Implementation: Curriculum Narrative

Subject: Mathematics	*Year: 10*	*Author: Mr Crockett*

Key Knowledge *Pupils will know*	**Key Skills** *Pupils will be able to*
Key Threshold Concepts:	**Subject Skills:**
To infer properties of populations or distributions from a sample, whilst knowing the limitations of sampling	use and interpret scatter graphs of bivariate data, recognise correlation, know that it does not indicate causation, draw estimated lines of best fit, make predictions, interpolate and extrapolate apparent trends whilst knowing the dangers of so doing
To interpret, analyse and compare the distributions of data sets from univariate empirical distributions through: appropriate graphical representation involving discrete, continuous and grouped data, including box plots, appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers)	change freely between related standard units (e.g. time, length, area, volume/capacity, mass) and compound units (e.g. speed, rates of pay, prices) in numerical contexts, compound units (e.g. density, pressure), in numerical and algebraic contexts
To apply statistics to describe a population	define percentage as 'number of parts per hundred' interpret percentages and percentage changes as a fraction or a decimal, and interpret these multiplicatively
To solve problems involving percentage change, including percentage increase/decrease and original value problems, and simple interest including in financial mathematics	express one quantity as a percentage of another
To solve problems involving direct and inverse proportion, including graphical and algebraic representations	compare two quantities using percentages
To apply the concepts of congruence and similarity, including the relationships between lengths in similar figures including the relationships between lengths, areas and volumes in similar figures	work with percentages greater than 100% use compound units such as speed, rates of pay, unit pricing, use compound units such as density and pressure compare lengths, areas and volumes using ratio notation, scale factors, make links to similarity (including trigonometric ratios)
know the formulae for: Pythagoras' theorem, a2+ b2= c2 and the trigonometric ratios, apply them to find angles and lengths in right-angled triangles in two dimensional figures, apply them to find angles and lengths in right-angled triangles and, where possible, general triangles in two and three dimensional figures	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
know the exact values of sinθ and cosθ for θ = 0°, 30°, 45° , 60° and 90° know the exact value of tanθ for θ = 0°, 30°, 45° , 60°	interpret the gradient of a straight-line graph as a rate of change, recognise and interpret graphs that illustrate direct and inverse proportion
know that the perpendicular distance from a point to a line is the shortest distance to the line	use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle)
know 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	use these to construct given figures and solve loci problems use the basic congruence criteria for triangles (SSS, SAS, ASA, RHS)

the angle facts, triangle congruence, similarity and properties of quadrilaterals to conjecture and derive results about angles and sides, including Pythagoras' theorem and the fact that the base angles of an isosceles triangle are equal, and use known results to obtain simple proofs **know the formulae: circumference of a circle = 2πr=πd, area of a circle = πr2, calculate perimeters of 2D shapes, including circles, areas of circles and composite shapes, surface area and volume of spheres, pyramids, cones and composite solids**	use standard units of measure and related concepts (length, area, volume/capacity, mass, time, money etc.) and apply formulae to calculate: area of triangles, parallelograms, trapezia; volume of cuboids and other right prisms (including cylinders)
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=sinx , y=cosx and y=tanx for angles of any size	where appropriate, 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'
	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
the ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments	solve two simultaneous equations in two variables (linear/linear) algebraically, find approximate solutions using a graph, including linear/quadratic, included inequality will be required.
to relate relative expected frequencies to theoretical probability, using appropriate language and the 0 to 1 probability scale	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
understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size	solve linear inequalities in one variable, solve linear inequalities in one or two variable(s), and quadratic inequalities in one variable, represent the solution set on a number line, represent the solution set on a number line, using set notation and on a graph.
to 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 x2+bx+c, including the difference of two squares, expanding products of two or more binomials, factorising quadratic expressions of the form ax2+bx+c	apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative
	calculate exactly with fractions, calculate exactly with multiples of π, calculate exactly with surds, simplify surd expressions involving squares (e.g.
	calculate with and interpret standard form A × 10n, where 1≤A<10 and n is an integer. Interpret calculator displays.
to enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams including using tree diagrams	use standard units of mass, length, time, money and other measures (including standard compound measures) using decimal quantities where appropriate. Imperial/metric conversions will be given in the question.

to calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions	apply and interpret limits of accuracy, including upper and lower bounds understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size use standard mathematical formulae, rearrange formulae to change the subject

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.

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

Calculating

- Y7 – T1 (Number and the Number System)*
- Y7 – T1 (Counting and Comparing)*
- Y7 – T2 (Calculating)
- Y7 – T5 (Checking, Approximating and Estimating)
- Y8 – T1 (Number and the Number System)
- Y8 – T1 (Calculating)
- Y9 – T1 (Basic Number, Factor and Multiple Review)
- Y9 – T2 (Rounding)
- Y10 – T1 (Review of Last Year Algebra/Number)
- Y11 – T1 (Algebra and Number Recap)

Prerequisites and Spiral Teaching:

- Key concepts and skills linked to and expanded from the Year 9 Overview.
- Leads into the Year 10 Overview, with many concepts revisited and investigated to a further degree.
- The designed Timeline of topics follows a similar format to those covered in Year 9, topics are adapted and extended from the following year. The mathematics involved is revisited in each topic spiralling from Year 7, 8, and 9 and also within the same year.
- We move through number, algebra, geometry, probability, ratio and statistics throughout the course. The sequence is repeated throughout the year and throughout the student's time in KLA.
- 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.
- 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.

  A weekly 'torture time' is used by teachers to address the well documented issue surrounding the ability of students to quickly recall and use timestable information.

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:

Reading lists / sources / reading around the subject recommendations

The KLA Maths department have a number of suggested further activities as a possible source of exploring around the topics covered in our Year 10 maths curriculum. We actively encourage the use of Hegarty 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.