Curriculum Guide for Maths

1. Curriculum Rationale

i) INTENT

Our curriculum aims to have the highest expectations of every student and to represent our belief that every student can learn every concept. In doing so, we aim to ensure that every student develops an understanding of the multiple links that occur between concepts, leading to a recognition of the beauty and power of Mathematics and an understanding of a set of tools that can be used beyond school.

We aim to make all students successful in each topic they study. By doing so, we aim to develop a sense of enjoyment and curiosity about mathematics, enabling our students to continue being successful as they progress to studying more complex content. We endeavour to provide a high-quality mathematics education which provides the foundation for understanding many disciplines, the ability to reason mathematically and ensures that all students are financially literate

SEND

Our curriculum is designed to meet the needs of all students, so they develop their knowledge, skills and abilities to ensure they have access to a broad and balanced education. Students will access the full curriculum and will have scaffolded support through the use of teaching and learning strategies, such as the Magnificent 7, where needed, which are intended to help students with SEND to overcome barriers.

We will also make any reasonable adjustments, where needed, to include students within the broad areas of need including setting challenging learning goals, responding to students' diverse learning needs through use of Individual Learning Plans (ILPs), found in Classcharts, and overcoming potential barriers to learning and assessment for particular individuals and groups of students.

We understand that some students with SEND will show their understanding in different ways from their peers, so we seek to use a range of opportunities for students to demonstrate this.

On top of this, Maths lessons will be heavily structured, to allow students to know routines and expectations, ‘Do Now’ tasks will be used at the start of every lesson to encourage and support the recall of previously studied topics and equipment will be provided if needed within the lesson to remove any barriers. Students will also be given increased ‘think time’ to allow for processing and encourage responses and teachers will use the deliberate modelling of a skill that is then replicated by the student in order to engage and show good practice.

In Maths, we also have smaller teaching groups for Year 7, 8 and 9 with additional support and offer a personalised homework platform that provides additional support both in class and via video support to ensure work is accessible yet challenging and encourages independent practice.

We will celebrate inclusive pedagogy in the department and draw upon context-independent knowledge, as well as develop an inclusive mindset to increase the learning and engagement of all students.

ii) IMPLEMENTATION

The Mathematics curriculum (Y7-11) follows the structure of the Pearson KS3/4 textbooks and Scheme of Work.

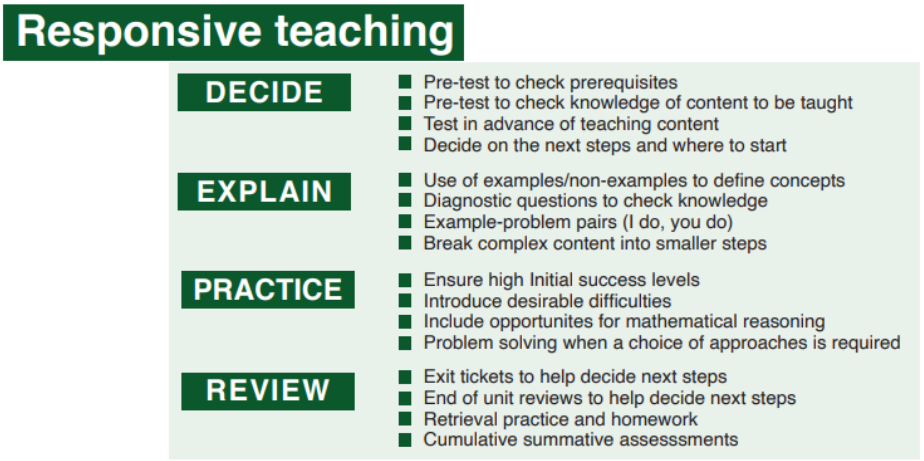
There is a Core Curriculum throughout Year 7 and Year 8, creating a connected pathway in which all students can be successful following on from their KS2 learning.

Students in Years 9, 10 and 11 then follow a tiered route, either foundation or higher, that builds on topics taught at KS3 to create a spiral curriculum in which topics are revisited and developed.

Students are given every chance to be successful on the Higher tier GCSE Maths course, with a specific focus on crossover content for those students who this decision is marginal.

The curriculum:

- Is sequenced to ensure topics and concepts are revisited and built upon throughout KS3 and KS4, to embed conceptual understanding and develop problem-solving skills.
- Provides accessible starting points for each learning sequence, with prior knowledge checks and end of unit assessments for each topic.
- Ensures skills and knowledge are broken down into small steps to support every student learning every step of every concept, including those with special educational needs
- Contains consistent and accurate use of mathematical language and explanations which match those contained in student knowledge organisers, to give students the vocabulary they need to reason mathematically.
- Is ambitious for all students, following the structure of the National Curriculum. Students are given every chance to be successful on the Higher tier GCSE Maths course.
- The Mathematics curriculum (Y7-13) follows the structure of the Pearson Key Stage 3/4/5 textbooks and Scheme of Work. There is a Core Curriculum throughout Year 7 and Year 8, creating a connected pathway in which all students can be successful following on from Pearson's KS2 'Power Maths', which is widely used with the majority of our feeder schools.
- The structure of units within the curriculum, following the structure of the National Curriculum, aims to adhere to the principles of 'Responsive teaching'



iii) CURRICULUM MAP

YEAR 7	
AUTUMN	Analysing and displaying data: mode, median, mean and range, displaying data, grouping data, comparing data, line graphs and bar charts Number skills: mental maths, adding and subtracting, multiplication and division, negative numbers, factors, multiples and primes, square and triangle numbers Expressions, functions and formulae: functions, simplifying expressions, writing expressions, writing formulae Decimals and measures: decimals and rounding, length, mass and capacity, scales and coordinates, perimeter, area
SPRING	Fractions: comparing fractions, simplifying fractions, fraction operations, fractions/decimals/percentages, percentages of amounts Probability: language, calculating single event, events not happening, experimental probability Ratio and proportion: direct proportion, writing ratios, using ratios, proportions and fractions/percentages
SUMMER	Lines and angles: describing and labelling, estimating, measuring and drawing, drawing triangles, angles in a triangle, quadrilaterals Sequences and graphs: sequences, patterns, coordinates, straight line graphs Transformations: congruence, symmetry, reflection, rotation, translation and combined transformations

YEAR 8	
AUTUMN	Number: negatives, powers and roots, substitution, multiples and factors Area and volume: area of a triangle, parallelogram and trapezium, volume of cuboids, surface area of cuboids Expressions and equations: algebraic powers, expressions and brackets, formulae, factorising, equations (balancing) Real-life graphs: conversion graphs, distance-time graphs, line graphs, real-life graphs
SPRING	Decimals and ratio: ordering decimals and rounding, place value calculations, calculations with decimals, ratio and proportion with decimals Lines and angles: quadrilaterals, angles in parallel lines, exterior/interior angles Calculating with fractions: fraction operations
SUMMER	Straight-line graphs: direct proportion on graphs, gradients, equations of straight lines Percentages, decimals and fractions: fractions and decimals, equivalent proportions, writing percentages, percentages of amounts Statistics, graphs and charts: pie charts, two-way tables, comparing data, scatter graphs

YEAR 9 FOUNDATION	
AUTUMN	Number: calculations, decimals, place value, factors and multiples, squares, cubes and roots, index notation, prime factors Algebra: expressions, substitution, formulae, expanding brackets, factorising, using expressions and formulae
SPRING	Graphs, tables and charts: frequency tables, two-way tables, representing data, time series, pie charts, scatter graphs Fractions and percentages: fractions, converting fractions/decimals/percentages, calculating percentages Equations: solving equations, inequalities, generating sequences, nth term of a sequence
SUMMER	Angles: properties of shapes, angles in parallel lines, interior/exterior angles, patterns. Averages and range: mean, mode, median and range, estimating the mean, sampling Perimeter, area and volume: area of shapes/compound shapes, surface area, volume of prisms
YEAR 9 HIGHER	
AUTUMN	Number: place value and estimating, HCF/LCM, indices, zero, negative and fractional indices, standard form, surds Algebra: algebraic indices, expanding and factorising, equations, formulae, linear sequences, non-linear sequences
SPRING	Interpreting and representing data: statistical diagrams, time series, scatter graphs, averages and range, pie charts Fractions, ratio and percentages: fraction operations, ratio, percentages, converting fractions/ decimals/percentages Angles and trigonometry: interior/exterior angles, Pythagoras' Theorem, trigonometry
SUMMER	Graphs: linear graphs, rates of change, real-life graphs, parallel & perpendicular lines, quadratic graphs, cubic & reciprocal graphs Area and volume: perimeter and area, units and accuracy, prisms, circles, sectors of circles, cylinders & spheres, pyramids & cones

YEAR 10 FOUNDATION	
AUTUMN	NGraphs: plotting, midpoint, gradient, y = mx + c, equation of a line through a point, real-life graphs, distance-time graphs Transformations: translation, reflection, rotation, enlargement, combining transformations Ratio and proportion: ratio notation, ratio problems, ratio and fractions, decimals and percentages, n:1, proportion on a graph, inverse and direct proportion
SPRING	Right-angled triangles: Pythagoras'Theorem, the distance formula, trigonometry, exact trigonometric values Probability: event not happening, expectation, listing outcomes, sample space diagrams, experimental probability/relative frequency, Venn diagrams, tree diagrams Multiplicative reasoning: percentage multipliers, compound interest/decay, compound measures, speed/distance/time, direct and inverse proportion
SUMMER	Constructions, loci and bearings: plans and elevations, congruence conditions, drawing triangles, scale diagrams, constructions, loci, bearings Quadratic equations and graphs: expanding double brackets, plotting graphs of quadratics, factorising quadratics, Perimeter, area and volume 2: circumference, area of a circle, sector area and arc length, volume and surface area of cylinders, pyramids, cones and spheres
YEAR 10 HIGHER	
AUTUMN	Equations and inequalities: inequalities and number lines, solving quadratic equations, the quadratic formula, completing the square, simultaneous equations Probability: product rule for counting, two-way tables, sample space diagrams, expectation, relative frequency, tree diagrams, conditional probability, Venn diagrams Multiplicative reasoning: percentage multipliers, compound interest and decay, compound measures, ratio, direct and inverse proportion
SPRING	Similarity and congruence: congruence, proof, similarity, area and volume scale factor More trigonometry: upper and lower bounds, trigonometric graphs, area of a triangle, sine rule, cosine rule, bearings with trigonometry, Pythagoras in 3D, trigonometry in 3D, transforming trigonometric graphs Further statistics: sampling, cumulative frequency, box plots, histograms, comparing distributions
SUMMER	Equations and graphs: simultaneous equations graphically, graphical inequalities, sketching quadratic graphs, expanding triple brackets, cubic equations, solving by iteration Circle theorems More algebra: rearranging where the subject appears more than once, algebraic fractions, algebraic proof, surds, equations with algebraic fractions, functions, inverse and composite functions

YEAR 11 FOUNDATION	
AUTUMN	Fractions, indices and standard form: fractions - four operations, laws of indices, negative powers, writing small and large numbers in standard form, calculating in standard form Congruence, similarity and vectors: scale factors, enlargement, similar shapes, proving similarity, congruent shapes, proving congruence, column vectors, drawing vectors. More algebra: graphs of cubic and reciprocal functions, non-linear graphs, solving simultaneous equations algebraically and graphically, rearranging formulae, identifying expressions, formulae, equations and identities.
YEAR 11 HIGHER	
AUTUMN	Graphs: linear graphs, rates of change, real-life graphs, parallel & perpendicular lines, quadratic graphs, cubic & reciprocal graphs Area and volume: perimeter and area, units and accuracy, prisms, circles, sectors of circles, cylinders & spheres, pyramids & cones

2. Teaching and learning in Maths

i) RETRIEVAL PRACTICE

Each lesson will contain a retrieval activity on previously covered content. The aims of this are:

- To improve students' long-term retention of key mathematical skills and knowledge to help improve fluency, transfer and reduce cognitive load.
- To help develop a culture of high expectations, exemplary behaviour and mathematical rigour within every classroom.
- The systematic approach to retrieval practice ensures key knowledge and skills are recalled at specific intervals, leveraging the 'spacing effect' and 'testing effect' to build durable learning. The systematic approach ensures that information is repeated in a distributed fashion or spaced over time, it is learned more slowly but it is repeated much longer' (Roediger & Pyc, 2012).
- To develop students who are capable of selecting required approaches from a variety of different interleaved questions, rather than providing solutions to a 'blocked' set of questions from the same topic (Rohrer, Dedrick & Burgess, 2014).

Where the questions included in the systematic retrieval practice are not deemed appropriate for the students at that time, staff are encouraged to adapt the questions, which are included according to the needs of the class.

ii) SEQUENCING

At Key Stage 3, there is a focus on the basics of number and algebra. The sequencing is designed to allow for interleaving of content; the placement of each unit within the scheme of work allows for knowledge to easily be transferred into the following topics allowing for links between domains to become visible. As a result, much of the Key Stage 3 scheme of work contains the following progression sequence: Number > Algebra > Geometry or Statistics.

Each section of the scheme of work references the prerequisites and dependents for that unit. This is in order to ensure that teaching builds on the knowledge and skills that students have, whilst ensuring that topics are taught in a way which best prepares them for success in future topics. Priority has been given to the topics which are heavily built upon at Key Stage 4 and 5.

Our KS3 and KS4 curriculum is based on the Pearsons SOW. It is a spiral curriculum that ensures students revisit topics . This provides the opportunity for topics to be revisited and knowledge built on and developed. We explicitly convey curriculum links through sharing the student learning journey (curriculum map) which is reinforced through the use of explicit vocabulary tasks to improve links between topics and successful encoding of knowledge and skills into long term memory. As Rohrer & Taylor (2006), found: 'the retention of Mathematics is markedly improved when a given number of practice problems are distributed across multiple assignments and not massed into one'

iii) ASSESSMENT PLAN

There are 5 **summative** assessments per year for years 7 - 10. Three of these are Granville Academy assessments and the other two are De Ferrers Trust assessments that aim to test all of the knowledge and skills that the students have developed. All of these assessments are followed up with a question level analysis (QLA) that not only informs the class teacher's medium and long term plan but also provides students with an individualised revision list that links to our homework platform.

To support our students' learning and to inform responsive teaching approaches we also use **formative** assessment. Examples of this are exit tickets and topic reviews which are used to provide whole class feedback to our students and provide opportunities to reflect on teaching and learning.

iv) HOMEWORK AND INDEPENDENT LEARNING

The Maths faculty uses a platform called Sparx Maths (www.sparxmaths.com) for student homework.

Sparx has been chosen because it personalises each child's homework, creating a weekly set of questions tailored to their level of understanding and learning pace. The questions are designed to be achievable whilst offering the stretch and challenge that learners need to make progress.

Each student in Year 7 to 11 will be given 60 minutes of Sparx homework each week. This Compulsory task is linked to our scheme of work and is designed to ensure prior knowledge is recalled. The aim for every student is to achieve 100% on their Compulsory tasks. In the event that a student does not achieve 100%, we ask that students watch the accompanying video and seek help if needed from a class teacher.

Students are also encouraged to complete their Target practice and XP boost. These are designed to give further practice and stretch and challenge.

Every student has a homework book in which they are to complete their extended practice.

3. Useful Websites

https://hegartymaths.com/

https://corbettmaths.com/

https://www.mathsgenie.co.uk/

https://www.onmaths.com/

https://www.cgpbooks.co.uk/

http://www.deferrerstrust.com/knowledgeorganisers