Shiplake C.E. Primary School
Memorial Avenue
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'I will instruct you and teach you in the way you should go; I will counsel you with my loving eye on you' Psalm 32.8

Maths (Calculation) Policy

Introduction

In order to ensure that all children at Shiplake achieve their maximum potential in Mathematics (ECM5) in a safe and secure learning environment (ECM2), this Policy for Written Calculations sets out the stages of development in written calculation and highlights the strategies to be taught.

Throughout Reception and Key Stage 1, children at Shiplake will be introduced to the processes of calculation through lively and fun practical, oral and mental activities (ECM1 and ECM3), leading on to written methods (informal) of calculation at the beginning of Year 3 and more formal standard written methods in Years 5 and 6.

Our goal is that when children leave Shiplake Primary School they:

 have a secure knowledge of number facts and a strong understanding of the four operations;

 are able to use this knowledge and understanding to carry out calculations mentally and to apply general strategies when using one-digit and two-digit numbers and apply particular strategies to special cases involving bigger numbers;

 make use of diagrams and informal notes to help record steps and part answers when using mental methods that generate more information than can be kept in their heads;

 have an efficient, reliable, compact written method for each operation that they can apply with confidence when undertaking calculations that they cannot carry out mentally;

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 use a calculator effectively, using their mental skills to monitor the process, check the steps involved and decide if the numbers displayed make sense.

Rationale:

The purpose of this policy is to outline the progression through written calculations as taught in our school. At Shiplake we use a variety of resources to teach and plan mathematics lessons. This policy exemplifies a recommended progression through the four operations, beginning in Foundation Stage and carrying on to Year 6.

The reasons for using written methods include:

 to assist in a mental calculation by writing down some of the numbers involved;

 to clarify a mental procedure for the writer;

 to help communicate solutions and methods with other readers;

 to provide a record of work done for themselves, teachers and others;

 to work out calculations which are too difficult to be done mentally;

 to develop, refine and use a set of rules for correct and efficient calculations.

It is expected that by the end of Year 6 all children will understand, and use successfully, the conventional standard written methods to carry out and record calculations that they cannot do 'in their head'. On the way to this mathematical fluency children will need to use an expanded layout but should be encouraged to work towards the most compact form. It is important that these methods build on children's understanding and that the children do not move on until they understand each step of the method. The

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teaching and learning of written method should develop from the children's mental methods

The Maths Curriculum provides a structured and systematic approach to teaching calculation skills. There is a high emphasis on developing a secure base of mental skills before beginning to work towards more formal written methods in the Primary framework. Our school embraces this approach.

Across the school written work takes many forms which are dependent upon: the children's age; ability and the task that has been set. This can be seen in their mathematics exercise books as:

- Pictorial recording.
- Informal jottings that help the learner but are not easily read by anyone else.
- Words describing a mental calculation.
- Use of appropriate signs and symbols.
- Use of increasingly compact and efficient formal methods.

It is also necessary to note that 'written calculations' have many other names such as: formal written methods; pencil and paper methods and standard written methods. For the purpose of this policy the term 'written calculations' will be used. It must also be noted that a 'jotting' is not a written method as it is primarily noted to support a mental calculation and can be discarded, whereas a genuine written method has value to both writer and teacher after the calculation has been completed.

The following calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics,

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and is also designed to give pupils a consistent and smooth progression of learning in calculations across the school. Please note that early learning in number and calculation in Reception follows the "Development Matters" EYFS document, and this calculation policy is designed to build on progressively from the content and methods established in the Early Years Foundation Stage.

Age stage expectations

The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, **however it is vital that pupils are taught according to the stage that they are currently working at,** being moved onto the next level as soon as they are ready, or working at a lower stage until they are secure enough to move on.

Providing a context 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 recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

Choosing a calculation method:

Children need to be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved:

Can I do it in my head using a mental strategy?

Could I use some jottings to help me?

Should I use a written method to work it out?

To work out a tricky calculation: Approximate, Calculate, Check.

New Curriculum

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We know that children learn at different paces. Teachers should make decisions about when children are moved on to harder content based on the 'security of pupils' understanding and their readiness to progress to the next stage'.

The curriculum content is set out in yearly programmes of study and grouped into two-year phases. The statutory requirement is for the content to be covered by the end of the key stage, so schools can move content between year groups.

There are some changes of name: for example, shape and space is renamed **geometry**, measuring becomes **measurement**, and data handling is **statistics**. However, the content within each of these sections is instantly recognisable.

Underneath the overall heading of **number**, you will find **number and place value**, **addition and subtraction, multiplication and division,** and **fractions** (including **decimals and percentages**). Across these sections you will find statements relating to the National Strategy strands of counting and understanding number, knowing and using number facts, and calculating – but it may not always be coherent or obvious where they are located.

The most significant omission is that of Ma1, **using and applying Mathematics**. Previously this was a separate strand and was often taught as an add-on. In many respects the inclusion of reasoning and problem solving within the overarching aims is an improvement.

It has been suggested that children should not use **calculators** until they have secure mental and written strategies for calculation. We believe that to wait until upper KS2 is too late and we will continue to encourage schools to use calculators right across the primary age range.

Bar Modelling

Bar modelling- a powerful visual approach for introducing number topics.

We are adopting a bar model approach to help support our understanding of maths. The bar model was developed in Singapore and has been highly effective. We feel that our children will benefit from the pictorial

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approach. We aim to embed a deep understanding of maths using the bar model.

We start by using objects and pictures before numbers and symbols. This helps develop a true understanding rather than learning to repeat routines without grasping what is happening. This approach is easily accessible by all children and helps them to develop confidence and mathematical ability without having to memorise rules and procedures. Hence, making mathematics more engaging and interesting.

Bar modelling, for the uninitiated, is not a method of calculation. Instead, it is a way of representing problems pictorially: from simple addition, through to finding percentages of amounts, all the way to complex multi-step problems involving ratio and proportion. Bar models can be used to pictorially represent arithmetic problems, as well as reasoning problems written with a

context.

The reading comprehension involved in problem-solving hampers our children, and while bar modelling doesn't remove the necessity to read and comprehend maths problems, it certainly provides a structured way of working through a written problem.

A worked example of bar modelling

Take this problem for example:

Jon and Ed shared £310 between them. Jon received £50 more than Ed. How much money did Jon receive?

Here we use a comparison model with two bars that represent Jon and Ed's money. We then follow this process:

- *We know that Jon has more than Ed, so his bar is longer.*
- *Using a bracket we show that together the two bars represent the total: £310.*
- *We prompt children to use the question mark (with a bracket in this case) to represent missing information: Jon's total.*

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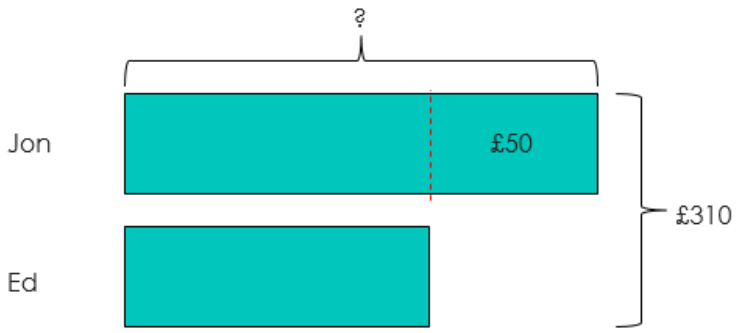
- *Then we can label the part of Jon's bar that is longer than Ed's as his extra £50.*
- *Now children see that Jon has the same amount as Ed, plus £50.*

At this point, the model has done its job, and it's over to the calculations:

- *We subtract £50 from £310, leaving £260.*
- *This £260 is split into two equal amounts as represented by the model; we divide £260 by 2 to get £130.*
- *Children may want to edit the bar model to show that Ed's amount is £130 and that the first part of Jon's bar (equal to Ed's bar) is also worth £130.*
- *To find out how much Jon has we add £130 to £50 to get the final answer of £180.*

Jon and Ed shared £310 between them. Jon received £50 more than Ed. How much money did Jon receive?



£310 - £50 = £260

£260 ÷ 2 = £130

£130 + £50 = £180

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3 year cycle