1. CURRICULUM INTENT OVERVIEW PLAN
Key Stage 3

Subject: Mathematics

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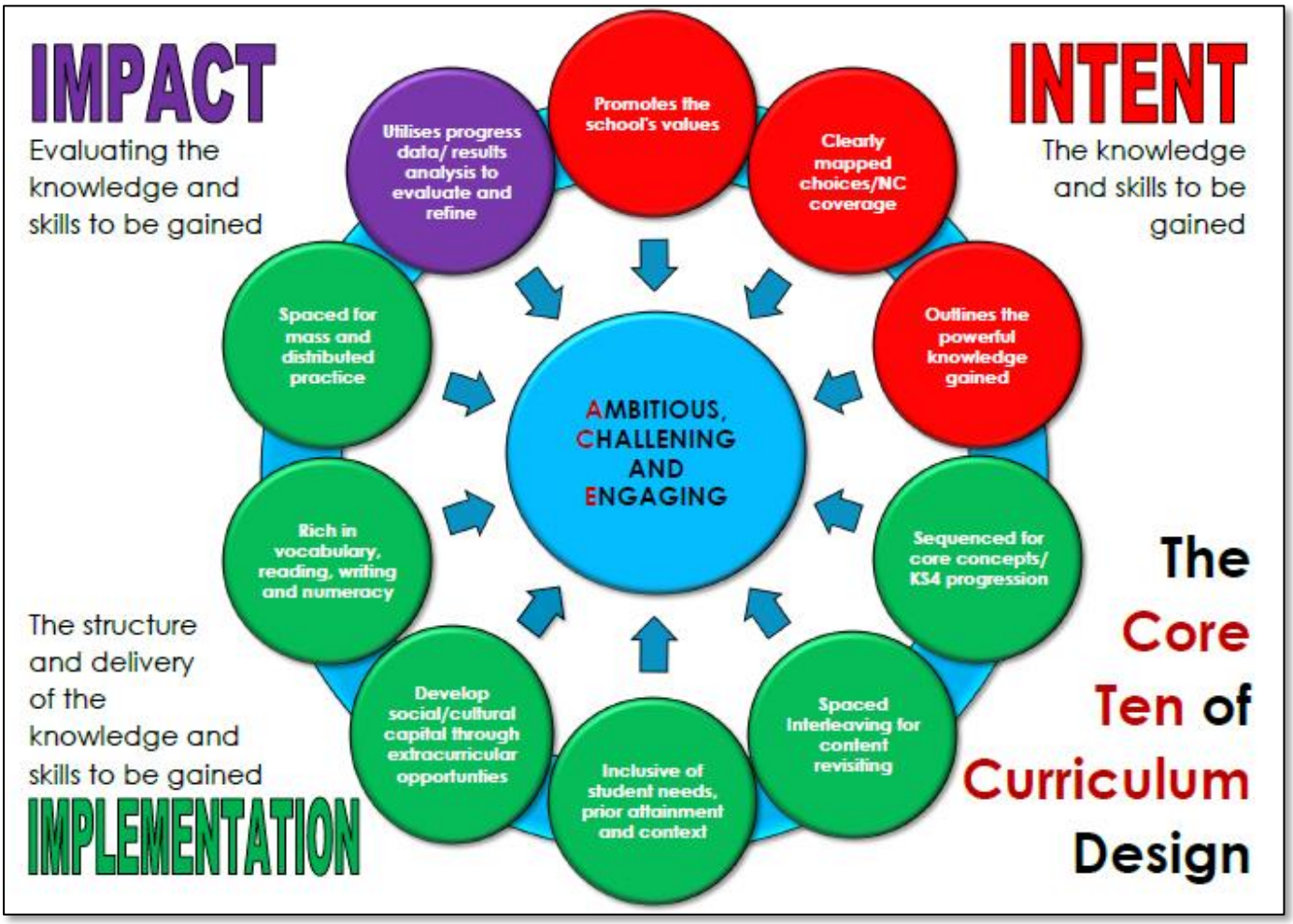
Created: February 2020

Updated:



THINKING PROCESS - CURRICULUM INTENT OVERVIEW PLAN (KS3)

Intent Statement – at Landau Forte Amington, we believe learning powerful knowledge helps students achieve and creates a fairer society.
How are you trying to accomplish this, with this Programme of Study (PoS)?

DEFINITION: Powerful Knowledge is knowledge that enriches students' lives and creates a fairer society by providing students with intellectual power. It is knowledge that support students in engaging with the world and communicating with people regardless of background or social standing.

In the Mathematics department, we aim to provide our students with experiences that will inspire curiosity and develop enquiring minds that can appreciate the power of Mathematics in our evolving society. From there, our students will be ready to become the next generation of problem-solvers that our society needs.

Aims – what do you want pupils to be able to know and do by the time they finish this Programme of Study (PoS)?

The aims of the Mathematics department reflect those of the KS3 National Curriculum of 2013. We aim for students to:-

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Academy Values – at Landau Forte Amington, we want students to be ambitious, brave and kind. How are these values promoted in this PoS?

Ambition – Mastery approach means that students will only move on when a high level of competence is reached
Bravery – Having a disposition geared towards believing that improvement can be made, regardless of prior attainment and experience
Kindness – Group work where appropriate

KS3 Curriculum Choices – what topics are taught and does it ensure breadth and depth, as well as meet the legal requirements of the National Curriculum (NC)? *(Please note - the sequencing of topics will be explored in the implementation overview, the main purpose at this stage is to know what is taught)*

Based on a model of 7 sessions a fortnight. NC references can be found at the end of the document

YEAR		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
7	Unit/Topic	**Investigating properties of shapes** **Proportional reasoning** **Visualising and constructing** **Exploring fractions, decimals and percentages** **Investigating angles**	Measuring space Algebraic proficiency: tinkering Solving equations and inequalities	Calculating fractions, decimals and percentages Pattern sniffing Checking, approximating and estimating	Calculating Calculating space	Numbers and the number system Counting and comparing	Measuring data Presentation of data Mathematical movement
	KS3 NC covered	**G5, G6, G7, G9, G10, G13, N10, R3, R4, R5**	A1, A2, A3, A7, G3, N5, N12, R1	A14, A15, N4, N10, N13, N14, R8	A5, G1, G2, N4, N5, R1	N2, N3, N7	A8, G8, S1, S2
8	Unit/Topic	**Calculating** Exploring fractions, decimals and percentages	**Numbers and the number system** Investigating angles Presentation of data	Calculating space Visualising and constructing Understanding risk I	Proportional reasoning Measuring data Solving equations and inequalities	Algebraic proficiency: tinkering Calculating fractions, decimals and percentages Pattern sniffing	Algebraic proficiency: visualising Understanding risk II
	KS3 NC covered	**N2, N4, N5, N9, N10**	G7, G11, G12, N8, S1, S2, S3	G1, G2, G7, G13, P1, P2	R5, R2, R6, R7 , R10, S1 ,S2, A7, A11	A1, A2, A5, N5, R8, N2, A14, A15	A9, A11, A12, A13, P1, P2, P3, P4
9	Unit/Topic	**Calculating space** **Visualising and constructing**	Proportional reasoning Understanding risk	Conjecturing Algebraic proficiency: tinkering	Algebraic proficiency: visualising Pattern sniffing	Calculating Investigating Shapes (S10)	Solving equations and inequalities I and II
	KS3 NC covered	**G2, G4, G14**	R9, R10, G9, G13	A3, A4, G9, G13	A9, A11, A15. A16	N7, N8, S2, S3	A3, A12, N16

National Curriculum content missing from this PoS and why?	Content taught in addition to the National Curriculum and why?
None	**None**

Powerful Knowledge Choices – what powerful knowledge is included in this PoS? Consider what knowledge is it important for our students to know, so that when they leave school they can engage in and lead discussions, with people from the most advantaged backgrounds? *(Please note - the sequencing of topics will be explored in the implementation overview, the main purpose at this stage is to know what powerful knowledge is gained)*

YEAR		Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
7	**Powerful Knowledge**	Understand and use geometric notation for labelling angles, lengths, equal lengths and parallel lines Rods and Triangles (Bowland Assessment) Write a quantity as a fraction or percentage of another Doughnut Percents	Substitute numbers into formulae Solve linear equations in one unknown Simplify and manipulate expressions by collecting like terms Perimeter Expressions Simplify and manipulate expressions by multiplying a single term over a bracket Interpreting Equations	Use multiplicative reasoning to interpret percentage change Baby Boom Add, subtract, multiply and divide with fractions and mixed numbers Bens Game	Use positive integer powers and associated real roots Calculate surface area of cubes and cuboids Candle Box	Apply the four operations with decimal numbers Carbon Footprint Check calculations using approximation, estimation or inverse operations 110 Years On	Understand and use lines parallel to the axes, y = x and y = -x Using coordinates to interpret data
	Why it is important to know	**This knowledge builds on the work done in previous settings whilst building the knowledge of students towards the requirements of the GCSE specifications. The resilience of the students will be built through the purposeful tasks built into each stage**					

8	**Powerful Knowledge**	Apply the four operations with negative numbers Convert between terminating decimals and fractions	Convert numbers into standard form and vice versa <u>A Million Dollars</u>	Apply the formulae for circumference and area of a circle <u>Pokemon Go Cheat</u> <u>Ferris Wheel</u> Calculate theoretical probabilities for single events <u>Cherries Come In Twos</u> <u>Winning the Lottery</u>	Find a relevant multiplier when solving problems involving proportion <u>Magic Potting Shed</u>	Apply the multiplication, division and power laws of indices Factorise an expression by taking out common factors <u>Counting Factors</u> <u>Factor Track</u> Solve problems involving percentage change, including original value problems <u>Change in Code</u> Change the subject of a formula when two steps are required Find and use the nth term for a linear sequence <u>Sheep Talk</u> Solve linear equations with unknowns on both sides <u>Building Equations</u>	Plot and interpret graphs of linear functions <u>Straight Line Graphs Mystery</u>
	Why it is important to know	This knowledge builds on the work done in previous settings whilst building the knowledge of students towards the requirements of the GCSE specifications. The resilience of the students will be built through the purposeful tasks built into each stage					

9	**Powerful Knowledge**	Use ruler and compass methods to construct the perpendicular bisector of a line segment and to bisect an angle Bisector Intersection Calculate exactly with multiples of π Circle Pattern Apply Pythagoras' theorem in two dimensions Pythagoras Proofs	Change freely between compound units Choose your Units Solve problems involving similar shapes Fit for Photocopying Use tree diagrams to list outcomes Chances are...	Manipulate algebraic expressions by expanding the product of two binomials Expanding Brackets Challenge Manipulate algebraic expressions by factorising a quadratic expression of the form $x^2 + bx + c$ Building a Doghouse Use geometrical reasoning to construct simple proofs Star Polygons	Understand and use the gradient of a straight line to solve problems Distance Time Graph Story Real-life Graphs Plot and interpret graphs of quadratic functions Representing Quadratic Graphs	Calculate with roots and integer indices Pocket Money Multiplying Cells	Solve two linear simultaneous equations algebraically and graphically Simultaneous Equations
	Why it is important to know	This knowledge builds on the work done in previous settings whilst building the knowledge of students towards the requirements of the GCSE specifications. The resilience of the students will be built through the purposeful tasks built into each stage					

How does the Curriculum Intent meet the ACE curriculum design?	
Ambitious	**Mastery approach means that students will only move on when a high level of competence is reached**
Challenging	**Pupils who grasp concepts rapidly will be challenged through rich and sophisticated problems before any acceleration through new content.**

Engaging	**Curriculum designed to promote procedural fluency, conceptual understanding, strategic competence, adaptive reasoning and productive dispositions alongside relevant real-life context**

What are the current strengths of the Curriculum Intent?

Full coverage of the Programme of Study at KS3

What specific actions have to be taken in response to the above? Please consider:

- KS3 Curriculum content changes;
- Powerful knowledge changes;
- Modifications to ensure an ACE curriculum design;
- CPD for teachers in your subject area;
- Additional research you have to consider as part of this review.

Adapt planning to include What-Why-How?
More purposeful practice to move students towards domain-specific problem solving knowledge (training required for staff as well)

Number

Pupils should be taught to:

N1 understand and use place value for decimals, measures and integers of any size

N2 order positive and negative integers, decimals and fractions; use the number line as a model for ordering of the real numbers; use the symbols =, ≠, <, >, ≤, ≥

N3 use the concepts and vocabulary of prime numbers, factors (or divisors), multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation property

N4 use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative

N5 use conventional notation for the priority of operations, including brackets, powers, roots and reciprocals

N6 recognise and use relationships between operations including inverse operations

N7 use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations

N8 interpret and compare numbers in standard form A x 10n 1≤A<10, where n is a positive or negative integer or zero

N9 work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and 27 or 0.375 and 83)

N10 define percentage as ‘number of parts per hundred’, interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100%

N11 interpret fractions and percentages as operators

N12 use standard units of mass, length, time, money and other measures, including with decimal quantities

N13 round numbers and measures to an appropriate degree of accuracy [for example, to a number of decimal places or significant figures]

N14 use approximation through rounding to estimate answers and calculate possible resulting errors expressed using inequality notation a<x≤b

N15 use a calculator and other technologies to calculate results accurately and then interpret them appropriately

N16 appreciate the infinite nature of the sets of integers, real and rational numbers.

Algebra

Pupils should be taught to:

A1 use and interpret algebraic notation, including:

- ab in place of a × b
- 3y in place of y + y + y and 3 × y
- a^2 in place of a × a, a^3 in place of a × a × a; a^2b in place of a × a × b
- a/b in place of a ÷ b
- coefficients written as fractions rather than as decimals
- brackets

A2 substitute numerical values into formulae and expressions, including scientific formulae

A3 understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors

A4 simplify and manipulate algebraic expressions to maintain equivalence by:

- collecting like terms
- multiplying a single term over a bracket
- taking out common factors
- expanding products of two or more binomials

A5 understand and use standard mathematical formulae; rearrange formulae to change the subject

A6 model situations or procedures by translating them into algebraic expressions or formulae and by using graphs

A7 use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)

A8 work with coordinates in all four quadrants

A9 recognise, sketch and produce graphs of linear and quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane

A10 interpret mathematical relationships both algebraically and graphically

A11 reduce a given linear equation in two variables to the standard form y = mx + c; calculate and interpret gradients and intercepts of graphs of such linear equations numerically, graphically and algebraically

A12 use linear and quadratic graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations

A13 find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential and reciprocal graphs

A14 generate terms of a sequence from either a term-to-term or a position-to-term rule

A15 recognise arithmetic sequences and find the nth term

A16 recognise geometric sequences and appreciate other sequences that arise.

Ratio, proportion and rates of change

Pupils should be taught to:

R1 change freely between related standard units [for example time, length, area, volume/capacity, mass]

R2 use scale factors, scale diagrams and maps

R3 express one quantity as a fraction of another, where the fraction is less than 1 and greater than 1

R4 use ratio notation, including reduction to simplest form

R5 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

R6 understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction

R7 relate the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions

R8 solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics

R9 solve problems involving direct and inverse proportion, including graphical and algebraic representations

R10 use compound units such as speed, unit pricing and density to solve problems.

Geometry and measures

Pupils should be taught to:

G1 derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume of cuboids (including cubes) and other prisms (including cylinders)

G2 calculate and solve problems involving: perimeters of 2-D shapes (including circles), areas of circles and composite shapes

G3 draw and measure line segments and angles in geometric figures, including interpreting scale drawings

G4 derive and 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); recognise and use the perpendicular distance from a point to a line as the shortest distance to the line

G5 describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric

G6 use the standard conventions for labelling the sides and angles of triangle ABC, and know and use the criteria for congruence of triangles

G7 derive and illustrate properties of triangles, quadrilaterals, circles, and other plane figures [for example, equal lengths and angles] using appropriate language and technologies

G8 identify properties of, and describe the results of, translations, rotations and reflections applied to given figures

G9 identify and construct congruent triangles, and construct similar shapes by enlargement, with and without coordinate grids

G10 apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles

G11 understand and use the relationship between parallel lines and alternate and corresponding angles

G12 derive and use the sum of angles in a triangle and use it to deduce the angle sum in any polygon, and to derive properties of regular polygons

G13 apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides, including Pythagoras' Theorem, and use known results to obtain simple proofs

G14 use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles

G15 use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D

G16 interpret mathematical relationships both algebraically and geometrically.

Probability

Pupils should be taught to:

P1 record, describe and analyse the frequency of outcomes of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale

P2 understand that the probabilities of all possible outcomes sum to 1

P3 enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams

P4 generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities.

Statistics

Pupils should be taught to:

S1 describe, interpret and compare observed distributions of a single variable through:

- appropriate graphical representation involving discrete, continuous and grouped data;
- and appropriate measures of central tendency (mean, mode, median) and spread (range, consideration of outliers)

S2 construct and interpret appropriate tables, charts, and diagrams, including frequency tables, bar charts, pie charts, and pictograms for categorical data, and vertical line (or bar) charts for ungrouped and grouped numerical data

S3 describe simple mathematical relationships between two variables (bivariate data) in observational and experimental contexts and illustrate using scatter graphs.