

Steps into Numeracy

Adding and Subtracting

This guide gives some general tips for adding and subtracting numbers quickly and correctly.

Introduction

Adding and subtracting are two of the four basic operations in mathematics, multiplication and division are the other two. There are many ways to add and subtract and this guide concentrates on the well-known column method which you may be familiar with and looks like this:

$$\begin{array}{r} 34 \\ 123 \\ 7 \\ \hline 5659 + \\ \hline 5823 \\ \hline 12 \end{array}$$
$$\begin{array}{r} 867 \\ 143 - \\ \hline 724 \end{array}$$

This guide will go over how to perform this method and give you extra tips to improve your adding and subtracting skills.

Adding successfully

Although adding is generally well understood, there are some useful tips to bear in mind if you sometimes find adding difficult. Addition is usually performed by arranging the numbers to be added in a column with digits with the same place value being arranged below each other. This means that all the units, tens, hundreds and so on from your numbers should be aligned vertically. If you do not take the time to do this then your addition will often be incorrect. Misalignment of the numbers you are adding often occurs if they have different numbers of digits. You can address this in the following ways:

- **If you are using lined paper**, turn it from portrait to landscape so that you have columns instead of rows. You can use these columns to help you to line up your numbers.
- **If you are adding whole numbers**, ensure that the units are all in the same column, this should help you to line up the other digits correctly.

- **If you are adding decimal numbers**, place all the decimal points in the same column and align the other digits accordingly. Write zeroes to fill in any gaps to the right of the decimal point so that your numbers have the same amount of digits to the right of the decimal point.
- **If you are adding a mixture of whole and decimal numbers**, introduce a decimal point at the right end of the whole numbers and then ensure all the decimal points are in the same column. You can also write zeroes to fill in any gaps to the right and left of the decimal point so that your numbers have the same amount of digits.

You always add down the columns of numbers starting with the one on the far right and then move left. You should remember that, when adding down a column of numbers, if your sum is over 10 then you carry the tens over into the next column and include them in the sum of that column.

Remember you do not have to add numbers in the order they are written, if you are adding a long list of numbers it is useful to look for digits which add to 10 as adding tens is easier. Learning and looking for **number bonds** such as $4 + 6$, $3 + 7$ and so on will help your speed when adding, especially when you have a long list of numbers to add.

Example: Add 34, 123, 7 and 5659

First, line the numbers up with two lines at the bottom where your answer will be written then add down the columns **working from right-to-left**. The rightmost column adds to 23 (you can use the number bond $3 + 7$ and then add 9 and 4) so “3” is written in the answer with 2 carried to the sum of the next column. This column adds to 12 (you can use the number bond $2 + 3 + 5$ then add the carried 2) so “2” is written in the answer with 1 carried to the next column. This column adds to 8 and so “8” is written in the answer. Finally the only number in the final column is 5 and so “5” is written in the answer.

$$\begin{array}{r}
 34 \\
 123 \\
 7 \\
 \hline
 5659 + \\
 \hline
 \hline
 \end{array}$$

Start by writing this

$$\begin{array}{r}
 34 \\
 123 \\
 7 \\
 \hline
 5659 + \\
 \hline
 5823 \\
 \hline
 12
 \end{array}$$

The calculation looks like this

This shows that the sum of 34, 123, 7 and 5659 is 5823.

Example: Add 34, 1.23, 0.7 and 5.659

As you are adding decimal numbers you must put the decimal points of all the numbers in the same column. Note that 34 is a whole number so you can introduce a decimal point at the right end to give "34.". Now write zeroes to fill any gaps after the decimal points. Next add down the columns starting with the rightmost. The rightmost column adds to 9 so "9" is written in the answer. The next column (to the left) adds to 8, so "8" is written in the answer. The next column adds to 15 and so "5" is entered in the answer with 1 being carried into the next column. The next column adds to 11 (you can use the number bond $1 + 4 + 5$ then add the carried 1) so "1" is entered into the answer and 1 is carried into the next column. The final column adds to 4.

The diagram illustrates the process of adding decimal numbers in three stages:

- Stage 1:** The numbers 34., 1.23, 0.7, and 5.659 are listed vertically. A callout box says "Start by writing this".
- Stage 2:** The numbers are aligned to the right, with zeroes added to the end of 34. and 1.23 to make 34.000, 1.230, 0.700, and 5.659. A callout box says "Add zeroes after the decimal".
- Stage 3:** The numbers are added column by column from right to left. The sum is 41.589. A callout box says "The calculation looks like this".

The final calculation is shown as follows:

$$\begin{array}{r} 34.000 \\ 1.230 \\ 0.700 \\ \underline{5.659} + \\ 41.589 \\ \hline 11 \end{array}$$

This shows that the sum of 34, 1.23, 0.7 and 5.659 is 41.589.

Subtracting successfully

In a similar way to addition, methods to help you subtract are generally well understood. However it is not practised as often as addition and these methods can be easily forgotten. You are rarely asked to subtract a long list of numbers and usually you need to take one number from another. All the tips at the beginning of this guide can be used to help improve your subtraction. However there are different situations you may come across when you are required to subtract numbers which require you to take extra care.

Example: What is $867 - 143$?

If you look carefully you can see that each of the digits in 867 is larger than the corresponding digits in 143:

hundreds: 8 is bigger than 1
tens: 6 is bigger than 4
units: 7 is bigger than 3

Subtractions for which this is the case are easily achieved. Line up the numbers as you

would for addition **with the largest number at the top**. Then, **working from right-to-left**, you subtract the lower digit from the upper digit and write the answer in between the two lines. So 7 minus 3 is 4, 6 minus 4 is 2 and 8 minus 1 is 7:

$\begin{array}{r} 867 \\ 143 \\ \hline \end{array} -$	Start by writing this	$\begin{array}{r} 867 \\ 143 \\ \hline 724 \\ \hline \end{array} -$	The calculation looks like this
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This shows that $867 - 143 = 724$.

Example: What is $497 - 378$?

Often subtractions are not as straightforward as in the previous example and you have to be careful when you carry them out. Here:

497 is 4 hundreds + 9 tens + 7 units

378 is 3 hundreds + 7 tens + 8 units

Here there are fewer units in 497 than in 378 and so you need to be careful. You cannot just subtract 8 from 7 and get minus 1 (or even 1). The way you perform the subtraction is by **borrowing from the next column to the left**.

You can think of 497 as:

497: 4 hundreds + 8 tens + 17 units

Where you have borrowed one of the 9 tens and interpreted it as 10 units. You can now subtract as before. So 17 minus 8 is 9. Remember that you have borrowed 1 from the tens column, this is usually denoted by crossing out the digit (9) and writing one less (8) above it. You use the remaining 8 tens in your subsequent calculations. So subtracting the 7 tens in 378 from the remaining 8 tens in 497 gives 1. Finally 4 minus 3 is also 1. The above procedure is an explanation of how the borrowing method works, naturally you would not write your answer in this longer form but as:

$\begin{array}{r} 497 \\ 378 \\ \hline \end{array} -$	Start by writing this	$\begin{array}{r} 81 \\ 4\cancel{9}7 \\ 378 \\ \hline 119 \\ \hline \end{array} -$	The calculation looks like this
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This shows that $497 - 378 = 119$.

Example: What is $1694 - 795$?

Here again there are some digits in the larger number which are larger than the corresponding digits in the smaller number and so you need to do some borrowing. As the units in 1694 (4) are smaller than the units in 795 (5) you need to borrow one ten from the next column to the left:

1694: 1 thousand + 6 hundreds + 9 tens + 4 units

or 1694: 1 thousand + 6 hundreds + **8 tens + 14 units**

You can now perform the subtraction as $14 - 5 = 9$. However, this borrowing means that you reduce the number of tens in 1694 from 9 to 8 and you have to borrow again, from the hundreds to enable you to subtract the 9 tens in 795.

1694: 1 thousand + **5 hundreds + 18 tens** + 14 units

You can now perform this subtraction as $18 - 9 = 9$. Again, as you have reduced the number of hundreds in 1694 from 6 to 5, you need to borrow the 1 thousand to allow you to subtract the 7 hundreds from 795:

1694: **0 thousands + 15 hundreds** + 18 tens + 14 units

You can now perform this final subtraction as $15 - 7 = 8$ and you should check that:

0 thousands + 15 hundreds + 18 tens + 14 units = 1694

The above procedure is an explanation of how the borrowing method works, naturally you would not write your answer in this longer form. It is usually written, with the borrowing illustrated by the numbers written above the 1694, as:

$\begin{array}{r} 1694 \\ 795 - \\ \hline \\ \hline \end{array}$	← Start by writing this	$\begin{array}{r} 1581 \\ 1694 \\ 795 - \\ \hline 899 \\ \hline \end{array}$	← The calculation looks like this
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This shows that $1694 - 795 = 899$.

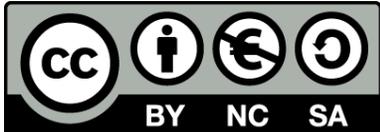
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