Mathematics Scheme of Work

Layout of the Scheme

The maths scheme of work is taken directly from the new National Curriculum guidance and covers all the statutory teaching required in each year group. The scheme is grouped in to 'themed' areas to allow teachers to see what has been taught previously and to help them move children on if required. Year groups are clearly labelled; non-statutory teaching in each area is at the teacher's discretion and would be planned to meet the needs of the individual or class.

Organisation of Work

Teaching for each year group is clearly outlined, both in the National Curriculum and in the Scheme of Work; how teachers timetable these areas of work is at their discretion. Teachers are responsible for creating medium term plans and for organising these in to weekly 'units' of work. Teacher's plans are kept and monitored to ensure all work is being covered.

Mental Maths Teaching

In every year group (except year 1 for division), basic mental maths teaching is required in all four areas of calculation; as outlined in each area of work, other skills also require a mental approach. How these skills are taught, and how often they are practised is at the teacher's discretion and is planned in to weekly lessons as they see fit. Tables teaching, however, is essential: By year 4 all children are expected to know their times tables to 12 x 12 and so time needs to be set aside daily, or weekly in key stage one and lower key stage two to allow these facts to be learnt, used and applied.

Problem Solving

In every area of mathematics teaching, the children will be expected to solve problems so that they can use their skills in a practical or real life way. This will be built in to teacher's planning and should be clearly seen in the children's work. This should be a regular occurrence, not just at the end of a block of work; problem solving should form the basis of the children's practise and underpins the scheme of work. If children cannot apply the skills they have learnt, they are meaningless.

Number and Place Value

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
• Count to and across 100 backwards and forwards from any number. • Count in 1,2,5 and 10. • Read and write numbers to 100; read and write 1 to 20 in words and numerals. • Identify and represent numbers using objects and pictures. • Recognise + - and = signs. • Write and use number bonds to 20. • Add and subtract 1 and 2 digit numbers from 20. • Solve problems using addition and subtraction' including empty box questions. • Use concrete objects and arrays to solve one step problems involving multiplication and division.	• Count in steps of 2,3,5 and 10 from 0 and in tens from any number. • Recognise place value in 2 digit numbers. • Read and write numbers to 100 in numerals and words. • Compare and order numbers using < > and =. • Use place value and number facts to solve problems. • Recall and use addition and subtraction facts to 20 **quickly**; derive and use related facts to 100. • Add and subtract a 2 digit number and a one, a two digit number and a ten and three single digit numbers using apparatus and mentally. • Use inverse relationships to check answers. • Add 2 numbers in any order. • Recognise and use x and ÷ in number sentences. • Multiply 2 numbers in any order. • Solve problems using addition, subtraction, multiplication and division.	• Count in 4,8,50 and 100; find 10 or 100 more or less than a given number. • Recognise hto. • Compare and order numbers to 1000. • Read and write numbers to 1000 in words and digits. • Add and subtract numbers mentally - hto and o, a 3 digit number and 10's amd a 3 digit number and 100's. • Use formal column methods for + and -. • Recall multiplication and division facts for 3,4 and 8 times tables. • Multiply a 2 digit number by a single digit. • Use and apply multiplication facts. • Write and solve x and ÷ statements. • Solve problems with all operations using appropriate methods.	• Count in 6,7,9,25 and 1000. • Find 100 more or less than a given number. • Recognise place value of th h t o. • Order and compare numbers beyond 1000. • Round any number to 10, 100 or 1000. • Read Roman numerals to 100. • Use formal methods to add and subtract numbers with 4 digits. • Use inverse operations and estimates to check reasonableness. • Recal tables facts up to 12 x 12. • Multiple and divide mentally using known facts. • Multiply a 3 and a 4 digit number by a single digit. • Use associative and distributive laws for multiplication. • Solve problems with all operations using appropriate methods.	• Read, write and compare numbers to 1,000,000. • Count forwards and backwards in 10, 100 or 1000 to 1,000,000. • Interpret negative numbers and count on or back appropriately. • Round any number to the nearest 10, 100, 1000, 10,000, 100,000. • Read Roman numerals to 1000 and recognise dates. • Add, subtract, multiply and divide using mental and formal written methods. • Multiple and divide whole and decimal numbers by 10, 100 and 1000. • Find multiples, prime factors and factors of numbers; find common factors of numbers. • Recognise prime numbers to 19. • Recognise square numbers and cubed numbers and appropriate notation. • Solve multi-step problems with all operations using appropriate methods.	• Read, write and compare numbers up to 10,000,000 and recognise place value of each digit. • Use negative numbers in a range of contexts. • Round numbers to degrees of accuracy, including decimals. • Use formal methods of calculation for all four number operations, including decimals. • Perform mental calculations with large numbers. • Identify common factors, common multiples and prime numbers to 100. • Use estimation to check degrees of accuracy. • Solve multi-step problems with all operations using appropriate methods.

Fractions, Decimals and Percentages

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
• Recognise and name ½. • Recognise and name ¼.	• Recognise and name ½, ¼, 1/3, 2/4 and ¾ of a shape, set of objects or a quantity. • Write simple fractions. • Recognise the equivalence of ½ and 2/4.	• Count up and down in 1/10's; know this is because an object has been divided in to 10 pieces. • Recognise fractions which are equivalent. • Find a fraction of a set of objects and relate this knowledge to division. • Add and subtract fractions with common denominators. • Compare and order fractions with the same denominator. • Solve simple fractional problems.	• Recognise and show common equivalent fractions; write equivalent fractions for ½, ¼ and ¾. • Count up and down in hundredths. • Add and subtract fractions with the same denominator. • Write equivalent decimals and fractions for tenths and hundredths. • Compare numbers with the same number of decimal places, up to 2 decimal places. • Solve problems involving fractions and decimals across a range of contexts.	• Compare and order fractions whose denominators have common multiples. • Identify equivalent fractions. • Recognise mixed and improper fractions and covert from one to the other. • Add and subtract fractions with the same denominator and ones where there are common multiples. • Multiple proper and mixed fractions by whole numbers. • Read and write decimal numbers as fractions. • Round decimals to 1 or 2 places. • Compare decimals up to 3 decimal places. • Recognise the % symbol and know it means out of 100/parts per 100. • Solve problems which require decimal, fraction and percentage equivalence of ½, ¼, 1/5, 2/5, 2/4 etc.	• Use common multiples and factors to express fractions using the same denominator. • Compare and order fractions > 1. • Add and subtract fractions with different denominators. • Multiply pairs of proper fractions. • Divide proper fractions by whole numbers. • Associate a given fraction with its decimal and percentage equivalent; use division to do this. • Multiply decimals by each other and by whole numbers. • Find a remainder to a division question as a decimal. • Solve a range of problems using fractions, decimals and percentages.

Geometry

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
• Recognise and name common 2D shapes. • Recognise and name common 3D shapes. • Use quarter turns to describe movement and direction.	• Recognise basic properties of 2D shapes, including lines of symmetry. • Describe properties of 3D shapes including vertices, edges and faces. • Identify 2D shapes on the surface of a 3D shape – Eg, rectangles on a cuboid. • Compare and sort common 2 and 3D objects. • Order and arrange sequences and patterns. • Use maths vocabulary to describe position, direction and movement; use quarter turns, clockwise and anti-clockwise.	• Draw 2D shapes and model 3D ones. • Recognise angles as a proportion of turn and recognise right angles. • Use right angles to describe turn. • Identify horizontal and vertical lines and lines which are parallel or perpendicular.	• Compare and classify geometric shapes, including quadrilateral and triangles based on properties and sizes. • Identify acute, obtuse and right angles in shapes. • Identify lines of symmetry in 2D shapes. • Draw objects to show symmetry. • Use coordinates in the first quadrant. • Translate simple shapes using positional language – up/down/left/right. • Plot points on a grid to construct simple polygons.	• Identify 3D shapes from nets and pictures. • Know angles are measured in degrees; recognise and compare obtuse, acute and right angles. • Draw angles and measure them accurately using a protractor. • Identify when angles total 180 and 360 degrees. • Use properties of rectangles to deduce missing information. • Recognise regular and irregular polygons. • Reflect and translate shapes according to instructions.	• Draw 2D shapes according to instruction. • Recognise and build 3D shapes using nets. • Find unknown angles in triangles and quadrilaterals. • Illustrate and name parts of circles – radius, diameter and circumference. • Recognise angles where they meet at a point, or on a straight line and find missing angles. • Plot and find points in 4 quadrants. • Draw and translate simple shapes in 4 quadrants and reflect them in axis.

Measurement

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
• Compare, describe and solve practical problems for: • Lengths and heights, mass or weight, capacity and volume. • Record all of these appropriately. • Recognise coins and notes in money. • Sequence events in chronological order, using appropriate language. • Know days of the week and months of the year in the correct order. • Tell the time to the hour and half past; draw hands on a clock to show times.	• Use standard measures for length, weight, capacity, temperature, time and money. • Compare length, weight and capacity. • Find specific amounts of money. • Solve practical problems with measures. • Tell and write the time to 5 minutes. • Know how many minutes in an hour and how many hours in a day. • Solve simple problems across these areas.	• Measure, compare, add and subtract lengths, masses, capacity and volume. • Measure the perimeter of simple shapes. • Add and subtract money. • Tell the time in analogue using Roman numerals and in 12 and 24 h clock. • Tell the time accurately to the nearest minute. • Know how many seconds are in 1 minute and how many days are in each month of the year. • Compare duration of events. • Solve problems across these areas of study.	• Convert between units of measurement. • Measure and calculate the perimeter of rectangles. • Find the area of rectangles and squares by counting squares. • Estimate and compare a range of measures. • Read, write and convert time between digital and analogue and between 12 and 24 hour clock. • Solve problems across these areas of study.	• Convert between a wide range of measures. • Understand and recognise equivalence between metric and imperial units. • Find perimeter and area of squares and rectangles and of compound shapes using formulae. • Estimate and calculate volume of solid objects. • Solve problems involving the passing of time. • Use all 4 number operations to solve problems across these areas of study, including decimal notation.	• Solve problems involving the calculation and conversion of units of measure, including decimals. • Use standard measures up to 3 decimal places where possible. • Convert between miles and km. • Recognise shapes with the same area and perimeter and know these can be different. • Calculate the area of triangles and parallelograms. • Calculate, estimate and compare the volume of cubes and cuboids.

Statistics

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
No statutory teaching. Teachers to use discretion as to what might be taught in this area if the children are ready for this.	• Read and construct simple pictograms, tally charts, block graphs and tables. • Answer simple questions by counting the number of objects. • Ask and answer questions about totalling and comparing data.	• Interpret and present data using bar charts, pictograms and tables. • Solve one and two step problems using information presented in scaled bar charts, pictograms and tables.	• Interpret and present discrete data and continuous data using appropriate methods, including bar and time graphs. • Solve complex problems using information presented in bar charts, pictograms, tables and other appropriate graphs.	• Solve comparison, sum and difference problems using line graph information. • Complete, read and interpret information in tables, including timetables.	• Interpret and construct pie charts and line graphs and use these to solve problems. • Calculate and interpret the mean as an average. • Understand mode and median as less accurate averages.

Algebra/Ratio and Proportion

Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
• Empty box questions at a simple level. • Number puzzles and pyramids.	• Empty box questions at a simple level. • Number puzzles and pyramids.	• Empty box questions at a simple level. • Number puzzles and pyramids.	• Balance 'sums'. • Empty box questions across all 4 number operations. • Simple ratio and proportion questions as part of other maths areas.	• Balance 'sums'. • Empty box questions across all 4 number operations. • Simple ratio and proportion questions as part of other maths areas. • Number sequence puzzles.	• Use simple formulae. • Generate and describe linear number sequences. • Express missing number problems algebraically. • Find pairs of numbers that satisfy an equation with 2 unknowns. • Find all possible combinations of 2 variables. • Solve problems using relative sizes of quantities. • Solve problems involving scale. • Solve problems that involve unequal sharing.

$$2\overline{)26} \quad 13$$

Year 4

In addition and subtraction, formal methods will be taught using numbers up to 4 digits.

The children will be taught how to use the inverse and estimation for checking the reasonableness of their answers.

In multiplication, the children will move on to multiplying 3 and 4 digit numbers by a single digit and in division the children will be taught how to do more complex formal working, including working with remainders.

$$5\overline{)721} \quad 144\text{ r}1$$

Year 5

In addition and subtraction the children will work with decimals ina range of contexts and will be expected to calculate beyond 4 digit numbers.

In multiplication the children will learn how to carry out long multiplication, multiplying two 2 digit numbers together.

$$\begin{array}{r} {}^{3}26 \times \\ 15 \\ \hline 130 + \\ 260 \\ \hline 390 \end{array}$$

In division the children will be taught how to carry out more complex division, when dividing by 2 digits and will be shown how to do long division.

$$12\overline{)306} \quad 25\text{ r }6$$

$$\begin{array}{r} 24 \\ \hline 066 \\ 60 \\ \hline 06 \end{array}$$

$$\longrightarrow \quad 12\overline{)306} \quad 25.5$$

$$\begin{array}{r} 24 \\ \hline 66 \\ 60 \\ \hline 060 \end{array}$$

Year 6

In year 6 the children will be taught how to +, -, x and ÷ to 3 decimal places and will be taught the +, -, x and ÷ of fractions.

They will be taught to always work with the units first.

This will be supported by concrete apparatus so the children can see what they are doing clearly.

If children are secure with this they will move on to standard methods.

The children will be expected to know 2, 3, 5 and 10 times tables by the end of year 2.

In x and ÷, the children will begin writing number sentences and using the inverse to solve empty box problems.

Eg,

$5 \times 2 = 10$
$10 \div 2 = \square$

Children will continue to build on mental addition and subtraction skills alongside written calculations.

Year 3

More complex mental addition and subtraction skills will be taught.

Formal written methods will be taught for written + and – calculations.

$$\begin{array}{r} {\scriptstyle 1} \\ 73 + \\ 28 \\ \hline 101 \end{array} \qquad \begin{array}{r} {\scriptstyle 4} \\ 56 - \\ 27 \\ \hline 29 \end{array}$$

In x and ÷, children will learn 3, 4, 6 and 8 times tables and will practise corresponding division facts, reinforced with empty box questions.

Multiplication of 2 digit numbers by a single digit will be taught, first as a mental calculation through partitioning and then formally as short multiplication.

$37 \times 3 = 111$
$30 \times 3 = 90$
$7 \times 3 = 21$

$$\begin{array}{r} {\scriptstyle 2} \\ 37 \times \\ 3 \\ \hline 111 \end{array}$$

Division will initially be taught through grouping and sharing in a practical way, moving on to simple formal recording by the end of the year.

Boltons Church of England Primary School – Calculation Policy

Aims

The aim of the calculation policy is to ensure that all pupils develop confidence and competence in using/working with whole numbers and decimals, with counting and with understanding place value. We want all our children to be able to use quick, fool-proof methods to calculate when using addition, subtraction, multiplication and division and for them to be able to decide confidently when a calculation is best carried out mentally or when to work it out on paper.

This policy should ensure that all children learn in a clear, systematic way, progressing through stages of understanding and developing confidence and speed as they go.

Basic mental skills are still vitally important to a good maths understanding and children will be taught mental methods of calculation alongside written ones and will be encouraged to decide for themselves when the use of these skills is appropriate.

At all stages of learning we believe that children need the opportunity to practise their basic skills through problem solving so that they are secure applying their skills in a range of 'real life' situations. It is essential that this is done on a weekly basis to ensure that all children can use their calculation skills in a meaningful way.

Year 1

Children will learn the quick recall of number bonds to 20 in both + and -.

They will learn how to count on and back with the aid of concrete apparatus such as a number square.

The children will learn how to record their number sentences for + and – questions and will begin to learn the 2, 5 and 10 tables by rote.

Children will be taught the meaning of place value and will use empty number box questions to help develop an understanding of inverse operations.

In x and ÷, children will be taught to group and share and count in 2, 5 and 10.

Year 2

Children will be taught to partition to add and subtract in columns.