

Implementation: Curriculum Narrative



Subject: Mathematics

Year: 11

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Key Knowledge

Pupils will know

Key Threshold Concepts:

the difference between an equation and an identity, argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments to include proofs

how to interpret simple expressions as functions with inputs and outputs interpret the reverse process as the 'inverse function', interpret the succession of two functions as a 'composite function'

to recognise, sketch and interpret graphs of linear functions and quadratic functions, including simple cubic functions and the reciprocal function $y=1/x$, including exponential functions $y=kx$ for positive values of k , and the trigonometric functions (with arguments in degrees) $y=\sin x$, $y=\cos x$ and $y=\tan x$ for angles of any size

to identify and work with fractions in ratio problems

to define percentage as 'number of parts per hundred', interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, work with percentages greater than 100%, solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics

to understand that X is inversely proportional to Y is equivalent to X is proportional to $1/y$, interpret equations that describe direct and inverse proportion, construct and interpret equations that describe direct and inverse proportion

to interpret the gradient of a straight-line graph as a rate of change, recognise and interpret graphs that illustrate direct and inverse proportion,

the formulae for: Pythagoras' theorem, $a^2 + b^2 = c^2$ and the trigonometric ratios, apply them to find angles and lengths in right-angled triangles in two dimensional figures, apply

Key Skills

Pupils will be able to

Subject Skills:

simplify and manipulate algebraic expressions by:, simplify and manipulate algebraic expressions (including those involving surds) by: simplify and manipulate algebraic expressions (including those involving surds and algebraic fractions) by: collecting like terms, multiplying a single term over a bracket, taking out common factors, simplifying expressions involving sums, products and powers, including the laws of indices, expanding products of two binomials, factorising quadratic expressions of the form x^2+bx+c , including the difference of two squares, expanding products of two or more binomials, factorising quadratic expressions of the form ax^2+bx+c

solve linear equations in one unknown algebraically, find approximate solutions using a graph, including those with the unknown on both sides of the equation

solve quadratic equations algebraically by factorising, including those that require rearrangement, including completing the square and by using the quadratic formula, find approximate solutions using a graph

translate simple situations or procedures into algebraic expressions or formulae, derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution

express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1

use ratio notation, including reduction to simplest form

divide a given quantity into two parts in a given part : part or part : whole ratio, express the division of a quantity into two parts as a ratio, apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations)

set up, solve and interpret the answers in growth and decay problems, including compound interest and work with general iterative processes

use standard mathematical formulae rearrange formulae to



them to find angles and lengths in right-angled triangles and, where possible, general triangles in two and three dimensional figures

the exact values of $\sin\theta$ and $\cos\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$ and 90° know the exact value of $\tan\theta$ for $\theta = 0^\circ, 30^\circ, 45^\circ, 60^\circ$

to identify and interpret roots, intercepts and turning points of quadratic functions graphically deduce roots algebraically, deduce turning points by completing the square

change the subject

apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors, use vectors to construct geometric arguments and proofs

express a multiplicative relationship between two quantities as a ratio or a fraction

use proportion as equality of ratios

relate ratios to fractions and to linear functions

solve problems involving direct and inverse proportion, including graphical and algebraic representations

compare lengths, areas and volumes using ratio notation, scale factors, make links to similarity (including trigonometric ratios)

apply addition and subtraction of vectors, multiplication of vectors by a scalar, and diagrammatic and column representations of vectors, use vectors to construct geometric arguments and proofs

Subject Specific Knowledge and Sequencing:

Subject specific knowledge and sequencing
The KLA mathematics timeline and subject sequence of learning contains a number maths topic headings. Key concepts and skills are embedded within each of these topics

The skills and knowledge have been identified and highlighted where knowledge spirals within the subject.

Prerequisites and Spiral Teaching:

- Key concepts and skills linked to and expanded from the Year 9 and 10 Overview.
- Leads into the Year 11 Overview, with many concepts revisited and investigated to a further degree.
- The designed Timeline of topics follows a from the timeline in Year 10, with Key Topics revisited based on historical issues for the school through results analysis in Year 11 and topics that are considered difficult in Year 10
- Lesson starters are used to recap prior knowledge throughout the course from lesson to lesson.
- Teachers use lesson starter to constantly revisit previous knowledge throughout the course to enable students to become more familiar at recalling essential techniques and threshold concepts.



An example of one topic and the spiral nature is below...

Visualising and Constructing

- Y7 – T2 (Investigating Properties of Shapes)
- Y7 – T5 (Calculating Space)
- Y7 – T5 (Mathematical Movement)
- Y8 – T2 (Visualising and Constructing)
- Y8 – T5 (Calculating Space)
- Y9 – T4 (Properties of Polygons)
- Y9 – T5 (Transformation)
- Y9 – T6 (Transformation)
- Y10 – T1 (Review of Last Year Geometry/Statistic)
- Y10 – T1 (Congruence and Similarity)
- Y10 – T2 (Constructions and Loci)
- Y11 – T1 (Vectors)

- Topic tests are used by teachers throughout the course to assess a student's ability at application and recall of key threshold concepts and techniques.
- Question Level Analysis from mock exams are used to inform the teaching of every maths class in year 11.
- Class specific topic teaching is conducted post mock 1 and continues throughout the revision period with teachers adapting teaching and resources to suit the needs of the students in order for all to achieve their potential.

Cross-Curricular Knowledge Links:

Cross-curricular knowledge

- Area calculations in technology
- Calorie calculation in PE/Food tech
- % increase and decrease in business
- Time calculations in history
- Quantity and units in Science

Reading Lists / Sources / Reading around the subject recommendations:

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The KLA Maths department have a number of suggested further activities as a possible source of exploring around the topics covered in our Year 11 maths curriculum. We actively encourage the use of Sparx maths, and the PiXL App as methods of further a student's mathematical base and further problem solving. NRICH activities are explored in classes to aid development of student's problem solving and team work skills.



	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12
Autumn	Graphs						Algebra					
	Gradients & lines	Non-linear graphs		Using graphs		Expanding & factorising		Changing the subject		Functions		
Spring	Reasoning						Revision and Communication					
	Multiplicative	Geometric		Algebraic		Transforming & constructing			Listing & describing	Show that...		
Summer	Revision						Examinations					