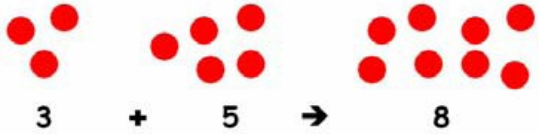
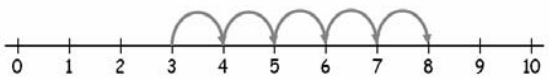
Barnes Junior School

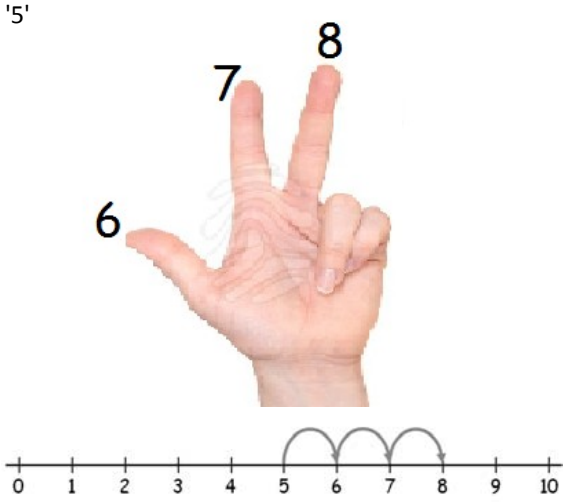
Proud to learn,
Proud to achieve

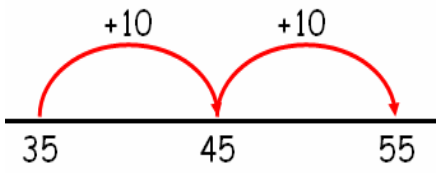
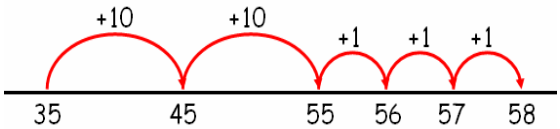
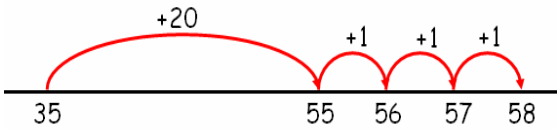
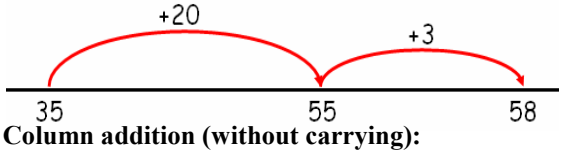
Barnes Junior School
Calculation Policy
An Overview for Parents

Addition

Addition Stage 1: Count all	Example of Written Method
Mental method: Count out the groups, then find the total by counting all the counters.	**3+5=8** 

Stage 2: Count on from the first number	Example of Written Method
Mental method: Verbally 'say' the first number, and then use fingers to count on. Demonstrate on a number line.	**3+5=8** **'3'**  

Stage 3: Count on from the larger number	Example of written method
Mental method: Children decide which number is the largest, verbally 'say' this number, and use fingers to count on. Demonstrate on a number line. **Written method:** Write the number sentence.	5+3 =8 '5'  **Include addition of 1 and 2 digit numbers to 20:** 9+9= 18 **Add three 1-digit numbers:** 5+3+4=12

Stage 4: Counting on using a number line	Example of written method
Mental method: Partitioning- adding the tens and ones separately. **Written method:** Steps in addition can be recorded on a number line. The steps often bridge through a multiple of 10. Number line helps record the steps on the way to calculating the total. Use straws to support column addition without carrying. Progress to use Dienes equipment to support column addition without carrying	35+20=55  35+23=58    **Column addition (without carrying):** 1 2 + 2 5 3 7

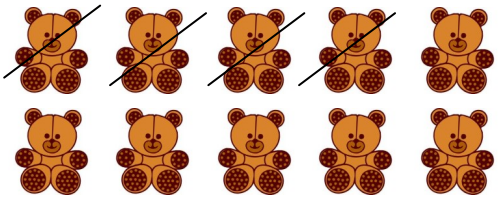
Stage 5: Partitioning leading to column addition	Example of written method
Mental Method: Step 1: Add the tens then the ones to form partial sums Step 2: Add the partial sums **Written method:** Record steps in addition using partitioning. Progress to column addition – use Dienes equipment initially.	18 + 15= 33 10+10 = 20 8 + 5= 13 20 + 13= 33 35 + 23=58 30 + 20= 50 5 + 3= 8 50 + 8= 58 **Column addition up to 3 digits:** $\begin{array}{r} 24 \\ +\ 15 \\ \hline 39 \end{array}$ $\begin{array}{r} 126 \\ +\ 33 \\ \hline 159 \end{array}$ $\begin{array}{r} 237 \\ +\ 516 \\ \hline 293 \end{array}$

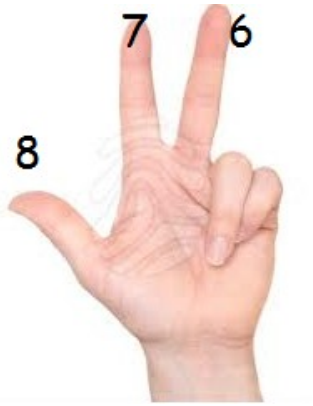
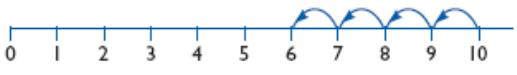
Stage 6: Column addition	Example of written method
Mental method: Step 1: Add the units Step 2: Add the tens Step 3: Add the hundreds Step 4: Add the thousands **Written method:** Extend column addition up to 4 digits.	**Column addition with up to 4 digits.** $\begin{array}{r} 2435 \\ +\ 3165 19 \\ \hline 6094 \end{array}$

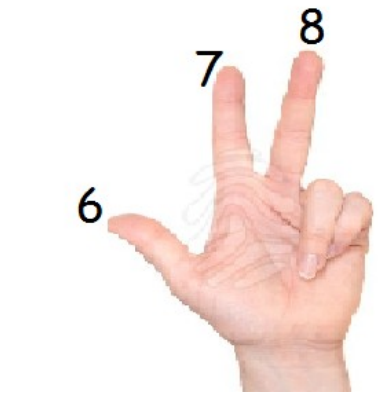
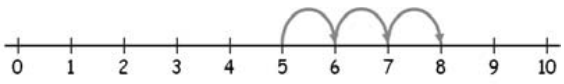
Stage 7: Extend column addition	Example of written method
Mental method: Children place numbers in columns, drawing on their understanding of place value. **Written method:** Column addition remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable. Carry digits are recorded on the line, using the words: 'carry ten' or 'carry one hundred', not 'carry one'. Continue to add numbers with up to 5 digits.	**Column addition with 5 digits:** 15362 + 23456 38818 **Column addition with decimals:** 56.3 + 2.6 58.9

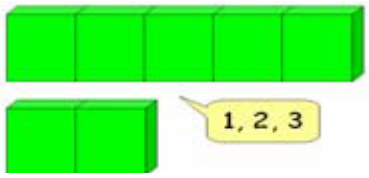
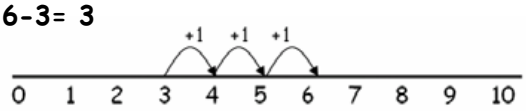
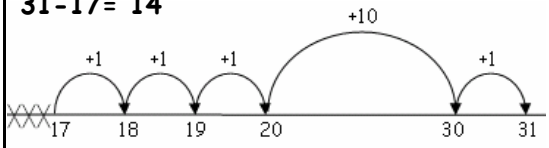
Stage 8: Continue to practise and apply skills	Example of written method
Mental method: Children should be able to perform mental calculations, including with mixed operations and large numbers. **Written method:** Column addition involving larger numbers and decimals.	**Use column addition effecient in problem solving contexts.** **Continue to practise column addition and extend to large numbers when appropriate:** 15362 + 23456 38818 **Column addition with decimals:** 56.3 + 2.6 58.9

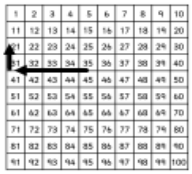
Subtraction

Subtraction Stage 1: Counting back (take away reduction)	Example of Written Method
Mental method: Count how objects need to be 'taken away', physically moving them or crossing out pictures. Count how many are left.	 13-5 = 8  **10 – 4 = 6**

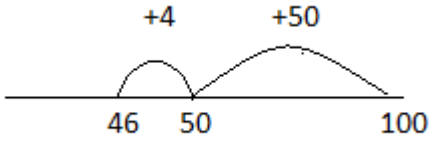
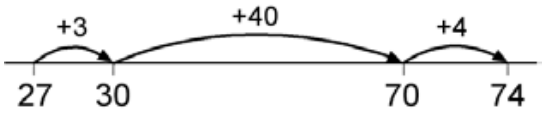
Subtraction Stage 2: Counting back using fingers	Example of Written Method
Mental method: Verbally 'say' the largest number, and then use fingers to count back. Demonstrate on a number line.	**9-3=6**  **10 – 4 = 6** 

Stage 3: Count on from the smaller number	Example of written method
Mental method: Children decide which number is the largest, verbally 'say' this number, and use fingers to count on. Demonstrate on a number line. **Written method:** Write the number sentence.	**8-5= 3** **'5'**  

Stage 4: Counting on to find the difference	Example of written method
Mental method: Step 1: Introduce using practical resources, verbally counting on 'How many more?' Step 2: Find the difference using a number line. Verbally say the smallest number and count on to the largest number. Step 3: Count up from the smallest number to the largest number. e.g. Start at 27 and count on to 31 **Written method:** Steps in subtraction can be recorded as 'jumps' on a number line. The steps often bridge through a multiple of 10.	**5-2= 3**  **6-3= 3**  **31-17= 14** 

Stage 5: Introducing column subtraction	Example of written method
Mental method: Reinforce place value by partitioning 2-digit numbers. Subtraction on a hundred square, again reinforcing place value. Introduce column subtraction, without borrowing. **Written method:** Record subtraction calculations initially in terms of partitioning, then introduce column subtraction.	**Partitioning a 2-digit number:** 10 + 5 =15 'One ten and five units make 15' **Subtraction on a hundred square:** 35-14 = 21  **Column subtraction (without borrowing):** **TU - U** **1 8** **- 6** **1 2** **TU - U** **4 8** **- 2 2** **2 6**

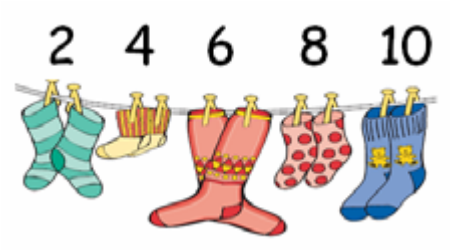
Stage 6: Recap partitioning and extend column subtraction	Example of written method
Mental method: Subtract the tens then the units. **Written method:** Record steps in subtraction using partitioning. Move to column subtraction with up to 3 digits, including borrowing.	**Subtraction by partitioning to reinforce place value:** 58 – 23 58 – 20 38 – 3 35 146 – 27 146 - 20 126 - 7 119 **Introduce column subtraction with up to 3- digits. Include some borrowing:** **TU - U** 4 1 5 ~~6~~ - 2 9 2 7 **HTU - TU** 3 1 1 ~~4~~ 6 - 3 7 1 0 9

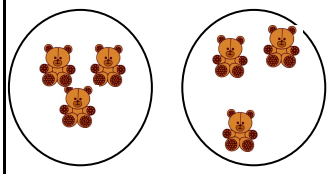
Stage 7: Counting on find a missing number	Example of written method
Mental method: Count up from the smallest number to the largest number. Reduce the number of jumps by combining steps. **Written method:** Show jumps on an empty number line. Write the number sentence.	100-46= 54  74-27= 47 

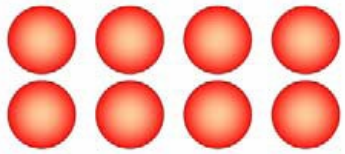
Stage 8: Column subtraction	Example of written method
Mental method: Children place numbers in columns, drawing on their understanding of place value. **Written method:** Column subtraction with up to 4 digits, including exchanging (a ten is exchanged for 10 units).	**Year 4 (Subtraction with up to 4-digits)** **ThHTU - HTU** 3 1 5 7 ~~4~~ 6 - 6 3 7 5 1 0 9

Stage 9: Extend column subtraction	Example of written method
Mental method: Children place numbers in columns, drawing on their understanding of place value. **Written method:** Compact subtraction remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable.	**Year 5 (Subtraction with up to 5 digits, including subtraction with decimals)** **HThThHTU - ThHTU** 6 1 4 1 ~~7~~ 2 6 ~~5~~ 4 - 5 6 2 7 6 7 0 2 7 4 1 ~~5~~.3 - 2.7 2.6

Multiplication

Multiplication Stage 1: Counting in equal steps of 2	Example of Written Method
Mental method: Children will begin to count in steps of 2s.	

Multiplication Stage 2: Repeated addition	Example of Written Method
Mental Method: Children will experience equal groups of objects and will begin counting in 2s, 3s, 4s, 5s and 10s. **Written method:** Children write the groups of repeated addition, as shown in the diagram. **Recognise and write the 'x' sign in mathematical statements. Calculate the answer with the teacher using concrete objects.**	 2 + 2 + 2 + 2 + 2 = 10 2 x 5 = 10 2 multiplied by 5 5 pairs  3 + 3 = 6 3 x 2 = 6 3 multiplied by 2

Multiplication Stage 3: Arrays	Example of written method
Mental Method: Following on from repeated addition, children use multiplication strategy of arrays. Count in equal steps, then relate to multiplication fact. Children may also count equal steps using their fingers. **Written method:** Draw the array, then write multiplication sentence. **Use the X and = signs to write mathematical statements.** **Ensure pupils recognise that multiplication can be done in any order.** **Times tables: 2, 5 and 10 up to x 12.**	 4 x 2 = 8 2 x 4 = 8 

Stage 4: Partitioning Multiplication of TU x U Example of Written Method	Example of written method
Mental method: Step 1: TU number is partitioned and multiplied by the U. Step 2: Totals are added together in column addition. **Written method:** Record steps in multiplication as shown in the diagram. **Times tables: 2, 3, 4, 5, 8,10 up to x 12.**	**37 x 4 =** **30 x 4 = 120** **7 x 4 = 28** **120 + 28 = 148**

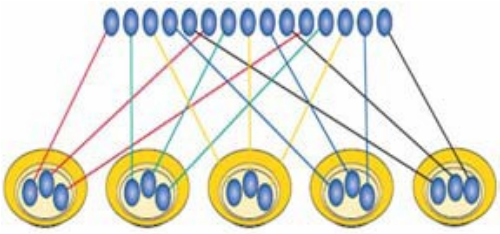
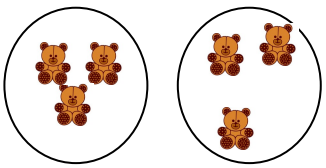
Stage 5: Short Multiplication	Example of written method
Mental method: Children place numbers in columns, drawing on their understanding of place value. **Written method:** Standard written method Multiplication of TU x U. Extend to HTU x U. **Times tables: Derive and recall all multiplication facts up to 12 x12.**	**38 x 7** 3 8 X 5 7 2 6 6 Extending to HTU x U.

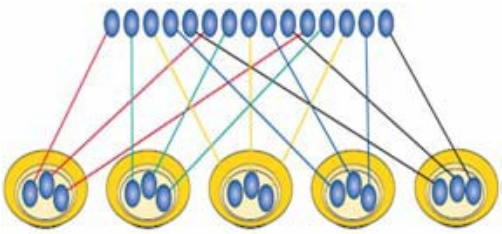
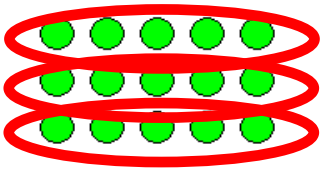
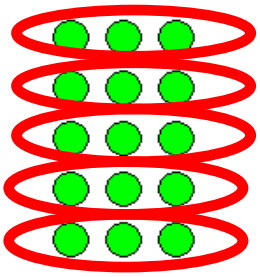
Stage 6: Long Multiplication	Example of written method
Mental method: Children place numbers in columns. Reinforce understanding of place value when multiplying by the ten. **Written method:** Record steps in multiplication as shown in the diagram. Multiplication of TU x TU Extend to HTU x TU **Times tables: Derive and recall all multiplication facts up to 12 x 12.**	**56 x 27** 56 × 27 is approximately 60 × 30 = 1800. 56 X 27 392 1120 1512 **286 x 29** 286 × 29 is approximately 300 × 30 = 9000 286 X 29 2574 5720 8294

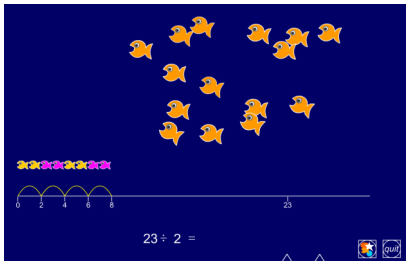
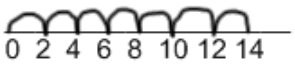
Stage 7: Extension and consolidation of long multiplication. Using and applying	Example of written method
Mental method: Children place numbers in columns. Reinforce understanding of place value when multiplying by the ten. **Written method:** Record steps in multiplication as shown in the diagram. Extend to ThHTU x TU **Times tables: Derive and recall all multiplication facts up to 12 x 12.**	**286 x 29** 286 × 29 is approximately 300 × 30 = 9000 286 X 29 2574 5720 8294 **Extend to ThHTU**

Division

Division Stage 1: Sharing practically	Example of Written Method
Mental method: Children will begin to talk about sharing, using practical resources.	Cut the pizza in half. How many pieces are there? 

Division Stage 2: Sharing into groups	Example of Written Method
Mental method: Children will begin to practically share objects into groups. Use words: '5 groups of 3' or '2 groups of 3' etc. Children will begin to recognise and write the ÷ symbol in mathematical statements, calculating the answer to word problems using practical objects and recording number sentence (with teacher support).	 15 marbles are shared out equally among 5 children. 15 ÷ 5 = 3 6 teddies shared into 2 hoops. 6 ÷ 2 = 3 

Division Stage 3: Using arrays	Example of Written Method
Mental method: Following on from practical sharing, children should now be familiar with the ÷ sign and will write mathematical statements, calculating the answer to word problems using practical objects and recording number sentences. Again use words: '5 groups of 3' or '2 groups of 3' etc. **Written method:** Draw the array, then write division sentence. Use the ÷ and = signs to write mathematical statements. Ensure pupils use inverse relations (e.g. 4 x 5 = 20 and 20 ÷ 5 = 4). **Times Tables: Recall of division facts for 2, 5 and 10 times tables**	15 marbles are shared out equally among 5 children. 15 ÷ 5 = 3  **Use of arrays: Sharing** The gardener planted 15 seeds in 3 equal rows. ***How many seeds in each row?*** 15 ÷ 3 = 5  **Use of arrays: Grouping** The gardener planted 15 seeds with 3 seeds in each row. ***How many rows of seeds are there?*** 15 ÷ 3 = 5 

Division Stage 4: Grouping on a number line	Example of Written Method
Mental Method: Recall multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables. **Written method:** Develop reliable written methods for division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the efficient written method of short division. **Times Tables: Recall of division facts for 2, 3, 4, 5, 8 and 10 times tables.**	 **14 ÷ 2 = 7** 

Division Stage 5: Short division	Example of Written Method
Mental Method: Continue to practise recalling multiplication facts and related division facts to aid fluency. **Written method:** Short division TU ÷ U as shown in the example. Extend to HTU ÷ U. **Times Tables: Recall of division facts all tables up to 12 x 12.**	**Extend to HTU ÷ U**

Division Stage 6: Long division	Example of Written Method
Mental Method: Continue to practise recalling multiplication facts and related division facts to aid fluency. **Written method:** Continue to practise short division as shown in example. TU ÷ U, HTU ÷ U, ThHTU ÷ U. **Times Tables: Recall of division facts all tables up to 12 x 12.**	**Extend to ThHTU ÷ U. Interpret remainders appropriately for the context.**

Division Stage 7: Long division Using and applying	Example of Written Method
Mental Method: Continue to practise recalling multiplication facts and related division facts to aid fluency. **Written method:** Long division HTU ÷ TU. Extend to ThHTU ÷ TU as shown in the example. **Times Tables: Recall of division facts all tables up to 12 x 12.**	023 r 24 37) 875 -74 135 -111 24 37 74 111 148 0 5 7 3 r 7 17) 9 7 4 8 −8 5 1 2 4 −1 1 9 5 8 −5 1 7 17 34 51 68 85 102 119 **Interpret remainders appropriately for the context.**