Year 8 Autumn Half Term 1

Overarching topic: Algebra - algebra recap, functions, linear graphs and sequences	
Why is this topic being studied at this time?	We need to start Year 8 off with a challenging topic to help students get back into the swing of the RWS Mathematics curriculum. It is also a pre-requisite for term 2.
How does it fit into the wider subject curriculum?	Sequences are seen in all kinds of situations but can be especially helpful in the radioactive decay of elements to population growth in cities / petri dishes etc. Linear graphs show a constant relationship between two variables which is useful in lots of different ways, for instance companies use them in growth and revenue forecasts.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	In what ways can we manipulate expressions? How do you substitute into a formula or expression? What are the key features of drawing and labelling graphs? What types of sequences are there and how are they distinguished? How can sequences be generated using term-to-term rules?	What methods are there in plotting linear graphs? How can the n^{th} term of linear sequences be found and how is it used? How do we know if a term is in a sequence?	How can linear simultaneous equations be solved? How can solutions be found from graphs? How can the n^{th} term of quadratic and geometric sequences be found and how are they used? How can we identify a quadratic, cubic or reciprocal graph?

	The sophistication and application of skills will become more advanced as students' progress through the essential, core and ambitious knowledge	
	Skill/technique	**How will this skill be developed?**
The Key skills/techniques	Substitution	Practice/quizzing at the start of the lesson
	Using coordinates	Quizzing and AFL

Throughout year 7 and 8, alongside the content in the provision map here, students will embrace the statistics elements of the curriculum through a bespoke set of projects integrating the use of technology. This will help to develop their skills using Excel and other mathematical software while covering various aspects of data handling and data analysis.

Year 8 Autumn Half Term 2

Overarching topic: Geometry - Transformations and 3D shapes	
Why is this topic being studied at this time?	Introducing a new topic that suits students who have a more artistic/spacial reasoning ability.
How does it fit into the wider subject curriculum?	*"Give me a place to stand, a lever long enough and a fulcrum and I can move the Earth."* Archimedes. The concepts studied will allow students to be able to calculate many different volumes, surface areas and to be able to manipulate 2D shapes on graphs.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What are the transformations and their key characteristics? What are the formulae involved in calculating volume and surface area of various 3D shapes? What is a net and how it it drawn? What are the characteristics of different 2D and 3D shapes?	How are the four transformations described? How are the formulae for volume and surface area applied?	How can multiple transformations be described? How do negative and fractional scale factors affect enlargements? How is a reflection executed with more complex lines of reflection? How can problems be solved involving volumes and surface areas?

	The sophistication and application of skills will become more advanced as students' progress through the essential, core and ambitious knowledge	
	Skill/technique	**How will this skill be developed?**
The Key skills/techniques	Surface Area and Volume of 3D shapes	Quizzing and use of retrieval tasks
	Describe and transform 2D shapes	Practice and quizzing

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Year 8 Spring Half Term 1

Overarching topic: Number - Surds , Prime factors, Indices and Standard form	
Why is this topic being studied at this time?	Pre-requisite knowledge for higher level content the students will be learning further in higher year groups.
How does it fit into the wider subject curriculum?	*"Mathematics is the queen of the sciences and number theory is the queen of mathematics."* Carl Friedrich Gauss. Rationality is a key concept in Mathematics at higher levels and surds are a useful tool in calculations involving roots.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What are the roots and squares of numbers up to 15? What are the index laws? What is a surd? What is a rational/irrational number? What are prime factors?	How are negative and fractional indices evaluated? How are surds simplified? Why is a fraction with a surd denominator irrational? How do you rationalise simple irrational fractions? How are the four operations executed with surds? How is a number converted between ordinary and standard form? How do you express a number as product of its prime factors?	How can problems be solved involving unknown powers? How are denominators rationalised when they contain more than one term? How can a calculation be done without converting out of standard form?

	The sophistication and application of skills will become more advanced as students' progress through the essential, core and ambitious knowledge	
	Skill/technique	**How will this skill be developed?**
The Key skills/techniques	Times tables	Regular practice during hooks
	Types of numbers	Practice and recall

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Year 8 Spring Half Term 2

Overarching topic: Algebra - further manipulation	
Why is this topic being studied at this time?	In order to access this content, students need to have solid grounding in algebraic concepts. By this time, they will have two half terms on algebra specifically and this will be a real extension of this important tool.
How does it fit into the wider subject curriculum?	Algebra is used to model the world around us. For example, understanding gradient helps us design everything from football stadiums and skate parks to ramps for the disabled. Algebra sent us to the moon and back again, it runs our computers and our cars, it tells us when it's going to rain and how early to get up to get to school on time: behind both the everyday and the extraordinary, there's algebra.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What is meant by the term quadratic/binomial? How are brackets expanded? How is an expression factorised and what does this mean? How are the four operations applied to algebraic fractions?	How can fractions involving algebra be simplified? What is meant by f(x)? How are more than two binomials expanded?	How can expressions be put into completed square form? How can we use algebra in problem solving?

	The sophistication and application of skills will become more advanced as students' progress through the essential, core and ambitious knowledge	
	Skill/technique	**How will this skill be developed?**
The Key skills/techniques	Interpretation of exam questions.	Key vocabulary recall such as solve, factorise, conclude, construct, prove...
	Basic Algebra skills.	Included in hook activities to ensure secure knowledge.

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Year 8 Summer Half Term 1

Overarching topic: Problem Solving	
Why is this topic being studied at this time?	Now that the basic topics have been covered, it gives students an opportunity, in preparation for their end of year assessment and start of their GCSE, to start to practice applying their knowledge and to start to understand the process of problem solving.
How does it fit into the wider subject curriculum?	*"Problems worthy of attack prove their worth by fighting back."* Piet Hein, Danish Mathematician, poet and resistance fighter. Difficult problems are what makes Mathematics so hard and so satisfying in equal measure. The feeling of overcoming a problem which is at first unfathomable, is like scoring a last-minute winner during a sports match. In both, huge effort needs to be expended, particularly through the difficult parts, to enable you to get the positive result at the end. Sometimes it doesn't go to plan and you lose, but you must brush yourself down and try again.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What does a Mathematics problem look like? What is the difference between process and problem solving? What does DISCO stand for? Do I need a diagram? Have I written down the key information in my own words?	What questions do I need to ask myself in order to break down each stage of the problem? What does the problem want me to find/do? Do I have the information I need to solve it from here? If not, what do I need in order to solve it later?	How can I write this in a way that makes more sense to me? Can I apply this to problems with any content? Can I use a particular method of solving a problem to solve a different problem?

	The sophistication and application of skills will become more advanced as students' progress through the essential, core and ambitious knowledge	
	Skill/technique	**How will this skill be developed?**
The Key skills/techniques	Recall	Revisiting a range of aspects from across key stage 3 in a mixture of contexts and at times in unison
	Problem solving	Repeated use of the DISCO approach to problem solving

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Year 8 Summer Half Term 2

Overarching topic: Geometry (Triangles)	
Why is this topic being studied at this time?	Introduction of a difficult topic towards the end of Year 8 as the students have gained the skills to enable them to find lengths and angles in triangles.
How does it fit into the wider subject curriculum?	Students often say "When will we ever use trigonometry?" Trigonometry is one of the more applicable concepts. This half term will be an opportunity to see that trigonometry can be used in many different ways: from calculating the trajectory of a bullet and building megastructures to designing the game mechanics of Fortnite, FIFA and any game that involves arcs or triangles.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What is Pythagoras' theorem (PT) and what does it mean? What is each side of a right-angled triangle called? What are the three trigonometric functions and how are they calculated on a calculator?	How can PT be used to find the hypotenuse or shorter sides? How can PT be applied to simple problems involving areas or non-right-angled triangles? How is SOHCAHTOA used to find angles or lengths?	Why does trigonometry / PT work to find missing sides and angles? What are the sine and cosine rules and how are they applied? How can PT / trigonometry be applied to complex problems?

	The sophistication and application of skills will become more advanced as students' progress through the essential, core and ambitious knowledge	
	Skill/technique	**How will this skill be developed?**
The Key skills/techniques	Calculator use	Through use of the calculator, with visualisers used to guide students in the correct way of entering calculations
	Manipulating algebra	To use trigonometry and PT correctly, students should be able to rearrange equations which will be practised a lot this half term.

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