

## Springwood High School Maths Curriculum Plan

### **Our Vision:**

We aim to ensure all pupils

- become fluent in the fundamentals of mathematics, by developing pupils conceptual understanding as well as being able to recall and apply knowledge rapidly and accurately.
- develop a broad range of skills in using and applying mathematics.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing difficulty, including breaking down problems into a series of simpler steps and persevering in seeking solutions.
- Understand how Mathematics is an interconnected subject and are able to move fluently between representations of mathematical ideas. Cross-curricular links are integrated within the scheme of learning.
- Embrace the value of learning and feel confident to be able to take risks and comfortable making mistakes and learning from them
- Are independent and think for themselves and are prepared to persevere when faced with challenges, showing a confidence that they will succeed.
- Use Mathematical language and symbols accurately in their work and in discussions.
- Have a broad curriculum which also looks at the history and development of mathematics throughout the years as well as the use of maths in real-life.
- develop a sense of curiosity, passion and commitment to the subject

Exam boards: GCSE - AQA. Additional maths qualification – OCR. A-level - Edexcel.

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### **Brief overview of topics, themes, skills or key questions for each term:**

Year	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
7	Consolidation of KS2 Place value Addition and subtraction Multiplication and Division	Factors & Multiples, Primes and Indices, Order of operations	Geometry: properties of shapes and angles Fractions	Algebraic expressions Fractions and percentages of amounts	Rounding and estimation Algebraic expressions 2	Statistics (used for Smoothie Super learning day)
8	Consolidation of Yr 7 Linear equations Angles	Area and perimeter Percentages 2 Ratio and proportion - ratio	Fractions 3 2-D geometry	3-D geometry Statistics	Probability Percentages 3	Algebraic expressions 3
9	Consolidation of Yr 8 Linear equations 2 Ratio and proportion 2 - proportion	Standard Form Sequences Straight Line Graphs	Real Life Graphs Transformations	Inequalities Quadratic expressions	Quadratic graphs Probability	Right angled triangles Trigonometry

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10	<p><b><u>Foundation</u></b> Sampling. Averages. Charts and Graphs Pie charts. Scatter graphs</p> <p><b><u>Higher</u></b> Indices and roots Surds Recurring decimals to fractions Changing the subject Linear graphs and coordinate geometry</p>	<p><b><u>Foundation</u></b> Properties of shapes, parallel lines and angle facts. Interior and exterior angles of polygons Quadratic equations: expanding and factorising and graphs</p> <p><b><u>Higher</u></b> Quadratic equations and expressions. Simultaneous equations Direct and inverse proportion Sampling. Averages.</p>	<p><b><u>Foundation</u></b> Pythagoras' Theorem. Perimeter and area</p> <p><b><u>Higher</u></b> Charts and Graphs Pie charts Scatter graphs.</p> <p>Properties of shapes, parallel lines and angle facts.</p> <p>Interior and exterior angles of polygons</p> <p>Pythagoras and Trigonometry in right-</p>	<p><b><u>Foundation</u></b> Surface area and volume. Probability Compound measures.</p> <p><b><u>Higher</u></b> Perimeter and area Similarity and congruence Surface area and volume.</p>	<p><b><u>Foundation</u></b> Constructions and loci and bearings Perimeter, area and volume.</p> <p><b><u>Higher</u></b> Accuracy and bounds Constructions, loci and bearings. Probability</p>	<p><b><u>Foundation</u></b> Similarity and congruency</p> <p><b><u>Higher</u></b> Compound measures. Trigonometry Vectors</p>
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			angled triangles			
11	<p><b><u>Foundation</u></b> Trigonometry</p> <p><b><u>Higher</u></b> Vectors Quadratic inequalities Sequences - quadratic Circle Theorems.</p>	<p><b><u>Foundation</u></b> Vectors Graphs Simultaneous equations. Proof</p> <p><b><u>Higher</u></b> Circle theorems Geometry – circles Functions Transformations of graphs. Inequalities - graphing Algebraic fractions.</p>	<p><b><u>Foundation</u></b> Accuracy and bounds</p> <p><b><u>Higher</u></b> Proof Iterations Gradient and area under a curve Growth and decay</p>	Revision	Revision	

	Pure lessons	Pure and Mechanics lessons	Pure and Statistics lessons
12	<p>Quadratic functions – factorising, solving, graphs and the discriminants</p> <p>Equations – quadratic/linear simultaneous</p> <p>The intersection of a line and a curve</p> <p>Inequalities – linear and quadratic (including graphical solutions)</p> <p>Graphs – cubic, quartic, factorised polynomials and reciprocal</p> <p>Transformations – transforming graphs – <math>f(x)</math> notation</p> <p>Circles – equation of a circle, geometric problems</p> <p>Algebraic division, factor theorem and proof</p> <p>Examples including proof by deduction and proof by contradiction</p> <p>The binomial expansion</p> <p>Trigonometric ratios and graphs</p> <p>Trigonometric identities and equations</p> <p>Radians (exact values), arcs and sectors</p> <p>Use of trigonometry in triangles</p>	<p>Algebraic expressions – basic algebraic manipulation, indices and surds</p> <p>Introduction to mathematical modelling and standard S.I. units of length, time and mass</p> <p>Definitions of force, velocity, speed, acceleration and weight and displacement; Vector and scalar quantities</p> <p>Graphical representation of velocity, acceleration and displacement</p> <p>Motion in a straight line under constant acceleration; suvat formulae for constant acceleration; Vertical motion under gravity</p> <p>Newton's first law, force diagrams, equilibrium, introduction to i, j system</p> <p>Newton's second law, '<math>F = ma</math>', connected particles; Newton's third law:</p>	<p>Straight-line graphs, parallel/perpendicular, length and area problems</p> <p>Introduction to sampling terminology; Advantages and disadvantages of sampling</p> <p>Understand and use sampling techniques; Compare sampling techniques in context</p> <p>Calculation and interpretation of measures of location; Calculation and interpretation of measures of variation; Understand and use coding</p> <p>Interpret diagrams for single-variable data; Interpret scatter diagrams and regression lines; Recognise and interpret outliers; Draw simple conclusions from statistical problems</p> <p>Interpret diagrams for single-variable data; Interpret scatter diagrams and regression lines; Recognise and interpret outliers;</p>

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	<p>Definition, differentiating polynomials, second derivatives</p> <p>Gradients, tangents, normals, maxima and minima</p> <p>Definition as opposite of differentiation, indefinite integrals of <math>x^n</math></p> <p>Definite integrals and areas under curves</p> <p>Exponential functions and natural logarithms</p> <p>Secant, cosecant and cotangent (definitions, identities and graphs); and inverse trig functions</p> <p>Compound (including proof) and double (and half) angle formulae *geometric proofs expected</p> <p>Proving trigonometric identities</p> <p>The form <math>R\cos(x+a)</math>, <math>R\sin(x+a)</math> etc</p> <p>Proof by contradiction</p> <p>Simplifying algebraic fractions</p> <p>Partial fractions</p> <p>Modulus function</p> <p>Composite and inverse functions</p> <p>Transformations</p> <p>Modelling with functions - may be Trigonometric, exponential, reciprocal etc.</p>	<p>equilibrium, problems involving smooth pulleys</p> <p>Resolving forces</p> <p>Friction forces (including coefficient of friction <math>\mu</math>)</p> <p>Variable force; Calculus to determine rates of change for kinematics</p> <p>Use of integration for kinematics problems</p>	<p>Draw simple conclusions from statistical problems</p> <p>Probability: Mutually exclusive events; Independent events</p> <p>Using set notation for probability</p> <p>Questioning assumptions in probability</p> <p>Statistical distributions: Use discrete distributions to model real-world situations; Identify the discrete uniform distribution; Calculate probabilities using the binomial distribution (calculator use expected)</p> <p>Language of hypothesis testing; Significance levels</p> <p>Carry out hypothesis tests involving the binomial distribution</p>
13	<p>Expanding <math>(a + bx)^n</math> for rational <math>n</math>; knowledge of range of validity</p> <p>Expansion of functions by first using partial fractions</p> <p>Arithmetic and geometric progressions (proofs of 'sum formulae')</p> <p>Sigma notation</p> <p>Recurrence and iterations</p> <p>Differentiating <math>\sin x</math> and <math>\cos x</math> from first principles</p> <p>Chain Rule</p>	<p>Forces' turning effect</p> <p>Applications of kinematics: Projectiles</p> <p>Applications of kinematics: Projectiles</p> <p>Equilibrium and statics of a particle (including ladder problems)</p> <p>Dynamics of a particle</p> <p>Constant acceleration (equations of motion in 2D; the <math>i, j</math> system)</p>	<p>Change of variable</p> <p>Understand and use the Normal distribution</p> <p>Use the Normal distribution as an approximation to the binomial distribution</p> <p>Statistical hypothesis testing for the mean of the Normal distribution</p>

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<p>Differentiating exponentials and logarithms</p> <p>Differentiating products, quotients, implicit differentiation</p> <p>Second derivatives (rates of change of gradient, inflections)</p> <p>Rates of change problems (including growth and kinematics)</p> <p>Integrating <math>x^n</math> (including when <math>n = -1</math>), exponentials and trigonometric functions</p> <p>Using the reverse of differentiation, and using trigonometric identities to manipulate integrals</p> <p>Integration by substitution</p> <p>Integration by parts</p> <p>Use of partial fractions</p> <p>Areas under graphs or between two curves, including understanding the area is the limit of a sum (using sigma notation)</p> <p>The trapezium rule</p> <p>Differential equations (including knowledge of the family of solution curves)</p> <p>Definition and converting between parametric and Cartesian forms and Curve sketching and modelling</p> <p>Differentiating parametric functions</p> <p>Integrating parametric functions</p> <p>Location of roots</p> <p>Solving by iterative methods (knowledge of 'staircase and cobweb' diagrams)</p> <p>Newton-Raphson method</p> <p>Numerical methods: Problem solving</p>	<p>Variable acceleration (use of calculus and finding vectors <math>r</math> and <math>r'</math> at a given time)</p> <p>Definitions, magnitude/direction, addition and scalar multiplication</p> <p>Position vectors, distance between two points, geometric problems</p> <p>Use of vectors in three dimensions; knowledge of column vectors and <math>i, j</math> and <math>k</math> unit vectors</p>	
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## Springwood High School Maths Curriculum Plan

### **Enrichment Activities:**

Additional Learning: Year 7 - Smoothie making.

Competitions: Senior Maths challenge (November), Intermediate maths challenge, Junior Maths challenge. Team Maths challenges. The Michaelmas Symposium (Year 12 in November). Trust maths competitions. Year 6 maths competition (July). Year 10 Maths feast and year 9 summer snacks with AMSP.

Trips: Disneyland Paris.

Clubs & Support: After school revision on Tuesdays, Wednesdays and Thursdays in B8. Stem club, Sparx maths, Corbett Maths, Maths pad, Dr Frost

Padlets: [KS4 revision padlet for students](#)    [KS5 revision padlet for students](#)