

Park House English School Calculation Policy Year 5 & 6



Park House
English School

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.

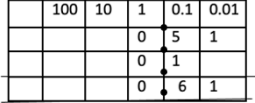
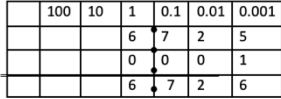
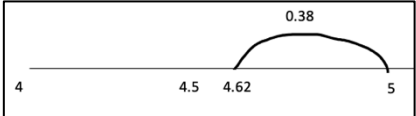
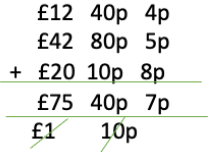
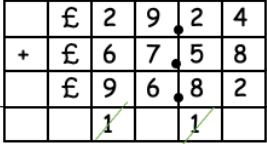
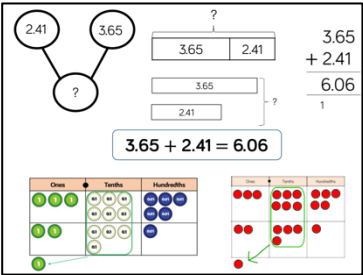
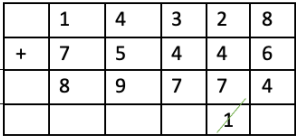
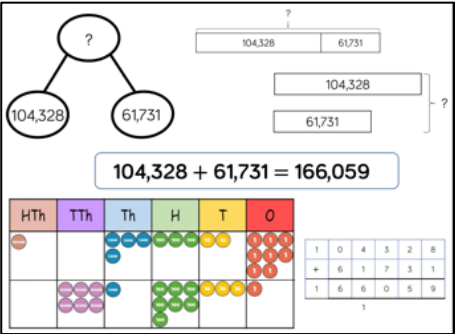
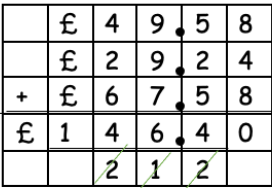
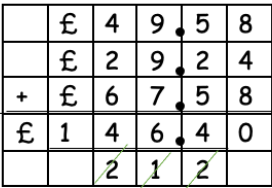
Introduction:

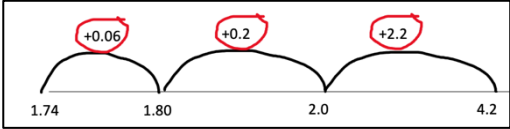
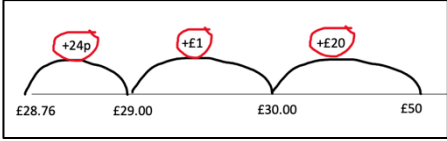
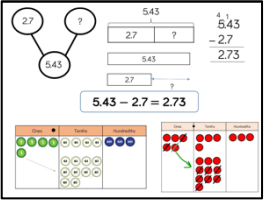

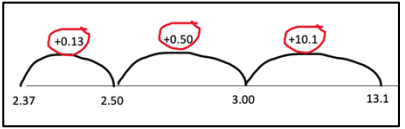
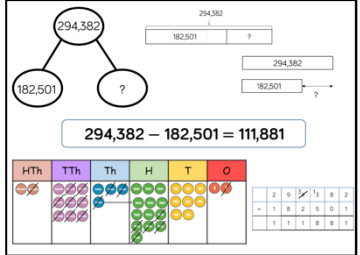
- The policy is set out in subjects, addition, subtraction, multiplication and division. Within each specific area there is a progression of skills, knowledge and layout for written methods. The calculation strategies which will be used will reflect this ideology - moving from concrete to pictorial and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

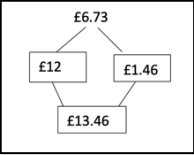
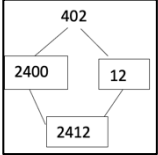
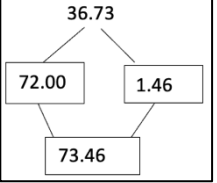
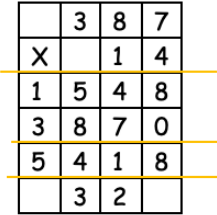
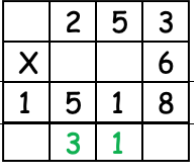
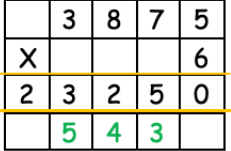
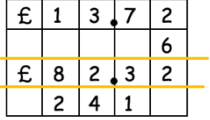
Calculation Policy Years 5-6

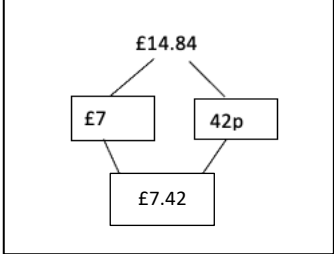
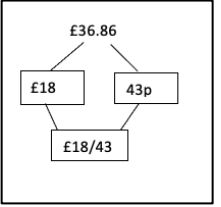
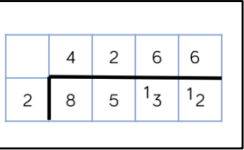
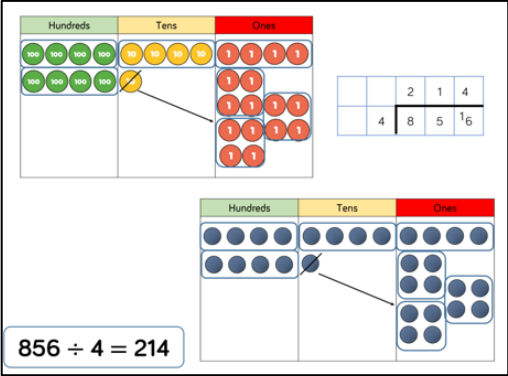
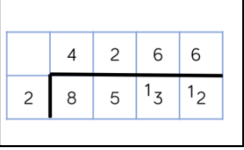
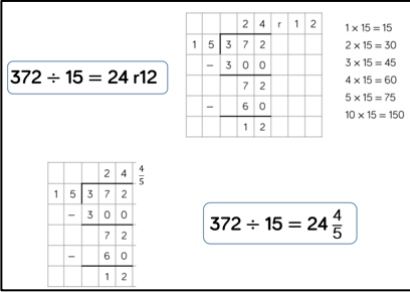
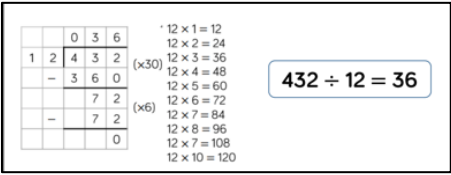


- The basis of our maths calculation policy is that mental and written methods are integral to each other and should not be seen as taking separate paths but developed in conjunction with each other. It is envisaged that the development of mental skills will lead to jottings, (which support mental calculation) 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.

	<u>Year 5</u>	<u>Year 6</u>
Mental Addition	<p><u>Using place value:</u></p> <ul style="list-style-type: none"> Count in 0.1 (tenths) and 0.01 (hundredths) e.g. knowing that 0.1 more than 0.51 is 0.61. Partitioning, e.g. $2.4 + 5.8$ as $0.4 + 0.8$ and $2+5$ and add the totals $7+1.2=8.2$  <p><u>Counting on using number facts</u></p> <ul style="list-style-type: none"> Add two decimal numbers by adding the ones then the tenths/hundredths e.g. $5.72 + 3.05$ as $5.72+3$ (8.72) then add 0.05 (8.77) Count on from large numbers e.g. $6834+3005$ as $9834 + 5$ Number bonds to 1 e.g. $0.4+0.6$ or $5.7+0.3$ Add to the next ten from a decimal number e.g. $7.8+2.2= 10$ 	<p><u>Using place value:</u></p> <ul style="list-style-type: none"> Count in 0.1 (tenths) and 0.01 (hundredths) and 0.001 (thousandths) e.g. knowing what 0.001 more than 6.725 is 6.726 Partitioning, e.g. $9.54+3.25$ as $9+3$ and $0.5+0.2$ and $0.04+0.05$ to get 12.79  <p><u>Counting on using number facts</u></p> <ul style="list-style-type: none"> Add two decimal numbers by adding the ones then the tenths and hundredths or thousandths e.g. $6.314+3.006$ as 6.314 add 3 (9.314) then add 0.006 (9.32) Count on from large numbers e.g. $16,375+12,003$ as $28,375+3$ Number bonds to 1 and to the next multiple of 1 e.g. $0.63+0.37$ or $2.355+0.645$ Add to the whole number, e.g. $4.62+0.38= 5$ 
Written Addition	<ul style="list-style-type: none"> Use expanded column addition for adding money leading to compact column addition of several amounts of money.   <ul style="list-style-type: none"> Use compact column addition to add decimal numbers up to two decimal places using manipulatives and pictorial representations such as place value counters, place value grids, part whole model and bar modelling.  	<ul style="list-style-type: none"> Use compact column addition for adding several large numbers and decimal numbers up to 2 decimal places using manipulatives and pictorial representations such as place value counters, place value grids, part whole model and bar modelling.   <ul style="list-style-type: none"> Use compact column addition for adding money.  <ul style="list-style-type: none"> Add fractions with unlike denominators e.g. $\frac{3}{4} + \frac{1}{3} = \frac{13}{12}$ or $1\frac{1}{12}$ and $2\frac{1}{4} + 1\frac{1}{3} = 3\frac{7}{12}$

	Year 5	Year 6																																																
Mental Subtraction	<p>Using Place Value</p> <ul style="list-style-type: none"> Use place value to subtract decimals e.g. $4.58 - 0.08$ or $6.26 - 0.2$ etc Take away multiples of powers of 10, e.g. $15,672 - 300$ or $4.82 - 2$ or $2.71 - 0.5$ or $4.68 - 0.02$ Partition or count back, e.g. $3964 - 1051$ or $5.72 - 2.01$ Subtract near multiples, e.g. $86,456 - 9999$ or $3.58 - 1.99$ <p>Counting up: (as shown below)</p> <ul style="list-style-type: none"> Finding the difference between two numbers by counting up from the smaller number to the larger number. Find change using counting up strategy e.g. $£10.00 - £6.89$ <p>Using Number Facts:</p> <ul style="list-style-type: none"> Knowing number bonds to £1, £10, £100, e.g. $£4.00 - £3.86 = 14p$ or $£100 - £66$ using $66 + 34 = £100$ 	<p>Using Place Value</p> <ul style="list-style-type: none"> Use place value to subtract decimal, e.g. $7.782 - 0.08$ or $16.263 - 0.2$, etc Take away multiples of powers of 10, e.g. $132,956 - 400$ or $686,109 - 40,000$ or $7.823 - 0.5$ Partition or count back, e.g. $3964 - 1051$ or $5.72 - 2.01$ Subtract near multiples, e.g. $360,078 - 99,998$ or $12.831 - 0.99$ <p>Counting up: (as shown below)</p> <ul style="list-style-type: none"> Count up to subtract numbers from multiples of 10, 100, 1000, 10,000. Finding the difference between two decimal numbers by counting up from the smaller to the larger decimal e.g. $1.2 - 0.87$. <p>Using Number Facts:</p> <ul style="list-style-type: none"> Knowing number bonds to £1, £10, £100, e.g. $£7.00 - £4.37$ or $£100 - £66.20$ using $20p + 80p = £1$ and $£67 + £33 = £100$ 																																																
Written Subtraction	<ul style="list-style-type: none"> Use counting up subtraction to subtract decimal numbers, e.g. $4.2 - 1.74$ Continue to use counting up subtraction for subtractions involving money including finding change or e.g. $£50 - £28.76$ Use compact column subtraction for numbers with up to 5 digits using effective manipulatives and pictorial representations e.g. base 10, place value counters, part-whole and bar modelling. Subtract fractions with like denominators e.g. $1\frac{1}{4} - \frac{3}{8}$ as $1\frac{2}{8} - \frac{3}{8}$ or $\frac{10}{8} - \frac{3}{8} = \frac{7}{8}$    <table border="1" data-bbox="707 1110 1010 1273"> <tr><td></td><td>0</td><td>15</td><td></td><td>1</td><td></td></tr> <tr><td></td><td>1</td><td>6</td><td>13</td><td>2</td><td>14</td></tr> <tr><td></td><td>-</td><td>8</td><td>5</td><td>1</td><td>6</td></tr> <tr><td></td><td></td><td>7</td><td>8</td><td>0</td><td>8</td></tr> </table>		0	15		1			1	6	13	2	14		-	8	5	1	6			7	8	0	8	<ul style="list-style-type: none"> Use counting up subtraction when dealing with money, e.g. $£100 - £78.56$ or $£45.23 - £27.57$ Use counting up subtraction when dealing with decimals e.g. $13.1 - 2.37 = 10.73$ Use compact column method to subtract large numbers using effective manipulatives and pictorial representations e.g. base 10, place value counters, part-whole and bar modelling. Subtract fractions with unlike denominators, e.g. $1\frac{1}{4} - \frac{2}{3}$ as $1\frac{3}{12} - \frac{8}{12}$ or $\frac{15}{12} - \frac{8}{12} = \frac{7}{12}$   <table border="1" data-bbox="1839 879 2107 1023"> <tr><td></td><td>2</td><td></td><td></td><td>7</td><td></td></tr> <tr><td></td><td>3</td><td>14</td><td>6</td><td>8</td><td>15</td></tr> <tr><td>-</td><td>1</td><td>6</td><td>4</td><td>5</td><td>8</td></tr> <tr><td></td><td>1</td><td>8</td><td>2</td><td>2</td><td>7</td></tr> </table> 		2			7			3	14	6	8	15	-	1	6	4	5	8		1	8	2	2	7
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	Year 5	Year 6																				
Mental Multiplication	<p>Doubling and halving:</p> <ul style="list-style-type: none"> Double amounts of money using partitioning e.g. £6.73 doubled is double £6 (£12) plus double 73p (£1.46) Use doubling and halving as a strategy for multiplying by 2,4, 8, 5 and 20 e.g. $58 \times 5 = \frac{1}{2}$ of 58 (29) $\times 10$ (290)  <p>Grouping:</p> <ul style="list-style-type: none"> Multiply decimals by 10,100, 1000 e.g. $3.4 \times 100 = 340$ Use partitioning to multiply simpler 2- digit and 3-digit numbers by single digit numbers e.g. 402×6 as 400×6 (2400) and 2×6 (12) Use partitioning to multiply decimal numbers by single digit numbers, e.g. 4.3×3 as $(4 \times 3) + (4 \times 0.5)$ Multiply using near multiples by rounding e.g. 32×29 as $(32 \times 30) - 32$  <p>Using number facts:</p> <ul style="list-style-type: none"> Use times tables facts up to 12×12 to multiply multiples of the multiplier, e.g. $4 \times 6 = 24$ so $40 \times 6 = 240$ and $400 \times 6 = 2400$ Know square numbers and cube numbers 	<p>Doubling and halving:</p> <ul style="list-style-type: none"> Double decimal numbers with up to two places using partitioning, e.g. 36.73 doubled is double 36 (72) plus double 0.73 (1.46) Use doubling and halving as strategies for mental multiplications.  <p>Grouping:</p> <ul style="list-style-type: none"> Use partitioning as a strategy for mental multiplication as appropriate e.g. 3060×4 as $(3000 \times 4) + (60 \times 4)$ or 8.4×8 as $8 \times 8 (64)$ and 0.4×8 Use factors in mental multiplication e.g. 421×6 as $421 \times 3 (1263)$ doubled is (2526) or 3.42×5 as half of (3.42×10) Multiply decimal numbers using near multiples by rounding e.g. 4.3×19 as 4.3×20 ($86 - 4.3$) <p>Using number facts:</p> <ul style="list-style-type: none"> Use times tables facts up to 12×12 for mental multiplication of large numbers or numbers with up to two decimal places e.g. $6 \times 4 = 24$ and $0.06 \times 4 = 0.24$ 																				
Written Multiplication	<ul style="list-style-type: none"> Use short multiplication for multiplying 2-digit, 3- digit and 4-digit numbers by a 1-digit number. Use long multiplication for multiplying 2-digit, 3- digit and 4-digit numbers by teen numbers. Use the grid method for multiplying numbers with up to two decimal places by single digit numbers.  <table border="1" data-bbox="168 1161 712 1273"> <tr> <td>X</td> <td>3</td> <td>0.2</td> <td>0.06</td> <td></td> </tr> <tr> <td>4</td> <td>12</td> <td>0.8</td> <td>0.24</td> <td>=13.04</td> </tr> </table>  <ul style="list-style-type: none"> Multiply fractions by single digit numbers e.g. $\frac{3}{4} \times 6 = \frac{18}{4}$ which is $4 \frac{2}{4} = 4 \frac{1}{2}$ 	X	3	0.2	0.06		4	12	0.8	0.24	=13.04	<ul style="list-style-type: none"> Use short multiplication for multiplying 2-digit, 3 -digit and 4-digit numbers by a 1- digit number. Use long multiplication for 2-digit, 3-digit, 4- digit numbers by 2-digit numbers. Use short multiplication for decimal numbers using $\times 100$ and $\div 100$, e.g. 13.72×6 as $1372 \times 6 \div 100$ Use short multiplication for money, e.g. $\pounds 13.72 \times 6$ Use the grid method for multiplying numbers with up to 2 decimal places by single digit numbers.  <table border="1" data-bbox="1115 1230 1525 1334"> <tr> <td>X</td> <td>5</td> <td>0.2</td> <td>0.05</td> <td></td> </tr> <tr> <td>4</td> <td>20</td> <td>0.8</td> <td>0.20</td> <td>=21</td> </tr> </table>  <ul style="list-style-type: none"> Multiplying proper and improper fractions, e.g. $\frac{3}{4} \times \frac{2}{3}$ 	X	5	0.2	0.05		4	20	0.8	0.20	=21
X	3	0.2	0.06																			
4	12	0.8	0.24	=13.04																		
X	5	0.2	0.05																			
4	20	0.8	0.20	=21																		

	Year 5	Year 6
Mental Division	<p>Doubling and halving:</p> <ul style="list-style-type: none"> Halve amounts of money using partitioning e.g. half of £14.84 as half of £14 and half of 84p Use doubling and halving as a strategy for dividing by 2, 4, 8, 5 and 20, e.g. $115 \div 5$ as double 115 $(230) \div 10$  <p>Grouping:</p> <ul style="list-style-type: none"> Divide numbers by 10, 100 and 1000 to obtain decimal answers up to three decimal places e.g. $3.40 \div 10 = 3.4$ Find unit and on unit fractions of large amounts, e.g. $\frac{3}{5}$ of 265 is $265 \div 5 = 53 \times 3 = 159$ <p>Using number facts:</p> <ul style="list-style-type: none"> Use division facts up to 12×12 to divide multiples of ten as a divisor, e.g. $3600 \div 9$ using $36 \div 9$ or $4500 \div 5$ using $45 \div 5$ and making the answer 100 times bigger. Know square numbers and cube numbers. 	<p>Doubling and halving:</p> <ul style="list-style-type: none"> Halve decimal numbers with up to 2 decimal places using partitioning, e.g. half of £36.86 as half of 36 (18) plus half of 0.86 (0.43) Use doubling and halving as strategies for mental division, e.g. $216 \div 4$ is half of 216 (108) and half of 108 (54)  <p>Number facts:</p> <ul style="list-style-type: none"> Use division facts from the times tables up to 12×12 to divide decimal numbers by single digit numbers e.g. $1.17 \div 3$ is $\frac{1}{100}$ of $117 \div 3$ (0.39)
Written Division	<ul style="list-style-type: none"> Use short division for dividing 3- and 4-digit numbers by single digit numbers.   <p>$856 \div 4 = 214$</p>	<ul style="list-style-type: none"> Use short division for dividing 3-digit numbers and 4-digit numbers by 1-digit numbers including remainders. Use long division for dividing 3-digit numbers and 4-digit numbers by two-digit numbers. Divide fractions by whole numbers e.g. $\frac{1}{4} \div 3 = \frac{1}{12}$   <p>$372 \div 15 = 24 \text{ r}12$</p>  <p>$432 \div 12 = 36$</p>