CARR HILL HIGH SCHOOL

Commitment Aspiration Resilience Respect

Timeline	Topic	Key concepts and knowledge	Skills development	Rationale
Half Term 1	Number – Factors, Powers and Roots	Understand and use negative and fractional indices. Use and calculate in standard form. Use and manipulate surds.	We want to develop students' ability to handle problem solving tasks. This will include prior knowledge from other topics to increase the challenge in the current topics.	Standard form allows students to gain an understanding of very large and very small numbers that are used to describe things such as distances in space or the size of atoms. In addition, resources in this topic allow for a realisation of the sheer size of objects in space.
	Statistics – Handling Data	Averages and range from a table. Drawing and analysing scatter graphs. Drawing and analysing a cumulative frequency graph. Drawing and analysing a boxplot. Calculating quartiles and the interquartile range. Drawing and analysing histograms.	We will also look to increase student understanding of the real world applications of Maths. We will also introduce a greater use of actual AQA past exam questions to help students to prepare for their GCSE. Students should become fluent in analysing data and drawing their own conclusions. They should be able to articulate their opinions, and state whether they agree with someone and why.	Students are shown how data can be presented in different ways to try and support different statements. This will make students think about whether they can always trust charts and show them what to look for to check if data/charts are intentionally misleading.
	Algebra – Algebraic Manipulation	Factorising an expressions using a common factor. Expanding a pair of binomials. Factorising a quadratic when a = 1 and when a is greater than 1.	Students should become confident with working with different types of numbers interchangeably and understand the appropriate times to use each of them.	Teaching Pythagoras' Theorem provides an opportunity to look at the history – in particular how the Pythagoreans used mathematics purely for "mystical reasons" and not for any practical reasons (they believed all things were made of numbers). Also provides an opportunity to look at how the development of mathematics has often clashed with religions and/or formed new ones.
	Geometry – Pythagoras and Trigonometry	Calculating a missing side in a right-angled triangle using Pythagoras' theorem. Calculating a missing side or angle in a right angled triangle using trigonometry.		

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Half Term 2	Geometry – Pythagoras and Trigonometry	Calculating a missing side in a right-angled triangle using Pythagoras' theorem. Calculating a missing side or angle in a right angled triangle using trigonometry. Using the Sine and Cosine rules for non-right-angled triangles.	We want to develop students' ability to handle problem solving tasks. This will include introduce prior knowledge from other topics to increase the challenge in the current topics. We will also look to increase student understanding of the real world applications of Maths.	The trigonometry topic provides a good opportunity for students to learn about how missing angles and edge lengths were calculated before calculators. Many ancient civilisations had their own methods to approximate them, and were surprisingly accurate.
	Number – Rounding and Limits	Estimate a calculation by rounding to a significant figure. Write the error interval for a number. Calculate with bounds.	We will also introduce a greater use of actual AQA past exam questions to help students to prepare for their GCSE.	The approximation topic will allow students to understand the possible size/value of things when they have been given an approximate answer. For example, if they have been given an approximate price for an item to the nearest £100, they know that the actual price could be up to £50 higher/lower.
	Geometry – Perimeter, Area and Volume	Volume of cuboids and prisms (including cylinders). Area and perimeter of sectors. Volume and surface area of pyramids, cones and spheres. Area of a segment. Area of a triangle using the Sine ratio.	Students will be expected to become increasingly fluent in their mathematical working – correct layout, notation etc. Students will be increasingly required to use formulae, substituting all types of numbers including surds.	The perimeter, area and volume topic provides an opportunity to talk about and experience the actual size of certain units with students (they can sometimes be a bit of an abstract concept). This can be done with the faculty resources, including the cubic meter resource.
	Algebra – Solving Quadratic Equations	Build on student knowledge of solving linear equations. Solving quadratic equations where a=1 or is greater than 1. Use the quadratic formula to solve quadratic equations.		The quadratic equations topic allows students to develop their logical ability. Jobs include working in agriculture, military and law enforcement and engineering.
	Probability	Using product rule for outcomes. Drawing and interpreting frequency trees. Understanding and calculating relative frequency. Using and calculating probabilities from a Venn diagram. Using tree diagrams and calculating probabilities.		

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Half Term 3	Geometry – Angles	Understanding and using the properties of angles in polygons. Understand and use bearings. Use circle theorems to find missing angles.	We want to develop students' ability to handle problem solving tasks. This will include introduce prior knowledge from other topics to increase the challenge in the current topics.	Angles in polygons provides an opportunity to look at tessellation and artwork that is created by 2D tessellation. The discussion can be had about shapes that do not tessellate in 2D, but can in 3D such as those that create a football.
	Algebra – Solving Linear Equations	Solving linear equations with one or two steps, which can also include brackets. Solving equations with unknowns on both sides. Solving inequalities. Solving equations with fractions. Describe and identify regions described using inequalities.	We will also look to increase student understanding of the real world applications of Maths. We will also introduce a greater use of actual AQA past exam questions to help students to prepare for their GCSE.	As the use of bearings is introduced, students should be made aware of the need for a measurement that is universal and is measured from a fixed point. There should be the discussion about what/who would need to use bearings, e.g ships and planes, and why.
	Number – Percentages	Calculating simple and compound interest. Calculate the original amount after a given percentage increase or decrease.	There will be a greater focus on the use of percentages in a financial situation, in particular those which students have not yet experienced but are likely to in the future such as mortgages, loans etc.	Percentages should be increasingly linked to financial situations that students will encounter in the future. In particular, the correct vocabulary should be used and explained so that students are aware of all of the terms early.
	Geometry– Pythagoras and Trigonometry	Continue from the previous half term.		As more complex percentage calculations are taught, students can be introduced to the way in which income tax and national insurance deductions are made. There can also be the discussion about what this money is used for, and why it is calculated in the way that it is.

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Half Term 4	Algebra – Formula	Substituting into formulae. Deriving formulae. Rearranging formulae. Modelling using formulae. Setting up and using formulae based on proportion.	Further develop their accurate drawing of diagrams. Increases their understanding of more conceptual ideas, including using letters and symbols to represent real life variables.	Students will be given formulae from a wide variety of contexts, with many coming from careers that they will choose in the future. When constructing and locating where the next mobile phone mast should be requires an understanding of loci and identifying the region using all the factors.
	Geometry – Shapes and Construction	Drawing constructions accurately. Drawing the loci of points from a given set of constraints.	Linear graphs can help students visualise what has previously been abstract algebra. They should be shown how linear graphs can be linked to solutions of linear equations.	
	Algebra – Linear Functions	Drawing and interpreting real life graphs. Plotting lines of the form ax + by = c. Understand the properties of parallel lines. Understand the links between lines that are perpendicular.	Modelling formulae can be represented using a linear function and the two topics overlap. Students are developing their fluency in algebraic manipulation by rearranging formulae that they will need to use across many topics within mathematics.	Identifying parallel and perpendicular lines allows for further geometrical reasoning and links to A level.

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Half Term 5	Geometry – Transformations and Vectors	Perform and recognise translations on a coordinate axes. Perform and recognise enlargements with and without a centre of enlargement. Perform enlargements with fractional and negative scale factors. Understand and recognise invariance. Understand the links between the measures in 2D and 3D shapes. Understand and use the properties of congruent triangles.		
	Geometry – Measures	Convert between different metric units. Convert between metric units of area and volume. Understand and use compound units including density and pressure.		
	Algebra – Simultaneous Equations	Solve simultaneous equations using elimination (with and without scaling). Solve simultaneous equations using substitution. Solve simultaneous equations graphically.		

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Half Term 6	Algebra – Non-Linear Functions	Plot and understand the properties of cubic graphs. Plot and understand the properties of reciprocal graphs. Plot and understand the properties of exponential graphs. Plot and understand the properties of trigonometric graphs. Plot and understand the properties of velocity time graphs.	Students investigate the different shapes of common graphs, and learn to identify key points to be able to categorise them. Students should be taught the difference between a plot and a sketch. Students will be developing their resilience as they look at more challenging aspects of the GCSE.	Quadratic functions (and other functions) have values which can be easily calculated and are an advancement on linear functions. In daily life, quadratics are used for calculating area, determining a product's profit or formulating the speed of an object. Sequences are the basis for series, which are important in differential equations and analysis. They can be studied as pattern or puzzles. Creating a pattern whilst decorating your garden will use a sequence.
	Algebra - Sequences	Position to term rules and term to term rules, linear sequences. Continuing and representing geometric sequences. Recognising and representing quadratic sequences. Use trial and improvement to solve equations.		
	Ratio and Proportion	Consolidation of all ratio work from previous years and working with exam questions.		

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