



## Curriculum Plan – Mathematics

*Called as God's family,  
we strive to achieve our personal best,  
by living and learning in Christ.*

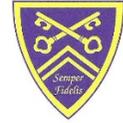
**Department Mission Statement** - Mathematics is fundamental to understanding the world in which we live. It is therefore vitally important that our students are open to thinking independently and are confident to use their skills to solve problems innovatively.

The Mathematics department aims:

- To create an atmosphere of trust and confidence in which everyone is valued, supported, challenged and respected.
- Encouraging pupils to strive to achieve their personal best by living and learning through Christ.
- To use different teaching and learning styles to motivate, engage and advance pupil participation.

### Key Stage 2

Knowledge Gained	Skills Developed
<p>Pupils should have the knowledge to:</p> <p><b>Number and Place Value:</b></p> <ul style="list-style-type: none"><li>• Read, write, order and compare numbers and determine the value of each digit.</li><li>• Round any whole number to a given degree of accuracy</li><li>• Use negative numbers in context</li></ul> <p><b>Addition, Subtraction , Multiplication and Division:</b></p> <ul style="list-style-type: none"><li>• Multiply and divide numbers using formal methods.</li><li>• Solve multi- step addition and subtraction problems.</li><li>• Identify common factors, common multiples and prime numbers</li><li>• Carry out calculations involving the four operations.</li></ul> <p><b>Fractions, Decimals and Percentage:</b></p> <ul style="list-style-type: none"><li>• Use common factors and multiples to manipulate fractions</li></ul>	<p>Pupils should have the skills to:</p> <p><b>Number</b></p> <ul style="list-style-type: none"><li>• Solve number problems based around place value.</li><li>• Say, read and write numbers.</li><li>• Perform mental calculations to solve number problems.</li></ul> <ul style="list-style-type: none"><li>• Use short division interpreting remainders</li><li>• Use the formal method for long multiplication and long division</li><li>• Decide which operation and methods to use and why.</li><li>• Perform calculations recognising and using the order of operations correctly.</li><li>• Use estimation to check an answer.</li></ul> <ul style="list-style-type: none"><li>• Express fractions with the same denominator to compare and order</li></ul>



## Curriculum Plan – Mathematics

- Add and subtract fractions with same and different denominators.
- Multiply proper fractions
- Divide proper fractions by a whole number
- Show basic fractions as decimals or percentages and vice versa

### Ratio and Proportion:

- Calculate basic percentages
- Calculate measurements using a scale factor
- Time:

### Algebra:

- Use simple formulae
- Generate linear sequences
- Express missing number problems using basic algebra

### Measurement:

- Recognise different measurements
- Calculate the area of basic shapes
- Recognise shapes with the same area can have different perimeters.

### Geometry:

- Draw 2D shapes given angles and dimensions
- Calculate the area of basic shapes
- Classify basic geometric shapes based on their properties
- Describe and name parts of a circle
- Use coordinates in all four quadrants
- Reflect simple shapes

### Statistics:

- Calculate the mean as an average

- Recognise the close links between fractions and division
- Multiply and divide numbers by 10, 100, 1000.
- Round an answer to required accuracy
  
- Use percentage to compare
- Solve problems around similar shapes and scale factors.
- Use proportion to manipulate a recipe for the required number of people
- Recognise how to read the time from a digital and analogue clock
- Recall the minutes in an hour and seconds in a minute

- Describe linear sequences
- Decipher missing values in basic number problems

- Use, read, write and convert between standard units
- Solve problems centred on conversion of units.
- Recognise when to use a formulae for area or volume

- To accurately use a protractor and ruler.
- Construct a net of a simple 3D shape.
- Calculate angles in triangles and quadrilaterals
- Calculate angles where they meet at a point or line.

- Interpret the mean



# Curriculum Plan – Mathematics

**Key Stage 3 Knowledge and Skills Requirement** (What knowledge and skills do pupils need to gain by the end of year 9?)

Knowledge and Key Terms To Be Built	Skills To Be Developed
<p><b>Number:</b></p> <ul style="list-style-type: none"> <li>• Use temperatures</li> <li>• Solve problems involving all four operations with multiple decimal places.</li> <li>• Manipulate squares, square roots, and powers of 10 with and without a calculator.</li> <li>• Use index notation for simple integer powers.</li> <li>• Calculate a fraction of a quantity using mental methods and with a calculator</li> <li>• Calculate any percentage</li> <li>• Simplify fractions and mixed numbers by cancelling common factors</li> <li>• Multiply fractions and mixed numbers by an integer or proper fraction</li> <li>• Use terminating and recurring decimal notation</li> <li>• Recognise factors, multiples, primes and prime factors.</li> <li>• Use of the not equals symbol</li> <li>• Round values to 1 significant figure</li> </ul> <p><b>Ratio and Proportion:</b></p> <ul style="list-style-type: none"> <li>• Calculate basic speeds from graphs and numerical information</li> <li>• Use ratio notation</li> <li>• Use the unitary method for proportion.</li> <li>• Recall time</li> </ul> <p><b>Algebra:</b></p> <ul style="list-style-type: none"> <li>• Generate term to term and position to term definitions of sequences.</li> <li>• Substitute positive and negative values into algebraic formulae.</li> <li>• Solve linear equations in which the unknown appears on one side or both sides of the equation. Including the use of brackets.</li> <li>• Solve basic inequalities</li> <li>• Manipulate algebraic expressions by collecting terms</li> <li>• Plot graphs of linear functions</li> <li>• Expand single brackets</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise which operation to perform with a calculator to solve numerical problems.</li> <li>• Using a calculator to process squares, cubes, other powers and roots.</li> <li>• Be able to estimate a root by recalling key, square and cube numbers.</li> <li>• Use a calculator to calculate harder percentages.</li> <li>• Perform calculations involving the hierarchy of operations.</li> <li>• Convert between terminating decimals and fractions.</li> <li>• Order a mixture of fractions, decimals and percentages.</li> <li>• Solve simple percentage problems including increases and decreases.</li> <li>• Interchange between more complex fractions, decimals and percentage</li> <li>• Use prime factors to find highest common factors and lowest common multiples</li> <li>• Use of trial and improvement as a form of decimal search.</li> <li>• Use significant figures to estimate solutions to calculations</li> </ul> <ul style="list-style-type: none"> <li>• Reduce a ratio to its simplest form</li> <li>• Solve worded problems involving ratio</li> <li>• Compare ratio</li> <li>• Solve problems that require the use of the unitary method</li> <li>• Solve problems around timings and time</li> </ul> <ul style="list-style-type: none"> <li>• Recognise the patterns associated with sequences and linear graphs</li> </ul> <ul style="list-style-type: none"> <li>• Recognise what is meant by ‘Expand’, ‘Factorise’ or ‘Solve’ in the context of an algebraic problem.</li> <li>• Carry out the process of ‘Expanding’, ‘Factorising’ or ‘Solving’ depending on the problem posed.</li> </ul>



## Curriculum Plan – Mathematics

- Factorise by taking out common factors from an expression

### Measurement and Geometry:

- Recognise different measurements
- Interpret plan views and side elevations
- Draw enlargements using a positive scale factor
- Recognise the order of rotation for all shapes
- Rotate a shape using a centre and angle.
- Reflect and translate shapes
- Construct accurate triangles given basic information
- Recall and reinforce basic angle facts
- Use formal names for angles in parallel lines
- Calculate interior and exterior angles in polygons.
- Know and use the formulae for the areas of rectangles, triangles, parallelograms and trapeziums.
- Know and use the formulae for the volume of prisms
- Know the name for all parts of a circle
- Calculate the circumference and area of a circle

### Statistics and Probability:

- Recognise Mean, median and mode for discrete data
- Recognise the range of discrete data
- Interpret graphs
- Construct pie charts
- Draw and interpret scatter graphs
- Know that the sum of the probabilities of all mutually exclusive events is 1.
- Draw simple Venn diagrams

- Make estimates of measurements
  - Accurately use different measuring instruments and read from varied scales
  - Use bearings to give directions
  - Solve problems based on angles around a point, on a line and in triangles and quadrilaterals.
  - Recognise alternate, corresponding and co-interior angles in parallel lines and use them to solve geometry problems.
  - Calculate the areas of compound shapes based around uniform shapes
  - Compare different distributions
  - Interpret the correlation in a scatter graph
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- Find the probability of something not occurring is just the probability of it occurring taken from 1.(  $1 - P$  )
  - Interpret and populate basic Venn diagrams



# Curriculum Plan – Mathematics

Knowledge and Key Terms :	Skills To Be Developed
<p>GCSE Mathematics is a two-year course examined at the end of year 11. There is no coursework component.</p> <p>There are two tiers of study in Mathematics, Foundation and Higher. Each tier is examined by three examinations, two calculator and one non-calculator paper.</p> <p>Available grades: Foundation 5 - 1 Higher 9 - 4</p> <p>Foundation Knowledge and Key Terms</p> <p><b>Number</b></p> <ul style="list-style-type: none"><li>• Find prime factors</li><li>• Use a Venn diagram to calculate HCF and LCM</li><li>• Recall decimal arithmetic</li><li>• Round</li><li>• Percentage</li><li>• Fractions</li><li>• Indices</li><li>• Standard form</li><li>• Exact calculations</li></ul> <p><b>Ratio and Proportion</b></p> <ul style="list-style-type: none"><li>• Ratio of quantity, simplifying ratio</li><li>• Direct proportion</li><li>• Inverse proportion</li></ul> <p><b>Algebra</b></p> <ul style="list-style-type: none"><li>• Expand single and double brackets with multiple terms</li><li>• Factorise single and double brackets</li><li>• Substitution</li><li>• Straight line graphs</li><li>• Quadratic, cubic and reciprocal graphs</li></ul>	<p>A large proportion of the assessment will be using and applying Mathematics to solve day to day problems. Therefore, thinking skills are essential.</p> <p>Foundation Skills</p> <ul style="list-style-type: none"><li>• Form a HCF or LCM problem from a worded problem</li><li>• Use rounding to approximation a complex calculation or check an answer is sensible.</li><li>• Calculate percentage change from a worded problem</li><li>• Calculate increase and decrease percentage using a decimal multiplier</li><li>• Perform multiple percentage changes.</li><li>• Solve problems involving fractions.</li><li>• Use the laws of indices</li><li>• Use a calculator to solve standard form problems.</li><li>• Simplify expressions by collecting together irrational numbers such as <math>\pi</math></li></ul> <ul style="list-style-type: none"><li>• Solve ratio problems using a bar</li><li>• Compare ratios where the ratios have to change and form a common ratio</li><li>• Solve worded problems by calculating the constant of proportionality.</li><li>• Time problems</li></ul> <ul style="list-style-type: none"><li>• Use substitution to solve SUVAT problems</li><li>• Recognise the gradient and y intercept from a straight line graph</li><li>• Form equations or inequalities from given information and then solve them.</li><li>• Use elimination to solve simultaneous equations.</li><li>• Calculate nth terms and decipher whether a term is present in a sequence.</li></ul>



## Curriculum Plan – Mathematics

- Solve linear equations and inequalities
- Simultaneous equations
- Linear Sequences
- Quadratic and Fibonacci sequences
- Functions

### Geometry:

- Angles round a point, line, in parallel lines, exterior and interior angles of polygons
- Angles on tangents
- Area and perimeter of basic shapes including trapeziums and compound shapes
- Pythagoras' theorem
- Construction and loci
- Trigonometry
- Scale diagrams
- Bearings
- Plans and elevations
- Transformations: Enlargement, Reflection, Rotation, Translation
- Similarity
- Congruence
- Vectors

### Statistics and probability

- Line graphs and pie charts
- Scatter graphs
- Averages
- Calculating probability
- Using sample spaces
- Venn diagrams
- Tree diagrams

- Understand the behaviour of the Fibonacci sequence given any two terms.
- Use number machines with successive functions
- Interpret the reverse of a function machine
  
- Break complex compound shapes up into basic shapes to calculate areas.
- Calculate unknown lengths in right angled triangles
- Recognise when a triangle is not right angled due to Pythagoras not being true.
- Solve problems by accurately constructing loci
- Calculate unknown angles and lengths in right angled triangles.
- Use knowledge of bearings to calculate the position of a point using multiple bearings.
- Draw plans and elevations given a 3D design
- Perform successive transformations on a coordinate grid
- State the centre and any important information to describe multiple transformations as a single transformation.
- Prove that shapes are congruent or similar
  
- Construct the best chart for the supplied data
- Calculate mean, median and mode and understand the advantages and disadvantages of each.
- Decide the best technique to use to find probabilities



## Curriculum Plan – Mathematics

### Higher Knowledge

#### Number

- Prime factorisation , HCF and LCM
- Bounds
- Percentage change
- Compound percentage and reverse percentage
- Fraction arithmetic
- Indices
- Standard form
- Surds

#### Ratio and Proportion

- Direct and inverse proportion
- Ratio
- Compound measures of speed, density and pressure
- Rates of change using tangents to a graph
- Area under a graph

#### Algebra

- Expand binomials
- Factorise quadratic expressions and equations
- Complete the square
- Quadratic formula
- Algebraic proof
- Substitution
- Rearranging formula
- Simultaneous equations using elimination, substitution and graphical methods
- Equation of a circle
- Algebraic fractions
- Linear and quadratic inequalities
- Linear and quadratic sequences
- Fibonacci and geometric sequences
- Functions

### Higher skills

- Form a HCF or LCM problem from a worded problem
- Use bounds with all forms of arithmetic to find maximum and minimum values.
- Use and recall the laws of indices for positive, fractional and negative powers
- Calculate standard form problems with and without a calculator , using knowledge of indices
- Simplify surds and rationalise the denominator
  
- Calculate and use a constant of proportionality to solve problems
- Calculate ratio using bar diagrams and compare two ratios by creating a common ratio value
- Manipulate compound formulae to correctly calculate the required quantity
- Recognise when an instantaneous gradient is required.
- Break a complex shape into basic trapezia to calculate area
  
- Accurately multiply two and three brackets
- Recognise how to find turning points of a quadratic graph by completing the square
- Construct coherent proof using algebra
- Manipulate any formulae to change the subject depending on the problem posed.
- Decide which technique is best to use to solve the given simultaneous equation
- Shade inequalities
- Find nth terms for complex sequences
- Use compound and inverse functions to find outputs and inputs



# Curriculum Plan – Mathematics

<p><b>Geometry</b></p> <ul style="list-style-type: none"><li>• Area of 2D shapes and surface area of 3D solids</li><li>• Volume of 3D solids</li><li>• Pythagoras and trigonometry in 2D and 3D</li><li>• Sine and cosine rule</li><li>• Area of a triangle</li><li>• Straight line graphs</li><li>• Graphs of sine, cosine and tangent</li><li>• Sketch graphs of circles, rational graphs, exponentials</li><li>• Loci</li><li>• Angles in parallels and in polygons</li><li>• Circle geometry rules and proof</li><li>• Equation of a line, Parallels and perpendiculars.</li><li>• Transformations and transformations of graphs</li><li>• Similar shapes and congruent proofs</li><li>• Vectors</li></ul> <p><b>Statistics and Probability</b></p> <ul style="list-style-type: none"><li>• Histograms</li><li>• Cumulative frequency curves</li><li>• Box plots</li><li>• Scatter graphs and correlation</li><li>• Probability sample spaces</li><li>• Venn diagrams and set theory</li><li>• Probability tree diagrams</li></ul>	<ul style="list-style-type: none"><li>• Use the required formula accurately giving appropriate units.</li><li>• Find angles and lengths in right angled and non-right angled triangles deciding the most appropriate formula to use.</li><li>• Sketch graphs given minimal information</li><li>• Find the gradient and intercept given two points on a coordinate grid</li><li>• Use the most appropriate rule to calculate angles in circle problems</li><li>• Use congruency rules to prove two triangles are identical</li><li>• Use vectors in a proof</li></ul> <ul style="list-style-type: none"><li>• Find the frequency density from a frequency distribution</li><li>• Interpret and compare median and IQR for multiple box plots</li><li>• Recognise outliers</li></ul>
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## Key Stage 5 Knowledge and Skills Requirement

Knowledge To Be Built	Skills To Be Developed
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## Curriculum Plan – Mathematics

The beauty of A-level Mathematics is that it covers three very different main areas of Mathematics.

The largest of these studies is Pure Mathematics, which is the basic tool kit to solve and interpret mathematical problems. It combines the algebra and trigonometry previously studied and takes the topics far beyond GCSE. In addition, new topics are discovered such as Calculus, which enables us to find gradients of curved lines.

The second area of study is Probability and Statistics. Here information and data are analysed and interpreted and real life situations are modelled using different probability models.

The third area is Mechanics. Again, mathematical models are used to demonstrate and interpret the real world of dynamics and forces.

### Year 12 Knowledge

#### Pure Mathematics

- Indices
- Surds
- Coordinate geometry
- Equations of lines
- Equations of circles
- Vectors
- Graphs of transformations
- Polynomial equations
- Inequalities
- Proof
- Binomial expansion
- Differentiation and gradient
- Equations of tangents, normal and turning points
- Exponentials and logarithms
- Trigonometry
- Integration
- Functions

Within year, 12 and 13 teachers will cover different sections of the course. The pace will be fast so students must spend an equivalent amount of time doing questions at home, as in lessons, to reinforce understanding.

One key skill is being comfortable in explaining why a particular final answer has been chosen.

- Use the laws of indices for all rational exponents.
- Manipulate surds including rationalising the denominator.
- Sketch curves defined by simple equations
- Use circle properties
- Calculate the magnitude and direction of a vector.
- Calculate the distance between two points represented by position vectors.
- Interpret the algebraic solution of equations graphically.
- Solve linear and quadratic inequalities
- Use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion.
- Work with the discriminant of a quadratic function.
- Be able to use the derivative of  $f(x)$  as the gradient of the tangent to the graph of  $y=f(x)$  at a general point  $(x,y)$
- Use the second derivative as the rate of change of gradient
- Be able to show differentiation from first principles for small positive integer powers of  $x$ .
- Apply differentiation to find the gradient at a point on a curve.
- Use the gradient conditions for two straight lines to be parallel or perpendicular.



## Curriculum Plan – Mathematics

- Sequences & series
- Radians
- Numerical methods
- Newton-Raphson

### Statistics

- Sampling
- Probability
- Binomial
- Representation of data
- Bivariate data
- Average, spread and outliers
- Use of Large data set
- Hypothesis testing

### Mechanics

- SI units
- Kinematics
- Time graphs
- Forces using vectors
- Motion under gravity
- Newton's 2<sup>nd</sup> law  $F=ma$

- Use the function  $e^x$  and its graph
- Use the definition and laws of logarithms
- Use the sine and cosine rules for more complex problems.
- Use trigonometric functions and the identity  $\sin^2 x + \cos^2 x = 1$
- Integrate binomials and use definite integrals to find the area between a curve and the x-axis.
- Use inverse functions and composite functions and find the inverse of a function by reflection in the line  $y=x$ , or algebraically.
- Work with arithmetic and geometric sequences given by a formula for the  $n$ th term and sequences generated by recursive formulae
- Work with radian measure, including use for arc length and area of sector.
- Be able to locate roots of a function by considering changes of sign.
- Solve equations using the Newton-Raphson method.
  
- Be able to interpret tables and diagrams for single-variable data
- Be able to use samples to make informal inferences about the population.
- Understand and be able to use mutually exclusive and independent events when calculating probabilities.
- Understand and be able to use simple, finite, discrete probability distributions
- Understand that area in a histogram represents frequency
- Be able to interpret scatter diagrams and regression lines for bivariate data
- Be able to calculate and interpret measures of central tendency and variation
- Recognise and be able to interpret possible outliers in data sets and statistical diagrams.
- Understand and be able to use the language of statistical hypothesis testing, developed through a binomial model
- Understand that a sample is being used to make an inference about the population
  
- Be able to use the fundamental quantities and units in the S.I. system
- Be able to use the language of kinematics
- Be able to interpret displacement-time and velocity-time graphs
- Understand, use and derive the formulae for constant acceleration: SUVAT
- Understand gravitational acceleration,  $g$
- Use a normal reaction force



# Curriculum Plan – Mathematics

<ul style="list-style-type: none"><li>• Equilibrium of a particle</li><li>• Friction</li><li>• Variable acceleration</li></ul> <p><b>Year 13 Knowledge</b></p> <p><b>Pure Mathematics</b></p> <ul style="list-style-type: none"><li>• Partial fractions</li><li>• Modulus functions</li><li>• Binomial expansions</li><li>• Points of inflection</li><li>• Product and quotient rule for differentiation</li><li>• Chain rule</li><li>• Trigonometry identities</li><li>• Proof by contradiction</li><li>• Vectors in 3D</li><li>• Integration by substitution and parts</li><li>• Implicit differentiation</li><li>• Parametric equations</li><li>• Differential equations</li></ul> <p><b>Statistics</b></p> <ul style="list-style-type: none"><li>• Conditional probability</li><li>• Normal distribution</li><li>• Hypothesis testing with normal distributions</li><li>• Discrete random variables</li><li>• Pearson’s product moment correlation coefficient</li></ul>	<ul style="list-style-type: none"><li>• Be able to apply a frictional force in context.</li><li>• Solve problems involving equilibrium of forces using vectors</li><li>• Solve problems with connected particles and smooth pulleys.</li><li>• Use differentiation and integration with respect to time.</li></ul> <ul style="list-style-type: none"><li>• Simplify rational expressions.</li><li>• Use the modulus function including the notation.</li><li>• Calculate the binomial expansion for any rational power.</li><li>• Use the second derivative in connection to convex and concave sections of curves.</li><li>• Differentiate using the product rule, the quotient rule and the chain rule.</li><li>• Solve problems involving connected rates of change and inverse functions.</li><li>• Use the secondary trigonometric functions and be able to use double angle formulae.</li><li>• Solve problems for expressions in the form <math>a \cos \theta + b \sin \theta</math></li><li>• Understand a proof of the irrationality of root 2 and the infinity of primes.</li><li>• Use integration as the limit of a sum.</li><li>• Carry out simple cases of integration by substitution and parts.</li><li>• Integrate functions using partial fractions</li><li>• Use the parametric equations of curves and be able to convert between Cartesian and parametric forms.</li><li>• Evaluate the analytical solution of simple first order differential equations with separable variables</li></ul> <ul style="list-style-type: none"><li>• Understand and be able to use conditional probability, including the use of tree diagrams, Venn diagrams and two-way tables.</li><li>• Be able to model with probability</li><li>• Be able to find probabilities using the normal distribution, using appropriate calculator functions.</li><li>• Be able to select an appropriate probability distribution for a context.</li><li>• Be able to conduct a statistical hypothesis test for the mean of a normal distribution</li><li>• Use Pearson's product-moment correlation coefficient as a measure of how close data points lie to a straight line.</li></ul>
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## Curriculum Plan – Mathematics

<p><b>Mechanics</b></p> <ul style="list-style-type: none"> <li>• Moments about a point</li> <li>• Resolving forces</li> <li>• Forces in equilibrium</li> <li>• Resultant forces in motion</li> <li>• Projectiles</li> </ul>	<ul style="list-style-type: none"> <li>• Calculate the moment of a force about an axis through a point.</li> <li>• Recognise that when a rigid body is in equilibrium the resultant moment is zero and the resultant force is zero.</li> <li>• Be able to resolve forces</li> <li>• Use vector addition in solving problems involving resultants.</li> <li>• Solve problems regarding limiting equilibrium</li> <li>• Be able to model the motion of a projectile as a particle moving with constant acceleration</li> <li>• Extend the constant acceleration formulae to motion in two dimensions using vectors</li> </ul>
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Curriculum Plan				
Year Group	Scheme of Work	Knowledge Gained and Key Terms	Skills Developed	Assessment of knowledge and skills
7	<b>Basic Number and properties of number</b>	Use the laws of arithmetic with whole numbers and decimals. Estimation and rounding Squares, cubes and roots Fractions Decimals Percentage Use of a calculator	<b>Number:</b> Solve number problems based around place value. Say, read and write numbers. Perform mental calculations to solve number problems. Perform one stage calculations by rounding to one significant figure. Recognising the reverse of squaring is square root. Convert between fractions, decimals & percentage. Recognise equivalent fractions and use them to solve problems Order a mixture of fractions, decimals and percentages Solve simple percentage problems <b>Using a calculator:</b> Basic buttons, answer button, fractions button. Using the power buttons	<b>Short assessments after each major topic.</b>  <b>Fortnightly Key skills graded tests</b>  <b>Half term assessments</b> Students are assessed every half



# Curriculum Plan – Mathematics

	<p><b>Algebra</b></p> <p>Work with expressions. Use substitution Plot co-ordinates in all four quadrants Explore patterns and sequences. Solve basic equations</p> <p><b>Basic Geometry Area</b></p> <p>Use basic angle rules to solve problems. Properties of different shapes Area of rectangles and triangles Use of rotational and reflection symmetry</p> <p><b>Basic Probability and Data comparison</b></p> <p>Find mean and range. Draw bar graphs and pie charts. Experiment and calculate chance and likelihood.</p> <p><b>Proportion and ratio</b></p> <p>Unitary method proportion Simplify basic ratio Calculate ratio from basic and worded problems. Time</p>	<p>Interchanging from displaying as a fraction to a decimal.</p> <p>Manipulate algebraic expressions to write expressions with the same value but different appearance and collect like terms.</p> <p>Use and interpret maps and scale drawings. Classify different shapes using their properties in a Venn diagram. Recognise different units for different measures. Using measuring equipment and scale drawings to find, the height of the school; the distance around the school running track; the area needed to re-carpet the classrooms</p> <p>Explore mean and range using a data project. Compare data distributions. Decide what events are more likely to occur than others are.</p> <p>Calculate basic unitary method proportion based around recipes. Analyse ratio problems to compare and contrast; Solve problems based around time constraints</p>	<p>term on the work previously covered.</p> <p><b>End of year assessments</b> All KS3 year groups have an end of year exam consisting of both a calculator and a non-calculator paper.</p>
8	<p><b>Number</b></p> <p>Using the calculator Estimation and significant figures Index notation Percentage Order of operations</p> <p><b>Algebra</b></p> <p>Formulae Substitution Equations</p>	<p>Recognise and use more buttons on the calculator; fractions and mixed numbers buttons, power and root keys Use rounding and approximations to calculate an estimated answer. Recognise that changing the order of a calculation can completely change the value Calculate percentages using a calculator</p> <p>Use substitution to check a solution to an equation Use reverse operations to solve equations Recognise the difference between expanding and factorising</p>	<p><b>Short assessments after each major topic.</b></p> <p><b>Fortnightly Key skills graded tests</b></p> <p><b>Half term assessments</b> Students are</p>



# Curriculum Plan – Mathematics

	<p><b>Ratio</b></p> <p>Expand brackets and factorise into brackets Linear graphs</p> <p>Reduce ratios to their simplest form Proportion</p> <p><b>Geometry</b></p> <p>Work with geometry in more complex shapes. Area of triangles, parallelograms and compound shapes. Perimeter of complex shapes Volume of cuboids and prisms Constructing triangles Transform shape using reflection, rotation and translation.</p> <p><b>Statistics</b></p> <p>Calculate median, mode and mean. Recognise and construct different data graphs. Probabilities and mutually exclusive events.</p>	<p>Use ratio problems to compare and contrast; Solve direct proportion problems</p> <p>Using measuring equipment and scale drawings to find: The surface area of the department and calculate costs associated with re-decorating.</p> <p>Use construction within the rose windows project</p> <p>Compare and contrast different methods of average. Compare data graphs Calculate probabilities from different theoretical scenarios.</p>	<p>assessed every half term on the work previously covered.</p> <p><b>End of year assessments</b> All KS3 year groups have an end of year exam consisting of both a calculator and a non-calculator paper.</p>
9	<p><b>Number</b></p> <p>Review fractions and decimals including mixed numbers and recurring decimals. Use indices laws. Standard form. Calculate repeated percentage change. Prime factors , HCF and LCM Simplify expressions that are more sophisticated. Formula. Expand double brackets. Complex equations, with brackets and fractions.</p> <p><b>Algebra</b></p>	<p>Recognise and be fluent at all fractions calculations Recognise recurring decimals and there fraction equivalent Compound percentage and simple interest over a specified time and investigate credit card percentage increases.</p> <p>Use and derive formulae Use substitution to check an equation solution</p>	<p><b>Short assessments after each major topic.</b></p> <p><b>Fortnightly Key skills graded tests</b></p> <p><b>Half term assessments</b> Students are assessed</p>



# Curriculum Plan – Mathematics

	<p><b>Geometry</b></p> <p>Angles in parallel lines Interior and exterior angles in polygons Area and circumference of circles and part circles. Area of trapeziums Perform repeated transformations; reflection, rotation and translations. Pythagoras</p> <p><b>Data</b></p> <p>Mean from a table Scatter graphs</p> <p><b>Proportion</b></p> <p>Speed and density Direct proportion</p>	<p>Solve geometric problems with justified reasons. Solve problems involving polygons</p> <p>Use measuring equipment and scale drawings to find the height of the school. Recognise when to use Pythagoras' theorem</p> <p>Construct data handling distributions and compare using the mean from grouped data. Form and use scatter graphs .Recognise correlations</p>	<p>every half term on the work previously covered.</p> <p><b>End of year assessments</b> All KS3 year groups have an end of year exam consisting of both a calculator and a non-calculator paper.</p>	
<b>Year Group</b>	<b>Scheme of Work</b>	<b>Knowledge Gained (Including How It Builds on Previous Knowledge Gained)</b>	<b>Skills Developed ((Including How It Builds on Previous Skills Gained)</b>	<b>Assessment of knowledge and skills</b>
<b>10</b>	<b>Foundation</b>	<ul style="list-style-type: none"> <li>• Angles round a point, line, in parallel lines,</li> <li>• Angles on tangents</li> <li>• Ratio of quantity, simplifying ratio</li> <li>• Find prime factors</li> <li>• Use a Venn diagram to calculate HCF and LCM</li> <li>• Expand single and double brackets with multiple terms</li> <li>• Factorise single and double brackets</li> <li>• Recall decimal arithmetic</li> <li>• Substitution</li> <li>• Round</li> </ul>	<ul style="list-style-type: none"> <li>• Recognise and use the rule for parallel line geometry</li> <li>• Solve ratio problems using a bar</li> <li>• Compare ratios where the ratios have to change and form a common ratio</li> <li>• Form a HCF or LCM problem from a worded problem</li> <li>• Recognise and use the words expand and factorise</li> <li>• Use substitution to solve SUVAT problems</li> <li>• Use rounding to approximation a complex calculation or check an answer is sensible.</li> </ul>	<p><b>Short assessments after each major topic.</b></p> <p><b>Fortnightly Key skills graded tests</b></p> <p><b>Half term assessments</b> Students are</p>



# Curriculum Plan – Mathematics

		<ul style="list-style-type: none"> <li>• Area and perimeter of basic shapes including trapeziums and compound shapes</li> <li>• Line graphs and pie charts</li> <li>• Averages</li> <li>• Pythagoras’ theorem</li> <li>• Construction and loci</li> <li>• Exterior and interior angles in polygons</li> <li>• Direct proportion</li> <li>• Inverse proportion</li> <li>• Percentage with and without a calculator</li> <li>• Compound percentage</li> <li>• Straight line graphs</li> <li>• Quadratic, cubic and reciprocal graphs</li> <li>• Solve linear equations</li> <li>• Speed, density and pressure compound measures</li> <li>• Fractions</li> <li>• Scatter graphs</li> <li>• Fractions</li> <li>• Indices</li> <li>• Standard form</li> <li>• Trigonometry</li> <li>• Solve inequalities</li> </ul>	<ul style="list-style-type: none"> <li>• Break complex compound shapes up into basic shapes to calculate areas.</li> <li>• Construct the best chart for the supplied data</li> <li>• Calculate mean, median and mode and understand the advantages and disadvantages of each.</li> <li>• Calculate unknown lengths in right angled triangles</li> <li>• Recognise when a triangle is not right angled due to Pythagoras not being true.</li> <li>• Solve problems by accurately constructing loci</li> </ul> <ul style="list-style-type: none"> <li>• Solve worded problems by calculating the constant of proportionality.</li> <li>• Calculate percentage change from a worded problem</li> <li>• Calculate increase and decrease percentage using a decimal multiplier</li> <li>• Perform multiple percentage changes.</li> <li>• Recognise the gradient and y intercept from a straight line graph</li> <li>• Form equations or inequalities from given information and then solve them.</li> <li>• Calculate compound measures including units</li> <li>• Construct scatter graphs from bivariate data</li> <li>• Solve problems involving fractions.</li> <li>• Use the laws of indices</li> <li>• Use a calculator to solve standard form problems.</li> <li>• Calculate unknown angles and lengths in right-angled triangles.</li> </ul>	<p>assessed every half term on the work previously covered.</p> <p><b>End of year assessments</b> Year 10 have an end of year exam consisting of both a calculator and a non-calculator paper.</p>
10	Higher	<ul style="list-style-type: none"> <li>• Prime factorisation , HCF and LCM</li> <li>• Expand binomials</li> <li>• Factorise quadratic expressions and equations</li> <li>• Complete the square</li> <li>• Algebraic proof</li> </ul>	<ul style="list-style-type: none"> <li>• Form a HCF or LCM problem from a worded problem</li> <li>• Accurately multiply two and three brackets</li> <li>• Recognise how to find turning points of a quadratic graph by completing the square</li> <li>• Construct coherent proof using algebra</li> </ul>	<p><b>Short assessments after each major topic.</b></p>



# Curriculum Plan – Mathematics

		<ul style="list-style-type: none"> <li>• Bounds</li> <li>• Area of 2D shapes and surface area of 3D solids</li> <li>• Volume of 3D solids</li> <li>• Pythagoras and trigonometry in 2D and 3D</li> <li>• Substitution</li> <li>• Rearranging formula</li> <li>• Histograms</li> <li>• Cumulative frequency curves</li> <li>• Box plots</li> <li>• Loci</li> <li>• Angles in parallels and in polygons</li> <li>• Direct and inverse proportion</li> <li>• Ratio</li> <li>• Percentage change</li> <li>• Compound percentage and reverse percentage</li> <li>• Simultaneous equations using elimination, substitution and graphical methods</li> <li>• Quadratic equations and Quadratic formula</li> <li>• Algebraic fractions</li> <li>• Fraction arithmetic</li> <li>• Scatter graphs and correlation</li> <li>• Straight line graphs</li> <li>• Equation of a line, Parallels and perpendiculars.</li> <li>• Indices</li> <li>• Standard form</li> <li>• Surds</li> <li>• Linear and quadratic inequalities</li> <li>• Compound measures of speed, density and pressure</li> <li>• Sine and cosine rule</li> <li>• Area of a triangle</li> </ul>	<ul style="list-style-type: none"> <li>• Use bounds with all forms of arithmetic to find maximum and minimum values.</li> <li>• Use the required formula accurately giving appropriate units.</li> <li>• Find angles and lengths in right angled and non-right angled triangles deciding the most appropriate formula to use.</li> <li>• Manipulate any formulae to change the subject depending on the problem posed.</li> <li>• Find the frequency density from a frequency distribution</li> <li>• Interpret and compare median and IQR for multiple box plots</li> <li>• Use the most appropriate construction when applied to a loci problem</li> <li>• Calculate and use a constant of proportionality to solve problems</li> <li>• Calculate ratio using bar diagrams and compare two ratios by creating a common ratio value</li> <li>• Solve complex problems using multiple percentage change.</li> <li>• Decide which technique is best to use to solve the given simultaneous equation</li> <li>• Solve complex algebraic fractions with common denominators</li> <li>• Recognise outliers</li> <li>• Sketch graphs given minimal information</li> <li>• Find the gradient and intercept given two points on a coordinate grid</li> <li>• Use and recall the laws of indices for positive, fractional and negative powers</li> <li>• Calculate standard form problems with and without a calculator , using knowledge of indices</li> <li>• Simplify surds and rationalise the denominator</li> <li>• Shade inequalities</li> </ul>	<p><b>Fortnightly Key skills graded tests</b></p> <p><b>Half term assessments</b> Students are assessed every half term on the work previously covered.</p> <p><b>End of year assessments</b> Year 10 have an end of year exam consisting of both a calculator and a non-calculator paper.</p>
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# Curriculum Plan – Mathematics

			<ul style="list-style-type: none"> <li>Manipulate compound formulae to correctly calculate the required quantity</li> <li>Use the most appropriate formulae to find the lengths and angles and area of non-right angled triangles.</li> </ul>	
11	Foundation	<ul style="list-style-type: none"> <li>Simultaneous equations</li> <li>Scale diagrams</li> <li>Bearings</li> <li>Plans and elevations</li> <li>Exact calculations</li> <li>Calculating probability and expected outcomes.</li> <li>Using sample spaces for probability</li> <li>Calculating probability from Venn diagrams</li> <li>Finding probability using Tree diagrams</li> <li>Transformations: Enlargement, Reflection, Rotation, Translation</li> <li>Linear Sequences</li> <li>Quadratic and Fibonacci sequences</li> <li>Similarity</li> <li>Congruence</li> <li>Functions</li> <li>Vectors</li> </ul>	<ul style="list-style-type: none"> <li>Use elimination to solve simultaneous equations</li> <li>Use knowledge of bearings to calculate the position of a point using multiple bearings.</li> <li>Draw plans and elevations given a 3D design</li> <li>Simplify expressions by collecting together irrational numbers such as <math>\pi</math></li> <li>Decide the best technique to use to find probabilities</li> <li>Perform successive transformations on a coordinate grid</li> <li>State the centre and any important information to describe multiple transformations as a single transformation..</li> <li>Calculate nth terms and decipher whether a term is present in a sequence.</li> <li>Understand the behaviour of the Fibonacci sequence given any two terms.</li> <li>Prove that shapes are congruent or similar</li> <li>Use number machines with successive functions</li> <li>Interpret the reverse of a function machine</li> </ul>	<p><b>Short assessments after each major topic.</b></p> <p><b>Fortnightly Key skills graded tests</b></p> <p><b>Year 11</b> have a mock exam in November consisting of both 3 papers two calculator and a non-calculator paper. They then have a Spring mock in February.</p>
11	Higher	<ul style="list-style-type: none"> <li>Circle geometry rules and proof</li> <li>Probability sample spaces</li> <li>Venn diagrams and set theory</li> <li>Probability tree diagrams</li> </ul>	<ul style="list-style-type: none"> <li>Use and prove the different rules for circle geometry</li> <li>Decide the most appropriate calculation to use to find a probability</li> </ul>	<p><b>Short assessments after each major topic.</b></p>



# Curriculum Plan – Mathematics

		<ul style="list-style-type: none"> <li>• Linear and quadratic sequences</li> <li>• Fibonacci and geometric sequences</li> <li>• Rates of change using tangents to a graph</li> <li>• Area under a graph</li> <li>• Graphs of sine, cosine and tangent</li> <li>• Sketch graphs of circles, rational graphs, exponentials</li> <li>• Equation of a circle</li> <li>• Transformations and transformations of graphs</li> <li>• Similar shapes and congruent proofs</li> <li>• Functions</li> <li>• Translations of graphs</li> <li>• Vectors</li> </ul>	<ul style="list-style-type: none"> <li>• Finds nth terms for complex sequences</li> <li>• Recognise when an instantaneous gradient is needed.</li> <li>• Break a complex shape into basic trapezia to calculate area</li> <li>• Recognise and reproduce all trigonometric graphs</li> <li>• Use congruency rules to prove two triangles are identical</li> <li>• Use compound and inverse functions to find outputs and inputs</li> <li>• Use vectors in a proof</li> </ul>	<p><b>Fortnightly Key skills graded tests</b></p> <p><b>Year 11</b> have a mock exam in November consisting of both 3 papers two calculator and a non-calculator paper. They then have a Spring mock in February.</p>
12	Pure Mathematics	<ul style="list-style-type: none"> <li>• Indices</li> <li>• Surds</li> <li>• Coordinate geometry</li> <li>• Equations of lines</li> <li>• Equations of circles</li> <li>• Vectors</li> <li>• Graphs of transformations</li> <li>• Polynomial equations</li> <li>• Inequalities</li> <li>• Proof</li> <li>• Binomial expansion</li> <li>• Differentiation and gradient</li> <li>• Equations of tangents, normal and turning points</li> <li>• Exponentials and logarithms</li> <li>• Trigonometry</li> </ul>	<ul style="list-style-type: none"> <li>• Use the laws of indices for all rational exponents.</li> <li>• Manipulate surds including rationalising the denominator.</li> <li>• Sketch curves defined by simple equations</li> <li>• Use circle properties</li> <li>• Calculate the magnitude and direction of a vector.</li> <li>• Calculate the distance between two points represented by position vectors.</li> <li>• Interpret the algebraic solution of equations graphically.</li> <li>• Solve linear and quadratic inequalities</li> <li>• Use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion.</li> <li>• Work with the discriminant of a quadratic function.</li> </ul>	<p><b>Year 12</b> have an initial exam at the start of the course.</p> <p><b>They</b> have short assessments after each major topic.</p> <p><b>Year 12</b> have a mock exam at the end of year 12 based on the</p>

# Curriculum Plan – Mathematics



	<p><b>Statistics</b></p>	<ul style="list-style-type: none"> <li>• Integration</li> <li>• Functions</li> <li>• Sequences &amp; series</li> <li>• Radians</li> <li>• Numerical methods</li> <li>• Newton-Raphson</li>   <li>• Sampling</li> <li>• Probability</li> <li>• Binomial</li> </ul>	<ul style="list-style-type: none"> <li>• Be able to use the derivative of <math>f(x)</math> as the gradient of the tangent to the graph of <math>y=f(x)</math> at a general point <math>(x,y)</math></li> <li>• Use the second derivative as the rate of change of gradient</li> <li>• Be able to show differentiation from first principles for small positive integer powers of <math>x</math>.</li> <li>• Apply differentiation to find the gradient at a point on a curve.</li> <li>• Use the gradient conditions for two straight lines to be parallel or perpendicular.</li> <li>• Use the function <math>e^x</math> and its graph</li> <li>• Use the definition and laws of logarithms</li> <li>• Use the sine and cosine rules for more complex problems.</li> <li>• Use trigonometric functions and the identity <math>\sin^2 x + \cos^2 x = 1</math></li> <li>• Integrate binomials and use definite integrals to find the area between a curve and the <math>x</math>-axis.</li> <li>• Use inverse functions and composite functions and find the inverse of a function by reflection in the line <math>y= x</math>, or algebraically.</li> <li>• Work with arithmetic and geometric sequences given by a formula for the <math>n</math>th term and sequences generated by recursive formulae</li> <li>• Work with radian measure, including use for arc length and area of sector.</li> <li>• Be able to locate roots of a function by considering changes of sign.</li> <li>• Solve equations using the Newton-Raphson method.</li>   <li>• Be able to interpret tables and diagrams for single-variable data</li> <li>• Be able to use samples to make informal inferences about the population.</li> </ul>	<p><b>year 12 content.</b></p>
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# Curriculum Plan – Mathematics

	<p><b>Mechanics</b></p>	<ul style="list-style-type: none"><li>• Representation of data</li><li>• Bivariate data</li><li>• Average , spread and outliers</li><li>• Use of Large data set</li><li>• Hypothesis testing</li></ul> <ul style="list-style-type: none"><li>• SI units</li><li>• Kinematics</li><li>• Time graphs</li><li>• Forces using vectors</li><li>• Motion under gravity</li><li>• Newton’s 2<sup>nd</sup> law <math>F=ma</math></li><li>• Equilibrium of a particle</li><li>• Friction</li><li>• Variable acceleration</li></ul>	<ul style="list-style-type: none"><li>• Understand and be able to use mutually exclusive and independent events when calculating probabilities.</li><li>• Understand and be able to use simple, finite, discrete probability distributions</li><li>• Understand that area in a histogram represents frequency</li><li>• Be able to interpret scatter diagrams and regression lines for bivariate data</li><li>• Be able to calculate and interpret measures of central tendency and variation</li><li>• Recognise and be able to interpret possible outliers in data sets and statistical diagrams.</li><li>• Understand and be able to use the language of statistical hypothesis testing, developed through a binomial model</li><li>• Understand that a sample is being used to make an inference about the population</li></ul> <ul style="list-style-type: none"><li>• Be able to use the fundamental quantities and units in the S.I. system</li><li>• <b>Be able to use the language of kinematics</b></li><li>• Be able to interpret displacement-time and velocity-time graphs</li><li>• Understand, use and derive the formulae for constant acceleration: SUVAT</li><li>• Understand gravitational acceleration, <math>g</math></li><li>• Use a normal reaction force</li><li>• Be able to apply a frictional force in context.</li><li>• Solve problems involving equilibrium of forces using vectors</li><li>• Solve problems with connected particles and smooth pulleys.</li><li>• Use differentiation and integration with respect to time.</li></ul>	
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# Curriculum Plan – Mathematics

	<b>Mechanics</b>	<ul style="list-style-type: none"><li>• Moments about a point</li><li>• Resolving forces</li><li>• Forces in equilibrium</li><li>• Resultant forces in motion</li><li>• Projectiles</li></ul>	<ul style="list-style-type: none"><li>• Use Pearson's product-moment correlation coefficient as a measure of how close data points lie to a straight line.</li><li>• Calculate the moment of a force about an axis through a point.</li><li>• Recognise that when a rigid body is in equilibrium the resultant moment is zero and the resultant force is zero.</li><li>• Be able to resolve forces</li><li>• Use vector addition in solving problems involving resultants.</li><li>• Solve problems regarding limiting equilibrium</li><li>• Be able to model the motion of a projectile as a particle moving with constant acceleration</li><li>• Extend the constant acceleration formulae to motion in two dimensions using vectors</li></ul>	
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