens column. 1 is smaller than 6 so
   you have to exchange 1 hundred for 10 tens.
   Change 4 hundreds into 3 hundreds and 10 tens.

3. Now you can subtract the tens column: 11 − 6 = 5.

4. There is nothing to subtract in the hundreds column
   so write 3 in your answer.

Now try this

Target grade **1**

1 Work out
   (a) 503 + 1126 + 85   **(2 marks)**
   (b) 745 + 283   **(2 marks)**

2 (a) Work out 627 − 251   **(2 marks)**
   (b) How much is 831 − 659? **(2 marks)**

3 Joe buys a magazine costing £4.45 and
   two birthday cards costing £1.99 each.
   He pays with a £10 note.
   How much change will he receive?
                                (3 marks)

Scan this QR code
to watch a video
of this question
being solved.

Worked
solution
video

You can work in pence so you don't have to use
decimal numbers. Work out 445 + 199 + 199,
then subtract the result from 1000.
Remember to give units with your answer.

Multiplying and dividing

You need to be able to multiply and divide numbers without a calculator.
For a reminder about multiplying and dividing by 10, 100 and 1000 have a look at page 61.

Mental methods

Try these methods for multiplying and dividing quickly in your head.

37×8

$30 \times 8 = 240$

$7 \times 8 = \ \ 56$

$37 \times 8 = 296$

Split 37 into 30 and 7. Then multiply each by 8. Add the answers to get the total.

$54 \div 6$

$6 \times \square = 54$

The answer is 9.

Try to find a multiplication fact using 6 with 54 as the answer.

Worked example

Target grade 1

Work out
(a) 49×3 **(2 marks)**   (b) 36×24 **(3 marks)**

$$\begin{array}{r} 49 \\ \times \ \ 3 \\ \hline 147 \\ {}_2 \end{array}$$

$$\begin{array}{r} 36 \\ \times \ 24 \\ \hline 144 \\ {}_2 \\ 720 \\ {}_1 \\ \hline 864 \end{array}$$

Always multiply from right to left.
1. $9 \times 3 = 27$. Write down 7 and carry over **2** (2 tens).
2. $4 \times 3 = 12$. Add on the carry-over. $12 + 2 = 14$. Write down 14.

Examiners' report

Remember that this is a **non-calculator** question. You need to show all your working.
1. Work out 36×4. (Answer = 144)
2. Work out 36×20. Write down **0** and then work out 36×2. (Answer = 720)
3. Add the answers. ($144 + 720 = 864$)

Multiplying and dividing are **much easier** if you are confident with your **times tables** up to 10×10.

Real students have struggled with questions like this in recent exams – **be prepared!**

Worked example

Target grade 1

Work out $288 \div 9$ **(2 marks)**

$$\begin{array}{r} 32 \\ 9\overline{)288} \\ -27 \\ \hline 18 \\ -18 \\ \hline 0 \end{array}$$

You can use long division.
1. Does 9 divide into 2? No.
2. Does 9 divide into 28? Yes. $9 \times 3 = 27$ so 9 divides into 28 three times with remainder 1.
3. Does 9 divide into 18? Yes. $9 \times 2 = 18$ so 9 divides into 18 two times with no remainder.

Using short division the calculation would look like this:

$$9\overline{)28\,^1 8} \quad 3\,2$$

Now try this

Target grade 1

1 (a) Work out 72×100 **(1 mark)**
   (b) Work out 256×9 **(1 mark)**
   (c) Work out 29×78 **(2 marks)**

Worked solution video

Target grade 1

2 (a) Work out $468 \div 3$ **(2 marks)**
   (b) Work out $1032 \div 8$ **(2 marks)**

Target grade 2

3 There are 18 chocolate coins in a bag.
   Paula buys 6 of these bags.
   Paula has 7 grandchildren. She wants to give each of her grandchildren 15 coins.
   Has she bought enough coins?   **(3 marks)**

You need to answer 'yes' or 'no' to the question, **and** show your working to **justify** your answer.

Operations on decimals

① Adding and subtracting

To add or subtract decimal numbers:
1. Line up digits with the same place value.
2. Line up the decimal points.
3. Write a decimal point in your answer.

See page 4 for a reminder about adding and subtracting.

Write in 0s so that both numbers have the same number of decimal places.

Worked example   Target grade **1**

(a) $0.75 + 1.6$ (b) $3.5 - 0.21$
      (1 mark)   **(1 mark)**

$$\begin{array}{r} 0.75 \\ + 1.60 \\ \hline 2.35 \\ \hline {\scriptstyle 1} \end{array}$$

$$\begin{array}{r} 3.\overset{4}{\cancel{5}}\overset{1}{0} \\ - 0.21 \\ \hline 3.29 \end{array}$$

② Multiplying

To multiply decimal numbers:
1. Ignore the decimal points and just multiply the numbers.
2. Count the number of decimal places in the calculation.
3. Put this number of decimal places in the answer.

(a) You can use estimation to check that the decimal point is in the correct place.

$8.69 \times 12 \approx 9 \times 12 = 108$ $108 \approx 104$ ✓

(b) 8.5×0.04 has 3 decimal places in total

So $8.5 \times 0.04 = 0.340 = 0.34$

Write a 0 before the decimal point and simplify your answer.

Worked example

Target grade **1**

(a) 8.69×12 (b) 8.5×0.04 Target grade **2**
      (2 marks)   **(2 marks)**

$$\begin{array}{r} 869 \\ \times\ \ 12 \\ \hline 1\,738 \\ {\scriptstyle 1\ 1} \\ + 8690 \\ \hline 10428 \\ \hline {\scriptstyle 1\ 1} \end{array}$$

$$\begin{array}{r} 85 \\ \times\ \ 4 \\ \hline 340 \\ {\scriptstyle 2} \end{array}$$

$8.5 \times 0.04 = 0.34$

$8.69 \times 12 = 104.28$

③ Dividing

To divide by a decimal number:
1. Multiply both numbers by 10, 100 or 1000 to make the second number a whole number.
2. Divide by the whole number.

Multiply 40.6 and 1.4 by 10.

If you multiply both numbers in a division by the same amount, the answer stays the same.

Worked example   Target grade **2**

(a) $55.8 \div 3$ (b) $40.6 \div 1.4$ **(2 marks)**
      (1 mark) $40.6 \div 1.4 = 406 \div 14$

$$\begin{array}{r} 1\,8.6 \\ 3\overline{)5\,^2 5.^1 8} \end{array}$$

$$\begin{array}{r} 29 \\ 14\overline{)406} \\ -28 \\ \hline 126 \\ -126 \\ \hline 0 \end{array}$$

$40.6 \div 1.4 = 29$

Now try this

Target grade **1**

1 (a) Work out $12.5 + 7.93$ **(2 marks)**
  (b) Work out $8.14 + 3 + 0.772$ **(2 marks)**

2 (a) Work out $16.5 - 9.72$ **(2 marks)**
  (b) Work out 5.76×34 **(2 marks)**

Target grade **2**

3 (a) A kitchen stool costs £39.90.
      Work out the cost of 6 kitchen stools.   **(2 marks)**
  (b) Tom buys 12 pencils for £11.28.
      Work out the cost of 1 pencil.   **(2 marks)**

Worked solution video

Make sure you line up the decimal points.

Hot Topic

Calculator and number skills

These calculator keys are really useful:

| x^2 | Square a number. | $(-)$ | Enter a negative number. |

| x^3 | Cube a number. | $\sqrt{\Box}$ | Find the square root of a number. |

| x^{-1} | Find the reciprocal of a number. | $\sqrt[3]{\Box}$ | Find the cube root of a number. You might need to press the shift key first. |

| Ans | Use your previous answer in a calculation. | S⇔D | Change the answer from a fraction or surd to a decimal. Not all calculators have this key. |
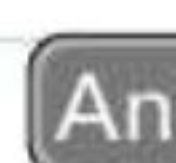
Order of operations

You need to use the correct **priority of operations when doing a calculation.**

Brackets
Indices
Division
Multiplication
Addition
Subtraction

$(10 - 7) + 4 \times 3^2$
$= 3 + 4 \times 3^2$
$= 3 + 4 \times 9$
$= 3 + 36$
$= 39$

Reciprocals

The reciprocal of a number is 1 divided by that number. You can find it by writing the number as a fraction then turning it upside down.

$7 = \frac{7}{1} \rightarrow \frac{1}{7}$ The reciprocal of 7 is $\frac{1}{7}$

$\frac{3}{4} \rightarrow \frac{4}{3}$ The reciprocal of $\frac{3}{4}$ is $\frac{4}{3}$

You can use the x^{-1} key on your calculator to find reciprocals.

Worked example

Target grade 4

(a) Work out the value of $\dfrac{\sqrt{8.3}}{12.5 - 7.3}$

Give your answer as a decimal. Write down all the figures on your calculator display.   **(2 marks)**

$\dfrac{\sqrt{8.3}}{12.5 - 7.3} = \dfrac{2.88097}{5.2} = 0.554033088$

(b) Find the reciprocal of 12.5. Give your answer as a decimal.   **(1 mark)**

$1 \div 12.5 = 0.08$

Read the question carefully. You have to give the answer as a **decimal**, so you might need to use the S⇔D button on your calculator.

Examiners' report

If you have to work out a calculation like this in your exam, you should work out the numerator (top) and denominator (bottom) **separately**, and **write them both down**. Then divide to work out the final answer. Read the question carefully. You have to write down **all the figures** from your calculator display.

Check it!
Check your answer by working out the whole calculation in one go using the 🖥 key.

Real students have struggled with questions like this in recent exams – **be prepared!**

Now try this

Try doing these **without a calculator**. Make sure you use the correct priority of operations.

Target grade 1

1 Work out
(a) $10 - 3 \times 2$ **(1 mark)**
(b) $84 \div (6 + 6)$ **(1 mark)**
(c) $8 + 3^2$ **(1 mark)**
(d) $(9 - 4)^3$ **(1 mark)**

Target grade 2

2 Work out
(a) $\sqrt{244 + 717}$ **(1 mark)**
(b) $\sqrt[3]{3.1 - 0.356}$ **(1 mark)**

Worked solution video

Use a calculator and give your answers as decimal numbers. You might need to use the S⇔D key to convert a fraction answer to a decimal.