Park House English School
Calculation Policy Year 3 & 4

Park House
English School

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At Park House Primary School, we wish to teach calculation with understanding, and not just as a process that is to be remembered. This Calculation Policy clarifies progression in calculation with examples that are 'mathematically transparent', in other words the way the calculation works is clear and supports both the development of mathematical concepts and closely links it to the mental strategies that are taught alongside the written methods.

AIMS OF THE POLICY

• To ensure consistency and progression in our approach to calculation and enable a smooth transition between year groups and phases.

• To ensure that children develop an efficient, reliable, formal written method of calculation for all operations.

• To ensure that children can use these methods accurately with confidence and understanding.

• To ensure pupils understand important concepts and make connections within mathematics.

• To ensure pupils show high levels of fluency in performing written and mental calculations.

• To ensure that pupils are ready for the next stage of learning and have been given strong foundations in mental methods, the use of practical equipment, allowed to explore jottings in a range of forms and then to move onto more formal recording using a strong knowledge of place value, number lines labelled or blank, partitioning before eventually using compact written methods.

• To ensure that pupils are competent in fluency, reasoning and problem solving and can make informed and appropriate choices about the methods they wish to use (mental or written) to solve mathematical problems efficiently and effectively.

Introduction:

- The policy is set out in subjects, addition, subtraction, multiplication and division. Within each specific area there is a progression of skills, knowledge and layout for written methods. The calculation strategies which will be used will reflect this ideology – moving from concrete to pictorial and then abstract recording leading to more formal written methods. Mental methods and strategies will work in partnership with these methods.

- The basis of our maths calculation policy is that mental and written methods are integral to each other and should not be seen as taking separate paths but developed in conjunction with each other. It is envisaged that the development of mental skills will lead to jottings, (which support mental calculation) and then into more formalised jottings in the form of number lines and partitioning which in turn leads to expanded column methods and ultimately compact algorithms.
- It is important to always show the links between operations and not teach them in isolation or without showing, in practical problem-solving activities and across all mathematical topics, how these operations can be applied.
- It is important that staff always use correct mathematical language and encourage this from every pupil. This will take place in class discussions as well as through oral and written feedback, next steps and target setting.

Calculation Policy Years 3-4

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Mental Addition

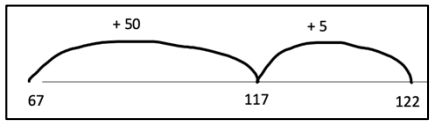
Year 3

Using Place Value:

- Count in hundreds 475+200 as 475, 575, 675
- Partitioning e.g. 68+74= 60+70 and 8+4

Counting on using number facts:

- Add two 2-digit numbers by adding the multiple of ten and then the ones e.g. 67+55



- Number bonds to 100, e.g. 35 + 65, 46+54, 73+27
- Add to the next ten and hundred, e.g. 176+4=180, 435+65=500

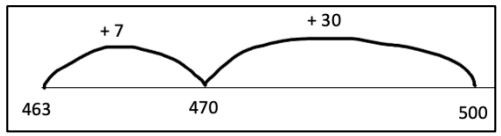
Year 4

Using Place Value:

- Count in thousands 1475+3000 as 1475, 2475, 3475, 4475
- Partitioning e.g. 343+234= 300+200, 40+30, 4+3 or 134+707 as 130+700 and 4+7

Counting on using number facts:

- Add two 2-digit numbers by adding the multiple of ten and then the ones e.g. 463+27



- Add to the next ten and hundred, e.g. 463+37, 1353+47
- Add decimals to the next whole number, e.g. 4.6+0.4

Written Addition

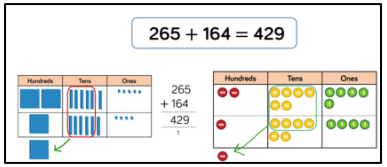
Year 3

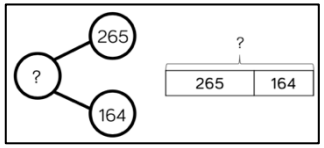
- Develop expanded column addition with two 3-digit numbers using partitioning.
- Expanded column method with 'carrying'
- Compact column addition with two or more 3-digit numbers or more than two 2-digit numbers.

300	40	6
+ 500	50	8
800	90	14

- Compact column addition with 3-dgit numbers and 4-digit numbers using effective manipulatives and pictorial representations e.g. base 10, place value counters, part- whole and bar modelling.

300	40	6
+ 500	50	8
900	0	4
100	10	





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

- Recognise fractions which add up to make 1 whole e.g. $\frac{1}{4}+\frac{3}{4}$ or $\frac{2}{5}+\frac{3}{5}$
- Add fractions with the same denominators e.g. $\frac{3}{5}+\frac{2}{5}=\frac{5}{5}$ or 1 whole

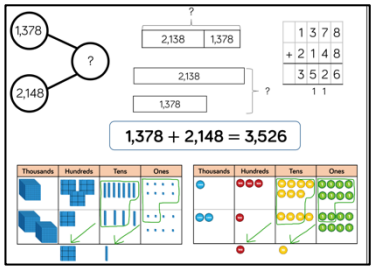
Year 4

- Build on expanded column addition to develop compact column addition with larger numbers.

1000	400	40	3
4000	800	50	6
+ 2000	100	80	5
8000	400	80	4
1000	100	10	

- Compact column addition with larger number up to 4 and 5- digit using effective manipulatives and pictorial representations e.g. base 10, place value counters, part- whole and bar modelling.

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



- Use expanded and compact column addition to add amounts of money.

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

- Add fractions with the same denominators e.g. $\frac{3}{5}+\frac{2}{5}=\frac{5}{5}$ or 1 whole

Calculation Policy Years 3-4

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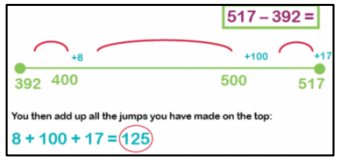
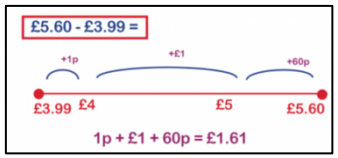
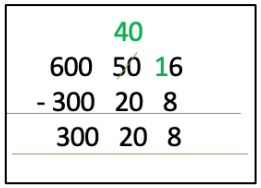
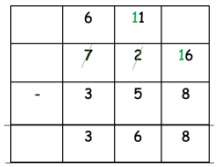
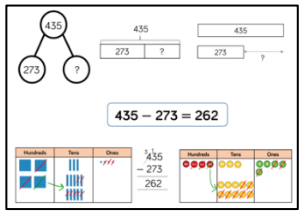
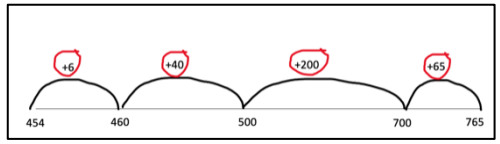
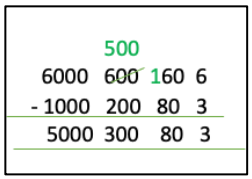
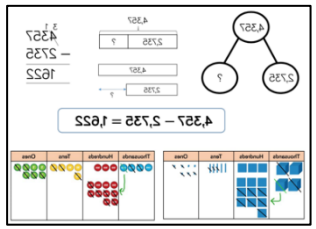
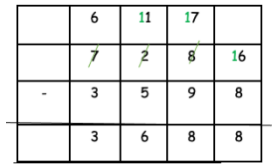
	Year 3	Year 4
Mental Subtraction	**Using Place Value** • Use place value to subtract, e.g. 348-300 or 348-40 or 348-8 • Take away multiples of 10,100 and £1, e.g. 476-40=436, 476-300=176, £4.76-£2=£2.76 • Using partitioning, e.g. 68-42 as 60-40 and 8-2 or £6.84-£2.40 as £6-£2 and 80p-40p and 4p -0p. • Counting back in hundreds, tens and then ones, e.g. 763-121 as 763-100 (663) then subtract 20 (643) then subtract 1 (642) • Subtract near multiples, e.g. 648-199 or 86-39 **Counting up:** (as shown below) • Finding the difference between two numbers by counting up from the smaller number to the larger number. **Using Number Facts:** • Knowing number bonds to 100, e.g. 100-35=65, 100-48=52 etc.	**Using Place Value** • Use place value to subtract e.g. 4748-4000 or 4748-8, etc • Take away multiples of 10,100, 1000, £1, 10p or 0.1, e.g. 8392-50 or 6723-3000 or £3.74-30p or 5.6-0.2. • Using partitioning, e.g. £5.87-£3.04 as £5-£3 and 7p-4p or 7493-2020 as 7000-2000 and 90-20 • Subtract near multiples, e.g. 3522-1999 or £34.86-£19.99 • Counting back in thousands, hundreds, tens and then ones, e.g. 6482-1301 as 6482-1000 then -300 then -1 (5181) **Counting up:** (as shown below) • Finding the difference between to numbers by counting up from the smaller number to the larger number. **Using Number Facts:** • Knowing number bonds to 10,100 and derived facts, e.g. 100-76=24 , 1.0-0.6=0.4 • Knowing number bonds to £1 and £10 , e.g. £1.00-86p=14p or £10-£3.40=£6.60 • Subtract fractions with the same denominator e.g. $\frac{4}{5} - \frac{2}{5} = \frac{2}{5}$
Written Subtraction	• Develop counting up for subtraction  • Use counting up subtraction to find change from £1 and £10   • Use expanded column subtraction with numbers up to 3 digits. • Use compact column subtraction with numbers up to 3 digits using effective manipulatives and pictorial representations e.g. base 10, place value counters, part-whole and bar modelling.   • Subtract fractions with the same denominator e.g. $\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$	• Develop counting up for subtraction.  • Use counting up to find change from £10, £20, £50 and £100   • Use expanded column subtraction with numbers up to 4-digits. • Use compact column subtraction with numbers up to 4 digits using effective manipulatives and pictorial representations e.g. base 10, place value counters, part- whole and bar modelling.   • Subtract fractions with the same denominator e.g. $\frac{8}{10} - \frac{5}{10} = \frac{3}{10}$

Calculation Policy Years 3-4

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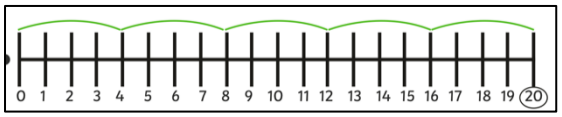
Mental Multiplication

Year 3

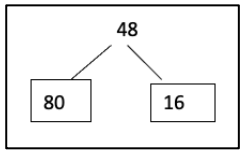
Counting in steps:

- Count in 2s, 3s, 4s, 5s, 8s, and 10s, e.g. colour in on a 100 grid or use hops on a landmarked line.



Doubling and halving:

- Find doubles up to double 50 using partitioning.
- Use doubling as a strategy in multiplying by 2 e.g. 18x2 is double 18 (36)



Grouping:

- Recognise that multiplication is commutative e.g. 4x8=8x4
- Multiply multiples of 10 by single digit numbers, e.g. 30x8=240
- Multiply smaller 2 -digit numbers by single digit numbers e.g. 13x4, 16x3 etc

Number facts:

- Know doubles to 20 e.g. double 45 is 90
- Know doubles of multiples of 5-100, e.g. double 85 is 170
- Know 2x, 3x, 4x,5x,8x,10x multiplication and division facts.

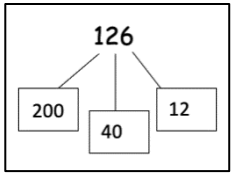
Year 4

Counting in steps:

- Count in 2s, 3s, 4s, 5s, 6s,7s, 8s, 9s, 10s, 11s, 12s, 25s, 50s,100s and 1000s

Doubling and halving:

- Find doubles to double 100 and beyond using partitioning
- Begin to double amounts of money e.g. £3.50 doubled is £7
- Use doubling as a strategy in multiplying by 2, 4 and 8, e.g. 34x4=double 34 (68) doubled again (136)



Grouping:

- Recognise that multiplication is commutative e.g. 4x8=8x4
- Use partitioning to multiply 2-digit numbers by single digit numbers.

e.g. 27x3= (20x3)+(7x3)
60+21
=81

- Multiply multiples of 100 by single digit numbers using tables facts e.g. 400 x8=3200

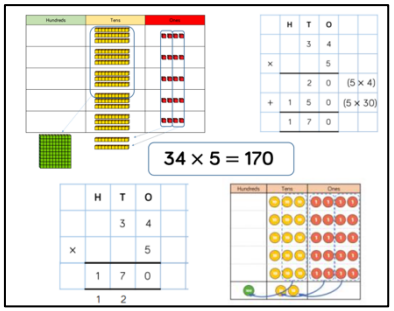
Number facts:

- Know all multiplication and division facts up to the 12x tables.

Written Multiplication

- Use partitioning to develop the grid method using manipulatives to support the understanding of formal written methods.

x	20	3	
4	80	12	=92



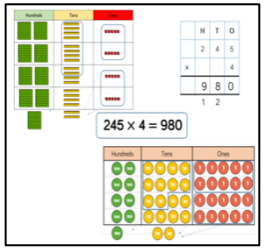
- Use grid multiplication to multiply 3-digit numbers by 1-digit numbers

x	200	50	3	
6	1200	300	18	=1518

x	40	6	
10	400	60	=460
8	320	48	=368

= 828

- Use the grid method to multiply 2-digit numbers by 2-digit numbers.
- Use vertical written algorithm to multiply 3-digit numbers by 1-digit numbers using manipulatives to support the understanding of formal written methods.



	2	5	3
X			6
1	5	1	8
	3	1	

Calculation Policy Years 3-4

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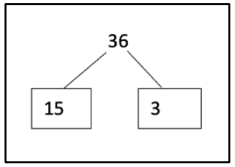
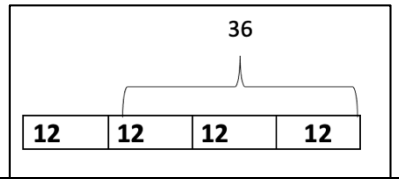
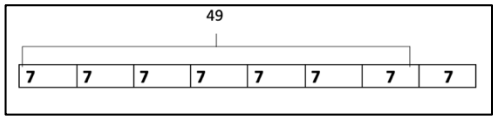
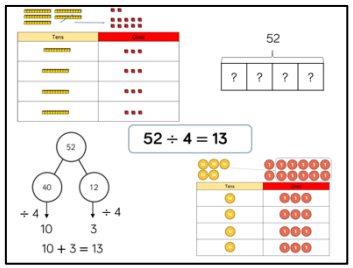
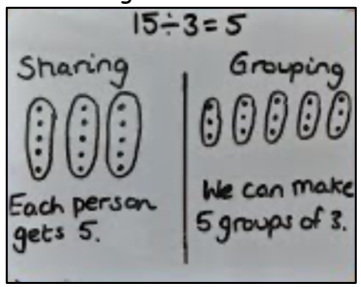
	Year 3	Year 4
Mental Division	**Counting in steps:** • Count in 2s,3s,4s,5s,8s and 10s by colouring numbers on a 1-100 grid or using a landmarked number line.  **Doubling and halving:** • Find half of even numbers to 100 using partitioning. • Use halving as a strategy in dividing by 2 e.g. 36÷2 is half of 36 **Grouping:** • Recognise that division is not commutative e.g. 16÷8 does not equal 8÷16 • Relate division to multiplications e.g. ☐ X 5= 30 is the same as calculation as 30÷5= ? Therefore, we can count in 5s to find the answer. • Divide multiples of 10 by single digit numbers using knowledge of division facts, e.g., 240÷8=30 **Using number facts:** • Know halves of multiples of 10-200 e.g. half of 170 is 85 • Know 2x,3x, 4x,5x,8x,10x division facts • Use division facts to find unit and simple non unit fractions of amounts within the times tables e.g. ¾ of 48 is 48÷4= 12 x3= 36 using bar modelling and pictorial representations to support. 	**Counting in steps:** • Count in 2s, 3s, 4s, 5s, 6s,7s,8,s, 9s, 10s, 11s, 12s, 25s, 50s, 100s, 1000s **Doubling and halving:** • Find halves of even numbers to 200 and beyond using partitioning. • Begin to half amounts of money e.g. £9 halved is £4.50 • Use halving as a strategy for dividing by 2, 4 and 8 e.g. 164÷4 is half of 164 (82) and half again (41) **Grouping:** • Divide multiples of 100 by single digit numbers using division facts, e.g. 3200÷8=400 • Divide numbers by 10,100 and 1000 to obtain decimal answers up to two decimal places e.g. 3.40÷10=3.4 • Recognise that division is not commutative e.g. 16÷8 does not equal 8÷16 • Relate division to multiplications e.g. ☐ X 5= 30 is the same as calculation as 30÷5= ? Therefore, we can count in 5s to find the answer. • Divide multiples of 10 by single digit numbers, e.g. 240÷8=30 **Using number facts:** • Know the times tables up to 12x12 and all related division facts • Use division facts to find unit and non-unit fractions of amounts withing the times tables e.g. $\frac{7}{8}$ of 56 is 56÷8= 7x7=49 using bar modelling as pictorial representations to support. 
Written Division	• Use grouping and sharing strategy for division using a range of manipulatives such as base 10, place value counters or pictorial representations such as part whole and bar modelling.  	• Use short division strategy for dividing 2,3, and 4-digit numbers by a single digit number including remainders.