Sir Thomas Fremantle

Year 10 Curriculum: Maths

Foundation Tier

Rationale	As maths continues to be building blocks of skills and knowledge, at Key Stage 4 we continue to develop numeracy and problem-solving skills in preparation for their GCSEs. GCSE Mathematics involves higher order thinking skills, where students have to apply their knowledge in a variety of practical contexts, as well as find cross topic links. We follow the AQA GCSE 8300 specification, which has two tiers, Foundation and Higher. The two tiers are on separate curriculum maps below

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Knowledge	Angles Apply the properties of: - Angles at a point - Angles at a point on a straight line - Vertically opposite angles Understand and use alternate and corresponding angles on parallel lines Understand and use	Basic Number Order positive and negative integers with and without a number line To be able to use and evaluate the symbols =, ≠, <, >, ≤,≥ and place inequalities on a number line Apply all four operations (both	Basic Percentages Interpret percentages and percentage change as a fraction or decimal Express one quantity as a percentage of another Compare quantities using percentages Work with	Ratio and Proportion Identify and work with fractions in ratio problems Express one quantity as a fraction of another Use ratio notation and how to simplify it Divide a given	Transformations Identify, construct and describe reflections and rotations and translations Identify, construct and describe enlargements using positive integers scale factors Identify, construct	Statistical Measures Classify data into categories such as quantitative and qualitative, discrete and continuous Understand what is meant by populations and samples Infer properties of populations or distributions from a

	interior and exterior angles of regular and irregular polygons Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries Use the standard conventions for labelling and referring to the sides and angles of triangles Draw diagrams from written descriptions <u>Scales and Bearings</u> Measure line segments and angles in geometric figures Use and interpret scale factors including ratios, scale diagrams and maps	mental and written) to context to positive and negative integers Understand and use appropriate use of place value Recognise inverse operations Estimate calculations, approximations and check solutions in alternative ways <u>Rounding</u> Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures) Use inequality notation to specify simple error intervals due to truncation or rounding Apply and interpret limits of accuracy including upper and lower bounds	percentages greater than 100% Calculate percentage and fractions of a quantity Solve problems using the multiplier <u>Perimeter and Area, and Surface Area</u> Properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres Calculate perimeters and areas of common 2D shapes such as triangles, parallelograms and Trapezia Calculate perimeter and areas of compound shapes	quantity into two parts in a given part:part or part:whole ratio Express the division of quantity into a given ratio Apply ratio to real life problems such as conversion, scale and recipes Express multiplicative relationships between two ratios Understand and use proportion as an equality of ratios Substitute numerical values into expressions and formulae <u>Equations</u> Substitute numerical values into expressions and formulae Substitute values into	and describe enlargements using negative and fractional scale factors Describe any reverse transformation <u>Congruency and Similarity</u> Understand the term of congruency and identify shapes that are congruent Identify the congruency in triangles using SSS, ASA, SAS proofs Understand the term similarity and identify similar shapes Use angle facts and knowledge of transformations to identify similar shapes Be able to find missing lengths of similar or congruent shapes using scale	sample, whilst knowing the limitations of sampling Interpret, analyse and compare data using the mean, median, mode and range in grouped and ungrouped data Consider outliers Apply statistics to consider and interpret a population <u>Measures</u> Interpret scales on a range of measuring instruments, including those for time and temperature Know that measurements using real numbers depend on the choice of unit Make sensible estimates of real-life situations

	Be able to estimate actual lengths from scaled diagrams Measure, construct and apply bearings (8 point compass and 3-figure bearings) **Factors and Multiples** Know and use key words such a prime numbers, factors and multiples Use methods to systematically list strategies, combinations and permutations given a context Use methods, such as Venn diagrams to find common factors and multiples to identify the LCM and HCF including abstract questions Know and use prime factor decomposition to find a number as a	Order positive and negative decimals **Basic Decimals** Order positive and negative decimals Apply the four operations, including formal written methods, to decimals – both positive and negative Understand and use place value (e.g. when calculating with decimals) Interchange between terminating decimals and their corresponding fractions **Collecting Data** Define, interpret and construct tables, charts and diagrams to represent data Calculate the mean, median and mode from discrete data	Calculate the surface area of prisms and pyramids with and without the use of nets Solve geometric problems using algebra **Circumference and Area** Identify parts of a circle Calculate the area and circumference of a circle Calculate the area and perimeter of compound shapes involving circles or parts of circles Calculate the surface area of cones, spheres and cylinders Solve problems involving circular shapes	mathematical formulae such as volume and area Substitute values into expressions and equations linking to conversion of metric and imperial measures Solve simple linear equations by using inverse operations or by transforming both sides in the same way Solve simple linear equations with integer coefficients where the unknown appears on one or both sides of the equation or where the equation involves brackets. **Indices** Use positive integer powers and associated real roots (square, cube and higher) Recognise powers of	factors and ratio relationships Understand and evaluate area and volume of similar shapes **Properties of Polygons** **Recall** the properties and facts of types of triangles and quadrilaterals Solve problems involving angles in 2D shapes Explore proofs involving shape properties **2D representations of 3D Shapes** **Construct** net of 3D shapes Draw plans and elevations of 3D objects Draw 3D shapes on isometric paper	Choose appropriate units for estimating measurements, for example the height of a television mast would be measured in metres Know and use standard metric and imperial measures Know and use compound measures such as area, volume, speed, density and pressure **Basic Probability** Complete frequency tables for experimental probability Understand and use relative frequency Complete frequency trees in a given context Understand mutually exclusive outcomes and how they add up

	product of their primes using index form Use prime factor decomposition to find the LCM and HCF Basic Fractions Be able to order positive and negative fractions Be able to find equivalent fractions and simplify fractions fully Apply the four operations, including formal written methods, to simple fractions (proper and improper) and mixed numbers - both positive and negative Basic Algebra Use conventional notation for priority of operations, including brackets, powers, roots and reciprocals in the context of algebra	Calculate the mean of grouped data and interpret the results Sequences Generate terms of a sequence from either a term-to-term or a position-to-term rule Recognise geometric and arithmetic sequences Recognise known sequences such a triangular and square Recognise and use Fibonacci like sequences Deduce expressions to calculate the nth term of linear and quadratic sequences Coordinates and Straight Lines Work with coordinates in all four quadrants to identify the midpoint of a line and solve geometric problems	Real Life Graphs Plot and interpret graphs (including reciprocal graphs) Plot and interpret graphs of non-standard functions in real contexts Find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion	2, 3, 4, 5 and to recall square numbers up to 15 x 15 and cube numbers up to 8 x 8 x 8 Calculate with roots and integer indices Standard Form Understand and use place value when working with large and small numbers Understand how 10, 100, 1000, 0.001 etc. can be written as powers of 10 Calculate with and interpret standard form using all four operations		to 1 Construct theoretical probability possibility spaces Loci and Constructions Use the standard ruler and compass constructions Perpendicular bisector of a line or two points Bisecting angles and constructing angles such as a 60° Use constructions to solve loci problems

	Use and interpret algebraic notation such as *ab* replacing *a* x *b* Ensure coefficients written as fractions rather than decimals Understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors Be able to construct and use both equations and expressions in contexts Simplify expressions by collecting like terms and where necessary make use of the index laws to simplify fully Expand, simplify and factorise expressions involving single	Plot straight line graphs Use the equation of the line y=mx + c to identify the gradient, intercept and parallel lines Find the equation of a line given the gradient and a coordinate or two coordinates Solve problems on coordinate axes involving geometry			

	brackets					
Skills	Across all of the topics covered in Year 10, we develop the following skills which are examined in the GCSE assessment objectives.					

AO1	**AO2**	**AO3**
I can accurately recall facts I can recall key terminology and definitions I can use and interpret notation correctly	I can accurately carry out routine procedures I can make deductions, inferences and draw conclusions from mathematical information I can interpret and communicate information accurately I can construct chains of reasoning to achieve a given result I can present arguments and proof I can present information and methods clearly including multi-step problems	I can translate problems in mathematical or non mathematical contexts I can make and use connections between different strands of mathematics I can interpret results of the given problem I can evaluate methods used and results obtained I can assess and evaluate arguments I can conclude contextual problems using abstract calculations and proof

Assessment						
	Regular short knowledge tests *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative end-of-year assessment*

Characteristics	Problem Solving	Committed	Adaptable	Critical Thinker
	Inquisitive	Realistic	Risk Taker	
	Organised	Enthusiastic		

Year 10 Curriculum: Maths

Higher Tier

Rationale	As maths continues to be building blocks of skills and knowledge, at Key Stage 4 we continue to develop numeracy and problem-solving skills in preparation for their GCSEs. GCSE Mathematics involves higher order thinking skills, where students have to apply their knowledge in a variety of practical contexts, as well as find cross topic links. We follow the AQA GCSE 8300 specification, which has two tiers, Foundation and Higher. The two tiers are on separate curriculum maps below

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Knowledge	Angles, Scales and Bearings Apply the properties of: - Angles at a point - Angles at a point on a straight line - Vertically opposite angles Understand and use alternate and corresponding angles on parallel lines Understand and use interior and exterior	Fractions and Decimals Be able to order positive and negative fractions Be able to find equivalent fractions and simplify fractions fully Apply the four operations, including formal written methods, to simple	Perimeter and Area, and Surface Area Properties of the faces, surfaces, edges and vertices of: cubes, cuboids, prisms, cylinders, pyramids, cones and spheres Calculate perimeters and areas of common 2D shapes such as	Indices Use positive integer powers and associated real roots (square, cube and higher) Recognise powers of 2, 3, 4, 5 and to recall square numbers up to 15 x 15 and cube numbers up to 8 x 8 x 8 Calculate with roots	Transformations Identify, construct and describe reflections and rotations and translations Identify, construct and describe enlargements using positive integers scale factors Identify, construct and describe	Pythagoras and Basic Trigonometry Know and recall Pythagoras' theorem Find missing lengths using Pythagoras' theorem Solve problems involving Pythagoras' theorem Introduce the trigonometric ratios

	angles of regular and irregular polygons Use conventional terms and notations: points, lines, vertices, edges, planes, parallel lines, perpendicular lines, right angles, polygons, regular polygons and polygons with reflection and/or rotation symmetries Use the standard conventions for labelling and referring to the sides and angles of triangles Draw diagrams from written descriptions Measure line segments and angles in geometric figures Use and interpret scale factors including ratios, scale diagrams and maps Be able to estimate	fractions (proper and improper) and mixed numbers - both positive and negative Order positive and negative decimals Apply the four operations, including formal written methods, to decimals – both positive and negative Understand and use place value (e.g. when calculating with decimals) Interchange between terminating decimals and their corresponding fractions Basic Percentages Interpret percentages and percentage change as a fraction or decimal Express one quantity as a percentage of another	triangles, parallelograms and Trapezia Calculate perimeter and areas of compound shapes Calculate the surface area of prisms and pyramids with and without the use of nets Solve geometric problems using algebra Circumference and Area Identify parts of a circle Calculate the area and circumference of a circle Calculate the area and perimeter of compound shapes involving circles or parts of circles Calculate the surface area of cones,	and integer indices Standard Form Understand and use place value when working with large and small numbers Understand how 10, 100, 1000, 0.001 etc can be written as powers of 10 Calculate with and interpret standard form using all four operations Surds Calculate exactly with surds Simplify surd expressions involving squares and rationalise denominators Recognise and use simple geometric progressions (r^n where n is an integer and r is a surd) Ratio and Proportion	enlargements using negative and fractional scale factors Describe any reverse transformation Congruency and Similarity Understand the term of congruency and identify shapes that are congruent Identify the congruency in triangles using SSS, ASA, SAS proofs Understand the term similarity and identify similar shapes Use angle facts and knowledge of transformations to identify similar shapes Be able to find missing lengths of similar or congruent shapes using scale factors and ratio	SOH, CAH, TOA Use trigonometric ratios to find missing angles and missing sides Know the exact values of sin 30°, 45°, 60°, 90° ; cos 30°, 45°, 60°, 90° ; tan 0°, 30°, 45°, 60° ; Compare lengths using ratios and link to trigonometric ratios Loci and Constructions Use the standard ruler and compass constructions Perpendicular bisector of a line or two points Bisecting angles and constructing angles such as a 60° Use constructions to solve loci problems

actual lengths from scaled diagrams Measure, construct and apply bearings (8 point compass and 3-figure bearings) **Basic Number Review** Know and use key words such a prime numbers, factors and multiples Use methods to systematically list strategies, combinations and permutations given a context Use methods, such as Venn diagrams to find common factors and multiples to identify the LCM and HCF including abstract questions Know and use prime factor decomposition to find a number as a product of their primes using index	Compare quantities using percentages Work with percentages greater than 100% Calculate percentage and fractions of a quantity Solve problems using the multiplier **Calculating with Percentages** Solve problems involving percentage increase and decrease with and without a calculator Solve simple and compound interest problems Calculate reverse percentages using the multiplier method **Algebraic Fractions** To be able to recall the methods associated with	spheres and cylinders Solve problems involving circular shapes **Sequences** Generate terms of a sequence from either a term-to-term or a position-to-term rule Recognise geometric and arithmetic sequences Recognise known sequences such a triangular and square Recognise and use Fibonacci like sequences Deduce expressions to calculate the nth term of linear and quadratic sequences **Coordinates and Straight Lines** Work with coordinates in all four quadrants to identify the midpoint of a line	Identify and work with fractions in ratio problems Express one quantity as a fraction of another Use ratio notation and how to simplify it Divide a given quantity into two parts in a given part:part or part:whole ratio Express the division of quantity into a given ratio Apply ratio to real life problems such as conversion, scale and recipes Express multiplicative relationships between two ratios Understand and use proportion as an equality of ratios Substitute numerical	relationships Understand and evaluate area and volume of similar shapes **Properties of Polygons** Recall the properties and facts of types of triangles and quadrilaterals Solve problems involving angles in 2D shapes Explore proofs involving shape properties	**Measures** Interpret scales on a range of measuring instruments, including those for time and temperature Know that measurements using real numbers depend on the choice of unit Make sensible estimates of real-life situations Choose appropriate units for estimating measurements, for example the height of a television mast would be measured in metres Know and use standard metric and imperial measures Know and use compound measures such as area, volume, speed, density and pressure

	form Use prime factor decomposition to find the LCM and HCF Order positive and negative integers with and without a number line To be able to use and evaluate the symbols $=, \neq, <, >, \leq, \geq$ and place inequalities on a number line Apply all four operations (both mental and written) to context to positive and negative integers Understand and use appropriate use of place value Recognise inverse operations Estimate calculations, approximations and check solutions in alternative ways Rounding	simplifying numerical fractions and the four operations To be able to apply basic fractions to algebraic fractions To be able to simplify algebraic expressions To be able to solve linear and quadratic equations involving algebraic fractions <u>Collecting Data</u> Define, interpret and construct tables, charts and diagrams to represent data Calculate the mean, median and mode from discrete data Calculate the mean of grouped data and interpret the results Construct and interpret diagrams for grouped discrete data and continuous	and solve geometric problems Plot straight line graphs Use the equation of the line $y=mx + c$ to identify the gradient, intercept and parallel lines Find the equation of a line given the gradient and a coordinate or two coordinates Solve problems on coordinate axes involving geometry Identify and interpret gradients and intercepts of linear functions graphically and algebraically Solve geometrical problems on coordinate axes <u>Real Life Graphs</u> Plot and interpret	values into expressions and formulae <u>Direct and Inverse Proportion</u> Use proportion to solve problems using informal strategies or the unitary method of solution Use direct proportion to solve geometrical problems Calculate an unknown quantity from quantities that vary in direct or inverse proportion Set up and use equations to solve word and other problems involving direct proportion or inverse proportion Relate algebraic solutions to graphical representation of the equations		

	Round numbers and measures to an appropriate degree of accuracy (e.g. to a specified number of decimal places or significant figures) Use inequality notation to specify simple error intervals due to truncation or rounding Apply and interpret limits of accuracy including upper and lower bounds Order positive and negative decimals <u>Basic Algebra</u> Use conventional notation for priority of operations, including brackets, powers, roots and reciprocals in the context of algebra Use and interpret algebraic notation such as *ab* replacing *a* x *b* Ensure coefficients	data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use Identify quartiles, interquartile range and represent them by constructing and interpreting boxplots <u>Statistical Measures</u> Classify data into categories such as quantitative and qualitative, discrete and continuous Understand what is meant by populations and samples Infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling Interpret, analyse and compare data using	graphs (including reciprocal graphs) Plot and interpret graphs of non-standard functions in real contexts Find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration Interpret the gradient of a straight line graph as a rate of change; recognise and interpret graphs that illustrate direct and inverse proportion	Sketch graphs to represent real-life situations Recognise graphs that represent direct and inverse proportion Understand that an equation of the form y = kx represents direct proportion and that k is the constant of proportionality Understand that an equation of the form y = represents inverse proportion and that k is the constant of proportionality. Recall the meaning of the gradient and how to calculate it Recognise that gradient represents the rate of change on real – life graphs <u>Growth and Decay</u> Growth and Decay Solve problems		

	written as fractions rather than decimals Understand and use the concepts and vocabulary of expressions, equations, formulae, identities, inequalities, terms and factors Be able to construct and use both equations and expressions in contexts Simplify expressions by collecting like terms and where necessary make use of the index laws to simplify fully Expand, simplify and factorise expressions involving single brackets <u>Equations</u> Substitute numerical values into expressions and formulae	the mean, median, mode and range in grouped and ungrouped data Consider outliers Apply statistics to consider and interpret a population <u>Scatter Graphs</u> Plot and interpret scatter graphs Draw and use a line of best fit		involving repeated proportional change Use calculators to explore exponential growth and decay using a multiplier and the power Solve compound interest problems		

	Substitute values into mathematical formulae such as volume and area Substitute values into expressions and equations linking to conversion of metric and imperial measures Solve simple linear equations by using inverse operations or by transforming both sides in the same way Solve simple linear equations with integer coefficients where the unknown appears on one or both sides of the equation or where the equation involves brackets.				

Skills	Across all of the topics covered in Year 10, we develop the following skills which are examined in the GCSE assessment objectives.					
	AO1		**AO2**		**AO3**	
	I can accurately recall facts I can recall key terminology and definitions I can use and interpret notation correctly		I can accurately carry out routine procedures I can make deductions, inferences and draw conclusions from mathematical information I can interpret and communicate information accurately I can construct chains of reasoning to achieve a given result I can present arguments and proof I can present information and methods clearly including multi-step problems		I can translate problems in mathematical or non-mathematical contexts I can make and use connections between different strands of mathematics I can interpret results of the given problem I can evaluate methods used and results obtained I can assess and evaluate arguments I can conclude contextual problems using abstract calculations and proof	
Assessment	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative assessment using exam questions on topics above*	*Regular short knowledge tests* *One formative assessment* *Summative end-of-year assessment*

Characteristics	Problem Solving Committed Adaptable Critical Thinker
	Inquisitive Realistic Risk Taker
	Organised Enthusiastic