Subject: Mathematics

End points	Year 7	Year 8	Year 9	Year 10	Year 11
End point 1 Knowledge of rational and irrational numbers and their representations, including fluency in arithmetic with all types of rational and irrational numbers.	Students spend most of Year7 honing their arithmetic and number skills with integers, decimals and fractions. They learn about the order of operations and apply their skills to some areas of statistics and geometry (averages, angles).	Students improve their fluency by applying their numerical skills to other concepts, including ratio andproportion, percentages, and geometry.	Students meet a new representation of number inthe curriculum – standard form – and continue to apply their numerical skills to other concepts, now including statistical analysis and probability.	Students continue to applytheir numerical skills, especially when solving problems involving trigonometry and circles without a calculator. They extend their understanding of the number system by studying irrational numbers and exponentiation in depth.	Students complete their numerical journey by breaking down numbers with the Fundamental Theorem of Arithmetic andusing prime factors to analyse numbers in great depth. They work with rational andirrational numbers in depth and apply these to other areas of mathematics. They continue to reach fluency by applying their skills to other concepts.
	Develop fluency, understand how to reason mathematically and to be able to solve problems.				
End point 2 Knowledge of multiplicative relationships, how to interpret and apply them in various contexts, and how to represent multiplicative relationships in	Students learn to multiply different types of numbersin preparation for specific work in Year 8. Students start to work with percentages and parts of wholes.	Students continue to workwith percentages to a greater depth. They learn about ratio notation, work with ratios invarious contexts, including geometric, and solve simpleratio problems.	Students consider rates of change generally in the context of gradients of lines. They work with rates of change specifically withspeed. They consider scaling in the contexts of similarity, enlargements and	Students consider scaling inthe context of advanced areas, volumes and trigonometry. They work with rates of change and compound units – speed, density, pressure. They consider direct andinverse proportion	Students solve complex problems involving ratio andproportion. They consider percentageerrors in calculations. They apply their knowledgeof scaling to vectors.

terms of ratio, proportion and rates of change.		They work with direct and inverse proportional relationships (not algebraically), including contexts such as recipes, rates of work, value for money and currency conversions. They apply scaling in the context of area.	reflections of shapes, and trigonometry.	algebraically. They consider advanced applications of percentages in compound interest and exponential growth and decay.	They apply knowledge of ratio and proportion to problems in geometry and statistics.
	Develop fluency, understand how to reason mathematically and to be able to solve problems.				
End point 3 Knowledge of how to use algebra to represent generalisations of numerical principles, both linear and non-linear, and how to find unknown quantities using algebraic techniques.	Students begin to think algebraically by solving missing number problemsand simplifying simple algebraic expressions. They expand single and double brackets and factorise into single brackets.	Students start to work withalgebra more formally. They solve linear equations, use and begin to transpose formulae, plot linear graphs,solve linear inequalities, andwork with linear sequences.	Students learn to interpret linear graphs and work with the general forms of linear graphs. They consider the ideas of parallel and perpendicular lines in depth. They solve systems of linearsimultaneous equations. They are introduced to quadratic expressions (monic and non-monic), expanding and factorisingthem and simplifying algebraic fractions. They apply their learning on linear graphs to contextual graphs, including conversiongraphs and graphs of rates of change	Students spend a lot of timeon non-linearity this year. They solve quadratic equations (monic and non- monic) by factorising, the formula and completing the square (for monics only). They plot and sketchquadratic graphs. They work with quadraticsequences and quadratic inequalities. They solve simultaneous equations where one is linear and one non-linear. They use their algebraic	Students continue their learning on non-linearity. They learn about cubic, exponential, circle, trigonometric and reciprocalgraphs and consider the similarities and differences between all graphs. They work with function notation and with compositeand inverse functions. They transform graphs by reflections and translations. They solve non-linearequations iteratively. They find gradients of chords and tangents andestimate the area under curves.

			(including distance-time and velocity- time).	skills to solve problems ofdirect and inverse proportion. They consider exponential growth and decay and interpret exponential graphs.	They perform operation withalgebraic fractions and solve complex equations involving these. They prove mathematicalresults algebraically. They apply their algebraic skills to problems in statistics and geometry.
	Develop fluency, understand how to reason mathematically and to be able to solve problems.				
End Point 4 Knowledge of how the geometry of two- and three-dimensions is used to understand and interpret the space around us.	Students meet simple ideas in geometry, including area and perimeter of simple shapes and early angle facts.	Students are introduced to geometry more formally with rigorous foundations inEuclidean geometry. They learn to draw, measureand construct accurately with mathematical equipment. They consider simple lociproblems. They learn about features ofpolygons in depth, includingthe angles in polygons. They learn angle facts, including those in parallellines.	Students learn about Pythagoras Theorem and thetrigonometry of right-angledtriangles. They learn about circle measure in depth – circumference and area offull circles and sectors. They learn how to use circletheorems. They learn about the concepts of congruence andsimilarity and how to find missing lengths in similar shapes (they do not yet learn the conditions for congruent triangles).	Students apply learning fromprevious years to find the surface area and volume of three-dimensional shapes, including composite shapes, prisms, pyramids and those with curved surfaces. They learn about different 2D representations of 3D shapes – isometric drawing,nets, plans and elevations. They apply trigonometry to3D shapes. They learn about the trigonometry of non-right-angled triangles. They learn about the areaand volume of similar shapes.	Students learn about vectorsin an algebraic and generalised form. Students solve geometric problems that include learning from other domains, such as ratio or algebra, or that combine a number of topics. They solve complex lociproblems. They consider multipleapproaches to solve geometric problems. They prove the circletheorems. They prove the congruence of triangles.

		They learn to find the area of rectilinear shapes, triangles, quadrilaterals, composite shapes and circles.	They learn to transform shapes on a coordinate grid.	Students apply knowledge ofequations, especially quadratics, to geometric contexts. They apply all previous geometry to new geometric learning where applicable.	
	Develop fluency, understand how to reason mathematically and to be able to solve problems.				
End Point 5 Knowledge of how data is collected, analysed and presented, and how chance is evaluated, to help understand an unpredictable world.	Students find the three averages and the range of simple datasets.	Students meet bivariate dataand consider scatter graphs. They learn about time seriesdata and graphs.	Students learn to present and analyse discrete data with statistical graphs and with measures of averageand spread, including the interquartile range. They calculate averages from ungrouped frequencytables. They learn about probabilityand working with probabilities of single events. They use simple probability diagrams including frequency trees and Venn diagrams.	Students learn to present and analyse continuous datawith cumulative frequency graphs and boxplots. They compare datasets withmeasures of average and spread. They learn about set theoryand logic formally. They learn about data collection, including sampling techniques and estimating population sizes. They learn advanced analysisof continuous data, includingdrawing and analysing histograms with measures ofaverage and spread.	Students learn to work with probabilities of two or more events. They consider conditional probability and arange of ways to solve probability questions, including sample space diagrams, probability trees, two-way tables and Venn diagrams. They apply algebraic, numerical and ratio or proportion skills to solve complex problems in probability.
	Develop fluency, understand how to reason mathematically and to be able to solve problems.				