Mathematics

Moulton Chapel Primary School

1. *To be able to read, write and speak with confidence and fluency.*
2. *To be able to use mathematical concepts to tackle problems and resolve them.*
3. *To be global citizens that have had cultural experiences beyond their normal lives.*
4. *To aspire our children to dream big in their career path.*
5. *Grow into responsible, respectful young people who value each other.*

Intent

At Moulton Chapel Primary School, our intent for Mathematics is underpinned by the belief that all children need to have a sound understanding of the mathematics they are learning. We want our children to recognise the importance of Mathematics in every aspect of their daily life. The Mathematics taught is carefully planned and sequenced, where we drive to build on their knowledge year on year that deepens their understanding and learning to enable them to become fluent in the fundamentals of mathematics. By achieving the aims within our curriculum, our children will leave our school to be able to use their mathematical concepts to tackle problems and resolve them.

Implementation

The teaching and implementation of the Mathematics at Moulton Chapel Primary School is based on the National Curriculum. We ensure that all pupils move through the curriculum and based on good AFL, our teachers make decisions about when to progress children, based on their security of knowledge. We encourage children to make connections between the different strands of Mathematics to develop their fluency, mathematical reasoning skills to tackle increasingly complex problems. We encourage the children to use their mathematical skills across the other subjects of the curriculum, particularly Science where relevant.

Our children are taught Mathematics daily and sessions are planned in outside of 'Maths' lessons to develop their fluency in areas such as their quick recall of multiplication facts.

We use many manipulatives throughout the school to support understanding and teaching of a concept and encourage the children to move through a Concrete, Pictorial, Abstract approach to ensure that the children's knowledge is embedded.

We teach the children the most efficient strategies for calculation using the agreed formal methods form the National Curriculum. The children are taught the skills for problem solving and given opportunities to apply and develop these skills with increasing complexity.

Children are reviewed using their school bookmark system and this informs planning sessions to meet their need. End of term assessments are carried out to assess their progress through the broader Mathematics journey.

EYFS have continuous Mathematic provision with a mixture of a well-balanced teacher directed and child directed tasks. They are assessed through Tapestry and this is regularly updated and informs the provision they are able to access.

Impact

Our overall impact is measured by whether the children meet age related expectations and are able to retain the knowledge and skills they have learnt and apply these years on year and in different contexts/subjects/strands of mathematics.
We want our children to be fluent in all four written operations and have the ability to recall and apply mathematical knowledge; follow a line of enquiry in a Mathematical problem using appropriate language and break down complex problems into simpler steps to come to a resolution.

Curriculum requirements:

EYFS requirements:

Number ELG
Children at the expected level of development will:

- *Have a deep understanding of number 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.*

Numerical Patterns ELG
Children at the expected level of development will:

- *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.*

National Curriculum for Mathematics:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/335158/PRIMARY_national_curriculum_-_Mathematics_220714.pdf

Key Stage 1 National Curriculum
Within the guidance Key Stage 1 child are taught these fundamentals of Mathematics through the strands of:

Number and Place Value	*Addition and Subtraction*	*Multiplication and Division*	*Fractions*	*Measurement*	*Properties of Shape*	*Position and Direction*	*Statistics*

Lower Key Stage 2 National Curriculum
Within the guidance Lower Key Stage 2 child are taught these fundamentals of Mathematics through the strands of:

Number and Place Value	*Addition and Subtraction*	*Multiplication and Division*	*Fractions*	*Decimals*	*Measurement*	*Properties of Shape*	*Position and Direction*	*Statistics*

Upper Key Stage 2 National Curriculum

Within the guidance Upper Key Stage 2 child are taught these fundamentals of Mathematics through the strands of:

Number and Place Value	*Addition and Subtraction*	*Multiplication and Division*	*Fractions*	*Decimals*	*Percentages*
Ratio and proportion	*Algebra*	*Measurement*	*Properties of Shape*	*Position and Direction*	*Statistics*

Whole School Overview

	Autumn 1	***Autumn 2***	***Spring 1***	***Spring 2***	***Summer 1***	***Summer 2***
KS1	*NPV (2)* *Addition and subtraction (2)* *Measure (1)* *Properties of shape (1)*	*NPV (1)* *Addition and Multiplication (2)* *Money (1)* *Fractions (1)* *Statistics (1)*	*NPV (1)* *Subtraction and division (2)* *Measure (1)* *Measure – Time (1)* *Position and direction (1)*	*Addition and subtraction (1)* *Measure – Time (1)* *Money (1)* *Properties of shape (1)* *Fractions (1)* *Statistics (1)*	*NPV (1)* *Addition and subtraction (1)* *Fractions (1)* *Measure (2)* *Properties of shape (1)*	*Addition and subtraction (2)* *Multiplication and division (1)* *Measure- Time (1)* *Position and direction (1)* *Statistics (1)*
Y3/4	*NPV (2)* *Addition and subtraction (2)* *Properties of shape (1)* *Statistics (1)*	*NPV (1)* *Multiplication and division (2)* *Fractions (1)* *Position and direction (1)* *Measure (1)* *Test techniques* →	*NPV (1)* *Addition and subtraction (1)* *Multiplication and division (1)* *Fractions (1)* *Properties of shapes (1)* *Statistics (1)*	*Multiplication and division (1)* *Decimals (2)* *Measure (2)* *Position and direction (1)*	*NPV (1)* *Addition and subtraction (1)* *Fractions (1)* *Decimals (1)* *Position and direction (1)* *Measure (1)*	*Addition and subtraction (1)* *Multiplication and division (2)* *Measure (1)* *Properties of shapes (1)* *Statistics (1)*
Y5/6	*NPV (2)* *Addition and subtraction (2)* *Multiplication and division (2)*	*NPV (1)* *Addition and subtraction (1)* *Multiplication and division (2)* *Fractions (2)* *Test techniques* →	*NPV (1)* *Multiplication and division (1)* *Fractions (2)* *Decimals (2)*	*Decimals (2)* *Percentages (2)* *Ratio and proportion (1)* *Algebra (1)*	*Addition, subtraction, multiplication and division (1)* *Fractions (1)* *Decimals (1)* *Percentages (1)* *FDP (2)*	*NPV (1)* *Addition, subtraction, multiplication and division (2)* *FDP (1)* *Ratio and proportion (1)* *Algebra (1)*
	Properties of shape (2) *Measure (4)*	*Properties of shape (1)* *Measure (1)* *Statistics (2)* *Position and direction (2)*	*Position and direction (2)* *Properties of shape (1)* *Measure (2)* *Statistics (1)*	*Measure (2)* *Position and direction (1)* *Properties of shape (2)* *Statistics (1)*	*Statistics (1)* *Position and direction (1)* *Measure (2)* *Properties of shape (2)*	*Statistics (1)* *Position and direction (1)* *Measure (2)* *Properties of Shape (2)*

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Progression through the school – fundamentals of Mathematics

	EYFS	Year 1 and 2	Year 3 and 4	Year 5 and 6
Number and place Value	▪ *Count reliably with numbers 1 to 20.* ▪ *Place them in order and say which number is one more or one less than a given number* ▪ *Read and write numbers 1-10 in numerals*	▪ *Read and write numbers to 100 in numerals and words* ▪ *Compare numbers to 100 using < > = signs* ▪ *Count reliably in steps of 2, 3, 5 and 10 from numbers forwards and backwards* ▪ *Understand the place value of each digit in a 2-digit number*	▪ *Count from 0 in multiples of 4, 6, 7, 8, 9, 25, 50 and 100* ▪ *Find 100 / 1000 more or less than a given number* ▪ *Count backwards through 0 to include negative numbers* ▪ *Recognise the place value of each digit in a 4-digit number* ▪ *Order and compare numbers beyond 1000* ▪ *Identify, represent and estimate numbers using different representations* ▪ *Round any number to the nearest 10, 100 or 1000* ▪ *Solve number and practical problems that involve all of the above and with increasingly larger numbers* ▪ *Use Roman numeral to 100 (I – C) and understand how over time the number system changed including the concept of 0*	▪ *Read, write, order and compare numbers up to 1 000 000 and determine the value of each digit* ▪ *Count forwards/ backwards in steps of power of 10 from any given number* ▪ *Round any number to a required degree of accuracy* ▪ *Use negative numbers in context, and calculate intervals across 0* ▪ *Solve number problems and practical problems that involve all of the above* ▪ *Read Roman numerals to 1000 (M) and recognise years written in Roman numerals*
Addition	▪ *Use quantities and objects, add 2 single digit numbers* ▪ *Count on to find an answer*	▪ *Use mental recall of addition facts to 20 and derive related facts up to 100* ▪ *Solve addition problems using both mental and written methods* ▪ *Begin to use knowledge of inverse for addition to check calculations*	▪ *Add numbers with up to 4-digits using a formal written method – columnar addition* ▪ *Estimate and use inverse operations to check calculations* ▪ *Solve addition two-step problems in contexts, deciding which operations and methods to use and why*	▪ *Add numbers mentally with increasingly larger value* ▪ *Add numbers with more than 4-digits using a formal written method – columnar addition* ▪ *Use rounding to check answers to calculations and determine, in the context of a problem* ▪ *Solve addition multi-step problems in contexts, deciding which operations and methods to use and why*
Subtraction	▪ *Use quantities and objects to subtract 2 single digit numbers* ▪ *Count back to find an answer*	▪ *Use mental recall of subtraction facts to 20 and derive related facts up to 100* ▪ *Solve subtraction problems using both mental and written methods* ▪ *Begin to use knowledge of inverse for subtraction to check calculations*	▪ *Subtract numbers with up to 4-digits using a formal written method – columnar subtraction* ▪ *Estimate and use inverse operations to check calculations* ▪ *Solve subtraction two-step problems in contexts, deciding which operations and methods to use and why*	▪ *Subtract numbers mentally with increasingly larger value* ▪ *Subtract numbers with more than 4-digits using a formal written method – columnar subtraction* ▪ *Use rounding to check answers to calculations and determine, in the context of a problem* ▪ *Solve subtraction multi-step problems in contexts, deciding which operations and methods to use and why*

Multiplication	▪ *Understand the concept of doubling* ▪ *Develop an understanding of groups*	▪ *Use mental recall of multiplication facts for 2, 5, 10* ▪ *Recognise odd and even numbers* ▪ *Begin to use and understand x = symbols* ▪ *Solve multiplication problems using repeated addition*	▪ *Recall multiplication facts for tables up to 12X12* ▪ *Use place value, known and derived facts to multiply mentally – including multiplying by 0 and 1* ▪ *Multiply together three numbers* ▪ *Recognise and use factor pairs and communitive law in mental calculations* ▪ *Multiply 2-digit and 3-digit numbers by 1-digit using a written formal method* ▪ *Solve problems involving multiplying and adding.*	▪ *Use a long and short written methods for multiplication calculations, including using decimals numbers.* ▪ *Multiply whole numbers involving decimals by 10, 100 and 1000* ▪ *Recognise and use prime numbers and prime factors* ▪ *Identify common factors and multiples* ▪ *Solve multiplication problems including recognition and application of factors, multiples, squares, cubes*
Division	▪ *Understand the concept of halving* ▪ *Develop an understanding of groups*	▪ *Use mental recall of division facts for 2, 5, 10* ▪ *Recognise odd and even numbers* ▪ *Begin to use and understand ÷ = symbols* ▪ *Solve division problems using arrays and repeated subtraction*	▪ *Recall division facts for tables up to 12X12* ▪ *Use division facts to complete calculations mentally* ▪ *Divide by 1-digit using a written formal method (short method)* ▪ *Solve problems involving division*	▪ *Use a long and short formal written methods for division calculation, including decimals numbers.* ▪ *Divide numbers up to 4-digit by 2-digit numbers* ▪ *Complete problems that including interpreting remainders*
Fractions		▪ *Find and record fractions ½ , ¾ , 2/4, ¼ of length, shapes and quantities* ▪ *Begin to recognise equivalent fractions*	▪ *Recognise and show, using diagrams, families of common equivalent fractions* ▪ *Compare and order fractions with the same denominator* ▪ *Add and subtract fractions with the same denominator*	▪ *Compare and order fractions whose denominators are all multiples of the same number and including fractions >1* ▪ *Use common factors to common factors; use common multiples to express fractions* ▪ *Recognise mixed numbers and improper fractions and convert from one to another* ▪ *Add and subtract fractions with the same denominator and denominators that are multiples of the same number* ▪ *Multiply simple pairs or proper fractions, writing the answer in its simplest form* ▪ *Divide proper fractions by whole numbers* ▪ *Associate a fraction with division and calculate decimal fraction equivalents* ▪ *Recall and use equivalences between simple fractions, decimals and percentages in different contexts*
Decimals			▪ *Count up and down in tenths and hundredths, recognising that tenths arise from dividing an object into 10 equal parts* ▪ *Recognise and write equivalent decimals of any number of tenths or hundredths* ▪ *Recognise and write decimal equivalents to ¼, ½, ¾* ▪ *Round decimals with 1dp to the nearest whole number* ▪ *Find the effect of dividing by 10/100 and understand the value of the resulting decimal numbers* ▪ *Compare numbers with the same number of decimal places up to 2dp*	▪ *Read and write decimal numbers as fractions* ▪ *Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents* ▪ *Identify the value of each digit in given numbers to 3dp* ▪ *Round decimals with 2dp to the nearest whole number and to 2dp* ▪ *Read, write and compare numbers with up to 3dp* ▪ *Multiply 1-digit numbers with up to 2dp by whole numbers* ▪ *Use written division methods in cases where the answer has up to 2dp* ▪ *Solve problems involving numbers up to 3dp or answers need to be rounded to specified degrees of accuracy* ▪ *Recall and use equivalences between simple fractions, decimals and percentages in different contexts*

Percentages				▪ *Know the per cent symbol % and understand that per cent relates to part of 100* ▪ *Solve problems that require knowing how to find percentages* ▪ *Write percentages as a fraction with denominator 100, and as a decimal* ▪ *Recall and use equivalences between simple fractions, decimals and percentages in different contexts*
Ratio and proportion				▪ *Solve problems involving the relative sizes of 2 quantities where missing values can be found by using multiplication and division facts* ▪ *Use percentages for comparison* ▪ *Solve problems involving similar shapes where scale factor is known* ▪ *Solve problems involving unequal sharing and grouping using knowledge of fractions*
Algebra				▪ *Use simple formula* ▪ *Generate and describe linear number sequences* ▪ *Express missing number problems algebraically* ▪ *Find pairs of numbers that satisfy an equation with two unknowns* ▪ *Enumerate possibilities of combinations of 2 variables*
Measurement	▪ *Use everyday language to talk about size, weight, capacity, distance, time, compare quantities and objects to solve problems*	▪ *Begin to use appropriate standard units to estimate and measure to the nearest unit including:* ❖ *Length (cm/m)* ❖ *Mass (kg / g)* ❖ *Temperature (°C)* ❖ *Capacity (l / ml)* ▪ *< > = symbols to compare and order mass and length* ▪ *Use the symbols for pounds and pence (£ / p)* ▪ *Begin to compare amounts of money to make a particular value and calculate change* ▪ *Understand how to tell the time to five minutes, including quarter past/to the hour* ▪ *Be able to draw times on a clock face* ▪ *Know the number of minutes in an hour and the number of hours in a day* ▪ *Compare and sequence intervals of time*	▪ *Measure, compare, add and subtract:* ❖ *Length (mm/cm/m)* ❖ *Mass (kg / g)* ❖ *Volume/capacity (ml/l)* ▪ *Convert between different units of measure* ▪ *Measure and calculate the perimeter of a rectilinear shape* ▪ *Find the area of a rectilinear shape by counting squares* ▪ *Add and subtract amounts of money giving change* ▪ *Read, write and convert time between analogue and digital 12- and 24-hour clocks* ▪ *Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days* ▪ *Know the number of seconds in a minute, days in each month, year and leap year* ▪ *Calculate the duration of events / tasks in a problem*	▪ *Convert between different units of measure* ▪ *Solve problems involving different units of measure, using decimal notation up to three places* ▪ *Understand and use approximate equivalents between metric and imperial units: inches, pounds, pints, miles* ▪ *Measure and calculate the perimeter of composite rectilinear shapes* ▪ *Calculate and compare the area of rectangles using standard units* ▪ *Recognise that shapes with the same areas can have different perimeters and vice versa* ▪ *Use a formula for calculating area and volume of shapes including parallelograms and triangles* ▪ *Estimate, calculate and compare the volume of cubes and cuboids using standard units* ▪ *Solve problems involving converting between units of time*

Properties of shape	▪ *Recognise and create and describe patterns* ▪ *Recognise 2D shapes including: triangles, circle, square and rectangle* ▪ *Explore characteristics of everyday objects and shapes* ▪ *Use mathematical language to describe them* ▪ *Begin to recognise 3D shapes including: pyramid, cube, cuboid, sphere*	▪ *Compare 2D and 3D shapes* ▪ *Use number of sides and knowledge of lines of symmetry in a vertical line* ▪ *Describe the properties of 2D shapes* ▪ *Use number of edges, vertices and faces to describe 3D shapes* ▪ *Begin to identify 2D shapes on the surface of 3D shapes*	▪ *Draw 2D shapes and make 3D shapes and recognise 3D shapes in different orientations* ▪ *Recognise angles as a property of shape and associate angels in turning* ▪ *Identify acute and obtuse angles and compare and order angles up to 2 right angles* ▪ *To recognise that two right angles make a half turn, three angles make a three-quarter turn.* ▪ *Identify lines of symmetry in 2D shapes* ▪ *Complete a simple symmetric figure* ▪ *Identify horizontal and vertical lines and pairs*	▪ *Draw 2D shapes using given dimensions and angles* ▪ *Identify 3D shapes from 2D representations* ▪ *Recognise, describe and build 3D shapes from nets* ▪ *Know that angles are measured in degrees; estimate and compare acute, obtuse and reflex angles* ▪ *Draw given angles, measuring them in degrees (°)* ▪ *Identify:* ✓ *Angles at a point and whole turn equals 360°* ✓ *Angles on a straight line or half turn equals 180°* ✓ *Other multiples of 90°* ▪ *Compare and classify geometric shapes based on their properties and can deduce related facts to find missing lengths* ▪ *Distinguish between regular and irregular polygons* ▪ *Illustrate and name parts of a circle, including radius, diameter, circumference and that the diameter is twice the radius* ▪ *Can use their knowledge of angels to solve problems of missing angles*
Position and direction	▪ *Use everyday language to talk about position and distance to solve problems*	▪ *Begin to produce patterns and sequences using mathematical objects* ▪ *Begin to understand the concept of angles and rotation, including right angles for quarter, half and three-quarter turns* ▪ *Understand and use the terms clockwise and anti-clockwise*	▪ *Describe positions on a 2D grid as co-ordinates in the first quadrant* ▪ *Describe movement between positions as translations of a given unit* ▪ *Plot specified points and draw sides to complete a polygon*	▪ *Describe positions on the full co-ordinate grid* ▪ *Draw simple shapes on the co-ordinate plane and reflect them in the axes* ▪ *Draw simple shapes on the co-ordinate plane and translate them in the axes*
Statistics	▪	▪ *Understand and know how to construct pictograms, tally charts, block diagrams and simple tables* ▪ *Begin to answer questions by counting / sorting, and totalling/comparing data*	▪ *Solve one step and two step problem using information presented in scaled bar charts and pictograms and table* ▪ *Interpret and present discreet and continuous data using bar charts and time graphs, pictograms and tables*	▪ *Solve comparison, sum and difference problems using information presented in a line graph* ▪ *Interpret and construct pie charts and line graph* ▪ *Complete, read and interpret information in tables, including timetables* ▪ *Calculate and interpret the mean, as an average*

Progression through the school – problem solving and reasoning skills (use of Nrich activities to support)

To know how to . . .	**EYFS**	**Year 1 and 2**	**Year 3 and 4**	**Year 5 and 6**
Work systematically ***Find all possibilities*** ***List possibilities for combinations***	▪ *Talk about things being in order.* ▪ *Identify things that are the same and different.* ▪ *Use ordinal vocabulary.* ▪ *Sort objects into criteria and be able to talk about that criterion.* ▪ *Explain what they are doing and thinking.* ▪ *Represent work with objects or pictures to discuss it.* ▪ *Talk about ways to check that there are no omissions or repetitions.*	▪ *Identify what is the same and different within a problem.* ▪ *Use a systematic way to solve a problem and explain how they have done this.* ▪ *Create a systematic list of possibilities.* ▪ *Look for patterns and possible general statements or relationships.* ▪ *Recognise that there is sometimes more than one possibility to answering a problem.* ▪ *Give examples that match a given statement and those that don't.*	▪ *Solve a problem by checking possible solutions against a given criteria.* ▪ *List possible answers in a systematic efficiently.* ▪ *Prove what they have found all possible answers by being systematic.* ▪ *Justify the approach as being systematic.* ▪ *Prove that all items are listed.* ▪ *Make a general statement and provide a convincing argument that it is true.* ▪ *Use a pattern to predict the next number of combinations*	▪ *Find all possibilities by working systematically.* ▪ *Identify a pattern to make a prediction of a number of possibilities.* ▪ *Prove all possibilities are listed.* ▪ *Recognise when reasoning is systematic and when it is not.* ▪ *Make a general statement and provide a convincing argument and apply this to other situations.* ▪ *Express the general statement from an investigation using mathematical language, symbols and sometimes algebra.*

Generalising and conjecturing ***Explain and justify*** ***Find rules and describe patterns***	▪ *Talk about, recognise and recreate simple patterns.* ▪ *Identify same and different.* ▪ *Describe solutions to practical problems, drawing on experience, talking about their own ideas, methods and choices.* ▪ *Sort objects using a criterion and explain their reasons.* ▪ *Make a prediction about the next part of the pattern.*	▪ *To identify, describe and recreate simple patterns and relationships involving numbers or shapes or items.* ▪ *Describe ways of solving puzzles and problems, explaining choices and decisions.* ▪ *Represent findings orally, using pictures or practically.* ▪ *Make a prediction about the next part of the pattern and explain why.*	▪ *Generate patterns by considering examples systematically in an investigation.* ▪ *Make general statements and discuss relationships using everyday language, writing and use diagrams and symbols.* ▪ *Describe and explain methods, choices and solutions to puzzles and problems.* ▪ *Use patterns to make predictions and general statements.* ▪ *Describe and continue more complex patterns.* ▪ *Draw conclusions from investigations and explain their reasoning.*	▪ *Generate patterns through systematic examples in an investigation.* ▪ *Identify and describe patterns using mathematical language.* ▪ *Accurately predict a later term in a pattern or sequence.* ▪ *Use a pattern to suggest and test general statements.* ▪ *Provide a convincing for the general statement.* ▪ *Draw conclusions from investigations and explain their reasoning using words, symbols or diagrams as appropriate.*
Think strategically **Interpret information** **Solve logic problems**	▪ *Recognise similarities and differences.* ▪ *Sort objects using several criterion and sort to their own criterion, justifying choices.* ▪ *Say why an item doesn't belong in a set.* ▪ *Guess the criteria being used to sort objects.* ▪ *Explain what they are doing and thinking.*	▪ *Solve a problem by identifying given facts and prioritising them.* ▪ *Identify necessary information for solving problems.* ▪ *Confirm that they have found the correct solution by checking in another way.* ▪ *Use recording to help them make sense of the information given and to find missing information.*	▪ *Solve a problem by identifying and prioritising given facts and information, checking possible solutions against given criteria.* ▪ *Check that their solution meets all the criteria.* ▪ *Identify necessary information for solving problems.* ▪ *Solve a problem by identifying and prioritising given facts and information.*	▪ *Identify necessary information for solving problems.* ▪ *Prioritise and use given facts to solve and check complex logic problems.* ▪ *Check that their answer meets the criteria.* ▪ *Ask 'What if…?' questions.* ▪ *Create their own criteria for solving a logic problem in the context of a solved problem.* ▪ *Refine and extend problems to generate fuller solutions.*
Reason, convince and prove ***Consider general statements***	▪ *Explain why an answer is correct.* ▪ *Explain why they have used certain things in their work.* ▪ *Explain why they have used resources to help them.*	▪ *Explain why an answer is correct by:* ➢ *Using known facts, inverse operations or place value* ➢ *Using resources* ▪ *Explain the general pattern or rules they have found are true.* ▪ *Convince a friend whether statements are true or false by:* ➢ *Explaining their thinking by using examples*	▪ *Explain why an answer is correct by:* ➢ *Using known facts, inverse operations or place value* ➢ *Using resources* ➢ *Using pictures or diagrams* ▪ *Explain the general pattern or rules they have found are true.* ▪ *Convince a friend whether statements are true or false by:* ➢ *Explaining their thinking by showing why a general statement may be true* ➢ *To use particular examples to support their explanation.*	▪ *Explain why an answer is correct by:* ➢ *Using known facts, inverse operations or place value* ➢ *Using resources* ➢ *Using pictures or diagrams* ▪ *Explain how they solved a word problem:* ➢ *Choosing operations* ➢ *Disregarding unnecessary information* ➢ *Use formulae* ➢ *Use accurate language* ▪ *Convince a friend whether statements are always, sometimes or never true by:* ➢ *If never true disprove by counter example* ➢ *Explaining their thinking by showing why a general statement may be true.* ➢ *Use particular examples* ➢ *Understanding that arguments should be based on mathematical patterns and properties.*

Strategies for effective problem solving:

As the children become proficient in column A you should then begin to progress them through the other columns

A	B	C	D	E	F
Look for a pattern →					
Make a model →					
Draw a picture	*Draw a diagram* →				
Work with a friend →					
Guess, check & improve →					
Act it out →					
	Produce a list	*Create a list/table systematically* →			
			Reason logically →		
				Work backwards →	
					Make a test / conjecture

Effective strategies for test technique Key Stage 2 – not in order :

Reading the entire question
Re-read and eliminate some possibilities
Look carefully at your instructions – tick, circle, join etc
Identify key vocabulary
Answer every question
Make a good estimate
Use jottings
Use an inverse to check

Mathematics vocabulary – this builds year on year with just the additional vocabulary listed here.

EYFS

NPV	***Addition and Subtraction***	***Measure***	***Properties of shape***
Number zero *all numbers 0-20* *none* *count on/up/to/from/down* *before after* *more less many few fewer least* *odd* *smallest greater most* *pair units tens digit compare*	*Number bonds number line add more make total altogether equals how many more? subtract take away how many fewer? how many less?*	*Full half full empty container weigh balance heavy heavier heaviest light lighter lightest scales time days of the week Seasons day week month year weekend birthday holiday morning afternoon evening night midnight bedtime dinnertime playtime today yesterday tomorrow before after old older oldest new newer newest first second third etc* *Long longer longest short shorter shortest tall taller tallest low wide thick thin money coin penny pence*	*Circle square rectangle triangle cube cuboid pyramid sphere cone shape* *Curved flat straight round* *Corner*

Year 1&2

NPV	***Addition and Subtraction***	***Mulitplication and division***	***Measure***	***Properties of shape***	***Position and direction***	***Statistics***	***Fractions***
Numbers to 100 *Beyond fewer fewest lesser* *odd even* *Partition combine recombine* *Equal to / the same as* *Value above / below* *numeral figure compare* *in order / a different order* *between halfway between* *Hundred more / less*	*Addition plus sum inverse subtraction minus double near double half halve is the same as (using = sign) difference between how many more to make…? How many more is … than …? How many fewer is … than …? How much less is…?*	*Odd even count in 2's, 3's, 5's, 10's* *Count on in 10's from a given number (forwards / back)* *How many times?* *Once, twice, three times, five times* *Multiple of times multiply multiply by* *Repeated addition array row column double halve share share equally group in pairs, threes etc* *Equal groups of divide divided by left leftover*	*Next last now soon early late quick quicker quickest quickly fast faster fastest slow slower slowest slowly* *Takes longer takes less time* *Hour o'clock half past quarter to quarter past minutes seconds clock face hands how long ago? How long will it be to …? How long will it take to …?* *How often?* *Always never often sometimes usually* *Once twice estimate close to about the same as* *Too many too few* *Metre ruler metre stick*	*Group sort* *Cylinder* *Hollow solid* *Face side edge vertices* *Make build draw* *Symmetrical line of symmetry* *Fold* *Match* *Mirror line reflection* *Pattern repeating pattern*	*Position* *Over under underneath above below top bottom side* *On in outside inside* *Around in front behind* *Front back before after beside next to opposite apart between middle edge centre rotation* *clockwise anti-clockwise straight line ninety degree turn right angle* *Left right up down forwards backwards sideways slide roll turn whole turn half turn*	*Count tally sort* *Vote* *Graph block graph pictogram* *Represent* *Group set list table* *Label title* *Most popular most common least popular least common*	*Whole equal parts half one half two halves quarter two quarters three quarters one third a third* *Equivalent*

			Pound price cost buy sell spend spent pay change costs more costs less costs the same as… *How much? How many?* *Total* *M / km g/kg ml/l* *Temperature (degrees)*				

Year 3 & 4

NPV	***Addition and subtraction***	***Multiplication and division***	***Measure***	***Properties of shape***	***Position and direction***	***Statistics***	***Fractions and decimals***
Numbers 0-1000 *Tenths hundredths* *Decimal (places)* *Round (to nearest)* *Thousand more / less than* *Negative integers* *Count through zero* *Roman numerals (L – C)*	*Column addition* *Column subtraction* *Carry exchange*	*Multiplication facts to 12x12* *Division facts* *Inverse* *Derive* *Product* *Multiples of 4, 8, fifty, 100* *Scale up*	*Leap year* *Twelve hr clock – 24hr clock* *Roman numerals I – XIII* *Convert*	*Horizontal vertical perpendicular parallel lines quadrilaterals triangles right angle, acute obtuse reflex* *Name all 2D shapes and common 3D shapes*	*Greater / less than 90degree angle* *Co-ordinates translation quadrant x-axis y-axis* *Perimeter area*	*Chart bar chart frequency table Carroll diagram Venn diagram* *Axis axes* *Line graph* *Continuous data*	*Numerator denominator unit fraction non unit fraction* *Compare and order* *Tenths* *Equivalent decimals and fractions*

Year 5 & 6

NPV	***Addition and subtraction***	***Multiplication and division***	***Measure***	***Properties of shape***	***Position and direction***	***Statistics***	***Fractions decimals and percentages***	***Algebra***
Powers of 10 *Numbers to ten million*	*Efficient written methods* *Order of operations*	*Formal written method* *Factor pairs* *Common factors common multiples* *Composite numbers prime numbers* *prime factors square numbers cubed numbers* *Order of operations*	*Volume* *imperial units metric units* *Reflex angles*	*Regular and irregular polygons dimensions* *vertically opposite (angles)* *Circumference radius diameter*	*Four quadrant* *Dimensions*	*Mean* *Construct* *Pie chart*	*Proper fractions improper fractions mixed numbers* *Percentage* *Half quarter fifth two fifths four fifths* *Ratio proportion degree of accuracy* *Simplify*	*Linear number sequence substitute variables symbol known values*

An additional vocabulary resource that can be used : *Ultimate_Maths_Vocabulary_List_KS1_KS2.pdf (thirdspacelearning.com)*