| Topic Name | Term | Skills Developed | Next link in curriculum  |
| --- | --- | --- | --- |
| **Number** | Autumn | * Calculations, checking and rounding
* Indices, roots, reciprocals and hierarchy of operations
* Factors, multiples and primes
* Standard form and surds
 | * Many of these skills are reinforced throughout the course.
* Use of product rule for counting involved in probability questions.
* Solving equations involving surds.
* Rationalising the denominator is to be looked at in further detail in the future.
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| **Algebra** | Autumn | * Index laws
* Expanding and factorising
* Setting up, rearranging and solving equations
* Sequences
 | * Use of algebraic manipulation to complete mathematical proofs.
* Use of substitution to solve equations using iterative methods.
* Quadratic sequences.
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| **Interpreting and representing data** | Autumn | * Averages and range
* Representing and interpreting data
	+ Pie charts
	+ Time-Series graphs
	+ Scatter graphs
	+ Two-way Tables
 | * Construct more challenging statistical diagrams such as cumulative frequency diagrams, box plots and histograms which require greater understanding of continuous data.
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| **Fractions, ratio and percentages** | Autumn/Spring | * Fractions
* Percentages
* Ratio and proportion
 | * Change recurring decimals into their corresponding fractions and vice versa.
* Use fractions to solve probability questions.
* Use understanding of ratio to solve complex algebraic fractions problems.
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| **Polygons, angles and parallel lines** | Spring | * Develop understanding of properties of 2D shapes and how to classify them
* Use angle rules in polygons to tackle a variety of problems including using internal and external angles of polygons
* Learn angle rules for parallel lines
* Use algebra to solve angle rule problems
* Recap of rotational symmetry from KS3
* Recap of tessellating shapes from KS3
 | * Circle theorems
* Could be used within a Pythagoras/trigonometry problem
* Be able to identify and “quote” the correct angle rule used in a given scenario including the circle theorems
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| **Pythagoras’ Theorem and trigonometry** | Spring | * Understand how to use Pythagoras’ Theorem in 2D including to decide whether a triangle is right-angled or not
* Calculate the length of line segments using Pythagoras
* Learn the three trigonometric ratios for sine, cosine and tangent and be able to use them to find missing sides and angle in right angled triangles
* Learn the exact values of sin, cos and tan for the angles, 0°, 30°, 45°, 60° & 90°
 | * Finding the length of line segments on coordinate grids
* Graphs of trigonometric functions
* Further trigonometry
	+ Area of a triangle using 0.5 ab sin C
	+ Sine rule
	+ Cosine rule
	+ Trigonometry without a calculator
* 3D trigonometry
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| **Graphs: the basics and real-life graphs** | Summer | * Draw and interpret graphs from real-life situations
* Draw and interpret distance-time and velocity-time graphs
* Understand different properties of various graphs to find information such as gradient of a velocity-time graph for acceleration
* Find the coordinates of a midpoint or a line segment
* Finding the length of line segments on coordinate grids
* Find missing coordinates from shapes using understanding of geometric properties
* Find the equation of a line through two given points
 | * Equations of parallel and perpendicular lines
* Equations of perpendicular bisectors
* Exact areas under graphs are studied at A-level by using integration to find distance travelled from a velocity-time graph
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| **Linear graphs and coordinate geometry** | Summer | * Recap the equations of horizontal and vertical line as well as the lines $y=x$ and $y=-x$
* Calculate and use gradients of straight-line graphs
* Learn what the equation $y=mx+c$ represents and how to use it
* Plot and draw straight line graphs with and without a table of values
* Find the equation of a line algebraically from a given gradient and point
* Explore the gradients of parallel and perpendicular lines
* Be able to rearrange equations of straight-line graphs into the form $y=mx+c$
* Find the equations of parallel and perpendicular lines
 | * Use a table of values to plot more complex graphs such as quadratics, cubics, exponentials and trigonometric graphs
* Use algebraic manipulation to help solve simultaneous equations
* Draw straight-line graphs to solve simultaneous equations graphically
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| **Quadratic, cubic and other graphs** | Summer | * Learn how to plot quadratic, cubic, reciprocal and circle graphs whose centres are $(0,0)$ and know what the shape of the graph will be from its equation
* Find (estimate) the roots of quadratic functions from a graph
* Understand that quadratics are used in a variety of real-life situations and be able to apply new learning in this unit to those types of problems
 | * Be able to recognise the shapes of these graphs when related to proportionality
* Finding the turning point on a quadratic graph by completing the square
* Solving simultaneous equations graphically
* At A-level maximum and minimum points are found by using differentiation for polynomials
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| **Perimeter, area and circles** | Summer | * Recall the formulae for area of the following: triangle, rectangle, trapezium and parallelogram
* Calculate the area and perimeter of compound shapes
* Define all the parts of a circle
* Explore the number π
* Learn and use the formula for area of a circle and circumference of a circle
* Calculate arc lengths and sector areas
* Given the area or circumference, calculate the radius of a circle
* Work in terms of π and understand that leaving answers like this is more accurate than the rounded decimal version
 | * Use area formulae to help calculate the volume and surface area of 3D shapes including cylinders
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