# Futura Maths

## Curriculum Framework

# Maths Curriculum Framework

**Intent:**

Our long-term aim is to produce an ambitious, engaging, connected curriculum accessible to all pupils in the Futura Learning Partnership. Pupils will make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems.

The intent of our mathematics curriculum is to design a curriculum, which is accessible to all and will maximise the development of every child's ability and academic achievement and preparation for their journey into the wider world. We aim to deliver lessons that are creative and engaging. We intend for our pupils to be able to apply their mathematical knowledge across the curriculum. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content.

**Inclusion:** Our curriculum is ambitious for all and strives to address inclusion and disadvantage in its intent and implementation

**Aims:**
Underpinning the intent are the following **key substantive and disciplinary concepts**:

**Contents**

**Appendix at end of document**

- EYFS to Yr6 yearly plan
- KS3 and KS4 calendar of dates for 2021-22

| Number | Substantive knowledge |
|---|---|

**EYFS** *For disciplinary knowledge: See 'White Rose' small steps*

Mathematics ELG: Number Children at the expected level of development will: - Have a deep understanding of number to 10, including the composition of each number; 14 - Subitise (recognise quantities without counting) up to 5; - Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts. ELG: Numerical Patterns Children at the expected level of development will: - 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.

**Year 1** *For disciplinary knowledge: See 'White Rose' small steps*

**PV**

- Count to 10 forward & backwards from any given number.
- Count, read, write numerals to 10 in words & numerals.
- Given a number, count 1 more or 1 less.
- Use objects and pictures to represent numbers.
- Use language of equal to, more than, less than
- Read & write numbers to 100 in numerals.

**Addition and subtraction**

- Represent and use number bonds and related facts within 10.
- Read & interpret mathematical statements involving +, - and = signs.
- Add & subtract 1-digit numbers to 10, including zero.
- Solve one-step problems using CPA.
- Missing number problems.

**Multiplication and division**

- Solve one-step problems by calculating the answer, using concrete resources and arrays with teacher support (Summer)

**Fractions**

- Recognise, find and name a half as one of two **equal** parts of an object, shape or quantity.
- Recognise, find and name a quarter as one of four **equal** parts of an object, shape or quantity.

**Year 2** *For disciplinary knowledge: See 'White Rose' small steps*

**PV**

- Count in steps of 2, 3 and 5 from 0, and in tens from any number, forwards and backwards.
- Read and write numbers to at least 100 in numerals and words.
- Identify, represent and estimate numbers using different representations, including a number line.
- Recognise the place value of each digit in a two-digit number (tens and ones)
- Compare and order numbers from 0 – 100 using < .> and = signs.
- Use place value and number facts to solve problems.
- Recall and use addition and subtraction facts to 20.
- Derive and use related facts up to 100.
- Show that addition of two numbers can be done in any order **(commutative)** and subtraction of one number from another cannot.
- Recognise and use the inverse relationship between + and -, using this to check calculations and missing number.

**Four operations**

- Add and subtract numbers using concrete and pictorial and mentally, including: a two-digit number and ones, a two digit number and tens, two two-digit numbers and adding three one-digit numbers.
- Solve problems with addition and subtraction: using concrete and pictorial representations, including those involving quantities and measure.
- Applying their increasing knowledge of mental and written methods.
- Recall and use multiplication and division facts for 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- Show that multiplication of two numbers can be done in any order **(commutative)** and division of one number by another cannot.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using x and ÷ and = signs.
- Solve problems involving multiplication and division, using arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

**Fractions**

- Recognise, find, name and write fractions ½, ¼, 2/4, ¾ of a length, shape, set of objects or quantity.
- Recognise the equivalence of 2/4 and ½.
- Write simple fractions for example ½ of 6 = 3.

**Year 3** *For disciplinary knowledge: See 'White Rose' small steps*

**PV**

- Count from 0 in multiples of 4,8, 50 & 100
- Find 10 or 100 more or less than a given number
- Identify, represent & estimate numbers using different representations
- Read & write numbers up to 1000 in numerals and in word
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Solve number problems & practical problems involving these ideas

**Addition and subtraction**

- Estimate the answer to a calculation and use inverse operations to check answers.
- Add and subtract numbers mentally, including a three-digit number & ones; A three-digit number and tens; a three-digit number and hundreds
- Add and subtract numbers with up to three digits, using formal written methods or columnar addition & subtraction
- Solve problems including mussing number problems, suing number facts, place value, and more complex addition and subtraction

**Multiplication and division**

- Recall & use multiplication & division facts for the 3,4 & 8 multiplication tables
- Write & calculate mathematical statements for multiplication & division using the multiplication tables that they know including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods.
- Solve problems, including missing number problems, involving multiplication & division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

**Fractions**

- Count up and sown in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit number of quantities by 10
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.
- Recognise and use fractions as numbers; unit fractions and non-unit fractions with small denominators

- Recognise and show using diagrams, equivalent fractions with small denominators
- Compare and order unit fractions, and fractions with the same denominators
- Add and subtract fractions with the same denominator within one whole (e.g. 5/7 + 1/7 = 6/7)
- Solve problems that involve all of the above

**Year 4** ***For disciplinary knowledge: See 'White Rose' small steps***

**PV**

- Count in multiples of 6,7,9.25 &1000
- Count backwards through zero to include negative numbers
- Identify, represent & estimate numbers using different representations
- 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
- Find 100 more or less than a given number
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, & ones)
- Order & compare numbers beyond 1000
- Round any number to the nearest 10, 100 or 1000
- Solve number & practical problems that involve all of the above and with increasingly large positive numbers.

**Addition and subtraction**

- Estimate & use inverse operations to check answer to a calculation
- Add & subtract numbers with up to 4 digits using the formal written method or columnar addition & subtraction where appropriate
- Solve addition & subtraction two-step problems in contexts deciding which operations & methods to use and why

**Multiplication and division**

- Recall multiplication & division facts for the multiplication tables up to 12 x 12
- Use place value know & derived facts to multiply and divide mentally, including multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- Recognise and use factor pairs and commutativity in mental calculations
- Multiply two-digit & three-digit number by a one-digit number using formal written layout
- Solve problems involving multiplying & adding, including using the distributive law to multiply two digit by one digit, integer scaling problems and harder correspondence problems such as n objective are connected to m objects
- Count up & down in hundredths; recognise that hundredth arise when dividing an objective by one hundredths & dividing tenths by ten.
- Recognise and show, using diagrams, families of common equivalent fractions
- Add & subtract fractions with the same denominator

**Fractions**

- Recognise & write decimal equivalent of any number of tenths or hundredths
- Recognise & write decimal equivalents to ¼, ½, ¾
- 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
- Find the effects of dividing a one or two-digit number by 10 and 100

- Identifying the value of the digits in the answer as ones, tenths and hundredths
- Solve simple measure & money problems involving fractions & decimals to two decimal places.

**Year 5** ***For disciplinary knowledge: See 'White Rose' small steps***

**PV**

- Compare numbers to at least 1,000,000
- Count forwards or backwards in multiples of 10.
- Interpret negative numbers in context.
- Round numbers up to 1,000,000 to nearest 10, 100, 1,000, 10,000, 100,000
- Read Roman numerals up to 1000

**Addition and subtraction**

- Add and subtract numbers mentally.
- Add and subtract whole numbers with more than 4 digits.
- Solve addition and subtraction multi step problems in context.

**Multiplication and division**

- Multiply and divide numbers by 10, 100 and 1000.
- Identify all multiples and factors of a number, including factor pairs.
- Recognise and use squared and cubed numbers.
- Use multiples, squares and cubes to solve problems involving multiplication and division.
- Know and use the vocabulary of prime numbers, establishing knowledge of prime numbers up to 100.
- Multiply a 4-digit number by a one- or two-digit number using a formal written method.
- Divide numbers of up to 4-digits by a one-digit number using a formal written method.
- In solving problems, understand the use of the equals sign.

**Fractions**

- Multiply proper fractions and mixed numbers by whole numbers.
- Read and write decimal numbers as fractions.
- Solve problems involving multiplication and division, including scaling.

**Decimals and percentages**

- Read, write, order and compare numbers up to 3 decimal places.
- Round decimals with two decimal places to the nearest whole number and to one decimal place.
- Solve problems involving number up to three decimal places.
- Recognise the percent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal.
- Solve problems which require knowing percentage and decimal equivalents of 1/2 , 1/4 , 1/5 , 2/5 , 4/5 and those fractions with a denominator of a multiple of 10 or 25.
- Recognise and write decimal equivalents of any number of tenths or hundredths.
- Find the effect of dividing a one- or two-digit number by 10 or 100, identifying the value of the digits in the answer as ones, tenths and hundredths.
- Solve simple measure and money problems involving fractions and decimals to two decimal places.
- Convert between different units of measure [for example, kilometre to metre].

**Year 6** ***For disciplinary knowledge: See 'White Rose' small steps***

**PV:**

- Compare and order numbers up to 10,000,000.
- Round any whole number to a required degree of accuracy.
- Use negative numbers in context and calculate intervals across zero.

- Solve number and practical problems that involve all the above.

**4 Operations:**

- Solve addition and subtraction multi step problems in contexts, deciding which operations and methods to use and why.
- Multiply multi-digit number up to 4 digits by a 2-digit number using the formal written method of long multiplication.
- Divide numbers up to 4 digits by a 2-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding as appropriate for the context.
- Divide numbers up to 4 digits by a 2-digit number using the formal written method of short division, interpreting remainders according to the context.
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Use their knowledge of the order of operations to carry out calculations involving the four operations.
- Solve problems involving addition, subtraction, multiplication and division.
- Use estimation to check answers to calculations and determine in the context of a problem, an appropriate
  degree of accuracy.

**Fractions:**

- Use common factors to simplify fractions.
- Use common multiples to express fractions in the same denomination.
- Compare and order fractions, including fractions > 1
- Generate and describe linear number sequences (with fractions)
- Add and subtract fractions with different denominations and mixed numbers, using the concept of equivalent fractions.
- Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example 1/4 x 1/2 = 1/8]
- Divide proper fractions by whole numbers [for example 1/3 ÷ 2 = 1/6]
- Associate a fraction with division and calculate decimal fraction equivalents [ for example, 0.375] for a simple fraction [for example 3/8]
- Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

**Decimals:**

- To identify whether partitions of numbers are correct using knowledge of up to 3dp place value.
- Identify the number using the given clues about the digits to three decimal places.
- Multiply and divide numbers by 0.1/10/100/1000.

**Percentages:**

- To find equivalents between fractions and percentages.
- To find percentages of whole numbers.

**Year 7**

- Use of a scientific calculator
- BIDMAS – calculator and non-calculator
- Sequences – patterns, generating, *nth term, quadratic*
- 4 operations
- Time – reading time, calculations with time, interpreting timetables, time on calculator

- Money – functional calculations
- Negatives – ordering, 4 operations.
- Factors and multiples
- Square & triangle numbers.
- Fractions: comparing, simplifying, of an amount, converting FDP.
- Percentages of an amount, *reverse percentages*

**Year 8**

- Calculations with negative integers (*and real numbers*)
- Powers and roots
- Substitution
- HCF, LCM
- *Prime factor decomposition*
- *Estimation*
- *Laws of indices/ powers of 10*
- FDP – calculations with fractions (*including mixed numbers), reciprocals*.

**Year 9**

- Ordering real numbers (*including SURD/index form), p*lace value
- Calculations – 4 operations
- BIDMAS
- Indices *(Inc negative/fractional)*
- *Surds*
- FDP – converting, ordering, mixed numbers, of amounts, percentages – increase/decrease, reverse, *compound interest, exponential growth/decay*
- Rounding – estimation, *error intervals, bounds*
- Standard form
- Use of calculator

**Year 10**

- Factors, multiples and primes.
- *Indices and powers*
- *Surds*
- Estimation (*using pi*), error intervals, standard form, *calculations/application of upper and lower bounds*

**Year 11**

Use of PLC only

## Algebra – Substantive Knowledge

### Year 1

*For disciplinary knowledge: See 'White Rose' small steps*

- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems, such as 7 = ? - 9

### Year 2

*For disciplinary knowledge: See 'White Rose' small steps*

- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and use this to check calculations and solve missing number problems.

### Year 3

No explicit teaching

### Year 4

No explicit teaching

### Year 5

No explicit teaching

### Year 6

*For disciplinary knowledge: See 'White Rose' small steps*

- Use simple formulae.
- 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 two variables.

### Year 7

**Expressions and Formulae:**

- Simplifying and writing expressions
- Writing and using formulae
- Substitution
- *Brackets and Powers*
- *Factorising Expressions*

**Equations:**

- Expanding brackets
- Factorising single brackets *(double brackets)*
- Solving one and two step equations
- Changing the subject of a formulae
- *Rearranging equations with fractions, indices and brackets*

### Year 8

**Sequences and Graphs:**

- Continuing sequences
- Nth term sequences
- Coordinates and line segments
- Linear graphs

**Straight line graphs:**

- Plotting linear graphs
- Linear graphs *(y=mx+c)* and interpreting graphs
- Gradient, midpoint, distance
- *Parallel and perpendicular lines*
- Solving linear equations graphically

**Year 9**

**Algebra 1- Expressions**

- Creating expressions,
- substitution,
- collecting like terms,
- expanding and factorising single *(double/triple)* brackets
- *Indices*

**Algebra 2 – Algebraic manipulation 1**

- Solving equations
- Solving inequalities
- Forming equations
- *Rearranging formulae*

**Algebra 3 – Sequences**

- nth term
- Special sequences
- Generating quadratics/ *nth term quadratics*

**Algebra 4 – Linear Graphs**

- Coordinates
- Plotting graphs (generating coordinates on calculator)
- Equation of a line
- Parallel *and perpendicular* lines

**Year 10**

**Algebra 5 – Algebraic Manipulation 2**

- Forming and solving multi step equations
- Changing the subject
- *Solving quadratics (inc quadratic formula)*
- *Solving simultaneous equations including quadratic*

**Algebra 6 - Quadratics**

- Expanding single and double brackets
- Factorising single and double brackets
- Solving quadratics
- *Completing the square*
- *Trig Graphs and Trig Transformations*

**Algebra 7 – Harder graphs**

- Quadratic graphs and function notation
- Solving quadratics (by factorising)
- Cubic and reciprocal graphs
- Real life graphs
- *Functions- inverse and composite*
- *Quadratic inequalities*
- *Circles and tangents*

**Year 11**

**Algebra 8- Algebraic Manipulation 3**

- Forming and solving equations
- Simultaneous equations

- *Iteration*
- *Algebraic fractions*
- *Proof*

| **Shape and Measure – Substantive Knowledge** | |
|---|---|
| **EYFS** | ***For disciplinary knowledge: See 'White Rose' overview*** |
| • Use everyday language to talk about size, weight, capacity, position, distance, time and money to compare quantities and objects and to solve problems.<br>• Recognise, create and describe patterns.<br>• Explore characteristics of everyday objects and shapes and use mathematical language to describe them.<br>*OBSERVATIONS OF CHILDREN DEMONSTRATING THIS INDEPENDENTLY IS CRITICAL. | |
| **Year 1** | ***For disciplinary knowledge: See 'White Rose' small steps*** |
| **Shape**<br>• Recognise and name common 2D shapes including: rectangles, squares, circles and triangles.<br>• Recognise and name common 3D shapes including: cuboids, cubes, pyramids and spheres<br>**Measure**<br>• Measure and begin to record lengths and heights.<br>• Compare describe and solve practical problems for: length and heights (for example, long/short, longer/shorter, tall/short, double/half)<br>• Measure and begin to record mass/weight, capacity and volume.<br>• Compare, describe and solve practical problems for mass/weight: (for example, heavy/light, heavier than, lighter than) capacity (for example, full/empty, more than, less than, half, half full, quarter)<br>**Position and direction**<br>• Describe position, direction and movement, including whole, half, quarter and three quarter turns<br>**Money**<br>• Recognise and know the value of different denominations of coins and notes**.**<br>**Time**<br>• Sequence events in chronological order using language (e.g. before and after, next, first today, yesterday, tomorrow, morning, afternoon and evening)<br>• Recognise and use language relating to dates, including days of the week, months and years.<br>• Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times. Compare, describe and solve practical problems for time (e.g. quicker, slower, earlier, later).<br>• Measure and begin to record time (hours, minutes, seconds) | |
| **Year 2** | ***For disciplinary knowledge: See 'White Rose' small steps*** |
| **Shape**<br>• Identify and describe the properties of 2D shapes, including the number of sides and line symmetry in a vertical line.<br>• Identify and describe the properties of 3D shapes, including the number of edges, vertices and faces.<br>• Identify 2D shapes on the surface of 3D shapes, (for example, a circle on a cylinder and a triangle on a pyramid.)<br>• Compare and sort common 2D and 3D shapes and everyday objects.<br>**Measure** | |

- Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature ($^{O}$C; capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels/
- Compare and order lengths, mass, volume/capacity and record the results using <, > and =.

**Position and direction**

- Use mathematical vocabulary to describe position, direction and movement including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)
- Order and arrange combinations of mathematical objects in patterns and sequences.

**Money**

- Recognise and use symbols for pounds and pence; combine amounts to make a particular value.
- Find different combinations of coins that equal the same amounts of money.
- Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change.

**Time**

- Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times.
- Know the number of minutes in an hour and the number of hours in a day.
- Compare and sequence intervals of time.

**Year 3** *For disciplinary knowledge: See 'White Rose' small steps*

**Measure**

- Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml)
- Add & subtract amounts of money to give change, using both £ & P in practical contexts
- Tell & write the time from analogue clock, including using Roman numerals from 1 to XII, and 12-hours and 24-hour clocks.
- Estimate and read time with increasing accuracy to the nearest minute; record & 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 & 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)
- Measure the perimeter of simple 2-D shapes

**Properties of shape**

- Draw 2-D shapes
- Make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations & describe them
- Recognise angles as a property of shape or a description of a turn
- Identify right angles, recognise that two right angles makes a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle
- Identify horizontal & vertical lines and pairs of perpendicular and parallel lines

**Year 4** *For disciplinary knowledge: See 'White Rose' small steps*

**Measure**

- Convert between different units of measure(for example, kilometre to metre; hour to minute)
- Estimate, compare and calculate different measures, including money in pounds & pence
- Read, write & convert time between analogue & digital 12 & 24 hour clocks

- Solve problems involving converting from hours to minutes; minutes to seconds; years to months, weeks to days
- Measure & calculate the perimeter of a rectilinear figure (including squares) in centimeters & metres
- Find the area of rectilinear shapes by counting squares

**Properties of shape**

- Compare & classify geometric shapes, including quadrilaterals & triangles, based on their properties & sizes

**Position and direction**

- Identify lines of symmetry in 2-D shapes presented in different orientations
- Identify acute & obtuse angles & compare & 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

**Year 5** ***For disciplinary knowledge: See 'White Rose' small steps***

**Measure:**

- Measure and calculate the perimeter of rectilinear shapes in m and cm.
- Calculate the area of rectangles using standard units.

**Properties of shape:**

- Identify 3-D shapes, including cubes and other cuboids, from 2-D representations.
- Use the properties of rectangles to deduce related facts and find missing lengths and angles.
- Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.
- Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles.
- Draw given angles and measure them in degrees. Identify: angles at a point and one whole turn (total 360°), angles at a point on a straight line and ½ a turn (total 180°) other multiples of 90°

**Position and Direction:**

- Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.

**Converting units:**

- Convert between different units of metric measure [for example, km and m; cm and m; cm and mm; g and kg; l and ml]
- Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.
- Solve problems involving converting between units of time.

**Year 6** ***For disciplinary knowledge: See 'White Rose' small steps***

**Properties of shape:**

- Draw 2-D shapes using given dimensions and angles.
- Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons.
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles

**Position and Direction:**

- To check the accuracy of given co-ordinates for a variety of shapes where there will be more than 1 error to identify.
- Draw and translate simple shapes over 4 quadrants

**Converting units:**

- Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate.
- Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to 3 dp.
- Convert between miles and kilometers.

**Perimeter, Area and Volume:**

- Recognise that shapes with the same areas can have different perimeters and vice versa.
- Recognise when it is possible to use formulae for area and volume of shapes.
- Calculate the area of parallelograms and triangles.
- Calculate, estimate and compare volume of cubes and cuboids using standard units, including cm3, m3 and extending to other units (mm3 , km3)

**Year 7**

**Area and Volume:**

- Triangle, rectangle, parallelogram, trapezium
- Compound area
- Volume cube/cuboids
- Naming 2D/3D shapes and their properties
- Surface area

**Lines and Angles:**

- Angles in parallel lines, triangles, *quadrilaterals, polygons*
- Drawing and estimating angles/triangles

**Year 8**

**Area, Perimeter and Volume:**

- Area and perimeter recap (Y7)
- Circles - area and circumference
- Volume and SA of prisms
- *Volume of cylinders, cones, spheres*

**2D and 3D Shapes:**

- Nets
- Plans and elevations
- Shapes and properties
- *Pythagoras*
- *Applied volume and SA.*
- *SOH CAH TOA*

**Transformations:**

- Congruence, *similarity*
- Translation, rotation, reflection, enlargement
- *Combining transformations*

**Year 9**

**Working in 2D:**

- Measuring lines and angles
- Area and perimeter of 2D shapes and circles
- Circles
- Metric conversion (1D)
- *Arcs and sectors*

**Angles and Polygons**

- Angle facts
- Angles in polygons
- Angles in parallel lines
- Bearings
- *Metric conversion 2D and 3D*

**Triangles**

- Pythagoras (*in 3D)*
- Trigonometry (*in 3D*)

**Working in 3D**

- Naming 3D shapes
- Nets, plans, elevations
- Volume prisms, cones, spheres
- Surface area
- Conversion of 2D and 3D units
- *Frustums*

**Year 10**

**Vectors and Transformations**

- Vectors (adding, resultant, algebraic)
- Transformations – translation, rotation, reflection, enlargement

**Circles and Harder Area**

- Recap circles area/perimeter
- Arcs and sectors
- Shaded Area
- Loci and construction of triangles
- *Circle Theorems*
- *Area of a triangle (1/2absinc)*

**Measures**

- All compound measures
- Distance (and *velocity*) time graphs
- Bearings and maps
- *Speed, density, pressure*

**Year 11**

**Triangles and Similarity**

- Similarity in 1D, *2D and 3D*
- *Sine rule and cosine rule*
- Congruency
- *Exact trig values*

**Data – Substantive Knowledge**

**Year 1** *For disciplinary knowledge: See 'White Rose' small steps*

No explicit teaching, however use of data within measure e.g. recording different heights, sizes...

**Year 2** *For disciplinary knowledge: See 'White Rose' small steps*

**Statistics**

- Interpret and construct simple pictograms, tally charts, block diagrams and simple tables.
- Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- Ask and answer questions about totalling and comparing categorical data.

**Year 3** *For disciplinary knowledge: See 'White Rose' small steps*

**Statistics**

- Interpret & present data using bar charts, pictograms & tables
- Solve one-step & two-step questions (for example "How many more?" and 'How many fewer?") using information presented in scaled bar charts & pictogram & tables

**Year 4** *For disciplinary knowledge: See 'White Rose' small steps*

**Statistics**

- Interpret & present discrete & continuous data using appropriate graphical methods, including bar charts and time graphs.
- Solve comparison sum & difference problems using information presented in bar charts, pictograms, table and other graphs.

**Year 5** *For disciplinary knowledge: See 'White Rose' small steps*

**Statistics:**

- Solve comparison, sum and difference problems using information presented in a line graph.
- Complete, read and interpret information in tables, including timetables.

**Year 6** *For disciplinary knowledge: See 'White Rose' small steps*

**Algebra:**

- Use simple formulae.
- 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 two variables.

**Year 7**

**Analysing and Displaying Data**

- Data collection
- Two way tables and bar charts
- averages and range
- Grouped data
- Further graphs
- Pie charts
- Correlation

**Probability**

- Language of probability
- Comparing probabilities
- Mutually exclusive events
- Estimating probability and expectation

- Experimental probability
- *Probability diagrams*
- *Tree diagrams*

**Year 8**

**Graphs and Charts**

- Pie charts
- Stem and leaf
- comparing distributions
- Scatter graphs
- Misleading graphs
- Time series

**Year 9**

**Presenting and Organising Data**

- Organising data
- Presenting data
- Interpreting timetables
- *Histograms*
- *Box Plots*

**Comparing Distributions**

- Frequency diagrams
- Averages and spread
- scatter graphs and correlation
- Time series
- *Cumulative Frequency*

**Year 10**

**Probability**

**Single Events**

- Theoretical probability
- Experimental probability and expectation
- Two way tables
- *Sampling*

**Two Events**

- sample space diagrams,
- frequency trees
- tree diagrams
- *venn diagrams and set notation*
- *histograms*
- combinations

**Year 11**

- Estimating averages and spread
- Modal groups
- *Complex tree diagrams and venn diagrams*

| Ratio and Proportion – Substantive Knowledge |
|---|
| **Year 1** |
| No explicit teaching |
| **Year 2** |
| No explicit teaching |
| **Year 3** |
| No explicit teaching |
| **Year 4** |
| No explicit teaching |
| **Year 5** |
| No explicit teaching |
| **Year 6** *For disciplinary knowledge: See 'White Rose' small steps* |
| **Ratio:**<br>• Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.<br>• Solve problems involving similar shapes where the scale factor is known or can be found.<br>• Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. |
| **Year 7** |
| **Proportion**<br>• direct proportion<br>• scales and measures<br>• proportion and fractions<br>• proportion and percentages |
| **Year 8** |
| **Ratio**<br>• Use ratio notation including reduction to simplest form<br>• Divide a quantity into two or more parts |
| **Year 9** |
| **Ratio**<br>• reading scales<br>• sharing in a ratio<br>• Ratios within ratios<br>• Algebraic ratios |
| **Year 10** |
| **Proportion:**<br>• Basic proportion<br>• Direct and inverse proportion<br>• Proportionality and ratio reasoning<br>• Conversion graphs and exchange rates<br>• Direct and inverse proportion |
| **Year 11** |
| As per PLC |

**Appendix:**

**EYFS Yearly Plan:**

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autumn | Place Value - Numbers to 5<br>Addition and Subtraction - Sorting<br>Place Value - Comparing groups<br>Addition and Subtraction - Change within 5<br>Measurement - Time | | | | | | | | | | | |
| Spring | Addition and Subtraction - Numbers to 5<br>Place Value - Numbers to 10<br>Addition and Subtraction - Addition to 10<br>Geometry - Shape and space | | | | | | | | | | | |
| Summer | Geometry - Exploring patterns<br>Addition and Subtraction - Count on and back<br>Place Value - Numbers to 20<br>Multiplication and Division - Numerical patterns<br>Measurement - Measure | | | | | | | | | | | |

**Year 1 Yearly Plan:**

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autumn | Number: Place Value (within 10) | | | | Number: Addition and Subtraction (within 10) | | | | Geometry: Shape | Number: Place Value (within 20) | | Consolidation |
| Spring | Number: Addition and Subtraction (within 20) | | | | Number: Place Value (within 50) | | | Measurement: Length and Height | | Measurement: Weight and Volume | | Consolidation |
| Summer | Number: Multiplication and Division | | | Number: Fractions | | Geometry: Position and Direction | Number: Place Value (within 100) | | Measurement: Money | Measurement: Time | | Consolidation |

**Year 2 Yearly Plan:**

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autumn | Number: Place Value | | | Number: Addition and Subtraction | | | | | Measurement: Money | | Number: Multiplication and Division | |
| Spring | Number: Multiplication and Division | | Statistics | | Geometry: Properties of Shape | | | Number: Fractions | | | Measurement: Length and Height | Consolidation |
| Summer | Geometry: Position and Direction | | | Problem solving and efficient methods | | Measurement: Time | | Measurement: Mass, Capacity and Temperature | | | Investigations | |

**Year 3 Yearly Plan:**

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autumn | Number: Place Value | | | Number: Addition and Subtraction | | | | | Number: Multiplication and Division | | | Consolidation |
| Spring | Number: Multiplication and Division | | | Measurement: Money | Statistics | | Measurement: Length and Perimeter | | | Number: Fractions | | Consolidation |
| Summer | Number: Fractions | | | Measurement: Time | | | Geometry: Properties of Shape | | Measurement: Mass and Capacity | | | Consolidation |

**Year 4 Yearly Plan:**

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autumn | Number: Place Value | | | | Number: Addition and Subtraction | | | Measurement: Length and Perimeter | Number: Multiplication and Division | | | Consolidation |
| Spring | Number: Multiplication and Division | | | Measurement: Area | Number: Fractions | | | | Number: Decimals | | | Consolidation |
| Summer | Number: Decimals | | Measurement: Money | | Measurement: Time | Statistics | | Geometry: Properties of Shape | | | Geometry: Position and Direction | Consolidation |

**Year 5 Yearly Plan:**

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autumn | Number: Place Value | | | Number: Addition and Subtraction | | Statistics | | Number: Multiplication and Division | | Measurement: Perimeter and Area | | Consolidation |
| Spring | Number: Multiplication and Division | | | Number: Fractions | | | | | | Number: Decimals and Percentages | | Consolidation |
| Summer | Number: Decimals | | | | Geometry: Properties of Shape | | | Geometry: Position and Direction | Measurement: Converting Units | | Measurement: Volume | Consolidation |

**Year 6 Yearly Plan:**

| | Week 1 | Week 2 | Week 3 | Week 4 | Week 5 | Week 6 | Week 7 | Week 8 | Week 9 | Week 10 | Week 11 | Week 12 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Autumn | Number: Place Value | | Number: Addition, Subtraction, Multiplication and Division | | | | Number: Fractions | | | | Geometry: Position and Direction | Consolidation |
| Spring | Number: Decimals | | Number: Percentages | | Number: Algebra | | Measurement: Converting Units | Measurement: Perimeter, Area and Volume | | Number: Ratio | | Consolidation |
| Summer | Geometry: Properties of Shape | | Problem Solving | | | Statistics | | Investigations | | | | Consolidation |

**KS3 and KS4 calendar**

| | | KS3 | | KS4 | | |
|---|---|---|---|---|---|---|
| **W/B** | **Week** | **7** | **8** | **9** | **10** | **11** |
| **06/09/2021** | 1 | **Number 1** | Number 4 | Number 1 | Shape 4 | CPT / N6 |
| **13/09/2021** | 2 | **Number 1** | Number 4 | Number 1 | Shape 4 | Number 6 |
| **20/09/2021** | 3 | **Baseline** | Number 4 | N1 / A1 | Shape 4 / PLC | Number 6 |
| **27/09/2021** | 4 | Data 1 | Catch up CC *** | Algebra 1 | ® Ratio 1 | CPT / A8 |
| **04/10/2021** | 5 | Data 1 | Algebra 5 | Algebra 1 | Ratio 1 | ® Algebra 8 |
| **11/10/2021** | 6 | ® Data 1 / Algebra 1 | ® Algebra 5 | Shape 1 | R1 / A5 | Algebra 8 |
| **18/10/2021** | 7 | Algebra 1 | Algebra 5 / S3 | ® Shape 1 | Algebra 5 | PLC / S7 |
| | | | | | | |
| **01/11/2021** | 8 | Algebra 1 | Shape 3 | Shape 1 | Revision / Assessment | Shape 7 |
| **08/11/2021** | 9 | Shape 1 | Revision / Assessment | S&P1 | Review / A5 | Revision |
| **15/11/2021** | 10 | Shape 1 | Review / S3 | S&P1 | ® A5 / S&P3 | Mocks* |
| **22/11/2021** | 11 | ® Shape 1 / N2 | ® Catch up CC *** | S&P1 | S&P 3 | Mocks* |
| **29/11/2021** | 12 | Number 2 | Catch up CC *** | Revision / Assessment | S&P 3 | Mock Review |
| **06/12/2021** | 13 | Number 2 | Number 5 | Review / N2 | Number 5 | ® Shape 7 |
| **13/12/2021** | 14 | Catch up CC *** | Number 5 | Number 2 | Number 5 | S&P 5 |
| | | | | | | |
| **03/01/2022** | 15 | Algebra 2 | Number 5 / R2 | ® Number 2 | Number 5 | S&P 5 |
| **10/01/2022** | 16 | Algebra 2 | Ratio 2 | Algebra 2 | PLC | S&P5 / Shape 8 |
| **17/01/2022** | 17 | Exams* | R2 / Revision | Algebra 2 | Algebra 6 | Shape 8 |
| **24/01/2022** | 18 | Review / Algebra 2 | Exams* | Revision | Algebra 6 | Shape 8 |
| **31/01/2022** | 19 | Catch up CC *** | Review/ PLC | Exams* | Algebra 6 | PLC |
| **07/02/2022** | 20 | Shape 2 | Review / S 4 | Review / S2 | Revision / Assessment | |
| **14/02/2022** | 21 | ® Shape 2 | ® Shape 4 | Shape 2 | Review / PLC | |

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **28/02/2022** | 22 | Algebra 3 | | | Shape 4 | | | ® Shape 2 | | Shape 5 | | | | |
| **07/03/2022** | 23 | Algebra 3 | | | Shape 4 | | | Number 3 | | ® Shape 5 | | | | MOCKS* |
| **14/03/2022** | 24 | Number 3 | | | Algebra 6 | | | Number 3 | | Shape 5 | | | | Mock Review |
| **21/03/2022** | 25 | Number 3 | | | Algebra 6 | | | Number 3 | A3 | R2 | | | | |
| **28/03/2022** | 26 | Computing 2 | | W | Algebra 6 | | | Algebra 3 | | R2 | | | | ® |
| **04/04/2022** | 27 | Computing 2 | | W | Computing 4 | | W | Algebra 3 | | R2 | PLC | | | |
| **25/04/2022** | 28 | N3 | Algebra 4 | E | Computing 4 | | W | Revision | | Algebra 7 | | | | |
| **02/05/2022** | 29 | Algebra 4 | | E | Data 3 | | E | Exams* | | Algebra 7 | | | | |
| **09/05/2022** | 30 | Algebra 4 | | L | Data 3 | | E | Review | S3 | A7 | S6 | | | |
| **16/05/2022** | 31 | Ratio 1 | | L | Data 3 | | L | Shape 3 | | Shape 6 | | | | |
| **23/05/2022** | 32 | Ratio 1 | | S | Shape 5 | | L | ® Shape 3 | | Shape 6 | | | | |
| **06/06/2022** | 32 | Ratio 1 | | S | Shape 5 | | S | S&P2 | | S&P4 | | | | |
| **13/06/2022** | 33 | Data 2 | | Y | Shape 5 | | S | S&P2 | | S&P4 | | | | |
| **20/06/2022** | 34 | Data 2 | | Y | Ratio 3 | | Y | Number 4 | | Revision/ Exams* | | | | |
| **27/06/2022** | 35 | Rev | Exams | | Rev | Exams | | Number 4 | | Exams / Review | | | | |
| **04/07/2022** | 36 | Exams | Review | | Exams | Review | | N4 | Algebra 4 | Review | N6 | | | |
| **11/07/2022** | 37 | ® Data 2 | EOY | | ® Ratio 3 | | Y | Algebra 4 | | ® Number 6 | | | | |
| **18/07/2022** | 38 | EOY | | | Ratio 3 | | | Algebra 4 | | Number 6 | | | | |