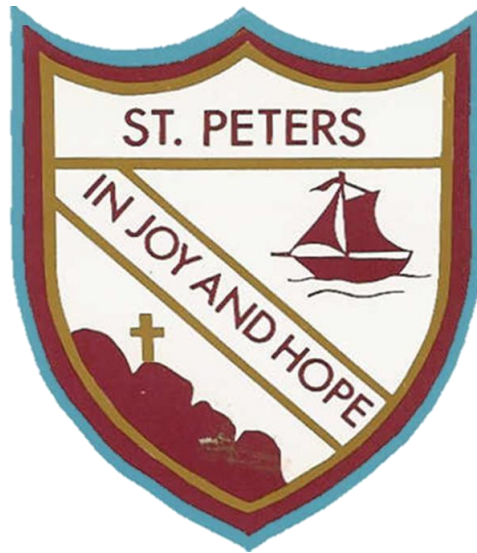


St Peter's Catholic Primary School



Calculation Policy

Rationale

This policy has been designed to show progression in written mathematical methods throughout the school. Our written calculation policy is set out to show:

- The objectives stipulated for all four operations by the National Curriculum
- The calculation methods for each year group
- Relevant vocabulary needed at each stage
- Examples of reasoning activities

Concrete, Pictorial and Abstract

Each method has examples as to what it looks like in the concrete, pictorial and abstract forms. All learners are introduced to a calculation method for the first time using concrete manipulatives. Concrete resources from EYFS to Year 6 include: bead strings, Base 10, Place Value counters, Numicon and Snap cubes. Children will then progress through to a pictorial stage before moving to the abstract. The amount of time needed to progress through each stage is unique to each learner.

Mastering Calculation

The new curriculum has a strong focus on mastery and therefore, if a child is fluent in a method for their year group, they should not be moved onto a different method of calculation or a larger set of numbers (see the quick glance guides in this policy). Instead, children will be encouraged by their teacher to 'go deeper' within this method. This may involve: using it in different contexts; using and applying it to other learning; using it with missing digits or values; explaining or experimenting with different aspects of it; proving answers with pictures or manipulatives; or explaining what has gone wrong in a calculation. Children must also check their calculations through the use of estimation and inverse operations.

Mathematical Vocabulary

The National Curriculum places great emphasis upon the use of correct mathematical vocabulary and children developing this. Throughout school, children are strongly recommended to use and apply mathematical vocabulary when learning a new method or concept. They will be constantly exposed to this, have it expertly modelled by their teacher and be expected to use it themselves when justifying methods.

Mental Methods

Children should always be encouraged to see if they can work out a calculation mentally before trying a written method. Children will be shown number patterns and relationships between numbers throughout the school. Please also see the separate Mental Calculation Strategies policy.

EYFS

Mathematics is taught across all of our Early year's classes, starting with our youngest pupils in Pre School, through to our Reception class. Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically.

Mathematics is taught and implemented across all areas of continuous provision and there are rich varied invitations to play, encompassing mathematics skills. Practitioners enhance play and focus on quality interactions with children. They build on children's prior knowledge, identifying gaps and set targets for children's next steps.

Our Mathematics curriculum in EYFS is delivered through formal teaching, play and structured exploration. We follow the Early Year's foundation stage statutory framework and we use Non-statutory guidance from Development Matters. This guidance sets out the pathways of children's development in broad ages and stages. The actual learning of young children is not so neat and orderly. For that reason, accurate and proportionate assessment is vital. It helps you to make informed decisions about what a child needs to learn and be able to do next. It is not designed to be used as a tick list for generating lots of data.

The guidance can help us to check that children are secure in all the earlier steps of learning before we look at their 'age band'. Depth in learning matters much more than moving from one band to the next or trying to cover everything. For example, it is important to give a child many opportunities to deepen their understanding of numbers to 5. There is no value in rushing to 10.

Development matters sets out guidance for ages as detailed below.

Birth to 3 years old	<ul style="list-style-type: none">• Combine objects like stacking blocks and cups. Put objects inside others and take them out again.• Take part in finger rhymes with numbers. React to changes of amount in a group of up to three items.• Compare amounts, saying 'lots', 'more' or 'same'. Develop counting-like behaviour, such as making sounds, pointing or saying some numbers in sequence.• Count in everyday contexts, sometimes skipping numbers – '1-2-3-5'.
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	<ul style="list-style-type: none"> • Climb and squeeze themselves into different types of spaces. Build with a range of resources. Complete inset puzzles • Compare sizes, weights etc. using gesture and language - 'bigger/little/smaller', 'high/low', 'tall', 'heavy'. • Notice patterns and arrange things in patterns.
3 and 4 year olds	<ul style="list-style-type: none"> • Develop fast recognition of up to 3 objects, without having to count them individually ('subitising'). • Recite numbers past 5. Say one number for each item in order: 1,2,3,4,5. • Know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle'). • Show 'finger numbers' up to 5. Link numerals and amounts: for example, showing the right number of objects to match the numeral, up to 5. • Experiment with their own symbols and marks as well as numerals. • Solve real world mathematical problems with numbers up to 5. • Compare quantities using language: 'more than', 'fewer than'. • Talk about and explore 2D and 3D shapes (for example, circles, rectangles, triangles and cuboids) using informal and mathematical language: 'sides', 'corners'; 'straight', 'flat', 'round'. • Understand position through words alone – for example, "The bag is under the table," – with no pointing. • Describe a familiar route. Discuss routes and locations, using words like 'in front of' and 'behind'. • Make comparisons between objects relating to size, length, weight and capacity. • Select shapes appropriately: flat surfaces for building, a triangular prism for a roof, etc. • Combine shapes to make new ones – an arch, a bigger triangle, etc. • Talk about and identify the patterns around them. For example: stripes on clothes, designs on rugs and wallpaper. Use informal language like 'pointy', 'spotty', 'blobs', etc. • Extend and create ABAB patterns – stick, leaf, stick, leaf. Notice and correct an error in a repeating pattern. • Begin to describe a sequence of events, real or fictional, using words such as 'first', 'then...'
4 and 5 year old's	<ul style="list-style-type: none"> • Count objects, actions and sounds. • Subitise. • Link the number symbol (numeral) with its cardinal number value. • Count beyond ten • Compare numbers • Understand the 'one more than/one less than' relationship between consecutive numbers. • Explore the composition of numbers to 10 • Automatically recall number bonds for numbers 0–5 and some to 10. • Select, rotate and manipulate shapes to develop spatial reasoning skills. • Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can. • Continue, copy and create repeating patterns. • Compare length, weight and capacity.
ELG: Number	<p>Children at the expected level of development will:</p> <ul style="list-style-type: none"> • Have a deep understanding of numbers to 10, including the composition of each number. • Subitise (recognise quantities without counting) up to 5. • Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.

ELG: Numerical Patterns	Children at the expected level of development will: <ul style="list-style-type: none">• Verbally count beyond 20, recognising the pattern of the counting system.• Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.• Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.
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The level of development children should be expected to have reached by the end of the EYFS is defined by the early learning goals (ELGs) as set out as above.

The ELGs should not be used as a curriculum or in any way to limit the wide variety of rich experiences that are crucial to child development. Instead, the ELGs should support practitioners to make a holistic, best-fit judgement about a child's development at the end of the EYFS, and their readiness for year 1.

In reception year, teachers and practitioners will also utilise the early learning goals which summarise the knowledge, skills and understanding that all young children should have gained by the end of the EYFS.

Key Stage 1 - Year 1

	+	-	x	÷
National Curriculum Objective	<ul style="list-style-type: none"> Read, write and interpret statements involving addition, subtraction and equals sign. Add and subtract 1 and 2 digit numbers to 20, including zero. Represent and make number bonds and related subtraction facts within 20. Regroup to 10 to make 10. 		<ul style="list-style-type: none"> Double and halve numbers to 10 through grouping and sharing. Make links to counting in multiples of 2, 5 and 10 – drawing arrays. Reason about odd and even numbers and relate to doubling and halving. Solve one-step problems involving multiplication and division. Share objects into equal sized groups. 	
Suggested calculation	<ul style="list-style-type: none"> Counting on using number lines and number tracks Informal partitioning 	Counting back	Repeated addition and arrays	Sharing and grouping
Mathematical vocabulary	count on, count back, number bonds, number facts, subtraction facts, fact family, add, subtract, more, less, plus, minus, total, sum, difference between, equal		grouping, sharing, multiply, divide, double, half, array, lots of	

Year 2

	+	-	x	÷
National Curriculum Objective	<ul style="list-style-type: none"> Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 Understand the = sign and how $20 + 2$ and $24 - 2$ both have the same value of 22. Add and subtract numbers: <ul style="list-style-type: none"> a 2-digit number and ones (no regrouping & regrouping in the ones) a 2-digit number and tens (no regrouping & regrouping in the ones) 		<ul style="list-style-type: none"> Introduction of arrays in a grid method. Write mathematical statements using the multiplication (\times), division (\div) and equals (=) signs. Link multiplication and division through missing number questions. Make links to counting in multiples of 4 and 8. Share and group objects. Group using repeated subtraction. 	
Suggested calculation	<ul style="list-style-type: none"> Informal partitioning Partitioning column 		<ul style="list-style-type: none"> Arrays in a grid 	<ul style="list-style-type: none"> Sharing and grouping in arrays
Mathematical vocabulary	Add, subtract, count on, count back, more, less, plus, minus, total, sum, difference, partition, bridge, round, inverse, number line, number facts, multiple of 10, regroup		Inverse, operation, multiplication table, times table, multiply, multiplication, times, product, repeated addition, lots of, array, divide, division, shared by, halve, double	

Lower Key Stage 2 - Year 3

	+	-	x	÷
National Curriculum Objective	<ul style="list-style-type: none"> Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100. Add and subtract numbers: <ul style="list-style-type: none"> up to three digits two 2 digit numbers adding 3 one digit numbers 		<ul style="list-style-type: none"> Multiply 2 digit numbers by a 1 digit. Introduction of the grid method. Make links to counting in multiples of 3,6,9. Share using place value headings $TO \div O$. Introduce remainders. 	
Suggested calculation	Expanded column method		<ul style="list-style-type: none"> Grid method 	<ul style="list-style-type: none"> Sharing and grouping within place value columns
Mathematical vocabulary	Add, subtract, count on, count back, more, less, plus, minus, total, sum, difference, partition, bridge, round, inverse, number facts, multiple of 10, regroup		Inverse, operation, multiplication table, times table, multiply, multiplication, times, product, repeated addition, lots of, array, divide, division, shared by, halve, double	

Year 4

	+	-	x	÷
National Curriculum Objective	Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction.		<ul style="list-style-type: none"> • Multiply 2/3 digits by a 1-digit number. • Recall multiplication & division facts up to 12 x 12. 	Divide numbers up to 3 digits by a 1 digit number using the formal written method of short division and interpret remainders appropriately in context
Suggested calculation	Compact column		<ul style="list-style-type: none"> • Expanded short multiplication • Compact short multiplication 	<ul style="list-style-type: none"> • Expanded short division
Mathematical vocabulary	addition, subtraction, sum, total, difference, minus, less, plus, altogether, column addition, column subtraction, regroup, operation, estimate, equal, method, inverse		place value, multiply, multiplication, times, product, divide, division, factor, factor pairs, multiplication & division facts, operation, estimate, multiple, shared equally, array	

Upper Key Stage 2 - Year 5

	+	-	x	÷
National Curriculum Objective	Add and subtract whole numbers with more than 4 digits and decimals, using formal written methods of columnar addition and subtraction.		<ul style="list-style-type: none"> • Multiply numbers up to 4 digits by a 1 or 2-digit number. • Introduction of expanded long multiplication. • Introduction of compact long multiplication. 	Divide numbers up to 3 digits by a 1 digit number using the formal written method of short division and interpret remainders appropriately in context
Suggested calculation	Compact column		<ul style="list-style-type: none"> • Expanded long multiplication • Compact long multiplication 	<ul style="list-style-type: none"> • Compact short division
Mathematical vocabulary	addition, subtraction, sum, total, difference, minus, less, column addition, column subtraction, operation, regroup, inverse, estimate, digit, place holder, rounding, approximate, accuracy		multiply, multiplication, times, product, commutative, short multiplication, long multiplication, multiplication facts, estimate, multiple, remainder	

Year 6

	+	-	x	÷
National Curriculum Objective	Add and subtract whole numbers with more than 4 digits, and decimals with different place values, using formal written methods of columnar addition and subtraction.		<ul style="list-style-type: none"> • Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using formal written method of long multiplication. 	Divide numbers up to 4 digits by a 2 digit number whole number using the formal written method of long division, and interpret remainders as whole number, fractions or decimals
Suggested calculation	Compact column		<ul style="list-style-type: none"> • Expanded long multiplication • Compact long multiplication 	<ul style="list-style-type: none"> • Long Division

Mathematical vocabulary	addition, subtraction, sum, total, difference, minus, less, column, operation, inverse, estimate, approximate, multiply, multiplication, times, product, commutative, short multiplication, long multiplication, estimate, remainder, fraction, decimal, divisible
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