TAUNTON SCHOOL

MATHS PATHWAY

Taunton Prep

&

Senior School

2020

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

The aims of Mathematics here at Taunton School are to give students the ability to:

- become fluent in the fundamentals of mathematics, developing conceptual understanding and the ability to recall and apply knowledge rapidly and accurately
- reason mathematically through exploration, conjecturing, generalisations, and developing an argument, justification or proof using mathematical language
- solve problems by applying their mathematics to a variety of problems, including breaking down problems into a series of simpler steps and persevering in seeking solutions

Key Stage 1

Reception

Number	Measurement	Geometry	Statistics
Counting - Count, read and write numbers to 10, 20 and 100, forwards and backwards **Calculations** - Simple halves and doubles	**Currency** - Recognise different coins **Days of the week and Time** – including using O'clock times on analogue clock. **Measurement** - Length, height and weight.	**Shapes** - identify circles, triangles and rectangles including squares **Symmetry** - Language of position and direction, left and right in the context of games.	**Classification** – organise items by colour, height etc. **Patterns** - Describe and create patterns using colours, shapes, objects, sounds and actions.

Year 1

Number	Measurement	Geometry	Statistics
Number - Locate 2-digit numbers on a 100 grid. Odd and even numbers **Counting** - Count objects in 2s, 5s and 10s **Calculations** - Add three small numbers (numbers up to 20), spotting pairs to 10 and doubles. Knowledge and understanding of the number line Represent and use number bonds to 20 Solve one-step problems involving multiplication and division using physical objects as aids	**Time** - Tell the time to the half hour and quarter hour on analogue clocks **Measure** – Measure and record lengths, heights, mass/weight, capacity, volume and time (hours, minutes and seconds)	**Shape** - Name and describe common 2D and 3D shapes **Symmetry** - recognise basic line symmetry. Sort 2D shapes according to their properties.	**Classification** – Continue to classify shapes by colour, size and properties. **Sets** - Venn diagrams and Carroll diagrams to compare lengths and heights.

Year 2

Number	Measurement	Geometry	Statistics
Calculations - Add and subtract 2-digit numbers, recall basic multiplication and division facts for the 2,	**Currency** - Use coins and make a given amount. **Time** - Tell time to 5 minutes.	**Shapes** - Identify properties (including faces and vertices) of 3D shapes; sort according to	**Sets** - Sort shapes and objects using a two-way Carroll diagram.

5 and 10 multiplication tables **Counting** - Count in 2s, 3s, 5s and 10s. **Place Value –** Recognise value in a two digit number **Functions** - Understand Addition/Subtraction, division/multiplication are inverse operations **Ordering** – Compare and order numbers using < and > signs. **Fractions** - Recognise 1/2s, 1/4s, 1/3s and 2/3s of shapes, lengths, set of objects or quantities	**Estimation –** Identify to correct unit and attempt to estimate quantities	properties including number of faces; name the 2D shapes of faces of 3D shapes.	**Statistical Graphs** - Draw a block graph, tally chart, pictogram and simple tables

Key Stage 2

Year 3

Number	Measurement	Geometry	Statistics
Counting – count in multiples of 4, 8, 50 and 100 **Place Value –** Recognise value in a three digit number Compare and order numbers up to 1000 **Calculations –** Add and subtract 3-digit numbers using column addition/subtraction. Add two 2-digit numbers mentally. Recall and use multiplication and division facts for the 3, 4 and 8 Develop formal written methods for short multiplication Solve word problems using these skills **Fractions** – Count up and down in tenths Add and subtract fractions with a common denominator Compare and order unit fractions Find equivalent fractions	**Measure –** Measure, compare, add/subtract lengths, mass, volumes Measure the perimeter of simple 2D shapes **Currency** – Add/subtract amounts of money, change etc. **Time** - Tell the time to the nearest minute on analogue and digital clocks, including knowledge of Roman numerals (I to XII) **Estimation –** Estimate and measure capacity in millilitres. Know 1 litre = 1000 ml.	**Shapes -** Know the properties of 3D shapes Identify, name and draw horizontal, vertical, perpendicular, parallel and diagonal lines, angles and symmetry in 2D shapes. **Angles -** Recognise right angles are 90°; understand angles are measured in degrees.	**Statistical Graphs** - Draw and interpret bar charts and pictograms and tables Collect information from a picture (Roman Where's Walley) in the form of a table, create and appropriate graph and make any observations and conclusions.

Year 4

Number	Measurement	Geometry	Statistics
Counting – count in multiples of 6, 7, 9, 25 and 1000 Count backwards through zero to include negative numbers **Place Value –** Recognise value in a four digit number Order and compare numbers beyond 1000 Round numbers to the nearest 10,100, 1000, or nearest integer Recognise and write Roman numerals to 100. **Calculations –** Add and subtract 4-digit numbers using column addition/subtraction. Estimate and use inverse calculations to check answers Set up and solve two-step problems involving addition/subtraction Know and recall timetables up to 12 x 12 Use mental multiplication and division strategies Multiply 3 and 4-digit numbers by single-digit numbers. **Fractions** – Count up and down in hundredths Recognise and write simple decimal equivalents (such as ½, ¾, tenths and hundredths) Order decimal numbers Investigate the effect of dividing a number by 10 or 100	**Currency** – Solve simple measure and money problems involving fractions and decimals up to two decimal places **Measures –** Convert between different measures of unit (km to m and hour to minutes) Measure and calculate perimeters of rectilinear shapes **Area** – Find simple areas by counting squares **Time -** Tell the time on a 24 hour clock and convert between analogue and 24 hour clock Calculate time intervals	**Shapes –** Sort 2D shapes according to their properties including types of quadrilaterals and triangles. Recognise and draw line symmetry in shapes Name and identifying regular and irregular polygons Use coordinates to draw polygons **Angles -** Recognise and compare acute, right and obtuse angles	**Statistical Graphs** -Draw and interpret bar charts and pictograms. Draw line graphs and understand that intermediate points have meaning. Look at statistics of African animals (Height, weight length). Use the data to create a 3-circle Venn diagram.

Year 5

Number	Measurement	Geometry	Statistics
Place Value – Order and compare numbers beyond up to 1 000 000 Count forward and backwards, including negative integers Round numbers to the nearest 10,100, 1000, 10 000, 100 000 or nearest integer Recognise and write Roman numerals to 1000. **Calculations –** Add and subtract 4-digit numbers	**Measures -** Metric and Imperial Units **Area –** Calculate areas of rectangles and squares; Calculate the perimeter and area of composite shapes. **Time –** Solve problems that involve the conversion of time	**Angles -** Measure and draw angles in degrees; classify angles as obtuse, acute and reflex; angles on a line total 180° and angles round a point total 360°. **Shapes –** Properties of equilateral, isosceles, scalene and right-angled triangles. Apply reflections and translations to 2D shapes and be able to describe the transformation;	**Statistical Graphs** – Interpret information given in a line graph or a timetable **Probability -** Revise Venn and Carroll diagrams. **Averages -** Introduce the concept of averages. Find the mean of given data and use it to compare two or more groups of data.

using column addition/subtraction. Add and subtract 2-digit numbers mentally. Solve word problems. Use rules of divisibility. Identity prime numbers; Find factors of numbers. Multiply pairs of 2-digit numbers, up to a four-digit number by a two digit number and using long multiplication techniques; Use short division to divide 3-digit numbers by 1-digit number; know and use square and cube numbers (including using correct notation) **Fractions** – Compare and place fractions on a line (including mixed and improper fractions); find equivalent fractions and reduce them to their simplest form. Introduce percentages.		Draw polygons using dotted square and isometric paper.	

Year 6

Number	Algebra	Geometry and Measurement	Statistics
Place Value – Understand negative numbers. Round numbers to a degree of accuracy. **Calculations –** Solve word problems; Identity common factors and common multiples. Use long division to divide a four digit number by a two digit number; consolidate methods in addition, subtraction and multiplication Use knowledge of order of operations to compute calculations; Solve addition and subtraction multi-step problems in shopping contexts and add and subtract money using column addition. **Fractions** – Compare and order fractions (including those greater than 1), add, subtract and multiply fractions and divide fractions by an integer and recognise fraction as division; recall and use equivalences between simple fractions, decimals and percentages	**Algebra -** Express missing number problems (by inspection) and find pairs of numbers that satisfy equations. Describe and continue sequences, generalise to predict the tenth term, begin to generalise a term in a sequence. Solving missing number problems using inverse operations; revise using trial and improvement to solve equations involving one or two unknowns	**Area –** Calculate the perimeter, area and volume of shapes, with correct units. Calculate the area of a triangle and parallelogram **Shapes –** describe properties of 3D shapes. Compare nets for different 3D shapes. Identify and name parts of a circle including diameter, radius and circumference; draw circles to a given radius. Read and plot coordinates in all four quadrants, draw and reflect simple polygons in both the x-axis and y-axis using coordinates **Angles –** Use angle facts including vertically opposite angles to find missing angles	**Averages -** Calculate and understand the mean average. Introduce terms Mode, Median, Range. **Statistical Graphs** – Construct and interpret distance/time line graphs where intermediate points have meaning, including conversion line graphs. Interpret and construct simple pie charts.

Ratio and Proportion – solve problems involving similar shapes where the scale factor is to be identified or used; solve problems relating to quantities being split unevenly			

Key Stage 3

Year 7

Number	Algebra	Geometry	Statistics
Calculations – Consolidation of four rules of number. Properties of number, including primes, prime factors HCF and LCM. Importance of estimation. **Fractions** – Add, subtract, multiply and divide fractions. Calculator skills. Using negative numbers. Fraction, decimal and percentage equivalence. Percentage increase and decrease. Decimal multiplication and division. Worded questions with decimals, fractions and percentages.	**Algebra -** Introduction to formative algebra. Simplifying expression. Using formulas in everyday life. Predicting the next term of a sequence und using the nth term. How to set out, and solve equations in a formal way, leading to solving equations with variables on both sides and with brackets. Introduction to simple simultaneous equations.	**Shapes –** A variety on transformations (reflections, rotations, enlargements and translations) in four quadrant co-ordinates. **Area –** Area and perimeter of a variety of shapes including compound shapes. Volume of prisms. **Angles -** Measuring angles and geometrical reasoning. Using angle facts including the sum of interior angles in an n-sided polygon **Right-angled triangles** - Introduction to Pythagoras.	**Statistical Graphs** - Describing correlations on scatter graphs. Constructing a variety of graphs with both discrete and continuous data. Drawing conclusions when given a variety of real-life graphs and proving explanations for the shape of graphs. How to collect data. Drawing pie charts. **Probability -** Simple probability.

Year 8

Number	Algebra	Geometry	Statistics
Calculations – Consolidation of four rules of number (using both positive and negative numbers). Properties of number, including primes, prime factors HCF and LCM. Rounding numbers to decimal to a given number of decimals places or significant figures. Standard index form. Index numbers. Compound measures and the units associated with these. **Fractions -** Add, subtract, multiply and divide fractions. Percentage change. Simple interest. Four rules of number applied to both fractions and decimals. Convert terminating decimals into fractions and vice versa. **Ratio and Proportion** – Use scale factors, scale diagrams and maps; use ratio notation and divide a quantity into a	**Algebra -** Solving equations with variables on both sides of the equation and with brackets. Simplify expressions including collecting like terms, expanding brackets and double expansion of brackets. Using the nth term of a sequence. Inequalities. More difficult simultaneous equations. Solving equations through trial and improvement. Rules of indices in Algebra. Changing the subject of a given formula. Substitute numbers into formulae; recognise and sketch linear and quadratic functions; know and use the equation of a straight line, identifying gradient and y-intercept	**Shapes –** Constructing shapes using a compass and calculating angles through geometrical reasoning. Using a combination of all the transformations. Plotting the locus of a set of points. Similar shapes. **Area –** Area and perimeter of a variety of compound shapes including circles and trapezia. **Right-angled triangles -** More Pythagoras. Introduction to basic trigonometry.	**Statistical Graphs** - Reading and interpreting graphs. Collecting data. More correlations with scatter graphs and the importance of the line of best fit. Constructing a variety of graphs including distance-time graphs. Understanding that you need to take care with data as it can be misleading. **Probability –** List outcomes from multiple events including sample space diagrams and tree diagrams **Averages –** Calculate averages from both discrete and continuous data

given ratio; solve problems involving direct and inverse proportion			

Key Stage 3/4

Mathematics is taught in groups set by ability, laying the foundations for the iGCSE Mathematics course.

Year 9

(*Additional Topics covered by the Top Set are printed in bold)

Number	Algebra	Geometry	Statistics
Indices – Use and application of index rules; Calculations involving standard form Ratio and Proportion – Solve problems involving direct and inverse proportion; solve problems involving ratio; solve problems involving compound measures (such as speed, density) Percentages – Convert between fractions, decimals and percentages; solve problems involving percentage increase and decrease (including reverse percentage problems);	Algebraic Manipulation – Expanding brackets and factorization (including quadratics); substitution and change the subject of formulae **Manipulate algebraic fractions;** Sequences – find the nth term of an arithmetic sequence; **find the sum of an arithmetic series** Inequalities – Solve inequalities involving one variable and be able to illustrate on a number line Simultaneous equations – Solve algebraically and recognize the significance of a graph **Functions - Understand the meaning of a function ; Know and use the notation for composite functions; Solve problems involving composite functions ; Find the inverse of a given function; Solve problems involving inverse functions**	Right-angled triangles – Solve problems involving Pythagoras' Theorem; **Knowledge of Trigonometric ratios to solve problems relating to lengths and angles in 2D right-angled triangles** Surface Area and Volumes of common 3D shapes Angles – Use angle facts relating to parallel lines (alternate, corresponding and interior angles); sum of interior and exterior angles of an n-sided polygon; Linear Functions – Use and find the equation of a straight line, identifying the gradient and recognising when lines are parallel Transformations – Complete and identify reflections, rotations, translations and enlargements **Circle Theorems – Use, apply and prove theorems to calculate unknown angles in circles**	Statistical Graphs – Construct diagrams to represent data including pictogram, bar chart, pie chart and a two-way table Probability – Know and use the multiplication law of probability, addition law and apply the product rule for counting ; Understand that relative frequency tends towards theoretical probability as sample size increases **Tree diagrams – Ability to complete a tree diagram to list multiple events and calculate their corresponding probabilities**

Key Stage 4

Mathematics is a compulsory subject at KS4. Pupils in Year 10 and 11 have 5 Mathematics lessons per week, in classes set by ability. All pupils complete the iGCSE Mathematics course (Pearson) at the end of year 11 with a few pupils at the top end also completing an additional qualification (FSMQ Additional Mathematics (OCR)). The iGCSE course provides an excellent foundation for the Mathematics A Level / IB courses, with the Additional Maths course strongly recommended for pupils considering the Further Mathematics A Level course.

Year 10

(*Additional Topics covered by the Top Set are printed in bold)

Number	Algebra	Geometry	Statistics
Indices – Use and application of index rules Bounds – Ability to identify upper and lower bounds, including in calculations Percentages – Convert between recurring decimals and fractions, use of compound interest and reverse percentage problem solving **Surds – manipulation of expressions involving surds**	Algebraic Manipulation – Substitution and the ability to rearrange formulae to change the subject of a formula Proportion – problem solving involving direct and indirect proportion Sequences – Identify nth term of an arithmetic sequence and find the sum of an arithmetic series Inequalities – Identifying regions of inequalities **and solve quadratic inequalities** Quadratics – Solve quadratics by factorizing, **completing the square and the quadratic formula** and apply this knowledge to the curve **Simultaneous equations – solving simultaneous equations where one equation is non-linear** **Differentiation – Introduce the concept of calculus looking at the instantaneous gradient at any point on a curve**	Trigonometry – Knowledge of Trigonometric ratios to solve problems relating to lengths and angles in 2D right-angled triangles, **including 3D problems and non-right angled triangles.** **Sketch Trigonometric functions and apply graph transformations to known curves** Transformations – Complete and identify reflections, rotations, translations and enlargements Surface Area and Volumes of common 3D shapes Similarity – Problem solving involving similar length, areas and volumes Circle Theorems – Use, apply and prove theorems to calculate unknown angles in circles, **and calculate the area of sectors, segments** Perpendicular lines – Use of y = mx + c in order to deduce the equation of perpendicular lines Vectors – Introduction of vectors and be able to compute basic operations using them, **including application to geometrical problems** **Ruler and Compass Constructions – construction of basic 2D constructions such as perpendicular bisector**	Probability – Use of systematic methods to list all outcomes to enable probabilities to be calculated Tree diagrams – Ability to complete a tree diagram to list multiple events and calculate their corresponding probabilities Statistics – Calculation of averages and spread Cumulative Frequency – Construct and interpret cumulative frequency graph **Histograms – Construct and interpret histograms** **Sets – use of Venn diagram to illustrate sets**

Year 11

(*Additional Topics covered by the Top Set are printed in bold)

Number	Algebra	Geometry	Statistics
Surds – manipulation of expressions involving surds, including rationalization of the denominator **Exponentials and Logarithms – Recognise functions of this type and know how to manipulate such expressions; use of log rules to manipulate expressions**	Quadratics – Solve quadratics by factorizing, completing the square and the quadratic formula and apply this knowledge to the curve **Use of discriminant to establish the number of roots** Functions - Understand the meaning of a function ; Know and use the notation for composite functions; Solve problems involving composite functions ; Find the inverse of a given function; Solve problems involving inverse functions **Know and use the equation of a circle** Inequalities – Identifying regions of inequalities and solve quadratic inequalities **Set up and solve linear programming problems** Differentiation – Introduce the concept of calculus looking at the instantaneous gradient at any point on a curve; **identify stationary points and determine their nature** **Integration – Introduce the concept of integration as the reverse of differentiation and use it to find the area under a curve** **Factor Theorem – Know and use factor theorem to factorise polynomials; use of the binomial expansion** **Recurrence Relations – Know and use the notation around recurrence relations**	Trigonometry – Knowledge of Trigonometric ratios to solve problems including 3D problems and non-right angled triangles. Sketch Trigonometric functions and apply graph transformations to known curves **Use trigonometric identities to solve equations involving trig functions** Vectors –Use of vectors to solve geometrical problems	Histograms – Construct and interpret histograms Sets – use of Venn diagram to illustrate sets **Probability –** Permutations and combinations; Binomial Distribution;

Key Stage 5

There are two major routes that students can take in the sixth form – IB or A Level. All students on the IB course are required to complete some Mathematics. There are two branches you can either take – Analysis and Approaches (AA) or the Application and Interpretation (AI). Currently we offer both Standard Level and Higher Level on the AA route and only Standard Level on the AI route. At A Level, Students can either choose the AS (Pearson) course (taken over two years), or the A Level Mathematics (Pearson) course, or the A Level Further Mathematics (Pearson) Course. Courses vary according to level and route and therefore the topics below give a broad idea of what you would expect to cover in sixth form, in general. For more information about specific routes, please make a request to the Head of Maths for the appropriate specification. For all routes it is advised that students purchase a CASIO CG-50 to ensure they have the necessary resources to access all areas of the course.

Year 12

Pure	Mechanics	Statistics
Algebra Manipulation – fluency in expanding brackets, factorizing expressions, solving equations (including quadratics), manipulation of indices and surds, simultaneous equations and inequalities, transformations of graphs **Number** – confidence in basic calculations, including percentages and use of calculators **Geometry** – use geometrical facts to solve problems involving straight lines, circles, areas, volumes etc. Trigonometry including trigonometric identities, Vectors **Calculus –** Differentiation and integration of polynomial expressions **Exponential and Logarithms** – Knowledge of functions, sketch of the functions and manipulation of logs	**Constant acceleration –** Use of SUVAT equations, solve problems involving either horizontal or vertical motion (separately) **Newton's law of motion –** Knowledge and application of Newton's 1^{st}, 2^{nd} and 3^{rd} Laws of Motion, solve problems involving connected particles or pulley systems **Variable acceleration –** Use of calculus to solve such problems	**Statistical Graphs and Data collection–** Sampling, Histograms, cumulative frequency, scatter diagrams **Measures of central tendency and spread –** averages to include mean, median and mode, and spread to include range, IQR, Variance and standard deviation **Probability –** Mutually exclusive, independent events and application of these **Statistical Distribution -** Binomial Distribution and hypothesis testing

Year 13

Pure	Mechanics	Statistics
Algebra Manipulation – Proof (including proof by induction), Partial fractions and algebraic division, Functions (including the modulus function), Arithmetic and Geometric Sequences, Binomial expansions, Parametric equations Numerical methods, Series, Roots of polynomials, Matrices **Number –** Complex Numbers **Geometry –** Vectors in 3D and scalar and cross product, Volumes of revolution, Polar coordinates, Linear transformations **Calculus –** Differentiation and integration of more complex expressions (including trigonometric ratios, hyperbolic functions etc.), Solving differential equations	**Constant acceleration –** Use of SUVAT equations to solve projectile problems **Moments –** Solve problems involving moments, including finding the centre of mass of an object **Newton's law of motion –** Application of Newton's laws of motion including problems involving inclined planes, friction (both static and dynamic), use of Hooke's law in application of elastic strings and springs **Variable acceleration –** Use of calculus to solve more complex problems **Momentum and Impulse –** Conservation of momentum, elastic collisions (including oblique impacts) **Work, energy and Power principle**	**Regression –** Correlation and hypothesis testing **Probability –** Conditional Probability, Venn diagrams and tree diagrams to help solve such problems **Statistical Distribution -** Normal Distribution, approximation of the binomial distribution

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