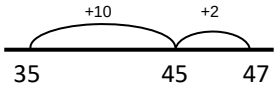
Calculations Policy

In this policy any reference to Halton School includes Halton Pre-School

Halton Community Combined School: Calculations policy

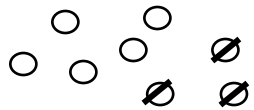
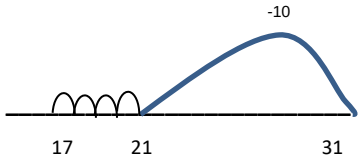
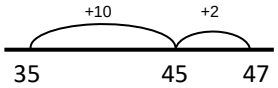
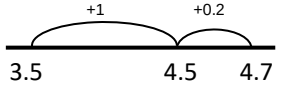
Children are introduced to the processes of calculation through practical, oral and mental activities. As they begin to understand the underlying ideas, they develop ways of **recording** to support their thinking and calculation methods, so that they develop both **conceptual understanding** and **fluency** in the fundamentals of mathematics. Whilst interpreting signs and symbols involved with calculation, orally in the first instance, children use models and images to support their mental and written methods of calculation. As children's mental methods are strengthened and refined they begin to work more efficiently, which will support them with using succinct written calculation strategies as they are developed.

Written methods for addition

	Modelled examples	Phase 1	Phase 2	Phase 3	Phase 4
Stage 1 **Adding by counting** Concrete phase leading to abstract		**Count all** using a variety of concrete resources including cubes, counters and Numicon.	**Count on** from one group to another using a variety of concrete resources (including fingers)	**Count on** putting the largest group or number first	
Stage 2 **Adding by counting on using a numbered number line** Concrete phase becoming more abstract	**7 + 4 = 11** 	**Count on** by finding a starting point on a number line remembering to put the biggest number first	**Count on** in steps of 1	**Count on** in bigger steps e.g. 10. 100	**Count on** in bigger steps and bridge through 10/100 etc
Stage 3 **Adding by counting on using an empty number line** Abstract phase	**35 + 12 = 47** 	**Count on** by using an empty number line putting on the numbers needed	**Count on** in the most efficient way	**Count on** using the fewest number of jumps	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first
Stage 4	**367 + 185 = 552**	**Arrange** and **organise** numbers correctly so that the biggest number in the	**Add each column** individually using the 'step	**Is my answer sensible?**	**Can this method be applied to decimals?**

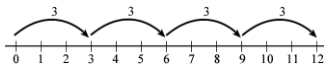
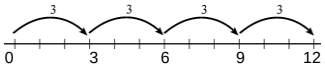
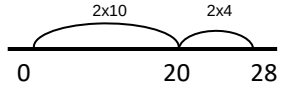
Adding by a vertical, expanded method **(column addition)** Abstract phase	367 + 185 12 140 400 552	calculation is first. Digits that represent hundreds are in the same column and the same for tens, units etc	by step' approach and **showing all totals** Start with the column of lowest value (far right hand side)	Be able to check whether answer is sensible by estimating first	**36.7 + 18.5 = 55.2** 36.7 + 18.5 1.2 14.0 40.0 55.2
Stage 5 **Adding by a vertical, compact (short 'carrying') method** **(column addition)** Abstract phase	**367 + 185 = 552** 367 + 185 552 1 1	**Add each column** individually using the 'step by step' approach and carrying over groups of tens and hundreds **showing only the 'carry' and the answer**	Can this method be applied to numbers with any number of digits? Can this method be used to add more than two numbers together?		

Written methods for subtraction

	Modelled examples	Phase 1	Phase 2	Phase 3	Phase 4
Stage 1 **Subtracting by taking away** Concrete phase leading to abstract	**8 – 3 = 5** 	**Count all** using a variety of concrete resources and taking some of the resources away. **Recounting** what is left over	**Use jottings** to start to record the number of objects at the beginning and how many were taken away		
Stage 2 **Subtracting by counting backwards using a numbered number line** Concrete phase becoming more abstract	**11 - 4 = 7** 	**Count backwards** by finding the starting point on a number line remembering to start on the first number in the number sentence	**Count backwards** in bigger steps e.g. 10.  **31 - 14 = 17**		
Stage 3 **Subtracting by counting on using a numbered number line** Abstract phase	**12 - 7 = 5** 	**Count on** by finding the starting point on a number line remembering to start on the smallest number in the number sentence	**Count on** in steps of 1	**Count on** in bigger steps e.g. 10. 100	**Count on** in bigger steps and bridge through 10/100 etc
Stage 4 **Subtracting by counting on using an empty number line** Abstract phase	**47 – 35 = 12** 	**Count on** by using an empty number line putting on the numbers needed	**Count on** in the most efficient way using the fewest number of jumps	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first	**Can this method be applied to decimals?** **4.7 – 3.5 = 1.2** 

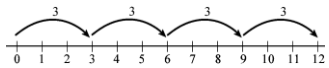
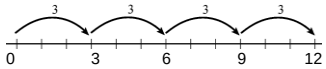
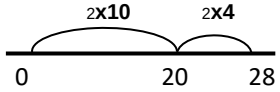
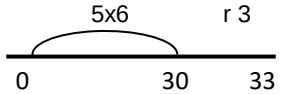
Stage 5 **Subtracting by a vertical column method** Abstract phase	**367 - 185 = 182** $\begin{array}{r} {}^{2}\not{3}\ {}^{1}6\ 7 \\ -\ 1\ 8\ 5 \\ \hline 1\ 8\ 2 \end{array}$	**Arrange** and **organise** numbers correctly so that the biggest number in the calculation is first. Digits that represent hundreds are in the same column and the same for tens, units etc	**Subtract each column** individually using the 'step by step' approach and **showing all totals** Start with the column of lowest value (far right-hand side) If the subtraction within a column cannot be done without resulting in a negative answer, 'borrow' from the adjacent column, adding 10 to the first number and then reducing the number 'borrowed' from by 1.	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first	**Can this method be applied to larger numbers and decimals?** **36.7 - 18.5 = 18.2** $\begin{array}{r} {}^{2}\not{3}\ {}^{1}6\ .7 \\ +\ 1\ 8\ .5 \\ \hline 1\ 8\ .2 \end{array}$

Written methods for multiplication

	Modelled examples	Phase 1	Phase 2	Phase 3	Phase 4
Stage 1 **Multiply by counting** Concrete phase leading to abstract		**Count in repeated groups of the same size** using a variety of concrete resources	**Count in repeated groups** using jottings to record the number of counts taken	Use **arrays** to make the link between repeated addition and multiplication e.g. 3 x 5 = 15 **.....** **.....** **.....**	
Stage 2 **Multiplying using a number line** Concrete phase becoming more abstract	**3 x 4 = 12** 	**Multiply** by using repeated addition on a numbered number line	**Count up** the number line using individual 'jumps'	**Multiply** by using repeated addition on a blank number line and labelling the numbers which are landed on. **e.g. 3 x 4 = 12** 	**Can I make this method more efficient** by partitioning the number and making bigger 'jumps'? **2 x 14 = 28** 
Stage 3 **Multiplying by a vertical, expanded method** **(short column multiplication)** Abstract phase	**38 x 4 = 152** 38 x 4 32 120 152	**Arrange** and **organise** numbers correctly so that the biggest number in the calculation is first. Digits that represent hundreds are in the same column and the same for tens, units etc	**Multiply each digit** individually using the 'step by step' approach and **showing all totals** Start with the column of lowest value (far right-hand side)	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first	**Can this method be applied to larger numbers and decimals?**
Stage 4 **Multiplying by a vertical, compact method** **(short column multiplication)** Abstract phase	**38 x 4 = 152** 38 x 4 152 3	**Multiply each digit** individually using the 'step by step' approach and carrying over groups of tens and hundreds **showing only the 'carry' and the answer**	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first	**Can this method be applied to larger numbers and decimals?**	

Stage 5 **Multiplying by a vertical, expanded method** **(long column multiplication)** Abstract phase	**38 x 14 = 532** 38 x 14 32 120 380 532	**Arrange** and **organise** numbers correctly so that the biggest number in the calculation is first. Digits that represent hundreds are in the same column and the same for tens, units etc	**Multiply each digit** individually using the 'step by step' approach and **showing all totals** Start with the column of lowest value (far right-hand side)	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first	**Can this method be applied to larger numbers and decimals?**
Stage 6 **Multiplying by a vertical, compact method** **(long column multiplication)** Abstract phase	**38 x 14 = 532** 38 x 14 152 3 380 532 1	**Multiply each digit** individually using the 'step by step' approach and carrying over groups of tens and hundreds **showing only the 'carry' and the answer**	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first	**Can this method be applied to larger numbers and decimals?**	

Written methods for division

	Modelled examples	Phase 1	Phase 2	Phase 3	Phase 4
Stage 1 **Sharing objects evenly** Concrete phase leading to abstract		**Share into groups of the same size** using a variety of concrete resources such as cubes, counters or other physical objects	**Share into groups of the same size** using simple jottings to record		
Stage 2 **Dividing using a number line** Concrete phase becoming more abstract	**Divide** by using individual 'jumps' on a numbered number line **12 ÷ 3 = 4** 	**Divide** by using individual jumps on a blank number line and labelling the numbers which are landed on. **e.g. 12 ÷ 3 = 4** 	**Can I make this method more efficient** by making bigger 'jumps'? **28 ÷ 2 = 14** 	**Can I use this method when the answer will have a remainder?** **33 ÷ 5 = 6 r3** 	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first
Stage 3 **Divide by using a formal written method** **'bus stop' method** **(short division)** Abstract phase	**112 ÷ 4 = 28** 2 8 4) 1 11 32	**Arrange** and **organise** numbers correctly so that the dividend (the number being divided) and the divisor (the number you are dividing by) are arranged as per the diagram	**Divide each digit of the dividend by the divisor** individually using the 'step by step' approach and **showing all totals** above the 'bus stop'. Any remainders to be added to the tens column of the next digit Start with the digit of highest value (far left-hand side)	**Can this method be applied to larger numbers and decimals?** **Is my answer sensible?** Be able to check whether answer is sensible by estimating first	**Can I use this method when the answer will have a remainder?** **115 ÷ 4 = 28 r3** 2 8 r 3 4) 1 11 35 Can I convert the remainder?
Stage 4 **Divide by using a formal written method** **'bus stop' method** **(long division)** Abstract phase	**648 ÷ 24 = 27** 2 7 24) 6 4 8 4 8 1 6 8 1 6 8 0	**Arrange** and **organise** numbers correctly so that the dividend (the number being divided) and the divisor (the number you are dividing by) are arranged as per the diagram	**Divide each digit of the dividend by the divisor** individually using the 'step by step' approach and **showing all totals** above the 'bus stop'.	**Is my answer sensible?** Be able to check whether answer is sensible by estimating first Can I use the inverse operation to check that my answer is correct: 27 x 24 = 648	**Can I use this method when the answer will have a remainder** **650 ÷ 24 = 27 r 2** 2 7 r 2 24) 6 4 8 4 8 1 6 8 1 6 8 0

Date: July 2022
Date approved by governing body:
Date for review: July 2024