Year 9 Autumn Half Term 1

Overarching topic: Percentage Change; Theoretical and Experimental Probability; Standard Form; Inequalities	
Why is this topic being studied at this time?	Students begin Year 9 by consolidating the multiplicative reasoning developed throughout Years 7 and 8. Fluency with fractions, decimals, percentages and ratio underpins success across the GCSE curriculum, particularly in algebra, graphs, probability and geometry. Revisiting these ideas at the start of Year 9 ensures that all students have secure number foundations before progressing to more abstract mathematical concepts later in the year. Probability develops statistical reasoning whilst standard form introduces mathematical notation commonly used in GCSE Science. Inequalities build upon Year 8 equation solving and prepare students for future algebraic modelling.
How does it fit into the wider subject curriculum?	The numbers used by scientists are often either incredibly large or incredibly small. Astronomers describe distances between galaxies using standard form, whilst microbiologists use standard form to describe the size of cells and bacteria. Probability models are used in weather forecasting, medical research and professional sport to predict outcomes and assess risk. Financial organisations use percentages every day to calculate inflation, interest rates and investment growth. Cross-curricular links include Science, Economics, Business Studies, Geography and Computing.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What is the relationship between fractions, decimals and percentages? How do we convert between fractions, decimals and percentages? What is a percentage of an amount? What is probability? What does standard form mean? What is an inequality? How are inequalities different from equations?	How do we calculate percentage increases and decreases? How do we calculate original values after percentage change? How do theoretical and experimental probabilities differ? How do we calculate with standard form? How do we represent solutions to inequalities? How do we solve inequalities involving more than one step? How do we construct inequalities from real-life situations?	How do probabilities help us predict future outcomes? Why does experimental probability approach theoretical probability over time? Why is standard form useful in science? How can inequalities be used to model real-world constraints? How do percentage changes affect long-term financial decisions? How can mathematical models be used to assess risk?

	The sophistication and application of skills will become more advanced as students' progress through the critical, core and pinnacle knowledge	
The Key skills/techniques	**Skill/technique**	**How will this skill be developed?**
	Numerical Fluency	Students will apply fractions, decimals, percentages and standard form in increasingly complex calculations through retrieval practice, reasoning tasks and contextual problems involving finance, science and probability.
	Algebraic Reasoning	Students will move from solving equations in Year 8 to constructing, interpreting and solving inequalities. This will be developed through worked examples, problem-solving tasks, mathematical discussion and graphical representations.

Year 9 Autumn Half Term 2

Overarching topic: Rearranging Formulae; Geometrical Constructions; Arc Length; Sector Area; Surface Area and Volume of Cylinders.	
Why is this topic being studied at this time?	Following the algebra covered in Autumn 1, students now apply their understanding to rearranging formulae and mathematical modelling. Geometrical constructions and circle measures build upon Year 8 geometry whilst introducing greater precision and formal mathematical methods. These topics prepare students for trigonometry, loci, advanced geometry and GCSE problem-solving
How does it fit into the wider subject curriculum?	Before digital technology existed, architects, engineers and navigators relied on compass-and-ruler constructions to create accurate designs. Formula rearrangement is used extensively in Physics equations, while circle geometry appears in engineering, product design and manufacturing. Cross-curricular links include Physics, Design Technology and Engineering.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What is the subject of a formula? What is a geometrical construction? What is a radius, diameter and circumference? What is a sector? What is surface area? What is volume?	How do we change the subject of a formula? How do we construct angle bisectors? How do we construct perpendicular bisectors? How do we calculate arc length? How do we calculate sector area? How do we calculate the surface area and volume of cylinders?	Why do formulae need rearranging? How does pi connect multiple circle measures? How can geometry be created without measuring? How are circle measures applied in engineering? Why are sectors important in design and manufacturing?

	The sophistication and application of skills will become more advanced as students' progress through the critical, core and pinnacle knowledge.	
The Key skills/techniques	**Skill/technique**	**How will this skill be developed?**
	Precision and Accuracy	Developed through compass and ruler constructions. Practised through repeated geometrical drawing and checking procedures.
	Mathematical Modelling	Developed through formula rearrangement and applications of circle formulae.

Year 9 Spring Half Term 1

Overarching topic: Error Intervals; Bounds; Plans and Elevations; Pythagoras' Theorem; Ratio	
Why is this topic being studied at this time?	Students develop a deeper understanding of accuracy and representation before moving into more complex modelling later in Year 9. Ratio builds directly on Year 7 fractions and Year 8 ratio work, while Pythagoras introduces one of mathematics' most significant theorems and lays foundations for future trigonometry.
How does it fit into the wider subject curriculum?	Legend suggests Pythagoras discovered this relationship over 2,500 years ago, yet it remains one of the most important ideas in mathematics. Pythagoras is used in surveying, GPS navigation, computer graphics, architecture and engineering. Cross-curricular links include Geography, Computing and Design Technology.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What are bounds and error intervals? What is a plan view? What is an elevation? What is a right-angled triangle? What is Pythagoras' theorem? What is a ratio?	How do we calculate error intervals? How do we interpret plans and elevations? How do we find unknown sides using Pythagoras? How do we apply Pythagoras in problem solving? How do we simplify and use ratios? How do we share quantities in a ratio?	How can measurement error affect conclusions? Why does Pythagoras only work for right-angled triangles? How is Pythagoras used in navigation? How do ratios support algebraic thinking? How can multiple mathematical ideas be combined in one problem?
The Key skills/techniques	The sophistication and application of skills will become more advanced as students' progress through the critical, core and pinnacle knowledge		
	Skill/technique	**How will this skill be developed?**	
	Spatial Reasoning	Developed through plans, elevations and geometric visualisation.	
	Problem Solving	Developed through multi-step Pythagoras and ratio questions.	

Year 9 Spring Half Term 2

Overarching topics: Direct and Inverse Proportion; Linear Graphs; Equations of Straight Lines; Compound Measures; Speed and Rates.	
Why is this topic being studied at this time?	Building on graph work from Year 8 and ratio from Spring 1, students begin to model relationships mathematically. The focus shifts from calculation to interpretation and representation, preparing students for future GCSE work involving gradients, functions and graphical analysis.
How does it fit into the wider subject curriculum?	Graphs are often described as the language of science because they allow relationships to be communicated visually. Engineers, economists, scientists and sports analysts all rely on graphs and rates of change when making decisions. Cross-curricular links include Physics, Geography and PE.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What is direct proportion? What is inverse proportion? What is a gradient? What is a straight-line graph? What is speed? What is a rate?	How do we solve direct proportion problems? How do we solve inverse proportion problems? How do we plot straight-line graphs? How do we find equations of straight lines? How do we calculate speed and rates? How do we convert units effectively?	How can graphs model relationships? Why do some relationships appear linear? How can formulae represent physical situations? How do compound measures connect mathematics and science? How do graphs help us predict future outcomes?
The Key skills/techniques	The sophistication and application of skills will become more advanced as students' progress through the critical, core and pinnacle knowledge		
	Skill/technique	**How will this skill be developed?**	
	Interpretation	Developed through analysing graphs and relationships.	
	Application of Mathematics	Developed through compound measure and proportion problems.	

Year 9 Summer Half Term 1

Overarching topics: Distance-Time Graphs; Quadratic Graphs; Angles; Bearings; Transformations; Similarity; Congruence.	
Why is this topic being studied at this time?	This half term connects geometry, algebra and graphical reasoning. Students build on Year 8 graph work and transformations whilst extending their understanding of shape and mathematical proof. Similarity and congruence provide important preparation for higher-level GCSE geometry.
How does it fit into the wider subject curriculum?	Pilots and ship captains use bearings for navigation, while architects use similarity when creating scale drawings. Quadratic graphs are used in sport, engineering and computer animation to model curved motion. Cross-curricular links include Geography, Engineering, Aviation and Design Technology.

	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What is a distance-time graph? What is a quadratic graph? What is a bearing? What is a transformation? What is similarity? What is congruence?	How do we interpret motion graphs? How do we plot quadratic graphs? How do we solve angle problems? How do we measure and calculate bearings? How do transformations change shapes? How do we identify similar and congruent shapes?	How can graphs tell stories about movement? Why do quadratic graphs have turning points? How do scale factors affect shapes? Why is congruence important in design? How can multiple geometric rules be combined?

The Key skills/techniques	The sophistication and application of skills will become more advanced as students' progress through the critical, core and pinnacle knowledge	
	Skill/technique	**How will this skill be developed?**
	Geometric Reasoning	Developed through angle, bearing and similarity problems. Practised through explanation and justification tasks.
	Representation	Developed through graphing and transformational geometry. Practised through sketching, plotting and interpretation.

Year 9 Summer Half Term 2

Overarching topics: Scatter Graphs; Data Collection; Grouped Data; Averages; Frequency Polygons; Vectors.			
Why is this topic being studied at this time?	Students finish Key Stage 3 by bringing together statistical reasoning and geometric thinking. The data-handling content builds on Year 7 and Year 8 statistics, while vectors introduce a powerful mathematical tool that supports future work in mechanics and advanced geometry.		
How does it fit into the wider subject curriculum?	Modern businesses collect vast amounts of data to make decisions. Professional sports teams, governments and scientists all rely on statistical analysis. Vectors are used extensively in computer graphics, aviation, physics and engineering. Cross-curricular links include Computing, Science, Economics and Geography.		
	Essential	Core	Ambitious
The Big questions (what questions will students be able to answer with mastery of this topic?)	What is correlation? What is grouped data? What is an average? What is a frequency polygon? What is a vector? What does a vector represent?	How do we interpret scatter graphs? How do we draw conclusions from data? How do we calculate averages from grouped data? How do we compare populations? How do we add and subtract vectors? How do we identify parallel vectors?	How can data be misleading? Does correlation imply causation? How can statistical evidence support decisions? How do vectors describe movement? How do vectors connect geometry and algebra?
The Key skills/techniques	The sophistication and application of skills will become more advanced as students' progress through the critical, core and pinnacle knowledge		
	Skill/technique	**How will this skill be developed?**	

	Statistical Literacy	Developed through analysing and evaluating real-world datasets. Practised through investigations, interpretation and discussion.
	Logical Reasoning	Developed through vector manipulation and geometric relationships. Practised through increasingly complex vector problem-solving tasks.