Programme of study for 9

Autumn (1st term)	Autumn (2nd term)	Spring (1st term)	Spring (2nd Term)	Summer (1st term)	Summer (2nd term)
Other timescale: From: September To: October	Other timescale: From: October To: December	Other timescale: From: January To: February	Other timescale: From: February To: April	Other timescale: From: April To: May	Other timescale: From: June To: July
Topic / Key Question: • Similar Shapes • Congruency • Pythagoras Theorem • Probability **Skills:** A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Topic / Key Question: • Type of sequence • Expanding and simplifying (double brackets) • Factorising Quadratic (double Bracket) • Solving Quadratics • Rearranging formula **Skills:** A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Topic / Key Question: • Trigonometry • Standard from **Skills:** A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Topic / Key Question: • Straight line Graphs • Real life graphs **Skills:** A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Topic / Key Question: • Angle Reasonings • Plan and elevation • Bearing **Skills:** A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts	Topic / Key Question: Project Based Maths **Skills:** A01: Use, recall and apply standard techniques AO2: From given mathematical information: Reason, interpret & communicate mathematically A03: Solve problems or evaluate methods and solutions within mathematics and in other contexts

Key Learning Outcomes:	Key Learning Outcomes:	Key Learning Outcomes:	Key Learning Outcomes:	Key Learning Outcomes:	Key Learning Outcomes:
Learners are required to go beyond intuitively recognising when shapes are similar or congruent, and to think about what can change and what has to stay the same for these properties to hold. Learners to use efficient written methods to add and subtract whole numbers and decimals with up to two places.

Learners will already be familiar with similarity through their work on proportional reasoning. Here the focus shifts to properties that may not have been explicitly addressed before, particularly the preservation of angle size when shapes are enlarged.

When exploring congruence, learners should be aware of not only what is changing but also what is staying the same, and investigate changes possible which maintain congruence. Exploring similarity and congruence with a range of polygons and triangles should help students | Much of this core concept focuses on arithmetic sequences, but learners will also experience other types of sequences, including special number sequences, that are connected to new learning in Key Stage 3 (for example, triangular numbers).

In here learners will explore:
-Understand the features of a geometric sequence and be able to recognise one
- Understand the features of special number sequences, such as square, triangle and cube, and be able to recognise one
- Appreciate that there are other number sequences

Learners will also build their knowledge further in algebra by exploring the following ideas:
-Use the distributive law to find the product of two binomials
-Understand and use the special case when the product of two binomials | Learners will build their understanding that the trigonometric functions are derived from measurements within a unit circle.
They will recognise the right-angled triangle within a unit circle and use proportion to scale to similar triangles.
Learners will explore Know how the sine, cosine and tangent ratios are derived from the sides of a right-angled triangle.

They will be bale to:
-choose appropriate trigonometric relationships to use to solve problems in right-angled triangles
- Use trigonometric ratios to find a missing side in a right-angled triangle
- Use trigonometric ratios to find a missing angle in a right-angled triangle | Learners to generate coordinate pairs that satisfy a simple linear rule; plot the graphs of simple linear functions, where y is given explicitly. in terms of x, on paper and using ICT; recognise straight-line graphs parallel to the x-axis or y-axis

Learners to plot and interpret the graphs of simple linear functions arising from real-life situations, e.g. conversion graphs

Learners will develop a deeper understanding and achieve fluency. They will explore the connections between equations of lines and their corresponding graphs, including those presented in a non-standard form, such as ax + by = c, as well as the more standard y = mx + c.
Learners will also explore and:

-Understand that different types of equation give rise to different graph shapes, identifying quadratics in | Learners to use correctly the vocabulary, notation and labelling conventions for lines, angles and shapes. identify parallel and perpendicular lines; know the sum of angles at a point, on a straight line and in a triangle; recognise vertically opposite angles.

Learners to identify and use angle, side and symmetry properties of triangles and quadrilaterals; explore geometrical problems involving these properties, explaining reasoning orally, using step. by-step deduction supported by diagrams.

Learners to solve geometrical problems using side and angle properties of equilateral, isosceles and right- angled triangles and special quadrilaterals, explaining reasoning. with diagrams and text, classify quadrilaterals by their geometrical properties. | Learners will be given opportunities to complete maths-based projects.

The project will be based on planning a family holidays, making enlarges items using scale factors and home design.

Learners will be expected to work in small groups and present their work to other students.

For every project, learners are expected to use the following mathematical concepts:
Measurements and conversion
Scale factors
Pythagoras theorem
Fractions calculations
Perimeter and areas
Trigonometry
Percentages
Conversions
Ratio and proportion
Calculator skills |

refine their understanding of these concepts and avoid confusion between them. The relationship described by Pythagoras' theorem offers a context for students to reason deductively and use known facts to generate other mathematical truths. The relationship described by Pythagoras' theorem offers a context for Learners to reason deductively and use known facts to generate other mathematical truths. Learners will be able to Find a relationship between the lengths of the sides of a right-angled triangle and use and apply Pythagoras' theorem to solve problems in a range of contexts. The introduction of probability at Key Stage 3 will offer learners a way to quantify, explore and explain likelihood and coincidence, and to reason about uncertainty.	is the difference of two squares -Find more complex binomial products Learners will also work on rearranging formulae and: Understand that an additive and multiplicative relationship between variables can be written in several different ways. -Apply an understanding of inverse operations to a formula to make a specific variable the subject (in a wide variety of increasingly complex mix of operations)		particular - Read and interpret points from a graph to solve problems - Model real-life situations graphically* - Recognise that the point of intersection of two linear graphs satisfies both relationships and hence represents the solution to both those equations	Learners to use straight edge and compasses to construct: -the midpoint and perpendicular bisector of a line segment -the bisector of an angle -the perpendicular from a point to a line -the perpendicular from a point on a line a triangle, given three sides Learners will explore and understand the concepts of plan and elevation of 3D shapes. They will also explore the idea of bearing and use the concepts to understand how everything has a locational relevancy to each other. The use ICT to explore constructions; use ruler and protractor to construct simple nets of 3-D shapes, e.g. cuboid, regular tetrahedron, square-based pyramid, triangular prism	

Learners could engage in experiments and develop a feel for likely, unlikely, even, certain and impossible chances, before starting to quantify probabilities and the likelihood of different outcomes. Furthermore, Learners need to appreciate that predictions of likelihood do not predict individual events. Rather, experimental data will tend towards this theoretical value. As they start to quantify outcomes, learners will be exposed to different ways to systematically organise and represent possible results, including lists, tables, grids, Venn and tree diagrams.					

End of term 1 assessment to cover:	**End of term 2 assessment to cover**:	**End of year assessment to cover:**
Progress check Assessment	Progress check Assessment	Progress check End of year Exam

Rationale for sequence:	**Rationale for sequence:**	**Rationale for sequence:**	**Rationale for sequence:**	**Rationale for sequence:**	**Rationale for sequence:**
Before beginning geometrical properties at Key Stage 3, students should already have a secure understanding of	Concepts such as sequences, expanding and factorising double brackets enable learners	It is important for learners to develop a secure understanding of trigonometry in right-	The Key Stage 3 programme of study states that students should be taught to 'move	Learners to recap and recall geometric properties and some of	In here the learners will be given an opportunity to apply their

the following learning outcomes from study at upper Key. Geometrical properties, possibly above all other areas of mathematics, offers students a set of contexts with which to build their understanding of key mathematical concepts and the nature of mathematics itself. In here the learners will explore the key ideas similarity and Pythagoras theorem and will be able to access further concepts in KS4 such as trigonometric ratios Before beginning to teach probability at Key Stage 3, students should already have a secure understanding of the following learning outcomes from earlier in Key Stage 3 -Understand that fractions are an example of a multiplicative relationship and apply this understanding to a range of contexts -Understand that ratios are an example of a multiplicative relationship	to make connections to other areas of algebra, particularly solving equations (when checking if a number is a term in a sequence) and graphs. Work on sequences in Key Stage 3 provides the foundation for exploring quadratic sequences and simple geometric progressions in Key Stage 4.	angled triangles in 2D figures in KS3 to support further study in Key Stage 4. Learners will develop the idea of trigonometry from solve problems involving similar shapes where the scale factor is known or can be found and earlier in Key Stage 3: and from their understanding and use similarity and congruence. In Year 9, students will further develop their understanding of the different ways that numbers can be expressed and will become more proficient in changing from one form to another. Leaners will be able to Understand that very large numbers can be written in the form $A \times 10^n$, (where $1 \le A < 10$) and appreciate the real-life contexts where this format is usefully used -Understand that very small numbers can be written in the form $A \times 10^{-n}$, (where $1 \le A < 10$) and appreciate the real-life contexts where this format is usefully used	freely between different numerical, algebraic, graphical and diagrammatic representations' and to 'express relationships between variables algebraically and graphically'. After thoroughly exploring the structure of linear relationships in this way, students should have experience of other functions and relationships (particularly quadratic ones), be able to use graphs to solve problems in real-life contexts and understand how linear graphs can be used to find solutions to simultaneous equations. Much of this learning is new and is built upon significantly in Key Stages 4.	the key angle facts and use geometric reasoning again here so they can have a better and solid understanding of much more complex geometric problems later in KS4. Plan and elevation will be explored here to give students a better understanding of properties of 3D shapes as well as explore the idea of how things may appears different from different point of view. This will enable learners to solve trigonometric problem later in KS4. The concepts of bearing will also give learners the ability to explore locations of different things; and enable them to understand how to explore the surroundings, cities, countries, and other places in relations to the North direction.	mathematical knowledge in non-conventional way. They will be applying maths concepts, skills and ideas into problem solving. Learners will be able to deeper their understanding, make connections between different part of mathematics and conjecture about different scenarios while solving mathematical tasks.

and apply this understanding to a range of contexts					
Reading / literacy: Key words/ problem solving questions/ retention and recall	**Reading / literacy:** Key words/ problem solving questions/ retention and recall	**Reading / literacy:** Key words/ problem solving questions/ retention and recall	**Reading / literacy:** Key words/ problem solving questions/ retention and recall	**Reading / literacy:** Key words/ problem solving questions/ retention and recall	**Reading / literacy:** Key words/ problem solving questions/ retention and recall
Numeracy: Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson	**Numeracy:** Assessed throughout the lesson

Enrichment / opportunities to develop cultural capital (including careers, WRL and SMSC):
Learners will be exploring the history of Pythagoras and use them in different contexts
Learners will be linking trigonometry to real life scenarios such as how trigonometry is used to help astronomers find the distance between the stars.
Learners