Lenham Primary School

Take Pride; Be Proud

Ham Lane

Lenham

Kent

ME17 2LL

Phone: 01622 858260

www.lenham.kent.sch.uk

Headteacher: Mrs Andrea McCluskey

Calculation Policy

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Calculation Policy

Aims of the policy:

- To ensure consistency and progression in our approach to calculation and enable a smooth transition between year groups and phases.
- To ensure that children develop an efficient, reliable, formal written method of calculation for all operations.
- To ensure that children can use these methods accurately with confidence and understanding
- To ensure pupils understand important concepts and make connections within mathematics.
- To ensure pupils show high levels of fluency in performing written and mental calculations.
- To ensure that pupils are ready for the next stage of learning and have been given strong foundations in mental methods, the use of practical equipemtn , allowed to explore jottings in a range of forms and then move onto more formal recording using a strong knowledge of place value, number lines labelled or blank, partitioning before eventually using compact written methods.
- To ensure that pupils are competent in fluency, reasoning and problem solving and can make informed and appropriate choices about the methods they wish to use (mental or written) to solve mathematical problems efficiently and effectively.

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, and accurately with understanding. Procedures and understanding are to be developed in tandem. End of key stage expectations are explicit in the programme of study.

At Lenham 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 according to age appropriate expectations as set out in the National Curriculum 2014, **however it may be more appropriate for pupils to work** at a lower stage, if necessary, 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. 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 approximate 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 continued 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 manipulative, 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's different?"
Learning will be planned to ensure pupil are encouraged to use and apply what they have learnt to problem solving tasks.

The pathway shown below is for *guidance.* As children move along the pathway it is vital that they practice, reinforce, consolidate, use and apply it to mathematical learning and NOT simply move onto the next step.

	EYFS/Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Addition	Combining two parts to make a whole: part whole model Starting at the bigger number and counting on – using cubes Regrouping to make 10 using ten frame	Adding three single digits Use of Base 10 to combine two numbers	Column method – regrouping Using place value counters (up to 3 digits)	Column method – regrouping. Using place value counters (up to 4 digits)	Column method – regrouping Use of place value counters for adding decimals	Column method – regrouping. Abstract methods. Place value counters to be used for adding decimal numbers.
Subtraction	Take away ones Counting back Find the difference Part whole model Make 10 using the ten frame	Counting back Find the difference Part whole model Make 10 Use Base 10	Column method with regrouping. (up to 3 digits using place value counters)	Column method with regrouping (up to 4 digits)	Column method with regrouping. Abstract for whole numbers. Start with place value counters for decimals – with the same amount of decimal places.	Column method with regrouping. Abstract methods. Place value counters for decimals – with different amounts of decimal places.
Multiplication	Recognising and making equal groups. Doubling. Counting in multiples. Use cubes, Numicon and other objects in the classroom.	Arrays – showing commutative multiplication.	Arrays 2 digit x 1 digit using base 10	Column multiplication – introduced with place value counters. (2 and 3 digit multiplied by 1 digit)	Column multiplication Abstract only but might need a repeat of year 4 first (up to 4 digit numbers multiplied by 1 or 2 digits)	Column multiplication Abstract methods (multi-digit up to 4 digits by a 2 digit number)

Division	Sharing objects into groups. Division as grouping e.g. I have 12 sweets and put them in groups of 3, how many groups? Use cubes and draw round 3 cubes at a time.	Division as grouping. Division within arrays – linking to multiplication Repeated subtraction	Division with a remainder – using lolly sticks, times table facts and repeated subtraction. 2 digit divided by 1 digit using Base 10 or place value counters.	Division with a remainder Short division (up to 3 digits by 1 digit – concrete and pictorial)	Short division (up to 4 digits by a 1 digit number including remainders)	Short division Long division with place value counters (up to 4 digits by a 2 digit number) Children should exchange into the tenths and hundredths column too.

PLEASE look at the LIVE padlet which explains our **Maths Knowledge Organiser @ Lenham Primary**

https://padlet.com/lculver4/rcur7eys6cqqgrbo

Below is a photo of the padlet.

As a separate document there is a PDF of the padlet which can be downloaded.

Maths Knowledge Organiser @ Lenham Primary

Musical Mathematics

Language	Representations and Manipulatives	Addition	Subtraction	Times Tables	Multiplication	Division

Language

Addend
A number to be added to another.

Aggregation
Combining two or more quantities or measures to find a total.

Array
An ordered collection of counters, cubes or other items in rows and columns.

Augmentation
Increasing a quantity or measure by another quantity.

Commutative
Numbers can be added or multiplied in any order.

Complement
In addition a number and its complement make a total e.g. 648 is the complement to 780 to make 1000.

Difference
The numerical difference between two numbers is found by comparing the quantity in each group.

Dividend
In division, the number that is divided.

Divisor
In division, the number by which another is divided.

Exchange
Change a number or expression for another of an equal value.

Factor
A number that multiplies with another to make a product.

Minuend
A quantity or number from which another is subtracted.

Multiplicand
In multiplication, a number to be multiplied by another.

Partitioning
Splitting a number into its component parts.

Product
The result of multiplying one number by another.

Quotient
The result of division.

Reduction
Subtraction as take away.

Remainder
The amount left over after a division when the divisor is not a factor of the dividend.

Scaling
Enlarging or reducing a number by a given amount, called the scale factor.

Subitise
Instantly recognise the number of objects in a small group without needing to count.

Subtrahend
A number to be subtracted from another.

Sum
The result of addition.

Total
The aggregate or the sum found by addition.

Representations and Manipulatives

Part Part Whole
This part-whole model supports children in their understanding of aggregation and partitioning.

Bar model (single)

Bar Model (multiple)

Bar Model (Multiplication and Division)

Number Shapes

Number Shapes (Multiplication and Division)

Cubes

Addition

YEAR 1 — Skill: Add 1-digit numbers within 10

YEAR 2 — Skill: Add three 1-digit numbers

YEAR 1/2 — Skill: Add 1 and 2-digit numbers to 20

YEAR 2/3 — Skill: Add 1-digit and 2-digit numbers to 100

YEAR 2/3 — Skill: Add two 2-digit numbers to 100

YEAR 3 — Skill: Add numbers up to 3 digits

YEAR 4 — Skill: Add numbers with up to 4 digits

YEAR 5/6 — Skill: Add numbers with more than 4 digits

YEAR 5 — Skill: Subtract with up to 3 decimal places

YEAR 5 — Skill: Add with up to 3 decimal places

Subtraction

YEAR 1 — Skill: Subtract 1-digit numbers within 10

YEAR 1/2 — Skill: Subtract 1 and 2-digit numbers to 20

YEAR 2 — Skill: Subtract 1 and 2-digit numbers to 100

YEAR 3 — Skill: Subtract numbers with up to 3 digits

YEAR 4 — Skill: Subtract numbers with up to 4 digits

YEAR 5/6 — Skill: Subtract numbers with more than 4 digits

YEAR 5 — Skill: Subtract with up to 3 decimal places

Times Tables

YEAR 2 — Skill: 2 times table

YEAR 2 — Skill: 5 times table

YEAR 2 — Skill: 10 times table

YEAR 3 — Skill: 3 times table

YEAR 3 — Skill: 4 times table

YEAR 3 — Skill: 8 times table

YEAR 4 — Skill: 6 times table

YEAR 4 — Skill: 7 times table

YEAR 4 — Skill: 9 times table

YEAR 4 — Skill: 11 times table

YEAR 4 — Skill: 12 times table

Multiplication

YEAR 1/2 — Skill: Solve 1-step problems using multiplication

YEAR 3/4 — Skill: Multiply 2-digit numbers by 1-digit numbers

YEAR 3/4 — Skill: Multiply 3-digit numbers by 1-digit numbers

YEAR 3/4 — Skill: Multiply 4-digit numbers by 1-digit numbers

YEAR 5 — Skill: Multiply 2-digit numbers by 2-digit numbers

YEAR 5 — Skill: Multiply 3-digit numbers by 2-digit numbers

YEAR 5 — Skill: Multiply 4-digit numbers by 2-digit numbers

Division

YEAR 1/2 — Skill: Solve 1-step problems using multiplication (sharing)

YEAR 3/4 — Skill: Solve 1-step problems using division (grouping)

YEAR 1/2 — Skill: Divide 2-digits by 1-digit (sharing with no exchange)

YEAR 3/4 — Skill: Divide 2-digits by 1-digit (sharing with exchange)

YEAR 4/5 — Skill: Divide 3-digits by 1-digit

YEAR 4 — Skill: Divide 3-digits by 1-digit (sharing)

YEAR 5 — Skill: Divide 3-digits by 1-digit (grouping)

YEAR 5 — Skill: Divide 4-digits by 1-digit

YEAR 6 — Skill: Divide multi-digits by 2-digit (short division)

YEAR 6 — Skill: Divide multi-digits by 2-digit (long division)