

Mathematics Curriculum Summary

The aim of the Maths curriculum is to create confident mathematicians who can problem solve, apply creativity, pursue their own investigations and have an enjoyment of playing with numbers, shape and mathematical concepts. It is taught by means of a spiral curriculum whereby certain topics are constantly revisited but at an ever higher level. We aim to cover all of the material included in the National Numeracy strategy. Given the high ability levels of many of our pupils we are very much aware of the need to extend children by providing challenging material that increases their depth of understanding, their enjoyment of the subject and their ability to rise to a challenge.

Key Skills and Content

Kindergarten (KG)

The KG Mathematics curriculum is based on the EYFS Framework, 'Development Matters'.

- say and use names in order in familiar contexts;
- count reliably up to ten objects;
- recognise numerals 1 to 9;
- use developing mathematical ideas and methods to solve practical problems;
- in practical activities and discussion begin to use the vocabulary involved in adding and subtracting;
- use language such as 'more' or 'less' to compare two numbers;
- find one more or one less than a number from one to ten, using objects;
- begin to relate addition to combining two groups of objects and subtraction to 'taking away';
- use language such as 'greater', 'smaller', 'lighter' or 'heavier' to compare two quantities;
- talk about, recognise and recreate simple patterns;
- use language such as 'circle' or 'bigger' to describe the shape and size of solids and flat shapes.

Transition 1 (T1)

- count reliably at least twenty objects;
- read, write and order whole numbers to a least 100;
- count on and back in ones from any small number, and in tens from and back to zero;
- read, write and order numbers from 0 to at least 20; understand and use the vocabulary of comparing and ordering these numbers;
- within the range 0 to 30 say the number that is 1 or 10 more or less than any given number;
- understand the operations of addition, and of subtraction and use the related vocabulary;
- know by heart the number bonds to 10;
- use mental strategies to solve simple problems using counting, addition, subtraction, doubling and halving, explaining methods and reasoning orally;
- compare two lengths, capacities or masses by direct comparison;
- suggest suitable standard or non-standard units and measuring equipment to estimate then measure a length, mass or capacity;
- use everyday language to describe features of familiar 2-D and 3-D shapes.
- Understand symmetry

Transition 2 (T2)

- Count, read, write and order whole numbers to 100 and beyond, knowing what each digit represents and counting reliably by grouping
- Round numbers to the nearest 10
- Describe and extend number sequences, counting on and back in 2s, 5s, 10s starting from any two-digit number
- Understand that multiplication is repeated addition, division as sharing and halving is the inverse of doubling
- Recognise two-digit multiples of 10, 5 and 2
- Understand and use 'half' and 'quarter' and recognize that two-quarters and one-half are equal
- Know the facts for the 2, 3, 4, 5 and 10 multiplication tables
- Understand that addition is the inverse of subtraction and state the subtraction corresponding to a given addition
- Know doubles to 10
- Use mental strategies to carry out addition and subtraction efficiently such as the knowledge that numbers can be added in any order, near doubles,
- Read a variety of simple scales to the nearest division
- Estimate, measure and compare lengths, masses and capacities using standard units suggest suitable units and equipment for such measurements.
- Use the common names for 2-D and 3-D shapes, sort shapes and describe a range of their features as well as use mathematical vocabulary to describe position, direction and movement.
- Read analogue and digital time and learn how to present data in a variety of ways.
- Know the days of the week and the months of the year in order
- Recognise all coins and use pound and pence notation and give change
- Solve mathematical problems and carry out investigations and solve problems by sorting, classifying and organizing information in simple ways
- Recognise lines of symmetry
- Recognise basic turns and angles, including right angles

Form 1

- Develop a wide range of strategies for calculating using mental methods with three-digit numbers
- Understand how to calculate using pencil and paper methods and more formal procedures for calculating using larger numbers
- Count in multiples of 4, 8, 50 and 100 and find 10 or 100 more or less than a given number
- recognise the place value of each digit in a three-digit number (hundreds, tens, ones)
- Read, write, compare and order numbers up to 1000
- identify, represent and estimate numbers using different representations
- solve number problems and practical problems
- Make estimations and use known strategies to check the answer
- Know and use multiplication and division facts for the 3, 4 and 8 multiplication tables
- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know
- Count up and down in tenths
- Recognize, find and write fractions of a discrete set of objects, as numbers and as diagrams including equivalent fractions and add and subtract fractions with the same denominator within one whole
- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- Measure the perimeter of simple 2-D shapes
- Add and subtract amounts of money to give change, using both £ and p in practical contexts
- Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks
- Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight
- Know the number of seconds in a minute and the number of days in each month, year and leap year

- Compare durations of events [for example to calculate the time taken by particular events or tasks].
- Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them
- Understand and use right angles
- Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.
- Interpret and present data using bar charts, pictograms and tables

Form 2

- Count in multiples of 6, 7, 9, 25 and 1000 and, find 1000 more or less than a given number and recognise the place value of each digit in a four-digit number
- count backwards through zero to include negative numbers
- Read, write, order and compare numbers beyond 1000
- Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems
- Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value.
- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- Estimate and use inverse operations to check answers to a calculation
- Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.
- Recall multiplication and division facts for multiplication tables up to 12×12
- Use place value, known and derived facts to multiply and divide mentally
- Multiply two-digit and three-digit numbers by a one-digit number
- Recognise and show, using diagrams, families of common equivalent fractions
- Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
- Recognise and write decimal equivalents of any number of tenths or hundredths
- Recognise and write decimal equivalents
- Round decimals with one decimal place to the nearest whole number
- compare numbers with the same number of decimal places up to two decimal places
- Convert between different units of measure
- Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres and find the area of rectilinear shapes
- Estimate, compare and calculate different measures, including money in pounds and pence
- Read, write and convert time between analogue and digital 12- and 24-hour clocks
- Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes
- Identify acute and obtuse angles and compare and order angles up to two right angles by size
- Identify lines of symmetry in 2-D shapes presented in different orientations
- Complete a simple symmetric figure with respect to a specific line of symmetry.
- Describe positions on a 2-D grid as coordinates in the first quadrant
- Describe movements between positions as translations of a given unit to the left/right and up/down
- Plot specified points and draw sides to complete a given polygon
- Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs
- Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.

Form 3

Michaelmas Term

Number Properties

- Use times tables facts to establish whether a number up to 50 is prime or composite.
- Recall prime numbers up to 19.
- List multiples of any number.
- Use tests of divisibility (3, 5, 10, 25, 100) to identify factors of a number
- Use systematic approach to find factors of a number and common factors of two numbers
- Recognise the sequence of square numbers and cube numbers. Use the notation for squared and cubed.
- Draw and interpret Venn and Carroll diagrams to classify and sort numbers (prime, composite, odd, even, factors, multiples, squares and cubes)

Place Value

- Read and write numbers to at least 1 000 000
- Order and compare numbers to at least 1 000 000 and determine the value of each digit
- Interpret negative numbers in context.
- Count forwards and backwards with positive and negative whole numbers through zero
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000
- Round any whole number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000
- Solve number problems and practical problems that involve all of the above
- Multiply a number by 10, 100 and 1000, relate to movement on a place value grid.
- Divide a number by 10, 100 and 1000, relate to movement on a place value grid.

Addition and Subtraction

- Add and subtract numbers mentally with increasingly large numbers
- Add and subtract whole numbers with more than 4 digits, including using formal written methods
- Use strategies to answer multi-step word problems
- Understand the laws of rounding
- Checking answers using inverse operations and estimation

Multiplication and Division

- Multiply and divide numbers mentally drawing upon known facts.
- Recap the formal written method for short multiplication including a 2, 3 and 4 digit number by a single digit.
- Extend to long multiplication including a 2 and 3 digit number by a 2-digit number.
- Multiply 2-digits by 2-digits using the area and/or grid model.
- To use a formal written method for short division using the bus stop including dividing into a 2, 3 and 4 digit numbers by a single digit.
- Interpret remainders in short division and relate to the context of the question
- Use estimation to mentally check answers by rounding numbers.

Transformations and Coordinates

- Read, write and use pairs of coordinates in a single quadrant graph
- Extend to read, write and use pairs of coordinates in a four-quadrant graph
- Translate coordinates and shapes on a grid with written instructions using language such as right, left, up and down.
- Describe a translation on a coordinate grid using instructions.
- Reflect an object in a line of symmetry on square paper.
- Reflect objects using lines of symmetry that are parallel to the axes
- Understand how coordinates can be reflected and the differences between the coordinates of the object and image.

Lent Term

Fractions

- Identify the position of a fraction on a number line (including fractions greater than 1).
- Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- Describe and extend sequences involving fractions
- Compare and order fractions that have the same denominator or numerator
- Compare and order fractions whose denominators are all multiples of the same number
- Understand a fraction as a proportion and write a fraction in its simplest form.
- Add and subtract fractions with the same and related denominators
- Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.
- Recognise mixed numbers and improper fractions and convert from one form to the other.
- Connect fractions to division. Identify improper fractions that are equivalent to whole numbers.

Decimals

- Read and write numbers with up to three decimal places.
- Order and compare numbers with up to three decimal places.
- Identify the place value of tenths, hundredths and thousands.
- Use place value to multiply a decimal number by 10 and 100.
- Read and write decimal numbers as fractions (e.g. $0.71 = 71/100$).
- Convert a fraction out of 10, 100 or 1000 into a decimal.
- Round decimals with two decimal places to the nearest whole number and to one decimal place.
- Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents, through the use of concrete and pictorial representations.
- Solve problems involving number up to three decimal places

Statistics

- Read the information presented in a table and interpret its meaning.
- Read and respond to information presented in a table. Solve problems involving converting between units of time.
- Read and respond to tables that have a variety of data sets.
- Read and interpret information provided in a line graph either where a single line represents the data or by more than two lines.
- Solve comparison, sum and difference problems using information presented in a line graph.
- Create frequency/tally charts to collate raw data.
- Draw bar charts, stick graphs and line graphs following 'what a graph must have.'

Angles in Shapes

- Understand that an angle is a measure of turn and know angles are measured in degrees
- Estimate and compare acute, obtuse and reflex angles
- Use a protractor to draw and measure angles.
- Be able to determine the degrees between different turns/times on a clock
- Identify angles at a point and one whole turn (total 360°)
- Identify angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°)
- Identify other multiples of 90°

Summer Term

Property of Shapes

- Use the properties of rectangles to deduce related facts and find missing lengths and angles
- Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- Calculate, by counting squares, the area of squares and rectangles and then move onto using a formula.
- Use standard units, square centimetres (cm²) and square metres (m²) when writing area.
- Learn to calculate the area of compound shapes and look at splitting the shapes effectively.
- Use knowledge of counting squares to estimate and the areas of shapes that are not rectilinear.

Proportion and Percentages

- Use concrete and pictorial representations to convert fractions into decimals.
- Introduced to 'per cent' and will understand that 'per cent' relates to 'number of parts per hundred'.
- Represent percentages as fractions using the denominator 100 and make the connection to decimals and hundredths.
- Recognise percentages, decimals and fractions are different ways of expressing proportions.
- Become secure with the percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and then consider denominators of a multiple of 10 or 25
- Convert fractions with a denominator of 10, 20 and 25 into percentages and decimals.

Units of Measurement

- Convert between different units of metric length (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre).
- Convert between different units of metric mass (Kilograms and Grams).
- Convert between different units of metric volume (Litres and Millilitres).
- Understand and use equivalences between metric units and common imperial units including units of length, mass and volume.
- Apply knowledge of units practically by developing a level of accuracy with appropriate equipment and be able to read a variety of different scales.
- Use decimal notation for metres, centimetres and kilometres.
- Read a temperature on a thermometer including negative numbers.
- Convert units of time and interpret 24-hour timetables.
- Interpret conversion graphs involving metric and imperial measures.

Volume and Capacity

- Understand that volume is the amount of solid space something takes up. Describe the difference between volume and capacity.
- Use centimetre cubes to make solid shapes and recognise different shapes that have the same volume.
- Compare and order the volume of different solids made of cubes
- Estimate volume (e.g. using 1 cm³ blocks to build cubes and cuboids) and capacity (e.g. using water or rice)
- Measure capacity using millilitres and litres, reading scales to a required degree of accuracy
- Choose the most suitable unit of measure for different objects
- Explore how containers can be different shapes but still hold the same capacity
- Use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling
- Identify 3-D shapes, including cubes and other cuboids, from 2-D representations.
- Develop knowledge of the language associated with 3-D shapes including faces, curved surfaces, vertices and edges.

Form 4

Michaelmas Term

Factors Multiples and Primes

- Recall times tables up to 12×12
- Use tables to do mental division
- Find factors and multiples of numbers
- Identify common factors, common multiples and prime numbers (under 50).
- Be able to draw a factor tree for any number to find all of its prime factors
- State the prime factorisation of a number using index notation.
- Understand the divisibility rules for 2,3,4,5,6, 8 and 10.
- Place factors, multiples and primes in the correct location in a Venn diagram.

Intro to Algebra

- Understand basic algebraic terminology including variable, term, expression, equation, formulae.
- Form algebraic expressions from worded scenarios.
- Simplify expressions by adding and subtracting like terms.
- Substitute positive numbers into simple expressions involving adding, subtracting and multiplication.
- Understand what is meant by $3a$ or ab or $a/2$
- Solve simple number problems presented in words
- Understand how a function machine works using numbers and algebra.
- Solve simple 2 step equations using function machines

Fractions

- Use diagrams to compare simple fractions.
- Simplify fractions using the highest common factor.
- Find equivalent fractions.
- Add and subtract fractions with the same denominator.
- Be able to add and subtract fractions with related denominators
- Add and subtract fractions with unrelated denominators using LCM.
- Be able to convert between mixed numbers and improper fractions.
- Find fractions of amounts using an appropriate method.
- Multiply proper fractions including cross cancelling
- Associate a fraction with division and calculate decimal fraction equivalents.
- Divide a fraction by a whole number and vice versa

Transformations

- Plot and read coordinates in one quadrant.
- Construct an axis and appropriately label.
- Test the rotational symmetry of a shape using tracing paper.
- Recognise reflective and rotational symmetry in any 2D shape.
- Draw in all lines of symmetry for a shape.
- Identify the order of rotational symmetry for any shape
- Reflect a shape in a diagonal line of symmetry on a grid.
- Translate a shape on a coordinate grid using worded instructions

Lent Term

Probability

- Understand the language of probability and explain likelihood using descriptive words.
- Place events in an appropriate position on the probability scale using words (Impossible – certain).
- Draw a probability scale between 0 and 1 and label the scale using fractions or decimals.
- Know what an event, an outcome and start to understand the link between the vocabulary of experimental and theoretical.
- Develop sample space diagrams to list total outcomes.
- Find the simple probability of an outcome to an event
- Use fractions, decimals and percentages to describe a probability
- Find the probability when rolling two dice.

Four Operations

- Use a written method to add and subtract 3 digit numbers
- Multiply multi-digit numbers up to four-digits by two-digit integers using formal written methods.
- Multiply and divide any number by 10, 100 or 1000
- Read, write, order and round any numbers up to one million
- Use a written method to add and subtract decimals
- Be able to round decimals to the nearest 1 decimal place
- Understand place value including decimals
- Order any number with two decimal places and put them on a number line
- Identify the value of digits in numbers up to three decimal places and multiply and divide numbers.
- Use estimation to check answers.
- Use BIDMAS to solve calculations without a calculator

Angles

- Classify angles using obtuse, acute, reflex, right angle
- Estimate, measure and draw different types of angles
- Identify and classify different types of triangles
- Recognise and use the angle rule on a 'Straight Line' = 180 degrees
- Recognise and use the angle rule 'Round a Point' = 360 degrees
- Recognise and use the angle rule 'Vertically Opposite' are the same
- Recognise and use the angle rule 'Triangle Angle Sum' = 180 degrees
- Recognise and use the various angle rules to find missing angles.

Sequences

- Recognise and continue special sequences including square, cube and triangular numbers, Fibonacci, prime and powers of two.
- Create and continue a visual pattern
- Recognise and continue a simple linear number pattern
- Understand the difference between a linear and non-linear sequence.
- Identify whether a sequence is arithmetic, geometric, quadratic or fibonacci
- Describe linear number sequences using the "term to term" rule.
- Generate sequences using the term-to-term rule.
- Find missing terms in a sequence

Summer Term

Fractions, Decimals and Percentages

- Find percentages of amounts
- Express one quantity as a percentage of another.
- Associate a fraction with division and calculate decimal fraction equivalents.

- Convert a fraction (in simplest form is a factor of 100) into a percentage.
- Change a percentage into a fraction (when denominator is a factor of 100)
- Change decimals up to 2 dp into percentages.
- Convert between single decimal place and a fraction.

2D and 3D Space

- Recognise that shapes with the same areas can have different perimeters and vice versa.
- Use formulae to calculate the area and perimeter of a rectangle.
- Use formulae to calculate the area and perimeter of a parallelogram.
- Use formulae to calculate the area and perimeter of a triangle.
- Draw 2-D shapes using given dimensions and angles
- Compare and classify geometric shapes
- Recognise, describe and build simple 3-D shapes, including making nets

Representing and Interpreting Data

- Collect a list of discrete data into a tally chart or frequency table.
- Draw a bar chart (including comparative bar chart) for discrete data.
- Draw a pictogram to represent data.
- Interpret information from a bar chart, pie chart and pictogram
- Know the meaning of and be able to calculate mean, median, mode and range.
- Compare 2 sets of data using an average and the range.
- Explore an aim or simple hypothesis using relevant data.
- Analyse data and make relevant comments about what it shows.

Ratio and Proportion

- Understand that amounts can be divided into parts using ratio
- Express a relation between amounts as a ratio
- Simplify ratios
- Solve problems involving ratio and direct proportion
- Divide a quantity into two or more parts in a given ratio
- Use the unitary method to solve problems
- Understand that amounts can be divided into parts using ratio
- Apply knowledge of ratio and proportion into worded problems.

Form 5

Michaelmas Term

Operations

- Order a list of whole numbers including positive and negative numbers
- Add and subtract using single digit negative numbers.
- Multiply and divide negative numbers
- Use the symbols =, ≠, <, and >
- Use knowledge of indices to square and cube numbers.
- Use knowledge of powers to calculate square and cube roots.
- Apply BIDMAS to calculations including negatives, decimals and indices.

Prime Factorisation

- Understand the divisibility rules for 2-12.

- Recognise prime numbers up to 100
- Understand that all numbers greater than 1 can be written as a product of prime factors.
- Use factors trees to work out the prime factorisation of a number
- Use INDEX notation to simplify a prime factorisation
- Represent the prime factorisation of two numbers in a VENN diagram.
- Find the HCF of two or more numbers
- Find the LCM of two or more numbers

Algebraic Expressions

- Understand the meaning of the words: equation, formula, identity, expression, unknown and variable.
- Simplify an expression by collecting like terms
- Simplify algebraic expressions involving sums, products, simple division and powers
- Write an expression in algebra for perimeter or area
- Substitute positive and negative numbers into simple expressions
- Multiply a positive integer and variable across a single bracket
- Multiple out two brackets and simplify.
- Apply BIDMAS to simplify algebraic expressions.

2D Space

- Know the difference between area and perimeter
- Recap the area of a triangle and parallelogram
- Work out the area of a kite
- Work out the area of a trapezium
- Work out missing lengths on shapes made up of rectangles
- Work out the area of compound shapes (made up of rectangles, triangles, parallelograms and trapeziums)
- Substitute numerical values into formulae

Representation and Analysis of Data

- Know the difference between quantitative and qualitative data
- Write a hypothesis for a questionnaire/survey
- Conduct a simple data collection activity and record the results in a frequency table
- Read frequencies from a bar chart or pictogram
- Draw and interpret line graphs and bar graphs including comparative bars
- Construct a pie chart from a frequency table
- Compare data represented in a pie chart and a bar chart
- Present information from results using graphs and tables

Transformations

- Identify and describe a translation using appropriate mathematical language.
- Translate 2D shapes horizontally and vertically on a coordinate grid.
- Progress to translating shapes using column vectors.
- Identify lines of symmetry in simple 2D shapes.
- Reflect shapes in horizontal, vertical and diagonal mirror lines on a grid.
- Plot and read coordinates in all four quadrants of a coordinate grid.
- Draw and identify lines such as $y = a$, $x = a$ or $x = y$ on the coordinate grid to reflect shapes.
- Describe the movement of points and shapes using coordinates.
- Draw reflected and translated shapes accurately on coordinate axes.
- Solve reasoning problems involving combined transformations on a coordinate grid.
- Check and explain whether a transformation has been carried out correctly.

- Apply transformations to create patterns, designs and tessellations.

Lent Term

Decimals

- Multiply and divide decimals by 10, 100, 1000, 0.1, 0.01, etc
- Use, convert and compare metric measures: length, mass/weight and capacity
- Appreciate the rough size of common metric units - make sensible estimates of everyday measures.
- Rounding integers to different place values
- Rounding to a certain number of decimal places
- Use estimation to approximate calculations and check answers
- Add and subtract decimals up to three-decimal places
- Multiply and divide decimals by a single digit number without a calculator
- Multiple and divide decimals up to two-decimal places.
- Use related calculations to work out decimal problems involving multiplication and division

Averages

- Find the range and averages (mean, median, mode) for a list of discrete data
- Write a simple statement using averages to compare two sets of data
- Make some conclusions based on data
- Construct and analyse a hypothesis using averages, range and graphical representations
- Find the mean, median, mode and range from a bar chart or pie chart
- Decide which average is most suitable for a set of data

Sequences

- Find the next few numbers in a linear sequence
- Recall the difference between linear and non-linear sequences
- Find the rule for the next term
- Find the nth term rule for linear sequences
- Generate sequences using the nth term
- Use the nth term to find a given term in a sequence
- Generate the terms of a sequence from the nth term
- Generate common integer sequences (including sequences of odd or even integers, squared integers, powers of 2, powers of 10, triangular numbers, square numbers)

Angles

- Recognise acute, obtuse and reflex angles
- Angle facts: "angles around a point add to 360"
- Angle facts: "angles on a straight line add to 180"
- Angle facts: "angles in a triangle add to 180"
- Angle facts: "Vertically opposite angles are equal"
- Solve simple problems involving one or two missing angles with up to two steps needed.
- Use the rules that, on parallel lines, alternate angles are equal and corresponding angles are equal as well
- Use the rule that, on parallel lines, co-interior angles have a sum of 180 degrees.
- Show a proof for the sum of the angles of a triangle being 180°, and the sum of the angles in a quadrilateral being 360 degrees

Solving Equations

- Write and solve an equation from an I think of a number problem

- Solve a simple number problem presented in words
- Use a flow diagram to solve simple equations.
- Solve missing number problems involving one, two and three steps
- Understand the idea of balancing equations
- Solve equations with two operations, eg $2x + 5 = 11$
- Solve linear equations with brackets, eg $3(x - 2) = 9$
- Solve equations with x on both sides, eg $4x - 2 = 3x - 1$
- Write and solve equations from practical situations and diagrams including shapes.

Fractions, Decimals and Percentages

- Calculate fractions of an amount
- Recap adding and subtracting fractions with unrelated denominators
- Multiply a fraction by a fraction
- Divide a fraction by a fraction
- Convert between a fraction and a decimal including dividing the numerator by the denominator
- Convert a decimal to a percentage
- Convert a fraction to a percentage
- Converting a mixed set of FDP into a single format (usually decimals) to order them by size.
- Calculate percentage of amounts using a chunking method
- Express an amount as a percentage
- Make and justify estimates and approximations to help check work

Summer Term

3D Space

- Know the vocabulary of 3D shapes (face, vertex, vertices, edges)
- Identify nets and name their respective solid
- Sketch the net for any 3-D shape
- Construct nets for 3-D shapes
- Create or sketch a 3D shape from a net
- Draw the plan, front and side elevation for a 3-D shape
- Make a 3D shape from the plan, front and side elevations
- Draw 3-D shapes using isometric paper.

Probability and Sets

- Record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes.
- Use appropriate language and understand the 0-1 probability scale
- Understand that the probabilities of all possible outcomes sum to 1
- Calculate probability using fractions, decimals and percentages
- Complete two-way tables to determine total outcomes.
- Fill in information into a Venn Diagram
- Calculate the probability from a Venn diagram.
- Understand the differences between experimental and theoretical probability and compare.
- Use information from experimental probability to predict and calculate missing values.

Probability and Sets

- Identify ratio notation and understand that a ratio shows the relationship between parts.
- Simplify ratios to their simplest form by finding common factors.

- Find equivalent ratios
- Express the relationship between two quantities as a ratio or a fraction
- Understand the difference between ratio (part-to-part) and proportion (part-to-whole)
- Divide a quantity into a given ratio using bar models or unitary methods.
- Recognise direct proportion: if one quantity doubles, the other must also double.
- Solve problems involving recipes or scaling quantities using a multiplier.
- Apply the unitary method to solve exchange rate or unit price problems.
- Create scale drawings
- Plot coordinate pairs derived from proportional relationships
- Construct a conversion graph by drawing a straight line through the origin
- Interpret the gradient of a conversion graph as the "unit rate" or the ratio multiplier.
- Convert between two units (e.g., Miles to KM, GBP to USD) by reading values accurately from the line of best fit.

Form 6

Michaelmas Term

Circles and Cylinders

- Understand how to calculate the value of pi and its relationship between the circumference and diameter.
- Label a circle with centre, circumference, radius, diameter, sector, segment and tangent.
- Work out the circumference and area of a circle when given the radius or diameter.
- Recall the formula to calculate areas of triangles, quadrilaterals (including a trapezium) and circles
- Recall the formula to calculate volume and surface area of right-angled prisms and cylinders.
- Write a formula algebraically and substitute in values
- Substitute positive, negative, fractional and decimals into formula.
- Convert between squared units and cubic units

Algebraic Notation

- Simplify algebraic expressions involving products, powers, brackets and fractions
- Recap multiplying a positive integer across a bracket
- Factorise an expression into one bracket
- Expand $a(b + c)$, $a + b(c + d)$, $a(b + c) + b(c + d)$ (including negatives) and simplify where appropriate.
- Write a formula algebraically
- Substitute positive, negative, fractional and decimal numbers into formula
- Rearrange a formula to change the subject incl. circles, trapeziums, triangles and 3D shapes including cylinders, cuboids and prisms.

Rounding and Estimation

- Round integers and decimals to a given number of decimal places.
- Round integers and decimals to a given number of significant figures.
- Recall all the square numbers from 2×2 to 15×15 and the corresponding square roots
- Use a calculator to evaluate expressions involving index form
- Recall the cubes of 2, 3, 4, 5 and 10
- Use index notation to simplify expressions
- Use index notation for squares, cubes and powers of 10
- Multiply and divide numbers by any power of 10

- Convert numbers to and from standard form
- Write large and small numbers in standard form in conventional notation and on a calculator
- Use index laws for multiplication and division of integer powers;
- Use the concepts and vocabulary of highest common factor, least common multiple, prime number and prime
- Use prime factor decomposition to find square roots and cube roots.
- Use index laws to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers.

Solving Equations and Graphing

- Solve linear equations with the unknown on both sides
- Solve linear equations with brackets
- Solve linear equations with fractions
- Form and solve an equation from a worded problem
- Connect simple linear equations to graphs identifying $y = mx + c$
- Understand that for graphs of the form $y = mx + c$, m refers to gradient and c refers to y-intercept
- Plot coordinates in all four quadrants
- Use a relationship between x and y to generate a table of coordinates and produce a graph
- Find the gradient and y-intercept from the equation of a line
- Plot linear graphs using ICT and compare graphs
- Recall that $y = x^2$ is non-linear
- Find the equation for a line

Speed, Distance, Time

- Understand the common units used for speed and their abbreviations inc. mph, km/h, m/s.
- Know the relationship between speed, distance and time and recall the formula
- Substitute values into the speed, distance, time formula.
- Calculate speed, distance and time for a simple problem
- Understand and implement the proportion method for calculating speed, distance, time.
- Use estimation to check answers.
- Convert between different units of time (hrs, mins, secs)
- Analyse and interpret distance, time graphs.
- Calculate the average speed from a distance/time graph.

Fractions, Decimals and Percentages

- Convert fractions into recurring decimals.
- Express amounts as percentages
- Transition from chunking method to using a decimal multiplier
- Percentage increase and decrease. Using multipliers for growth and decay.
- Calculating the percentage change between two values
- Finding the original value after a percentage increase or decrease has occurred using reverse percentages
- Understand the link to financial mathematics and apply FDP to contexts like simple interest, profit and loss, and VAT.
- Use efficient calculator and non-calculator methods

Lent Term

Inequalities

- Understand and know what these symbols mean: $<$, $\leq$, $>$, $\geq$
- Use a number line to represent an inequality
- Solve simple linear inequalities in one variable
- Give integer solutions for inequalities
- Represent inequalities as regions on graphs
- Solve inequalities using the balance method

Simultaneous Equations

- Solve Simultaneous Equations using the elimination, substitution and graphical methods.
- Solve Simultaneous Equations using the substitution method.
- Solve Simultaneous Equations using the graphical methods.
- Form and solve simultaneous equations from worded problems.
- Gain an understanding of calculating a reciprocal of a number in fraction and decimal form.
- Find a linear equation that is parallel to another.
- Using knowledge of reciprocals and gradient, find a linear equation that is perpendicular to another.

Pythagoras and Trigonometry

- Understand and use Pythagoras' theorem to find missing lengths in a right-angled triangle
- Label a right-angled triangle with hypotenuse, adjacent and opposite
- Use a calculator to find sin, cos and tan of an angle
- Identify which of sin, cos and tan to use in a right-angled triangle
- Use sin, cos and tan to solve trigonometry problems
- Find the missing angles of a right-angled triangle using inverse trigonometric functions

Transformations

- Identify the three pieces of information needed for a rotation: centre of rotation, angle and direction (clockwise or anticlockwise).
- Rotate 2D shapes about a centre of rotation located at the origin
- Perform rotations where the centre of rotation is a specific coordinate using tracing paper.
- Describe a rotation fully by finding the centre, angle, and direction from a given image and object.
- Understand that enlargement changes the size but preserves the shape (angles stay the same).
- Enlarge a 2D shape by a whole number scale factor
- Use centre of enlargement to determine the exact position of the new image on a coordinate grid.
- Identify the sf and centre of enlargement by drawing "ray lines" through corresponding vertices.
- Perform enlargements using fractional scale factors recognising that the shape gets smaller.
- Calculate missing side lengths in similar shapes using the scale factor.
- Recognise that "similar" shapes have the same interior angles and proportional side lengths.

Circle Theorems

- Recall parts of a circle and understand the following vocabulary associated with circles including subtended, arc, segment
- Prove and understand that the angle in a semi-circle is 90 degrees
- Prove and understand that the angle formed at the centre is double the angle formed at the circumference.
- Prove and understand that the angles in the same segment, subtended in the same arc are equal
- Prove and understand that the opposite angles in a cyclic quadrilateral add up to 180 degrees
- Prove and understand that a tangent and a radius create a 90° angle.
- Prove and understand that the two tangents from a point are equal length

- Prove and understand that the angle between a chord and a tangent are equal in the alternate segment.
- Create a reference sheet for each theorem, describe the rule using algebra.
- Use circle theorems to solve angle problems.

Constructions

- Draw a circle given the radius
- Describe the locus of a simple set of points such as equal distance from a point or around a line
- Draw an equilateral triangle using a compass and straight edge
- Use a compass and pencil to construct the midpoint of a line
- Draw a triangle given SSS, SAS, ASA using a compass, ruler and protractor.
- Use a straight edge and compasses to construct the midpoint and perpendicular bisector of a line segment
- Use a straight edge and compasses to construct the perpendicular to and on a point on a line
- Use a straight edge and compasses to construct the angle bisector

Bearings

- Understand the link between bearings and the real-world giving industries/jobs where bearings can be found.
- Know the bearing for each point on the compass N, NNE, NE, ENE, E, ESE, SE, SSE, S, SSW, SW, WSW, W, WNW, NW, NNW, N
- Give the direction of a place using compass bearings
- Recap angle types.
- Measure, estimate and draw bearings accurately.
- Recap angles on parallel lines; vertically opposite angles, corresponding angles, alternate angles, supplementary angles
- Calculate a back bearing using a given rule.
- Convert a distance on a map into one in real life and vice versa
- Draw a simple route on a map using a given description both using a compass and bearings
- Use bearings to pinpoint a location.
- Apply angle rules to solve complex problems involving bearings.

Scatter Graphs and Correlations

- Understand how to use a Scatter graph to represent data and interpret the results.
- Gain knowledge of real life situations that could have a positive correlation, negative correlation or no relationship and how an outlier could occur.
- Conduct an investigation to find relationships between two variables.
- Draw frequency/tally charts to aid data collection
- Draw scatter graphs, using an appropriate scale including a line of best fit
- Comment and interpret scatter graphs including the correlation and outliers.
- Calculate the mean, median, mode and range from frequency charts.
- Interpret results and write conclusions using P.E.E structure.

Contribution to Spiritual, Moral, Social and Cultural Education

Mathematics develops SMSC in a wide variety of ways, including:

- Developing an awareness of symmetry, harmony, proportion and balance
- Giving an awareness of infinity (e.g. through the concept of the infinity of number)
- Teaching children to work collaboratively
- Developing creativity as children investigate, problem solve, explore different solutions

- Developing a wonder in the world and how maths works
- Enabling children to understand the contribution made by mathematicians from other cultures
- Understanding the use of Maths in architecture and design around the world
- Use of art to explore Maths from around the world (e.g. Mondrian)