Valuing Potential; Creating Opportunities

CALCULATION POLICY

This policy to be read in conjunction with Assessment and Marking Policies, Equal Opportunities Policy, Planning,Teaching and Learning Policies, Racial Equality Policy, Maths Policy, Inclusion and SEN Policies

RATIONALE

This policy outlines the different stages and calculation methods that we teach in school. The Numeracy Framework provides a structured and systematic approach to teaching number calculations. There is a considerable emphasis on teaching mental calculation strategies and speaking and listening activities. Informal written recording should take place regularly and is an important part of learning and understanding. More formal written methods should follow only when a child is able to use a wide range of mental calculation strategies.

This policy concentrates on the introduction of standard symbols, the use of the empty number line as a jotting to aid mental calculation and on the introduction of pencil and paper procedures. It is important that children do not abandon jottings and mental methods once pencil and paper procedures are introduced. Therefore children will always be encouraged to look at a calculation problem and then decide which is the best method to choose – pictures, mental calculation with or without jottings, structured recording or use a calculator.

AIMS AND OBJECTIVES

Our long-term aim is for children to be able to select an efficient method of their choice (whether this be mental, written, diagrams, pictures or using a calculator) that is appropriate for a given task. They will do this by asking themselves the following questions:

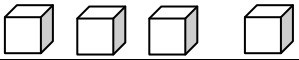
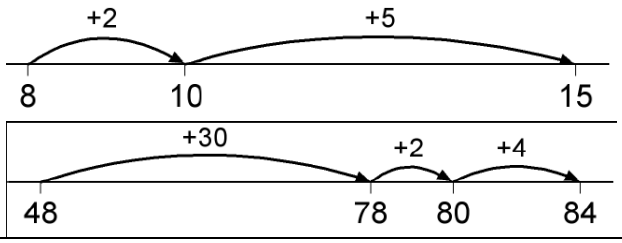
'Can I do this in my head?' 'Can I do this in my head using drawings or jottings?' 'Do I need to use a pencil and paper procedure?' 'Do I need a calculator?'

We will ensure:

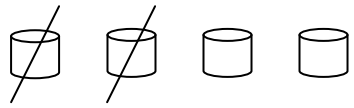
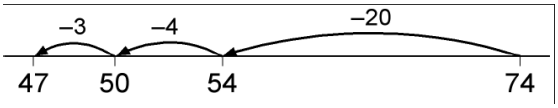
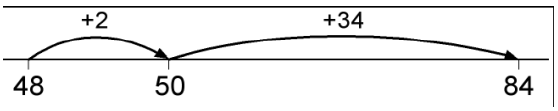
- Consistency in methods taught throughout the school.
- Opportunities for progression from informal / practical methods of recording to written methods for each of the four operations.
- Parents and children will have an understanding of the stages of learning
- Children have an understanding of the mathematical theory behind the practice
- Children have opportunities to approximate answers and check calculations

These are the methods that we teach at school and the policy shows how the methods change as the children move through the year and the school.

ADDITION

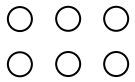
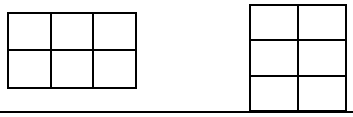
The different stages	*Example of what it looks like*
Stage 1 Counting sets of objects	
Stage 2 Combining 2 sets of objects into 1 group and counting practically.	For example for 6+2= the children may get 6 cubes, then 2 more and count how many altogether.
Stage 3 Drawing pictures/dots – informal jottings. Then counting how many altogether.	4 + 2 = 6 * * * * + * *
Stage 4 Counting on, on a number line with numbers on it.	6 + 3 = 9 1 2 3 4 5 6 7 8 9 10
Stage 5 Steps in addition can be recorded on a number line. The steps often bridge through a multiple of 10. 1) Partition the smaller number into tens and units 2) Add on the tens.	8 + 7 = 15 48 + 36 = 84 30 6 
Stage 6 Partitioned numbers are written underneath one another	47 40 + 7 + 76 70 + 6 110 +13 = 123
Stage 7 Write the numbers in columns, add the tens first. Add the units first:	47 47 + 76 76 110 13 + 13 110 123 123
Stage 8 Short method, where numbers are 'carried' into the next column	47 76 123 11
Stage 9 Adding numbers with different amount of digits.	258 + 87 345 11
Stage 10 Adding decimal numbers	258.10 + 87.02 345.12 11

SUBTRACTION

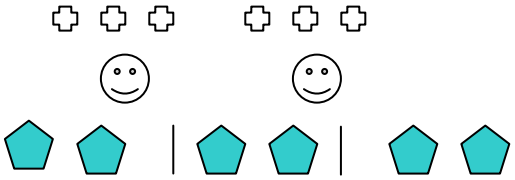
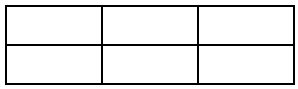
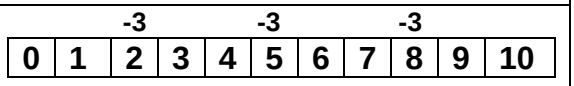
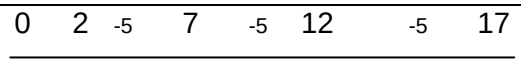
The different stages	*Example of what it looks like*
Stage 1 Practical activities	Put a group of objects in a dish, take some away and put in another dish. Count how many are left in the first dish.
Stage 2 Jottings Draw objects and cross them out.	4 - 2 = 2 
Stage 3 Count back on a number line	x x 1 2 3 4 5 6 7 8 9 10
Stage 4 Count back on a blank line (74 – 27) Count forward on a blank line	 
Stage 5 Partitioned numbers written underneath each other	70 4 - 20 3 50 1 50 + 1 = 51
Stage 6 'Exchange' for two digit numbers	60 14 6 14 70 4 7 4 - 20 7 - 2 7 40 7 4 7
Stage 7 Exchange for three digit numbers (741 – 367)	600 13 0 11 6 13 11 700 40 1 7 4 1 - 300 60 7 - 3 6 7 300 70 4 3 7 4
Stage 8 Exchange for four digit numbers	9 4 ~~5~~ 10 10 5 0 0 8 - 1 2 5 7 3 7 5 1

MULTIPLICATION AND DIVISION

Year 2	2, 5, 10 multiplication tables
Year 3	2, 3, 4, 5, 6, 10 multiplication tables
Year 4	Derive and recall multiplication and division facts for all tables up to 10 x 10 (12 x 12 at Hartsbourne)

The different stages	*Example of what it looks like*
Stage 1 Counting/sharing in repeated groups/patterns	
Stage 2 Informal jottings and introduction of vocabulary (eg lots of, groups, multiply)	 2 lots of 3 = 6
Stage 3 Arrays	
Stage 4 Repeated addition Also shown on a number line	5 + 5 + 5 = 5 x 3 
Stage 5 Partitioning	13 x 5: 10 x 5 = 50 3 x 5 = 50 + 15 = 65
Stage 6 The grid method	38 x 7: x | **7** **30** | 210 **8** | 56 | 266
Stage 7 Long multiplication shows method of recording in a column format but links to the grid method	30 x 7 = 210 8 x 7 = 56 266 3 8 x 7 56 210 266
Stage 8 Short multiplcation	3 8 x 7 2 6 6 5
Stage 9 Grid method for multiplying two, two-digit numbers (place value must be secure)	x | 20 | 7 | 50 | 1000 | 350 | 1350 06 | 120 | 42 | 162 | | | 1512 1
Stage 10 Children follow the basic grid method in a column format. They should be able to approximate, eg 60 x 30 = 1800, therefore….	50 x 20 = 1000 6 x 20 = 120 50 x 7 = 350 6 x 7 = 42 56 x 27 1000 120 350 42 1512 1

DIVISION

The different stages	*Example of what it looks like*
Stage 1 Counting/sharing in repeated groups/patterns	
Stage 2 Informal jottings and introduction of vocabulary (eg shared equally, share, divide, sets) Repeated addition (6 sweets, how many children can have 2 sweets each):	
Stage 3 Arrays	 6 ÷ 3 6 ÷ 2
Stage 4 Calculations involving remainders, using repeated subtraction (10 ÷ 3 = 3 r 1)	 -3 -3 -3 0 1 2 3 4 5 6 7 8 9 10
Stage 5 Children use their own (blank) number lines for repeated subtraction	 0 2 -5 7 -5 12 -5 17 17 ÷ 5 = 3 r 2
Stage 6 Use understanding of multiplication to solve division problems	27 ÷ 5 = 5 r 2 5 x 5 = 25 27 – 25 = 2
Stage 7 Vertical methods of division	72 ÷ 3 : 3) 72 - 30 (10 x 3) 42 (2 lots of 10 = 20) - 30 (10 x 3) 12 - 6 (2 x 3) 6 (2 lots of 2 = 4) - 6 (2 x 3) 0 20 + 4 = 24
Stage 8 Three-digit numbers using larger multiples of ten (sometimes referred to as 'chunking').	7) 2 5 6 - 7 0 10 x 7 1 8 6 - 1 4 0 20 x 7 4 6 - 4 2 6 x 7 4 36 r 4
Stage 9 Division using knowledge of place value and multiplication tables	0 8 3 r 5 7) 5 8 2 6 7 x 8 = 56 r 2 7 x 3 = 21 r 5
Stage 10 Long division with h t u and estimation: How many packs of 24 can we make from 560 biscuits.	24) 5 6 0 - 4 8 0 8 0 - 7 2 8 Estimate: 24 x 20 = 480 24 x 3 = 72 23 packs r 8