Park Hall Junior Academy's Mathematics Calculation Policy

Parents' guide Year 4

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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 with crossing the boundaries – larger numbers.

Expanded column method with crossing the 1000s boundaries.

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

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

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

3 4 8 + 8 2 1 = 1 1 6 9

	1000s	100s	10s	1s
		300	40	8
+		800	20	1
	1000			
	1000	1100	60	9

Miss a line!

Add the 1s, add the 10s and add the 100s. Children are to recognise that there is a '1000' in the 100s column. Children are to cross it out and move it across into the next column placed on the line they missed out. Add the 1000s.

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

1000 + 100 + 60 + 9 = 1169

Compact column method with crossing the boundaries – larger numbers.

5347 + 2286 + 1495 = 9128

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.

	5	3	4	7
	2	2	8	6
+	1	4	9	5
	1	2	1	
	9	1	2	8

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

Miss a line!

Children add the 1s and find the answer '18'. They partition the answer into 10s and 1s (10 and 8).

They put the 1s number under the line in the 1s column and **carry** the 10s into the 10s column placing it on the line they missed out. Remind children that they are just putting '1' and not '10' as '1' is '1 lot of 10' which is the same as '10'.

Then they add the 10s column and find the answer '22 10s' or '220' (remind children that this is the 10s column). They partition the answer into 100s and 10s (200 and 20). They put the 10s number under the line in the 10s column – remind children that they have '1 lot of 10' so they just write '1' and not '10'.

Then **carry** the 100s into the 100s column placing it on the line they missed out – again remind children that this is '2 lots of 100' so we just put a '2' not '200'.

Then they add the 100s column and find the answer '11 100's or '1100' (remind children that this is the 100s column).

They partition the answer into 1000s and 100s (1000 and 100). They put the 100s number under the line in the 100s column – remind children they have '1 lot of 100' so they write '1' and not '100'.

Then **carry** the 1000s into the 1000s column placing it on the line they missed out – again remind children that this is '1 lot of 1000' so we put '1' and not '1000'.

Then add the 1000s.

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 drawn to separate them (vinculum).

Subtraction

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

Write out the question. One digit per square.

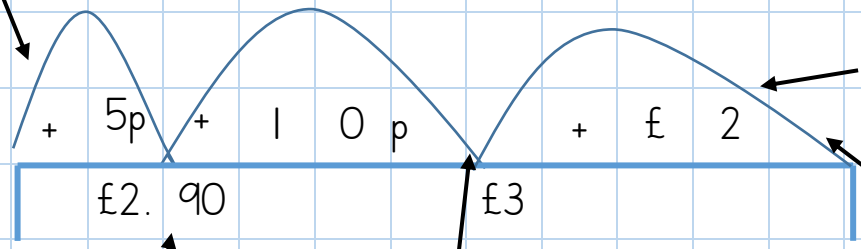
£ 5 - £ 2 . 8 5 = £ 2 . 1 5

The first jump only needs to be two squares.

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 £ 5

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 but should put the pound sign, the 1s 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.

£ 2 + 1 0 p + 5 p = £ 2 . 1 5

Children add up the jumps starting with the £1s.

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.

Counting up on a number line. Finding change from £20.

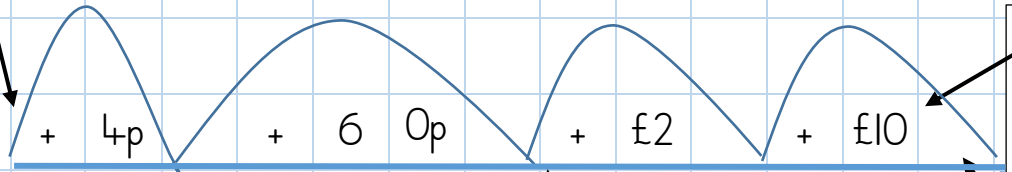
The first jump only needs to be two squares.

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

£ 2 0 - £ 7 . 3 6 = £ 1 2 . 6 4



+ 4p + 6 0p + £2 + £10

£7. 40 £8 £10

£ 7 . 3 6 £ 2 0

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

Children do not need to use one digit per square here but should put the pound sign, the 1s and decimal point together in one square and the pence in the next square.

The number the children have 'jumped to' should go at the end of the jump.

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

The next 'jump' moves to the nearest £1.

The next 'jump' moves to £10

The final 'jump' moves to £20

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 up to at the end of the number line.

£ 1 0 + £ 2 + 6 0 p + 4 p =

£ 1 2 . 6 4

Children add up the jumps starting with the £10s.

NB See finding change from £5 for any amount being taken away that is over £10.

Counting up on a number line. Finding change from £50.

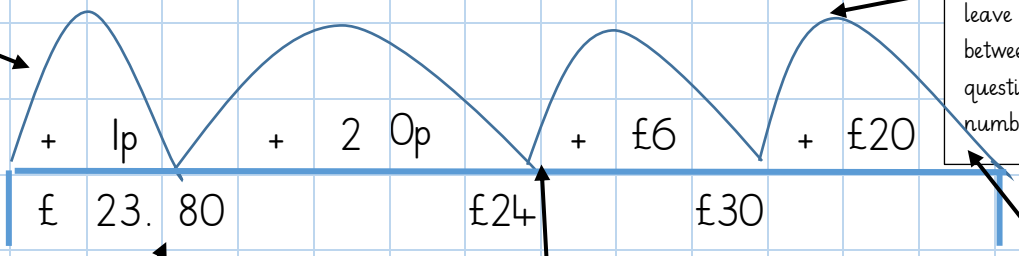
Write out the question. One digit per square.

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

£	5	0	-	£	2	3	.	7	9	=	£	2	6	.	2	1

The first jump only needs to be two squares.

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



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

£	2	3	.	7	9						£	5	0

Children do not need to use one digit per square here but should put the pound sign in one square, the 1s and 10s 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 next 'jump' moves to £10

The final 'jump' moves to £50

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 up to at the end of the number line.

£	2	0	+	£	6	+	2	0	p	+	1	p	=						
														£	2	6	.	2	1

Children add up the jumps starting with the £10s.

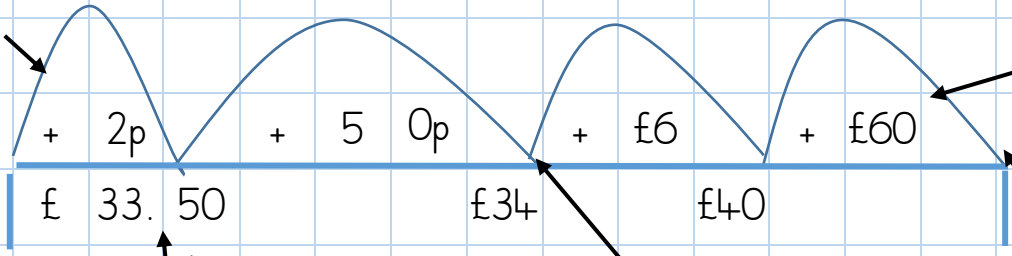
NB See finding change from £5 for any amount being taken away that is over £40.

Counting up on a number line. Finding change from £100

Write out the question. One digit per square.

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

£100 - £33.48 = £66.52



£33.48 £100

The first jump only needs to be two squares.

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

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 but should put the pound sign in one square, the 1s and 10s 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 next 'jump' moves to £10

The final 'jump' moves to £100

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 up to at the end of the number line.

£60 + £6 + 50p + 2p = £66.52

Children add up the jumps starting with the £10s.

NB See finding change from £5 for any amount being taken away that is over £90.

Expanded column subtraction without exchanging.

726 - 312 = 414

100s	10s	1s
700	20	6
- 300	10	2
400	10	4

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.

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

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.

726 - 318 = 408

100s	10s	1s
	10	
700	20	16
- 300	10	8
400	00	8

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.

Miss a line!

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'.

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

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.

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Compact column subtraction without exchanging.

7 2 6 - 3 1 2 = 4 1 4

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

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

Miss two lines between the question and the working out. This will be used when children move on to exchanging.

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

	7	2	6
-	3	1	2
	4	1	4

Children subtract 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 subtracting the 10s and 100s that it is how many lots of 10s and 100s.

Compact column subtraction with exchanging of the 10s.

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

7 2 6 - 3 1 8 = 4 0 8

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

Remind children that this stands for '1 ten' and '16 ones'

Miss two lines between the question and the working out.

		1	16
	7	~~2~~	~~6~~
-	3	1	8
	4	0	8

When exchanging, children are to cross out the previous number and write the new number above.

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

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** (do not use the term 'borrowing'. We take '10' from '2' (remind children this means 2 tens so the same as 20) and add it to the '6'.

Compact column subtraction with exchanging of the 100s.

7 2 6 - 3 5 2 = 3 7 4

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

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

Miss two lines between the question and the working out.

Remind children that this stands for '6 hundreds' and '12 tens'

When exchanging, children are to cross out the previous number and write the new number above.

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

The 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 '2' (remind children this means 2 tens so the same as 20) larger by **exchanging** (do not use the term 'borrowing'). We take '100' from '7' (remind children this means 7 hundreds so the same as 700) and add to the '2' or '20'.

Recognise complements of any fraction to 1

The denominator is kept the same and the numerators are subtracted from one another.

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

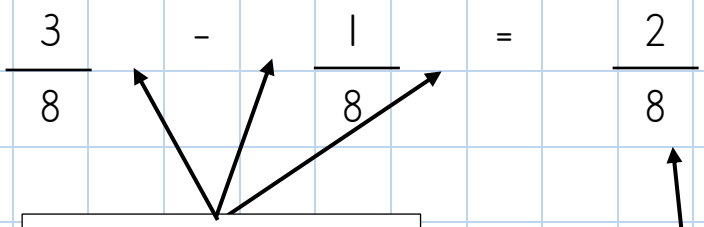
Children need to recognise that this is also the same as $\frac{4}{4}$

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

The denominator is kept the same and the numerators are subtracted from one another.



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 3-digit x 1-digit numbers.

Children are to draw a grid.

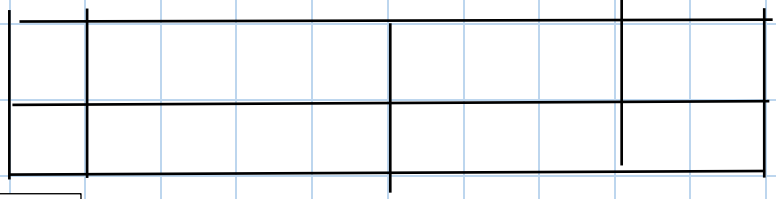
2 rows down.

Column 1 – 1 square

Column 2 – 4 squares

Column 3 – 3 squares

Column 4 – 2 squares



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

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

2 5 3 x 6 = 1 5 1 8

x		2	0	0		5	0		3
6	1	2	0	0	3	0	0	1	8

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

The 1-digit number goes underneath the multiplication sign.

The children need to partition the number into 100s, 10s and 1s. The 100s go into the column next to the multiplication sign then the 10s, then the 1s.

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

If children struggle with multiplying the 100s and 10s e.g. 200 x 6. Remind them to solve 2 x 6 then make it 100 times bigger. **DO NOT tell them to add on a zero,** 50 x 6. Remind them to solve 5 x 6 then make it 10 times bigger. **DO NOT tell them to add on a zero.**

1 2 0 0 + 3 0 0 + 1 8 = 1 5 1 8

The children then add the answers to the multiplications. The can use any method taught to add numbers.

Grid method 2-digit x 2-digit numbers.

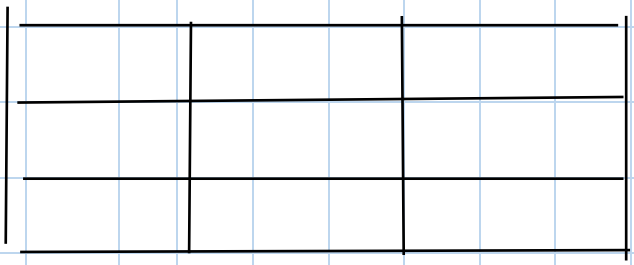
Children are to draw a grid.

3 rows down.

Column 1 – 2 squares

Column 2 – 3 squares

Column 3 – 3 squares



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

16 x 48 = 768

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

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

x		10		6	
40		400	240		640
8		80	48		128
					768

or

x		40		8	
10		400	80		480
6		240	48		288
					1
					768

The numbers can be put in any order. Remind them of the commutative law (for addition and multiplication the numbers can be in any order).

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

One of the 10s digit goes next to the multiplication sign the other goes underneath.

If children struggle with multiplying e.g. 40 x 6. Remind them to solve 4 x 6 then make it 10 times bigger. **DO NOT tell them to add on a zero.** Or 40 x 10. Remind them 4 x 1 then make it 100 times bigger. **DO NOT tell them to add on zeros.**

Ladder method 3-digit x 1-digit numbers.

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

2 5 3 x 6 = 1 5 1 8

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

1000s	100s	10s	1s
	2	5	3
x			6

Children are to write out the question then write the numbers in the ladder layout.

Make sure the numbers are lined up in the correct place value columns – children are to write the place value above each column.

Always write an extra place value column in case the answer requires it.

1	2	0	0	(6 x 200)
0	3	0	0	(6 x 50)
0	0	1	8	(6 x 3)
1	5	1	8	

Children must partition the top number and remember the value of each digit.

Start by multiplying the 100s first. Remember if children find this difficult remind them to solve '2 x 6' first then make it 100 times bigger. **DO NOT tell them to add on two zeros.**

Children are to write the answers in the correct place value columns.

Children are to write this in their books to help.

Children then add up the answers to the multiplication. Remind children to leave a line as they would do for column addition.

Children may want to add in zeros to help them when working out the

Miss a line!

Division

Written division method. Dividing 2-digit numbers by 1-digit numbers.

Explain there are two ways to say this division. 86 divided by 3 or how many lots of 3 go into 86?

8 6 ÷ 3 = 2 8 r 2

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

Children are to write out the question then write the numbers in the written division layout.

Remind children that division is the inverse of multiplication

Encourage children to always start with the 10th multiple unless the answer is less than this.

Some children may recognise that they can take more than one lot of 10 which they could also do.

		x	3	=	8	6
1	0	x	3	=	3	0
					5	6
1	0	x	3	=	3	0
					2	6
	5	x	3	=	1	5
					1	1
	3	x	3	=		9
						2

Children are to circle how many lots of '3' they have been subtracting to remind them they need to add these later on.

Remind children to place numbers in the correct place value so that they do not become confused when subtracting.

Children should recognise they can no longer take any more lots of '3' away and use this as a remainder.

1 0 + 1 0 + 5 + 3 = 2 8 r 2

They then need to add the lots of '3' they have been subtracting.

Written division method. Dividing 3-digit numbers by 1-digit numbers.

Explain there are two ways to say this division. 135 divided by 6 or how many lots of 6 go into 135?

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

1 3 5 ÷ 6 = 2 2 r 3

Children are to write out the question then write the numbers in the written division layout.

Remind children that division is the inverse of multiplication and we can multiplication to help us solve this.

Encourage children to always start with the 10th multiple unless the answer is less than this.

Some children may recognize that they can take more than one lot of 10 which they could also do.

	x	6	=	1	3	5
1 0	x	6	=		6	0
					7	5
1 0	x	6	=		6	0
					1	5
2	x	6	=		1	2
						3

Children are to circle how many lots of '3' they have been subtracting to remind them they need to add these later on.

Remind children to place numbers in the correct place value so that they do not become confused when subtracting.

Children should recognise they can no longer take any more lots of '3' away and use this as a remainder.

1 0 + 1 0 + 2 = 2 2 r 3

They then need to add the lots of '3' they have been subtracting.

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.

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

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 ÷ 8 = 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.

4 x 1 = 4

Finding non-unit-fractions of amounts.

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

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

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

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 ÷ 4 = 12

12 x 3 = 36