

## Column methods we use at St Barnabas

### Calculating with Big Maths

## SUBTRACTION

### Step 1

$$\begin{array}{r} 96 \\ - 42 \\ \hline 54 \\ \hline \end{array}$$

This is the step where children are first introduced to a Column Method for subtraction.

Children should be taught this step after '[Basic Skills: Subtraction: Step 27](#)', which ensures children can already understand subtracting a 2d number from a 2d number.

However, unlike addition, there is not a direct link between the High-understanding Method and the Column Method for subtraction. This holds true as we progress up the Column Method Progress Drive for subtraction. One could explain to children what is 'really happening' during column subtraction (including with 'borrowing' later on), but it is a laborious discussion and the whole premise of Column Methods is that we sacrifice understanding for efficiency. All the more reason therefore that '[Basic Skills: Subtraction: Step 27](#)' has been secured prior to this step so that we know that the children are already numerate before teaching the 'high doing' mechanics.

Note that here, children are not needing to 'borrow' from the tens column, so they are learning to solve a 2d - 2d question but not *any* 2d - 2d question. Therefore, children will only be entering this step once they are competent with *all* 1d - 1d '[Learn Its](#)', so that finding the difference between the top number and the bottom number of each column is not an issue.

### Step 2

$$\begin{array}{r}
 6 \cancel{7} 6 \\
 - 48 \\
 \hline
 28
 \end{array}$$

Here the pupil is faced with questions where they can not simply 'go down the columns' as they now come across situations where the units digit in the bottom number is larger than the units digit in the top number.

The new skill for the child to master here is to reduce the tens digit on the top number by 1 (by crossing through the original tens digit and writing a new tens digit reduced by 1, and then writing a mini 1 next to the units digit, thereby creating a mini-tens column within the units column). This is done so that we can now go down the units column and subtract the bottom digit successfully!

It is a very wordy process to explain, so repeated modelling / supporting is the best way forward. It becomes even more wordy if one wishes to explain to the learner what is really happening (of course what has really happened is that we have 'borrowed 10' from the tens digit of the top number). Every child should have completely mastered this skill at this step before moving on as it will be used again and again in future steps.

It is worth providing two key points to the children. The first point is to remind the children that they must 'Remember To...' reduce the tens digit by 1 (noting that it is always a reduction of 1) as this will definitely provide them with 'a way into' the question. The second point is to be explicit in showing that we haven't at this point done any subtraction, we have just rewritten the question to turn it from one question we can't do straight away, into two that we can! This of course is only true if the child can indeed subtract one digit numbers from a number up to as high as 18.

Therefore children will only be entering this step once they are competent with the ability to subtract 1 digit numbers from a number to 18 (['Basic Skills: Subtraction: Step 12'](#)), so that finding the difference between the top number (after the borrowing) and the bottom number of each column is a non-issue.

### Step 3

$$\begin{array}{r}
 986 \\
 - 42 \\
 \hline
 944
 \end{array}$$

Here, the hundreds column is used for the first time with a Column Method for subtraction. To isolate the new skill of coping with the hundreds column we retreat to questions where no borrowing is required.

Typically, children will spend little time at this step as there is virtually no new learning.

#### Step 4

$$\begin{array}{r} 8 \quad 12 \\ \cancel{9} \cancel{3} 1 \\ - \quad 82 \\ \hline 849 \end{array}$$

Here the pupil is again faced with questions where they can not simply 'go down the columns', as they come across situations where 'borrowing' is required. There is a mini-line of progression at this step:

- We begin with a 3 digit number on the top, where just the units digit in the bottom number is larger than the units digit in the top number. This is identical to [Step 2](#), except with a hundreds digit to simply drop into the answer.
- Once comfortable with the above step, progress to questions where just the tens digit in the bottom number is larger than the tens digit in the top number. The new skill for the child to master here is to reduce the hundreds digit on the top number by 1 (by crossing through the original hundreds digit and writing a new hundreds digit reduced by 1, and then writing a mini 1 next to the tens digit thereby creating a 2 digit number within the tens column). This is done so that we can now go down the tens column and subtract the bottom digit successfully!
- Finally children progress to questions where *both* the units digit *and* the tens digit of the top number require borrowing in order for the bottom digit to be successfully subtracted. It is worth highlighting here that the 'borrowed 1' from the hundreds column is written next to the new digit in the tens column, rather than the crossed out original digit (see example shown).

Again, it is worth being explicit with the pupils regarding the key skill of reducing the next digit along (i.e. to the left) by 1 (always 1) as 'a way into' the question.

Bearing in mind the 'borrowed 1s' are actually either hundreds or tens and not ones at all, we can see that the high-understanding conversation with pupils soon becomes convoluted and confusing. However, once the skill of 'borrowing' is mastered, it is mastered for life. This mastery leaves the learner equipped to succeed with a written

method for subtracting all manner of numbers. This is why progression up the remainder of this progress drive can now be a rapid journey.

## Step 5

$$\begin{array}{r} 8 \quad 17 \quad 1 \\ \cancel{9} \cancel{8} 5 \\ - 596 \\ \hline 389 \end{array}$$

Here we use the hundreds column for both numbers for the first time. To begin with, we can retreat to questions where no borrowing is required.

Where children can actually see the question and if no borrowing is required, then it is also productive to expect children to solve it mentally by going down the columns. This is also true for many of the next steps where the same conditions apply. This is not in contradiction to the progression of Mental-Methods we are continuing with in CLIC because this method will not equip us for success where borrowing is required.

If children have the ability to just say the answer without needing to write it down, then it is common sense to acknowledge that.

It is also useful to extend this step into the subtraction of amounts involving money (e.g. £6.45 - £3.13) and then other measures. Then, place these questions into real life scenarios (Outer Numeracy).

Increase the challenge of this step by progressing through the same mini-steps detailed at [Step 4](#).

Just to recap, these are:

Increasing the amount of 'borrowing' required.

Increasing the number of digits in the number being subtracted.

Moving into the context of measures by 'swapping the thing' (the constant use of '[Swapping the Units](#)').

Moving the context into real life scenarios (Outer Numeracy).

Challenging children to solve mentally if no 'borrowing' is required.

Giving children questions that are already set up in columns, and then questions where they need to set up the question themselves.

## Step 6

$$\begin{array}{r}
 \overset{4}{\cancel{5}}\overset{1}{6}\overset{7}{\cancel{8}}\overset{1}{6} \\
 - \quad \quad 749 \\
 \hline
 4937 \\
 \hline
 \end{array}$$

There is very little new learning at this step, but it deserves recognition on its own because we introduce a 4d number for the first time with column subtraction. Initially, subtract a 2d number from it before progressing to a 3d number.

The same lines of progression within the step (see [Step 4](#) and [Step 5](#)) should be followed.

Just to recap, these are:

Increasing the amount of 'borrowing' required.

Increasing the number of digits in the number being subtracted.

Moving into the context of measures by 'swapping the thing' (the constant use of '[Swapping the Units](#)').

Moving the context into real life scenarios (Outer Numeracy).

Challenging children to solve mentally if no 'borrowing' is required.

Giving children questions that are already set up in columns, and then questions where they need to set up the question themselves.

## Step 7

$$\begin{array}{r}
 \overset{4}{\cancel{5}}\overset{1}{6}\overset{7}{\cancel{8}}\overset{1}{6} \\
 - \quad \quad 4749 \\
 \hline
 937 \\
 \hline
 \end{array}$$

Again, there is very little new learning here, we simply acknowledge the introduction of subtracting a 4d number for the first time. As before, the same lines of progression within this step (see [Step 4](#) and [Step 5](#)) should be followed.

Just to recap, these are:

Increasing the amount of 'borrowing' required.

Increasing the number of digits in the number being subtracted.





## Step 11

$$\begin{array}{r} 7 \quad 1 \quad 1 \quad 1 \\ \cancel{8}.6\cancel{2}5 \\ - 4.908 \\ \hline 3.717 \end{array}$$

There is little new challenge as we move into subtracting with 3 decimal places for the first time because children are already familiar with 'thousandths'.

The same mini-steps of progression apply – with a particular emphasis on relating to the subtraction of units of measure involving thousandths such as Kg and Km.

Just to recap, these are:

Increasing the amount of 'borrowing' required.

Increasing the number of digits in the number being subtracted.

Moving into the context of measures by 'swapping the thing' (the constant use of '[Swapping the Units](#)').

Moving the context into real life scenarios (Outer Numeracy).

Challenging children to solve mentally if no 'borrowing' is required.

Giving children questions that are already set up in columns, and then questions where they need to set up the question themselves.

## Step 12

$$\begin{array}{r} 7 \quad 1 \\ \cancel{8}.625 \\ - 4.8 \\ \hline 3.825 \end{array}$$

As with the [Equivalent Addition](#) step, it is useful to begin with questions where the numbers to be subtracted are already in the correct columns (e.g. a 1dp number being subtracted from a 2dp number).

This provides a visual image of the issue that there are different amounts of decimal places. Initially learners can be asked to write in a zero where there is no hundredths digit on the 1dp number. After a few questions like this, the need to write in the zero

will diminish and the child is left to understand that technically it is there. We can then take a line of progression building up and varying amounts of:

- decimal places (e.g. 1dp - 3dp),
- whole number digits (e.g. 2d.1dp - 1d.2dp)

An important line of progression here, is to provide questions where the numbers are not presented in columns and children are required to set up the question themselves. The emphasis is then placed on setting up the question by aligning the units digits in a straight line (or by using the decimal point as an anchor) and keeping the other respective digits in their correct columns also. Since this is a skill in itself, it is profitable to assess this 'setting up of the question' in isolation and reward success before asking the learner to go down the columns as before.

When solving questions where there are more decimal places in the bottom number than the top number, the pupil must remember to write a zero in the appropriate decimal column so that when 'borrowing' takes place there is a zero ready to turn into a '10' thus enabling the 'going down the column' subtraction to be successful.