Wittersham CEP School

Maths Policy

Reviewed October 2014

Wittersham CEP Primary School

Progression towards a standard method of calculation

Introduction:

The 2014 National Curriculum provides a structured and systematic approach to the teaching of calculation. The aim is for mental calculations and written procedures to be performed efficiently, fluently, accurately with understanding. Procedures and understanding are to be developed in tandem. End of key stage expectations are explicit in the programmes of study.

At Wittersham CEP Primary School, we have a consistent approach to the teaching of written calculation methods in order to ensure continuity and progression across the school.

Age related expectations:

This calculation policy is organised with the expectation that the majority of pupils will move through the programmes of study at broadly the same pace. However, it is important that pupils are taught according to the stage that they are currently working at. Decisions about when to progress will always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any acceleration through new content. Conversely, those who are not sufficiently fluent with earlier material will be supported in consolidating their understanding, including thorough additional practice, before moving on.

Providing a content for calculation:

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them to recognise when to use certain operations and methods. It is also important for children to be confident to use mental and written strategies to explain their thinking. This must be a priority within calculation lessons. Written methods need to be viewed as tools to enable children to solve problems and record their thinking in an organised way.

Aims:

Children should be able to use an efficient method, mental or written appropriate to the given task, with understanding. By the end of year 6, children will have been taught, and be secure with, a compact standard method for each operation.

To develop efficient written calculation strategies children need:

- Secure mental methods which are developed from early years
- A solid understanding of the number system
- Practical hands on experience including a range of manipulatives
- Visual models and images including number lines and arrays
- Experience of expanded methods to develop understanding and avoid rote learning
- Secure understanding of each stage before moving onto the next

Before carrying out a calculation, children will be encouraged to consider:

- Can I do it in my head? (using rounding, adjustment)
- The size of an appropriate answer (estimation)
- Could I use jottings to keep track of the calculation?
- Do I need to use an expanded or compact written method?

Pre requisite skills for written calculations

Addition and Subtraction:

- Do they know all the addition and subtraction facts for all numbers to 20?
- Do they understand place value and can they partition and then re-partition numbers?
- Can they add three single digit numbers mentally?
- Can they add and subtract any pair of two digit numbers mentally?
- Can they explain their mental strategies orally and record them using informal jottings?

Multiplication and Division:

- Do they know the 2, 5 and 10 times tables and corresponding division facts?
- Do they know the result of multiplying by 1 and 0?
- Do they understand 0 as a place holder?

- Can they multiply two and three digit numbers by 10 and 100?
- Can they double and halve two digit numbers mentally?
- Can they use multiplication and division facts they know to derive mentally other multiplication and division facts that they do not know?
- Can they explain their mental strategies orally and record them using informal jottings?

These lists are not exhaustive but are a guide for the teacher as they structure the move from informal to formal methods of calculation. It is vitally important that children's mental methods of calculation continue to be practised and secured alongside their learning and use of an efficient written method for each operation.

A pathway to teaching calculation methods:

Expanded methods should be viewed as steps towards a standard method and not as methods in themselves.

Before beginning to record in a more refined written format, children must have had significant practical work reinforced with appropriate manipulatives, models and images.

Teachers will guide pupils to refine their written methods of recording by modelling and asking questions such as "What is the same? What is different?"

Learning will be planned to ensure pupils are encouraged to use and apply what they have learnt to problem solving tasks.

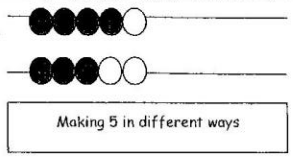
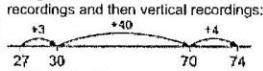
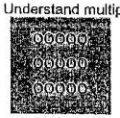
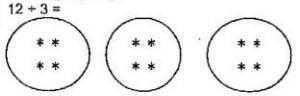
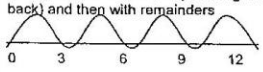
As children move along the pathway, it is important that they practise, reinforce, consolidate, use and apply it to mathematical learning and not simply move onto the next step.

Please see Appendix A which details the progression towards pupils achieving compact written calculations in stages.

Stage 4	Record steps in addition using partitioning: 47 + 76 = 47 + 70 + 6 = 117 + 6 = 123 47 + 76 = 40 + 70 + 7 + 6 = 110 + 13 = 123 Partitioned numbers are then written under one another: 47 = 40 7 + 76 70 6 →Possible support 110 13	Moving onto decomposition: Partitioned numbers are written under one another 9Note as possible support to mirror the teaching of addition): Example: 74 − 27 70 4 60 14 6 14 − 20 7 − 20 7 − 2 7 40 7 4 7	Informal recording might be: 43 40 3 X6 240 18 = 258 and moving this onto using the grid method: 38 × 7 = (30 × 7) + (8 × 7) = 210 + 56 = 266 × 7 30 210 8 56 266	Mental division using partitioning: Informal recording for 84 ÷ 7 might be: 84 70 14 ÷7 10 2 = 12
Stage 5	47 + 76 = 123, 11 258 + 87 = 345, 11 366 + 458 = 824, 11 Column addition remains efficient when used with larger whole numbers and decimals. Once learned, the method is quick and reliable.	Example: 741 − 367 700 40 1 600 130 11 6 13 11 − 300 60 7 − 300 60 7 − 3 6 7 300 70 4 3 7 4	Extending the grid method into TO x TO and then HTO x TO and then decimal numbers: × 20 7 50 1000 350 1350 6 120 42 162 1512 1 × 20 9 200 4000 1800 5800 80 1600 720 2320 6 120 54 174 8294 1	Short division method: Example: 81 ÷ 3 = 27 3) 8 21
Stage 6			And moving this into the compact written method: 56 x 27 42 7x 6 = 42 350 7 x 50 = 350 120 50 x 6 = 120 1000 20 x 50 = 1000 1512 1 56 x 27 1120 56 x 20 392 56 x 7 1512 1	Long division method: 806 ÷ 13 = 62 13) 7 8 10 6 78 26 0

Progression in Written Calculations

This shows the progression towards pupils achieving compact written calculations. Mental skills need to be developed across the primary and secondary phases. Use the methods with decimals (eg. money and measures). Teachers also need to refer to 'Teaching children how to calculate mentally'.
Stages are progressive and do not correlate to year groups. A child can be on different stages across and within different operations.

	Addition	Subtraction	Multiplication	Division
Stage 1 Ref: DfES Models and Images Charts	 Making 5 in different ways Pictorial recording	 How many are left? Find own ways of recording for subtraction Teach number sequences alongside practical	Count in repeated groups of the same size Oral counting in twos; e.g. pairs of gloves, socks .... Make a bead necklace, 2 red, 2 blue, 2 red, 2 blue ...	Share objects into equal groups and count how many in each group; e.g. fruit for a snack, cup for every person
Stage 2	Know pairs with a total of 10 Doubles to 5 Use number tracks and simple number lines 1 2 3 4 5 6 7 8 9 10 Show number sequences alongside practical	 7 beads 3 beads How many are left when 3 beads are taken away? (Bonds to 10) Find the difference between ... Use number tracks and simple number lines. Show number sequences alongside practical	Count in repeated groups of the same size Count in 2s, 5s and 10s (See models and images charts for multiplication and division) Show number sequences alongside practical	Sharing numbers equally using 2, 5 and 10 groups. E.g. I have 8 wheels, how many bikes can I make? *Get into groups of 4 for PE (See models and images charts for multiplication and division) Show number sequences alongside practical
Stage 3	Steps in addition can be recorded on a number line. The steps often bridge through a multiple of 10. 28 + 7 = 35  28 30 35 48 + 36 = 84  48 78 Understand addition as the inverse of subtraction. Use the symbols + and = to notate number sentences.	Using number line first with horizontal recordings and then vertical recordings:  27 30 70 74 3 + 40 + 4 = 47 Number line method to show either counting on or counting backwards. Children need to spend time partitioning Understand subtraction as the inverse of addition. Use the symbols - and = to notate number sentences.	Number line, number track, 100 square as a visual support Understand multiplication as the inverse of division. Use the symbols x and = to notate number sentences. Understand multiplication as describing an array  → 5 x 3 = 3 x 5	**Sharing equally:** 12 ÷ 3 =  **Grouping equally:** 12 ÷ 3 = → Hops on a number line (counting on and back) and then with remainders  0 3 6 9 12 Understand division as the inverse of multiplication. Use the symbols ÷ and = to notate number sentences.

Written by the Maths Subject Leaders Rachael Harrington (Woodchurch CE P School) in collaboration with Claire Harris (Primary Strategy Consultant) in 2010. Revised and developed by Carole Johnson and TRA Maths Subject Leaders 2013