



THE
GARIBALDI
SCHOOL

Garibaldi School Year 10 Overview Schemes of Learning 2023-2024 teaching

PRIDE • RESPECT • ACHIEVE

The Year 10 Scheme of Learning ensures that our students continue to build upon their Mathematical knowledge through the development of **fluency, reasoning and problem solving skills**, providing an enriched programme of study that caters for all abilities and offers stretch and challenge so that all pupils are fully equipped and prepared to start the rigour of GCSE preparation at the start of year 11.

The Maths team have ensured that the order of learning is **progressive and logical**, and continues to develop fluency, through reasoning and problem solving. In addition, we aim to increase our students love and enthusiasm for maths and improve their understanding for maths around them in their everyday lives, through an appreciation of everyday uses and application of mathematical concepts. To explore this in more detail, we have included in the Year 10 SOL **Real-world maths** lessons focused on developing students understanding of **'Money and Finance'**, which goes **over and above** the statutory National Curriculum content.

Our teachers will build on prior learning, by interleaving content, in order to help students consolidate topics and aid retention.

Topics that are shaded in purple are higher tier content only.

		Term 1			Term 2		
Autumn	Number			Number	R&P	Geometry	
	Using Number Systems	Fractional Reasoning	Application of Percentages	Application of Types of Number	Application of Compound Measures	Use of Transformations Constructions & loci	
Spring	Geometry	Algebra	Statistics	Probability	Geometry		
	Application of Shape and Space	Algebraic Manipulation	Displaying Data	Using and calculating with Probability	Angles & Trigonometry		
Summer	Algebra			Algebra	End of Year activities		
	Application of Sequences Simultaneous Equations	Interpret and use Graphs	Algebraic Manipulation (higher tier only)	Red Assessment Book RAG revisit/ Mock exams & work experience			

Term 1

Number

1. Use of Number Systems

<u>Estimation</u>	Estimate answers to calculations given a rule. Check answers to calculations by rounding. Estimate using 1 sig fig. Work with area, perimeter, volume and money.
<u>Error Intervals</u>	Write error intervals given an accuracy of rounding. Work with money.
<u>Upper and Lower Bounds</u>	Find Max and Min value for rounding. Find upper and lower bounds dependant on context. Involve compound measures.
<u>Recurring Decimals</u>	Understand recurring notation & be able to write recurring decimals in fractions.
<u>Surds</u>	Simplify surds.
<u>Convert recurring decimals</u>	Use algebra to convert recurring decimals to fractions (simplest form).
<u>Surds</u>	Multiply and divide Surds. Expand brackets and simplify with surds. Add and subtract Surds. Extend to calculations involving areas of rectangles/triangles.
<u>Rationalise the denominator</u>	Understand what a rational denominator is. Rationalise the denominator with simple surds and by using a conjugate.
<u>Iteration</u>	Use iterative formulae to work out the next solutions to an equation.

2. Fractional Reasoning

<u>Mixed Number Fraction Operations</u>	Be able to add/subtract/multiply and divide mixed numbers as calculations in context.
<u>Reverse Fractions</u>	Finding the original given the fraction. Finding a fraction given another fraction
<u>Expanding and Factorising Quadratics</u>	Expand double brackets in the form $(x \pm a)(x \pm b)$ Be able to factorise quadratic into two brackets and also solve for when $= 0$.
<u>Solving Algebraic Fractions (Linear)</u>	Solve Linear algebraic Fractions. Interleave with probability, SDT, DMV, Mean, Reverse Mean etc.
<u>Expanding and Factorising Quadratics</u>	Be able to expand when the x^2 coefficient is > 1 Students familiar with factorisation technique when $x^2 > 1$
<u>Simplify Algebraic Fraction</u>	Simplify with numerical denominators, and involving factorising of algebra. Simplify fractions with algebraic denominators.
<u>Multiply and divide Algebraic Fractions</u>	Multiply and divide algebraic fractions with numerical denominators, and with algebraic denominators.
<u>Add and subtract Algebraic Fractions</u>	Add and subtract algebraic fractions with numerical denominators, and with algebraic denominators.

3. Application of Percentages

<u>Percentage Change</u>	Be able to work out the quantity as a percentage of another. Be able to work out percentage change both increase and decrease given two quantities.
<u>Reverse Percentage</u>	Be able to find the whole given the final or given the part. Example:- Increase by 20%, new amount is 500. Find the original amount.
<u>Simple Compound Interest</u>	Understand how to formulate the compound interest formula. Work out final values and interest gained. Reason with which option is best and also identify how many years an investment is needed to make a certain quantity.
<u>Depreciation</u>	Depreciation with compound percentage loss. Problems involving depreciation by fractional amounts.
<u>More complex problems involving percentages.</u>	Application and extension of above

Real-world maths - Money & Finance lessons this half term:
Bank Statements/accounts & types of cards, Debt Overdrafts and Loans

4. Application of Types of Number

<u>Product of Primes</u>	<p>Be able to find the product of primes by using non-calculator and calculator methods.</p> <p>Be able to check a solution and justify if it is correct.</p> <p>Be able to work with product of primes to find factors and problem solve.</p>
<u>HCF / LCM</u>	<p>Understand the difference between HCF and LCM.</p> <p>Be able to find both HCF and LCM with and without finding product of primes and understand when it is most efficient to use a Venn to find solutions.</p>
<u>Standard Form (Simplifying)</u>	<p>Understand what standard form means and be able to check and correct answers.</p> <p>Be able to convert big and small numbers into standards form.</p> <p>Be able to write standard form solutions into written numbers.</p> <p>Ensure students can work with standard form both with and without a calculator.</p>
<u>Standard Form Calculations</u>	<p>Ensure students can multiply and divide standard form using indices rules but also finding the original then putting back into standard form.</p> <p>Students need to understand that they can work with original numbers to add and subtract but also when they can add standard form directly (e.g. when the powers are the same), and why that works.</p>
<u>Negative indices</u>	<p>Be able to work with negative integer powers.</p>
<u>Fractional Indices</u>	<p>Understand how fractional indices effects the base.</p> <p>Work with fractional indices.</p> <p>Be able to work fluently with indices and give answers in a given form.</p>

Ratio & Proportion

5. Application of Compound Measures

<u>Three Way Ratio</u>	Be able to combine two or more ratios into one. EXAMPLE: A:B = 3:4 and A:C = 2:3 - Write in the form A:B:C Work with ratio problems involving two or more ratios.
<u>Conversion Graphs</u>	Be able to plot quantities on a conversion graph. Identify values from a conversion graph. Extrapolate to find values not on a conversion graph. Make comparisons using a conversion graph.
<u>SDT / Distance Time Graph</u>	Understanding of speed units. Work with SDT fluently. Be able to identify movement and speed from a Distance time graph. Be able to calculate speed from a distance time graph.
<u>DMV</u>	Understand units of density. Fluently work with DMV in simple context. Work with DMV when the volume might need to be found from a shape. DMV problems when more than one material is compared and worked with.
<u>Before and After Ratio</u>	Working with ratio when a before after model is presented and to be able to understand what has changed in order to find values and solutions to problems.
<u>Direct and Indirect Proportion</u>	Algebraic method: use of proportionality symbol. Understand the difference between direct and indirect. Be able to find the constant value and form equations involving proportionality. Use a given proportion equation to find unknowns. Be able to identify graphs of proportionality.
<u>Velocity Time Graphs</u>	Understand that velocity and speed are the same. Know the difference between distance-time graphs and velocity-time graphs. Understand how to find the acceleration from a velocity time graph and the units for acceleration. Find distance and determine if it is an underestimate or overestimate. Use total distance and total time to find the average speed (Velocity).
<u>Rates of change Of curved graphs</u>	To be able to estimate and interpret the rate of change and area underneath of a quadratic or non-linear graph.

Real-world maths - Money & Finance lessons this half term:
Wages and Payslips, Calculating Tax

Term 2

Geometry

6. Use of Transformations

<u>Translation</u>	Understand vector notation for movement. Be able to move a given shape using vector translations. Understand that to describe a translation we must use a vector. No invariance.
<u>Reflection</u>	Reflection across a given line (horizontal and vertical). Reflection given an equation of a line. Reflection across a diagonal mirror line. Understand that for a reflection you must be given a mirror line (or the equation of a line to reflect over). No invariance.
<u>Rotation</u>	Rotations of a shape anywhere on a diagram. Understand rotations clockwise/anticlockwise and by 90° , 180° and 270° . Understand that to be able to rotate a shape we need to know, how many degrees, clockwise/ anticlockwise and from where. Be able to rotate a shape given a point of rotation. No invariance.
<u>Enlargement</u>	Understand that an enlargement can mean getting bigger or smaller. Enlarge shapes given a positive scale factor. Enlarge shapes given a fractional scale factor. Link the scale factor to where it is being mapped. Enlarge given a centre of enlargement. Understand information needed to enlarge: Scale factor, centre of enlargement. Link vector movements! No invariance.
<u>Describing Transformations</u>	Be able to identify and describe all transformations.
<u>Mixed transformations</u>	Carry out/describe transformations where the object has been transformed twice.
<u>Invariance</u>	Compare transformations using invariant points. Can identify invariant points following a transformation.
<u>Negative Enlargement</u>	Be able to work with negative enlargements. Use of vector translations to be able to work out the mapped movement. Students should be able to work with negative and fractional combined.
<u>Vector Geometry basic</u>	Vector notations given a geometric representation. Be able to find and simplify vector resultants of geometric representations. Include ratio of lengths and scale factor quantities.
<u>Vector Geometry proving Parallel and Straight</u>	Be able to explain what a scalar multiple of a vector means. Understand how to prove if lines are parallel using scalar multiple. Be able to prove that a line is a straight line using vector scalar multiple.

7. Constructions

<u>Construct triangles ASA/SAS/SSS/RHS</u>	Accurately (+/- 1 mm/degree) construct scalene triangles, given angle side angle, side angle side, side side side, or right-angle hypotenuse side.
<u>Construct bisectors</u>	Accurately (+/- 1 mm/degree) perpendicular bisectors and angle bisectors using a compass.
<u>Loci</u>	Show the locus of points given a rule.
<u>Regions</u>	Show the region that satisfies specific criteria.

Geometry

8. Application of Shape and Space

<u>Surface Area</u>	Work with surface area in more complex scenarios. Interleave ratio, fraction of amount, percentage etc.
<u>Volume</u>	Working with volume in more complex scenarios. Use of time and rate of flow. Interleave ratio, fraction of amount, percentage.
<u>Cones, Sphere's and Pyramids</u>	Be able to work out the volume of cones, spheres and pyramids given the formula. Be able to work and simplify fully in terms of π . Work with real life contexts.
<u>Circles</u>	Be able to work out the area of half, quarter, and three-quarter circles.
<u>Arc and Sectors</u>	understand how to work with sectors to find area and arc lengths. Simple use of proportion of a full circle to be able to evaluate in terms of π . Be able to work fluently to find the area/arc, radius/diameter.
<u>Frustums</u>	Use of scale factor to find missing lengths. Understand that a frustum is what is left from a cone. Be able to work in terms of π . Work in real life context and use of rate of flow.

Algebra

9. Algebraic Manipulation

<u>Solving with unknown on both sides</u>	Solve algebraic equations involving unknown on both sides. Elimination of smallest unknown is preferred method. Ensure method is used for solving inequalities.
<u>Forming and Solving Equations</u>	Be able to form expressions and equations from both worded and geometric problems. Include angle problems, perimeter, area etc. Work with money in context. Change the subject for basic 1 and 2 step equations.
<u>Expanding and Factorising Quadratics</u>	Expand double brackets in the form $(x \pm a)(x \pm b)$ Also include with coefficient of x in the bracket. Be able to factorise quadratic into two brackets and also solve for when $= 0$. Understand that solutions are called the roots. <i>COVERED IN AUTUMN 1 SO MAYBE DO AS STARTER.</i>
<u>Solving Quadratics by Factorising</u>	Factorise and find the roots. Form and solve quadratic equations to find solutions to problems.
<u>Change the subject</u>	Change the subject of the formula, where the formula appears only once.
<u>Expanding and Factorising Quadratics</u>	Be able to expand when the x^2 coefficient is > 1 Students familiar with factorisation technique when $x^2 > 1$. <i>COVERED IN AUTUMN 1 SO MAYBE DO AS STARTER ACTIVITY.</i>
<u>Solving Quadratics by Quadratic Formula</u>	Students must know the quadratic formula. Understand that it must be in the form $ax^2 + bx + c = 0$ Be fluent with the formula and how the coefficients match up. Use questions not in the form $ax^2 + bx + c = 0$. Forming and solving quadratics via quadratic formula in various contexts.
<u>Solving Algebraic Fractions (Quadratic)</u>	Solve algebraic fractions involving quadratics + using common formula.
<u>Expanding Triple Brackets</u>	Expanding triple brackets in any form.

Real-world maths - Money & Finance lessons this half term:
Budgeting, Cost of Living

10. Displaying Data

<u>Mean from Table</u>	Calculate mean from discrete and continuous tables. Understand how to find the MMR from discrete and continuous tables. Using midpoint to find an estimated mean. Be able to find missing frequencies given the mean/ estimated mean. Understand the impact when the group sizes are reduced.
<u>Pie Charts</u>	Understand pie charts are a representation of proportion. Finding scale factor and drawing pie charts when quantity is below and above 360. Interpreting pie charts given a part or difference using angle proportion. Comparing pie charts based on proportion not quantity.
<u>Comparing Statistics</u>	Be able to choose and explain which statistic gives you the best information given a set of data. (This changes depending on data given). Compare a set of MMR and answer in context to the question.
<u>Cumulative Frequency</u>	Draw cumulative frequency diagrams and be able to interpret to answer questions based on quantity, proportion or percentage. Be able to argue or justify a given statement using a cumulative frequency curve.
<u>Box Plots / IQR</u>	Find IQR and draw box plots from a cumulative frequency curve or a set of data. Understand what percentage of the data is in the IQR and why it is good to use. (Middle 50% and removes outliers) Interpret box plots and be able to correct. Interpret and compare box plots using the median and IQR.
<u>Histograms</u>	Understand the reasoning for using a histogram. Be able to find the frequency density given data. Draw a histogram given a scale and without. Be able to find the scale from a histogram and information. Interpret histograms based on quantity, proportion and percentage.

11. Using & Calculating with Probability

<u>Frequency Trees</u>	Be able to understand and use a frequency tree. Find missing numbers based on information given. Problems involving ratio and fraction of amount. Using algebra or ratio where two things are missing EXAMPLE: the number of boys is 3 times the number of girls. So B:G = 3:1 or $B = 3x$ and $G = x$ to solve. Using a frequency tree to work with a wider problem. Use frequency trees to state probabilities.
<u>Venn Diagrams</u>	Given information find missing areas of a Venn diagram. Be able to use a Venn diagram to find probabilities. Understand Set Notation. Be able to correct mistakes in Venn diagrams.
<u>Product rule for counting</u>	Understand and use the product rule for counting. Interpret information to be able to apply the product rule in various contexts. EXAMPLE: padlock codes, menu options, number problems etc. Be able to find probabilities of events using product rule.
<u>Tree Diagrams</u>	Using a tree diagram to represent outcomes of events. Be able to use decimals and fraction probabilities. Understand that each branch adds to 1. Work out probabilities by multiplying given outcomes. Work with independent and very basic dependent questions. Understand the difference between frequency and probability trees.
<u>Experimental Probability</u>	Understand that the more trials the more accurate the probability. Use experimental probability to scale to find estimates.
<u>Relative Frequency</u>	Work out the relative frequency based off number of times the outcome has arisen over total trials. Use probabilities to find estimate outcomes for a set number of trials/attempts.
<u>Conditional Probability</u>	Working with fractions and decimals to be able to work out probabilities that are conditional. The 1st outcome effects the 2nd probability etc.
<u>Probability with Algebra</u>	Be able to construct probabilities using algebra and hence solve to find accurate solutions using algebraic fractions.
<u>Venn Diagrams</u>	Use Venn Diagrams to calculate probabilities, using forming expressions and/or solving equations.

Real-world maths - Money & Finance lessons this half term:
Buying on Finance, Mortgages

Term 4

Geometry

12. Working with Angles

<u>Parallel Lines</u>	Know the difference between two parallel lines and the transversal. Be confident that for a set of parallel lines and a transversal: all acute angles are equal and all obtuse angles are equal. Know the correct terminology and types of angles in parallel lines. Be able to use parallel line facts to find missing angles. Incorporate algebra into questions to solve.
<u>Exterior / Interior Angles in Polygons</u>	Be able to recall that exterior angles of polygons are given by $360 \div \text{number of sides}$. $\text{EXT} + \text{INT} = 180$. Sum of angles in a polygon given by $180(n-2)$ Use all the above facts to find missing values in regular polygon questions.
<u>Bearings</u>	Be able to identify bearing from a given point by knowing it must be 3 digits, from north and clockwise. Use parallel line rules to find missing bearings. Use bearings to draw on maps and find missing locations. Interleave into other topics (ie vectors).
<u>Circle Theorems</u>	Explore and investigate circle theorems. Be able to recognize circle theorems and give the circle theorem definition. Students might need to use multiple angle properties plus circle theorems to find missing angle values.
<u>Geometric Proof</u>	Use geometric reasoning to prove angle size algebraically or prove a numerical value.

13. Trigonometry

<u>Pythagoras</u>	Find missing lengths in right-angled triangles given the other two lengths. Extend to functional style questions.
<u>Trigonometry</u>	Find missing sides and angles in right-angled triangles. Extend to problems involving compound shapes and bearings.
<u>Exact Values</u>	Know and recall exact trigonometric values for Sin, Cos and Tan for all the following: 0° , 30° , 45° , 60° and 90° .
<u>Sine Rule</u>	Understand that Sine rule can be used on any triangle with a matching pair of angle and opposite side length. Be able to recall Sine rule and understand how to best use the formula based on finding an angle or length. Apply the formula to find lengths and angles. Apply in routine and non-routine questions.
<u>Cosine Rule</u>	Understand that Cosine rule can be used on any triangle with an angle sandwich (angle and two adjacent lengths). Be able to recall Cosine rule and understand how to best use the formula based on finding an angle or length. Apply the formula to find lengths and angles. Apply in routine and non-routine.
<u>Area Formula</u>	Use and apply Area formula for any triangle. $\frac{1}{2}ab\sin C$ Formula must be recalled by students. Be able to label accurately and use the area formula in routine and non-routine problems to find, area, as well as work backwards to find sides or angle.
<u>Trig. Graphs</u>	Be able to draw Sine, Cosine and Tangent graphs and be able to identify solutions.
<u>3D Pythag and Trig</u>	Use of Pythagoras and trigonometry with 3D shapes to find missing angles and lengths. Interleave with volume and surface area.

Algebra

14. Application of sequences

Algebra

15. Simultaneous Equations

<u>Special Sequences</u>	Understand the difference between Arithmetic, Geometric and Fibonacci sequences. Students should also know their square and prime number sequence. Use Fibonacci rule with numbers and algebra. Determine if a sequence is Geometric.
<u>Linear Nth term</u>	Find the nth term of a linear sequence. Be able to find terms given the nth term. Be able to work out if a number is in the sequence. Ensure students can derive from a pattern.
<u>Quadratic Nth Term</u>	Evaluate quadratic sequences to come up with the pattern for the second difference. Be able to identify the number of n^2 . Work from your n^2 back to the original to find the quadratic nth term. Use quadratic nth term to find other numbers in the sequence and solve if a number is in the sequence.

<u>Simultaneous equations</u>	Using elimination of a variable to solve simultaneous equations. Ensure a common number of a variable and understand when to add or subtract to eliminate.
<u>Simultaneous equations</u>	As above and extend to changing one or BOTH equations to make a common variable.
<u>Quadratic Simultaneous Equations</u>	Be able to solve simultaneous equations of both forms. When both equations are equal but also when you need to rearrange and substitute in.

Real-world maths - Money & Finance lessons this half term:
Cost and Profit, First Car

16. Interpret and Use Graphs

<u>Y=Mx+C</u>	Given an equation of the form $y = mx+c$ be able to identify the gradient and y-intercept. Given an equation not in the form $y = mx+c$, be able to rearrange and find the gradient and y-intercept. Given a line, be able to write the equation in the form $y = mx+c$ and state the gradient and y-intercept. Extend where appropriate to find the equation of a line given two points.
<u>Drawing Quadratic / Cubic</u>	Be able to draw quadratic/cubic graphs given a table of values both non-calculator and calculator. Recognize cubic and quadratic graph characteristics.
<u>Roots and Turning Points</u>	Understand and be able to identify the roots and turning points of a quadratic graph. Be able to use the graph to determine values for specific solutions. EXAMPLE: Find solutions for when $x^2 + 3x + 1 = 3$ Draw a line at $y = 3$ and see where it intersect the curve; state the x coordinate.
<u>Parallel Lines</u>	Be able to identify parallel lines based off the gradient. Parallel = SAME gradient. Be able to evaluate and find lines that are parallel to others.
<u>Perpendicular Lines</u>	Be able to identify perpendicular lines based off the gradient. Perpendicular = NEGATIVE RECIPROCAL gradient Be able to evaluate and find lines that are perpendicular to others.
<u>Equation of a circle</u>	Be able to calculate the equation of a circle – given the centre (0,0) or the centre (a,b).
<u>Equation of Tangent to Circle</u>	Use knowledge of equation of circle, circle theorems (tangent meets radius at 90 degrees hence perpendicular) and gradient to find the equation of tangents to circles in the form $y=mx+c$. Use the equation of the line to find intersection points on the x and y axis.
<u>Shading the Region</u>	Be able to draw straight lines with inequalities. Understand how to represent the different inequality symbols. E.g. bold for 'and equal to' \leq and \geq , dashed for $>$ and $<$ 'not equal to'. Plot and recognize the acceptable region available and clearly show to the examiner.
<u>Graph Transformations</u>	Familiarise students with the changes that occur for graph transformations. Deduce and determine patterns to create rules for easy recap. Be able to determine how a graph changes based of the transformation and also be able to determine the changed equation if given a transformation.

17. Algebraic Manipulation

<u>Completing the Square</u>	Understand the concept of completing the square. Be able to complete the square given an even coefficient of x . Be able to complete the square given an odd coefficient of x or a x^2 coefficient > 1 . At all levels be able to sketch and determine the turning point and y - intercept. ensure students solve using completing the square methods and understand it's efficiency.
<u>Solving Quadratic Inequality</u>	Solving quadratic inequalities using factorising and quadratic formula methods. Sketch to find the roots and identify the inequality solutions.
<u>Functions</u>	Substituting into a function. Be able to find composite function solutions understanding which function should be used first. Be able to write composite function expressions. Solving with functions. Manipulation methods to find the inverse function. Simplify and solve problems involving functions, composite functions and inverse functions.
<u>Algebraic Proof</u>	Be able to write odd, even, square and consecutive numbers using algebra. Understand that to prove it is a multiple they need to factorise the multiple out of the expression. Proving a solution is a square number involves factorising into two exact same things.
<u>Change the Subject</u>	Changing the subject when the unknown is attached to another variable and needs to be factorised. Harder rearrangement of algebra

REVISION FOR MOCKS

End of Year Activities

Red Assessment book RAG
Quality check – re-assess topics of
weakness/interleave

Common Topics List

MOCK EXAMS (TWO WEEKS)
WORK EXPERIENCE (ONE WEEK)

Summer 2