

Mathematical Curriculum and Knowledge at Muschamp Primary School

There are three main overarching aims of the primary mathematics curriculum.

These are –

- **Fluency**
- **Reasoning**
- **Problem solving**

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately

- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language

- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions

Mathematical knowledge is recognised as being organised into three main areas.

Declarative Knowledge – This is related to the things we often talk about as being recall or ‘learnt by heart’. It is the number facts to be learnt. It is the key facts we recall. It is knowing things like rules and formula. It is the relationship between rules and facts. It is being familiar enough with vocabulary and principles so that the equations needed within word problems can be recognised. It is easy to think of it as sentences which begin with, **“I know that/what...”**

Procedural Knowledge – This is related to knowing the methods available to do things like complete calculations. It is about using methods accurately and efficiently. It is developing confidence to progress to the next steps with calculation. It is applying the recall of facts (declarative knowledge) to procedures. It relates to more practical elements too, like knowing how to measure, covert units of measurement, draw shapes and create patterns, It is easy to think of it as sentences which begin with, **“I know how/how to...”**

Conditional Knowledge – This is related to the knowledge and understanding of facts and procedures which can then be used to reason and solve problems. It’s making and connecting the relationships. It’s knowing strategies to use to problem solve. It is easy to think of it as sentences which begin with, **“I know when...”**

Declarative Knowledge

Think of it as sentences which begin with,
“I know that/what...”

EYFS –

- Numbers and number bonds to 10
- Concepts and vocabulary for talking about maths/patterns

Key Stage 1 –

- Maths facts and number bonds (within and between 20)
- Key number facts within and between 100
- Multiplication facts for 2, 5 and 10 times tables
- Important fraction facts (like half of 8 is 4)
- Time facts – for example, minutes in an hour
- Basic arithmetic
- The number system and the symbols we use
- Simple fractions
- Place value and conventions for expressions and equations
- Counting, addition, subtraction, equal sharing, doubling, balancing equations
- Classifying and properties of numbers – odd, even, teens
- Inverse operations
- Basic measurements – length, capacity, time, position, direction
- Basic geometry – properties of 2D and 3D shapes

Lower Key Stage 2 –

- Rules for addition and subtraction of numbers, decimal numbers, place value, negative numbers
- All multiplication facts for the 3, 4, 6, 7, 8, 9, 11, 12
- Decimal equivalents of key fractions, equivalent fractions
- Formulae: Units of measurement conversion rules, formulae for perimeter and area
- Geometry facts: acute, obtuse and right angles, right angles in whole and half turns, symmetry, triangle and quadrilateral classifications; horizontal, perpendicular, parallel and perpendicular lines
- Link words/phrases to their corresponding operations in mathematics (e.g. ‘spending’ is associated with ‘subtraction from an amount’ and ‘increase’ with addition)
- The rules for multiplying and dividing by 10, 100 and 1000
- First quadrant grid coordinate principles

Upper Key Stage 2 –

- Enhanced knowledge of place value: up to and within 1 000 000, multiples, factors,
- Multiples, factors, decimals, prime number facts to 100, composite numbers, indexation for square and cubed numbers
- Properties of linear sequences
- Conversion facts metric to imperial measurements and vice versa
- Key circle, quadrilateral and triangle facts and formulae (e.g. angles on a straight line sum to 180 degrees)
- Rules and principles governing order of operations

Procedural Knowledge

Think of it as sentences which begin with, “I know how/how to...”

EYFS –

- Accurate counting
- Single digit addition and subtraction
- Halving, doubling and sharing

Key Stage 1 -

Efficient and accurate methods:

- Counting up and down in 1s, 2, 5s, 10s and 1/2s
- Addition; subtraction
- Equal sharing, division and multiplication
- Reading, writing of the digits/symbols, vocabulary and phrases required for working with simple fractions
- Arithmetic expressions and equations
- Measuring length, capacity, time and monetary value
- Presentation and layout of calculations
- Using a ruler
- Spotting and making geometric and numerical patterns
- Construction and interpretation of categorical data: pictograms, charts, tables

Lower Key Stage 2 -

Efficient and accurate methods:

- Counting up and down in multiples of 3, 4, 6, 7, 8, 9, 11, 12, 25, 50, 100, 1000, in tenths, in ones through to negative numbers
- Column addition and subtraction, Short division and multiplication
- Mental addition, subtraction and multiplication using derived facts and rules
- Fractions: finding unit and non-unit fractions of amounts, common equivalents, addition, subtraction and comparison of fractions with the same denominator
- Measure, compare, add, subtract: lengths, mass, capacity
- Read, write and compare roman numerals
- Draw 2D and 3D shapes
- Interpret and present data
- Estimation and rounding
- First quadrant grid construction, plotting and translation of points

Upper Key Stage 2

- Efficient and accurate methods
- Scaling, coordinate geometry in all four quadrants
- Division with remainders as fractions or decimals
- Fractions: convert mixed to improper and vice versa, add, subtract, multiply
- Finding percentages of amounts
- Converting units of measurement
- Measurement of length, angles, area, perimeter, volume
- Use of order of operations
- Convert between fractions, decimals and percentages
- Linear algebra, basic trigonometry
- Long multiplication and division

Conditional Knowledge

Think of it as sentences which begin with,
“I know when/that when...”

EYFS –

Use combinations of number facts, shape facts, pattern facts, methods of counting, addition and subtraction to...

- play games
- sing songs
- answer questions
- talk about everyday objects
- solve problems using objects within continuous provision

Key Stage 1 -

Use combinations of taught and rehearsed facts and methods to:

- Complete written exercises
- Solve missing number problems
- Solve simple word problems involving arithmetic, money, time and fractions
- Solve data and measurement problems

Lower Key Stage 2 –

Use combinations of taught and rehearsed facts and methods to:

- Complete written exercises
- Solve missing number, length problems
- Solve word problems involving arithmetic, fractions, data handling, shape, length, mass and capacity

Upper Key Stage 2

Use combinations of taught and rehearsed facts and methods to:

- Complete written exercises
- Find missing quantities, lengths, angles
- Solve one- and two-step word problems involving all the operations
- Abstract and solve linear equations from word problems

Useful links...

<https://www.gov.uk/government/publications/early-years-foundation-stage-framework-2> (Early Years Foundation Stage Statutory Framework)

<https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study/national-curriculum-in-england-mathematics-programmes-of-study#key-stage-3> (The Mathematics National Curriculum for KS1 – KS4)

<https://www.johnfisherschool.org/ckfinder/userfiles/files/Mathematics%20KS3.pdf> (Declarative and disciplinary knowledge at KS3)