

Park Hall Junior
Academy's
Mathematics
Calculation Policy

Parents' guide Year 3



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The purpose of this guide is to outline the various calculation methods for addition, subtraction, multiplication and division that children are taught as they progress through the school, many of which look different to the methods that you may have been taught in your primary school days. This guide will also explain to you how we teach each method therefore creating a level of consistency between home and school. Hopefully, this consistency will prevent confusion of the teaching of too many methods and will support your child's progression in Mathematics. The methods below are mainly used for written calculations (calculations that are too difficult to complete mentally). Your child will also be taught a range of mental strategies to consolidate their understanding of number facts and begin to develop ways of recording to support their thinking and calculation methods. As children progress through the school and are taught more formal written methods, they are still encouraged to think about mental strategies they could use first and only use written methods for those calculations they cannot solve in their heads.

When faced with a calculation problem, encourage your child to ask:

Can I do this in my head?

Could I do this in my head using drawings or jottings to help me?

Do I need to use a written method?

Should I use a calculator?

Also help your child to estimate and then check the answer. Encourage them to ask: Is the answer sensible?

We hope the explanations and examples of strategies will help you to assist your child at home.

Addition

Expanded column method without crossing the boundaries.

The Addition sign positioned on the left side on the bottom line of the addition.

$$348 + 121 = 469$$

At the end, children write the answer next to the calculation they have written out.

Children are to write the place value chart out every time using 1s, 10s, 100s, 1000s, 10000s etc.

	100s	10s	1s		100s	10s	1s
	3	4	8		4	6	9
+	1	0	0		2	0	1
	4	0	0		6	0	9

Miss a line as this will be needed when children move on to crossing the boundaries.

$$400 + 60 + 9 = 469$$

Finally, children write the place value addition along with the answer.

Expanded column method with crossing the 10s boundary.

The Addition sign positioned on the left side on the bottom line of the addition.

$$348 + 123 = 471$$

At the end, children write the answer next to the calculation they have written out.

Children are to write the place value chart out every time using 1s, 10s, 100s, 1000s, 10000s etc.

	100s	10s	1s		100s	10s	1s
	3	4	8		4	7	1
+	1	0	0		2	0	3
	4	0	0		7	0	1

Miss a line!

Add the 1s. Children are to recognise that there is a '10' in the 1s column. Children are to cross it out and move it across into the next column placed on the line they missed out. Add the 10s and the 100s.

$$400 + 70 + 1 = 471$$

Finally, children write the place value addition along with the answer.

Expanded column method with crossing the 100s boundary.

The addition sign positioned on the left side on the bottom line of the addition.

$$348 + 181 = 529$$

At the end, children write the answer next to the calculation they have written out.

Children are to write the place value chart out every time using 1s, 10s, 100s, 1000s, 10000s etc.

	100s	10s	1s
348	3	4	8
181	1	8	1
+	1	0	0
	1	0	0
	5	2	9

Miss a line!

Add the 1s then add the 10s. Children are to recognise that there is a '100' in the 10s column. Children are to cross it out and move it across into the next column placed on the line they missed out. Add the 100s.

$$500 + 20 + 9 = 529$$

Finally, children write the place value addition along with the answer.

Compact Column addition. No crossing of boundaries.

$$346 + 221 = 567$$

Children write the answer at the end next to the calculation they have written out.

Children write the addition they are solving before they present it in a column.

$$\begin{array}{r} 346 \\ + 221 \\ \hline \end{array}$$

Miss a line as this will be needed when children move on to crossing the boundaries.

$$\begin{array}{r} 567 \\ \hline \end{array}$$

The addition sign positioned on the left side on the bottom line of the addition.

Children add the 1s and write the answer in the 1s column underneath the line. Repeat for the 10s and 100s etc. Remind children that when they are adding the 10s and 100s that it is how many lots of 10s and 100s.

Compact Column addition. Crossing of boundaries.

$$346 + 278 = 624$$

Children write the answer at the end next to the calculation they have written out.

Children write the addition they are solving before they present it in a column.

$$\begin{array}{r} 346 \\ + 278 \\ \hline \end{array}$$

Miss a line.

$$\begin{array}{r} 11 \\ \hline 624 \\ \hline \end{array}$$

The addition sign positioned on the left side on the bottom line of the addition.

Children add the 1s and get the answer '14'. They recognise that there is a '10' in the 1s column. They partition the number (10 & 4). They place the 4 in the correct column underneath the line and **carry** the '10' into the 10s column placing it on the line they missed out. Remind children that they only write '1' and not '10' as we have 1 lot of 10.

Children add the 10s and get the answer '12'. Remind children that this is actually 12 lots of 10 which is also the same as 120. The children place the '20' or '2 lots of 10' in the 10s column underneath the line and **carry** the '100' or '10 lots of 10' to the 100s columns placing it on the line they missed out.

Compact Column addition with two or more 3-digit numbers or towers of 2-digit numbers.
No crossing of boundaries.

$$342 + 221 + 413 = 976$$

Children write the addition they are solving before they present it in a column.

Children write the answer at the end next to the calculation they have written out.

The addition sign positioned on the left side on the bottom line of the addition.

Miss a line as this will be needed when children move on to crossing the boundaries.

$$\begin{array}{r} 342 \\ 221 \\ + 413 \\ \hline 976 \end{array}$$

Children add the 1s and write the answer in the 1s column underneath the line. Repeat for the 10s and 100s etc. Remind children that when they are adding the 10s and 100s that it is how many lots of 10s and 100s.

Compact Column addition with two or more 3-digit numbers or towers of 2-digit numbers.
Crossing the 10s boundary.

$$347 + 226 + 415 = 988$$

Children write the addition they are solving before they present it in a column.

Children write the answer at the end next to the calculation they have written out.

The addition sign positioned on the left side on the bottom line of the addition.

Miss a line!

$$\begin{array}{r} 347 \\ 226 \\ + 415 \\ \hline 988 \end{array}$$

Children add the 1s and find the answer is '18'. They partition the answer into 10s and 1s '10 and 8'. They put the 1s number under the line in the 1s column, **carry** the 10s into the 10s column placing it on the line they missed out. Remind children that we are only putting '1' as it is '1 lot of 10'.

Recognise like fractions that add to 1.

$$\frac{3}{8} + \frac{7}{8} = \frac{8}{8}$$

When writing a whole, children are to use 2 squares.

Leave a space between the fraction and the addition as this will help when they progress onto adding fractions with related or unlike fractions.

The numerator is positioned in the square above the denominator. Then a line is to be drawn to separate them (vinculum).

Adding like fractions.

$$\frac{3}{8} + \frac{1}{8} + \frac{1}{8} = \frac{5}{8}$$

Leave a space between the fraction and the addition as this will help when they progress onto adding fractions with related or unlike fractions.

The numerator is positioned in the square above the denominator. Then a line is to be drawn to separate them (vinculum).

Subtraction

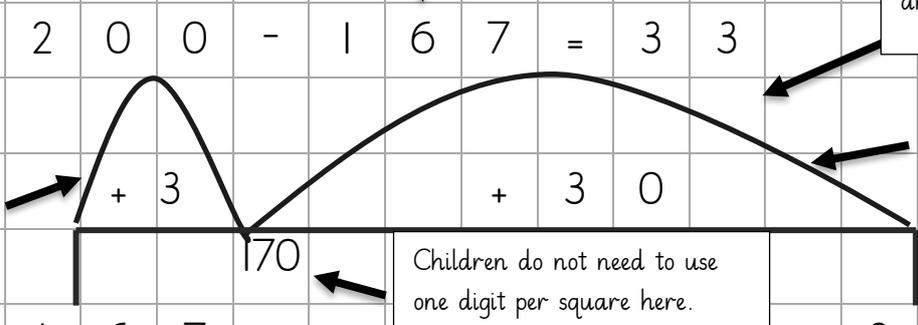
Counting up on a number line. Subtracting 3-digits from 3-digits.

At the end, children write the answer next to the calculation they have written out.

Write out the question. One digit per square.

Children are to leave two lines between the question and the number line.

The first jump only needs to be two squares. The next jump can go to the end.



The jumps should use the two lines that were left so they can write in the jumps.

Children do not need to use one digit per square here.

Children are to write the number they are counting from at the beginning of the number line.

The first 'jump' always moves to the nearest multiple of 10. The next 'jump' moves to the end number.

Children are to write the number they are counting up to at the end of the number line.

30 + 3 = 33

Children add up the jumps starting with the 10s.

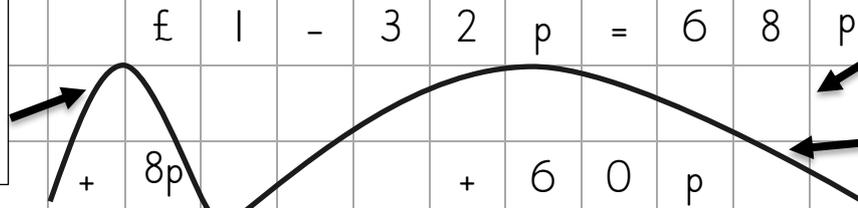
Counting up on a number line. Finding change from £1

Write out the question. One digit per square.

At the end, children write the answer next to the calculation they have written out.

Children are to leave two lines between the question and the number line.

The first jump only needs to be two squares. The next jump can go to the end.



The jumps should use the two lines that were left so they can write in the jumps.

Children are to write the number they are counting from at the beginning of the number line.

Children do not need to use one digit per square here.

The first 'jump' always moves to the nearest multiple of 10.
The next 'jump' moves to the £1.

£ 1
1 0 0 p

Children are to write the number they are counting up to at the end of the number line.

6 0 p + 8 p = 6 8 p

Children add up the jumps starting with the 10s.

They may also want to write 100p underneath £1 to remind them that they are counting up to 100 and not 1. (Place value of money misconception - remind children £1 = 100p).

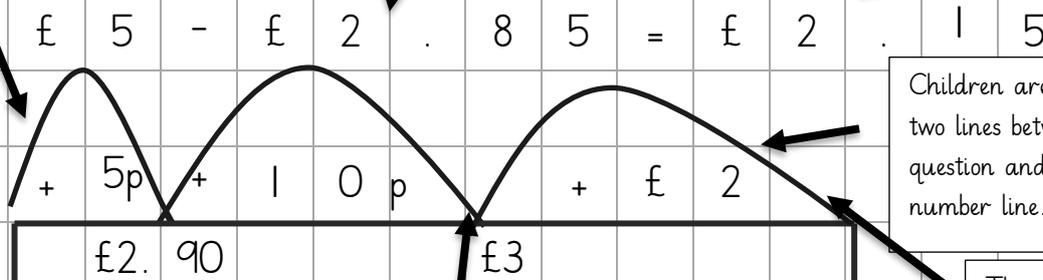
Counting up on a number line. Finding change from £5

The first jump only needs to be two squares.

Write out the question. One digit per

At the end, children write the answer next to the calculation they have written out.

Children are to write the number they are counting from at the beginning of the number line.



Children are to leave two lines between the question and the number line.

£ 2 . 8 5 £ 2 . 9 0 £ 3 £ 5

Children do not need to use one digit per square here but should put the pound sign, the ls and decimal point together in one square and the pence in the next square.

The first 'jump' always moves to the nearest multiple of 10.
The next 'jump' moves to the nearest £1.
The final 'jump' moves to the £1 total at the end.

Children are to write the number they are counting up to at the end of the number line.

The jumps should use the two lines that were left so they can write in the jumps.

£ 2 + 1 0 p + 5 p = £ 2 . 1 5

Children add up the jumps starting with the £ls.

NB Finding change for £10 is similar apart from the end number.

Along with finding change from £20 as long as the amount being taken away is over £10.

Similar to finding change from £50 as long as the amount being taken away is over £40.

Expanded column subtraction without exchanging.

The subtraction sign positioned on the left side on the bottom line of the subtraction.

$$\begin{array}{r}
 726 \\
 - 312 \\
 \hline
 414
 \end{array}$$

100s 10s 1s

$$\begin{array}{r}
 700 \\
 - 300 \\
 \hline
 400
 \end{array}$$

$$\begin{array}{r}
 20 \\
 - 10 \\
 \hline
 10
 \end{array}$$

$$\begin{array}{r}
 6 \\
 - 2 \\
 \hline
 4
 \end{array}$$

$$400 + 10 + 4 = 414$$

At the end, children write the answer next to the calculation they have written out.

Children are to write the place value chart out every time using 1s, 10s, 100s, 1000s, 10000s etc.

Miss a line as this will be needed when children move on to exchanging.

Finally, children write the place value addition along with the answer starting with the 100s.

Expanded column subtraction with exchanging of the 10s.

Miss a line!

The subtraction sign positioned on the left side on the bottom line of the subtraction.

$$\begin{array}{r}
 726 \\
 - 318 \\
 \hline
 408
 \end{array}$$

100s 10s 1s

$$\begin{array}{r}
 700 \\
 - 300 \\
 \hline
 400
 \end{array}$$

$$\begin{array}{r}
 \cancel{20} \\
 10 \\
 16 \\
 - 18 \\
 \hline
 8
 \end{array}$$

$$400 + 0 + 8 = 408$$

At the end, children write the answer next to the calculation they have written out.

Children are to write the place value chart out every time using 1s, 10s, 100s, 1000s, 10000s etc.

The children need to recognise that they cannot subtract the 1s (the Commutative Law does not work for either subtraction or division). Children need to make the '6' larger by **exchanging**. We take (do not use the term 'borrowing') '10' from '20' and add it to the '6'.

Children cross out the '20' and write the new number above it. They add the '10' to the 1s column.

Finally, children write the place value addition along with the answer starting with the 100s.

Expanded column subtraction with exchanging of the 100s.

At the end, children write the answer next to the calculation they have written out.

$$726 - 352 = 374$$

Children are to write the place value chart out every time using 1s, 10s, 100s, 1000s, 10000s etc.

Miss a line!

$$100s \quad 10s \quad 1s$$

$$\begin{array}{r}
 600 \\
 - 700 \\
 \hline
 300 \\
 300 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 120 \\
 50 \\
 \hline
 170 \\
 70 \\
 \hline
 \end{array}
 \quad
 \begin{array}{r}
 6 \\
 2 \\
 \hline
 4
 \end{array}$$

Subtract the 1s. Children need to recognise that they cannot subtract the 10s (the Commutative Law does not work for either subtraction or division). Children need to make the '20' larger by **exchanging** (do not use the term 'borrowing'). We take '100' from '700' and add it to the '20'.

The subtraction sign positioned on the left side on the bottom line of the subtraction.

Children cross out the '700' and write the new number above it. They add the '100' to the 10s column.

$$400 + 70 + 4 = 374$$

Finally, children write the place value addition along with the answer starting with the 100s.

Recognise complements of any fraction to 1

$$1 - \frac{1}{4} = \frac{3}{4}$$

When writing a whole, children are to use 2 squares.

Leave a space between the fraction and the subtraction as this will help when they progress onto adding fractions with related or unlike fractions.

The numerator is to be in the square above the denominator. Then a line is to be drawn to separate them.

Subtract like fractions

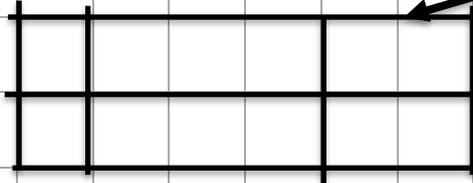
$$\frac{3}{8} - \frac{1}{8} = \frac{2}{8}$$

Leave a space between the fraction and the subtraction as this will help when they progress onto adding fractions with related or unlike fractions.

The numerator is to be in the square above the denominator. Then a line is to be drawn to separate them.

Multiplication

Grid method 2-digit x 1-digit numbers.



Children are to draw a grid.

2 rows down.

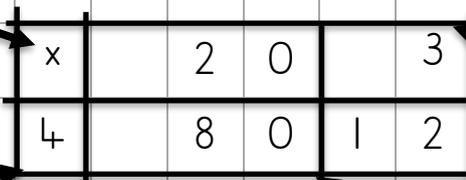
Column 1 – 1 square

Column 2 – 3 squares

The multiplication sign positioned in the top left corner of the grid.

$$23 \times 4 = 92$$

At the end, children write the answer next to the calculation they have written out.



Children need to place the numbers into the correct place value in the columns.

The 1-digit number goes underneath the multiplication sign.

$$80 + 12 = 92$$

The children need to partition the number into 10s and 1s. The 10s go into the column next to the multiplication sign.

The children then add the answers to the multiplications. They can use any method taught to add numbers do not use a new method if it hasn't been taught yet.

Children then need to multiply the 1-digit number by the partitioned number.

If children struggle with multiplying the 10s e.g. 20×4 . Remind them to solve 2×4 then make it 10 times bigger. **DO NOT tell them to add on a zero.**

Division

Finding unit-fractions of amounts.

The numerator is positioned in the square above the denominator. Then a line (vinculum) is to be drawn to separate them.

$$\frac{1}{8} \text{ of } 36 = 4$$

Leave a space between the fraction, the 'of', the whole number and the equals sign.

At the end, children write the answer next to the calculation they have written out.

Explain what the questions means/is asking them to do and try to put it into context- 'If I was sharing 36 sweets between 8 people, how many would 1 person get?'

The question needs to be adjusted so that the whole number is being divided by the denominator then multiplied by the numerator.

$$36 \div 8 = 4$$

$$4 \times 1 = 4$$

It is important that children complete this step as they will struggle to understand or forget to do this when finding non-unit fractions of amounts.

Finding non-unit-fractions of amounts.

The numerator is positioned in the square above the denominator. Then a line (vinculum) is to be drawn to separate them.

$$\frac{3}{4} \text{ of } 48 = 36$$

Leave a space between the fraction, the 'of', the whole number and the equals sign.

At the end, children write the answer next to the calculation they have written out.

Explain what the questions means/is asking them to do and try to put it into context- 'If I was sharing 48 sweets between 4 people, how many would 3 people get?'

The question needs to be adjusted so that the whole number is being divided by the denominator then multiplied by the numerator.

$$48 \div 4 = 12$$

$$12 \times 3 = 36$$