

Longcroft School Curriculum Overview STATISTICS



LONGCROFT

—SCHOOL AND SIXTH FORM COLLEGE—

Longcroft School Mission Statement

Longcroft strives to be a positive, warm and welcoming school where pupils aim to do their very best and, with great heart, thought and vision, take pride in their achievements and those of our community. By constantly challenging our pupils to excel, we nurture aspiration and strive to cultivate a lifelong love of learning in our young people. We provide a creative, safe, inclusive and caring environment where every child is known and cared for as an individual. In this climate, every young person has the opportunity to thrive as they develop in personality, character and intellect and become a highly successful learner and individual.

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Introduction

This document outlines the curriculum and key considerations including:

- Aims and purpose
- Alignment with the whole school provision and curriculum intent
- A summary programme of study which includes sequencing of taught content

We use the National Curriculum as our statutory foundation and broadly share its principles and aims including:

- ‘To provide pupils with an introduction to the essential knowledge that they need to be educated citizens. To introduce pupils to the best that has been thought and said; and help engender an appreciation of human creativity and achievement’.
- To prepare students to be confident in themselves, to have a fulfilled and successful life beyond our school - one where they contribute positively to society.
- Our statutory curriculum is just one element in the education of every child. There is time and space in the school day and in each week, term and year to range beyond statutory specifications.
- Provision of a framework of core knowledge around which teachers can develop exciting and stimulating lessons to promote the development of pupils’ knowledge, understanding and skills as part of the wider school curriculum.
- The wider school curriculum includes an extensive range of opportunities and activities that are routinely available to students, are inclusive and reflect our diverse community.

Inclusion

In accordance with our school curriculum statement, teachers will set high expectations for every pupil. They should plan stretching work for all pupils, including those whose attainment is significantly above the expected standard. There is an even greater obligation to plan lessons for pupils who have low levels of prior attainment or come from disadvantaged backgrounds. Evidence based approaches must be taken to respond to specific needs including students with special educational needs and those for whom English is not their first language; and be regularly reviewed. Teachers must at all times take account of their duties under equal opportunities legislation and act consistently with our vision and values.

Numeracy and literacy

Teachers should take opportunities to develop pupils’ mathematical fluency, spoken language, reading, writing and vocabulary within their specific discipline and in line with the expectations laid out in our school curriculum statement.

Purpose of study

‘Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history’s most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.’ Adapted from National Curriculum, DfE, 2014.

Aims

The Longcroft School and Sixth Form curriculum for mathematics aims to ensure that all pupils:

- 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.
- are confident in their mental arithmetic as well as in using when appropriate calculators.

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- are prepared to effectively articulate their knowledge and skills in the way that best represents these in statutory assessments such that they have the requisite outcomes to enable the widest access of opportunity.

Subject Curriculum Vision

The mathematics department strives to give students the confidence to acquire and use mathematical skills to become the engineers, scientists, politicians and teachers of the future. The department seeks to achieve excellence in the teaching and learning of mathematics, in order for the students to make significant progress, irrespective of their prior attainment in this varied subject. We are committed to ensure our young people are equipped with the skills to manage their daily finances and work/household commitments.

Our curriculum develops a deep mathematical understanding, our practices embeds the importance of mastering the essential skills through small steps that ensures proficiency before progressing to the next step.

We ensure our learner are able to assess risk and become independent and informed thinkers. The curriculum draws on content that ensure they have the acquired depth of understanding to be able to combine different mathematical disciplines to support more complex problem solving.

Our curriculum reflects our core school values of Great Heart, Great Thought and Great Vision:

Great Heart

To promote a welcoming, supportive, safe environment where both students and staff work together to challenge each other. Students will have the resilience to make mistakes, learning from their mistakes allowing them to gain in confidence achieving a feeling of success.

Great Thought

To provide an enriching, engaging and challenging mathematics curriculum for all, delivered to develop logical reasoning and problem-solving skills.

To provide a structured learning experience that is well sequenced, building effectively on prior learning that secures the knowledge and skills required for academic and real-world success.

To instil within our young people the enjoyment and confidence in tackling mathematical problems, by showing clear working out and reflecting to ensure progress.

Great Vision

To have a sense of purpose as to where their mathematical ability could lead them. To acknowledge that their hard work and commitment to learning now, will be rewarded in future accomplishments.

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Key subject skills

AO1	AO2	AO3
Demonstrate knowledge and understanding, using appropriate terminology and notation, of standard statistical techniques used to: <ul style="list-style-type: none"> • collect and represent data • calculate summary statistics and probabilities 	Interpret statistical information and results in context and reason statistically to draw conclusions.	Assess the appropriateness of statistical methodologies and the conclusions drawn through the application of the statistical enquiry cycle.

Building on prior learning - *What can students do by the end of KS2?*

Number - addition, subtraction, multiplication and division	Number - fractions (including decimals and percentages)	Ratio and proportion	Algebra	Measurement	Geometry	Statistics
<p>Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication</p> <p>Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context</p> <p>Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context</p> <p>Perform mental calculations, including</p>	<p>Use common factors to simplify fractions; use common multiples to express fractions in the same denomination</p> <p>Compare and order fractions, including fractions > 1</p> <p>Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions</p> <p>Multiply simple pairs of proper fractions, writing the answer in its simplest form</p> <p>Divide proper fractions by whole numbers</p> <p>Associate a fraction with division and calculate decimal fraction equivalents for a simple fraction</p>	<p>Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts</p> <p>Solve problems involving the calculation of percentages and the use of percentages for comparison</p> <p>Solve problems involving similar shapes where the scale factor is known or can be found</p> <p>Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.</p>	<p>Use simple formulae</p> <p>Generate and describe linear number sequences</p> <p>Express missing number problems algebraically</p> <p>Find pairs of numbers that satisfy an equation with two unknowns</p> <p>Enumerate possibilities of combinations of two variables</p>	<p>Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate</p> <p>Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places</p> <p>Convert between miles and kilometres</p> <p>Recognise that shapes with the same areas can have different perimeters and vice versa</p>	<p>Draw 2-D shapes using given dimensions and angles</p> <p>Recognise, describe and build simple 3-D shapes, including making nets</p> <p>Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons</p> <p>Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius</p> <p>Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.</p>	<p>Interpret and construct pie charts and line graphs and use these to solve problems</p> <p>Calculate and interpret the mean as an average.</p>

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<p>with mixed operations and large numbers</p> <p>Identify common factors, common multiples and prime numbers</p> <p>Use their knowledge of the order of operations to carry out calculations involving the four operations</p> <p>Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why</p> <p>Solve problems involving addition, subtraction, multiplication and division</p> <p>Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.</p>	<p>Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places</p> <p>Multiply one-digit numbers with up to two decimal places by whole numbers</p> <p>Use written division methods in cases where the answer has up to two decimal places</p> <p>Solve problems which require answers to be rounded to specified degrees of accuracy</p> <p>Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.</p>			<p>Recognise when it is possible to use formulae for area and volume of shapes</p> <p>Calculate the area of parallelograms and triangles</p> <p>Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm³) and cubic metres (m³), and extending to other units.</p>	<p>describe positions on the full coordinate grid (all four quadrants)</p> <p>Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.</p>	
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Baseline expectations

Number	Algebra	Ratio, proportion and rates of change	Probability
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N1	order positive integers, decimals and fractions; understand and use the symbols =, ≠, <, >, ≤, ≥	A2	substitute numerical values into formulae and expressions, including scientific formulae	R3	express one quantity as a fraction of another, where the fraction is less than 1 or greater than 1	P1	record, describe and analyse the frequency of outcomes of probability experiments
N2	apply the four operations to integers, decimals and simple fractions (proper and improper), and mixed numbers; understand and use place value (for example when working with very large or very small numbers, and when calculating with decimals)	A5	understand and use standard mathematical formulae; rearrange formulae to change the subject	R4	use ratio notation, including reduction to simplest form	P7	construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities
N3	recognise and use relationships between operations, including inverse operations, for example cancellation to simplify calculations and expressions; use conventional notation for priority of operations, including brackets, powers, roots and reciprocals	A8	work with coordinates on Cartesian grid	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; apply ratio to real contexts and problems (such as those involving probability)		
N9	understand and use standard form	A9	understand and use the general equation of a straight-line $y = mx + c$ where c is the intercept with the y -axis and $m = \frac{(y_1 - y_2)}{(x_1 - x_2)}$.	R8	relate ratios to fractions and vice versa		
N10	work interchangeably with terminating decimals and their corresponding fractions (such as 3.5 and $\frac{7}{2}$ or 0.375 and $\frac{3}{8}$). Recognise that some fractions can be written as recurring decimals			R9	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		
N11	identify and work with fractions in ratio problems			R11	use compound units such as speed, rates of pay, unit pricing		
N12	interpret fractions and percentages as operators			R14	interpret the gradient of a straight-line graph as a rate of change		
N13	use standard units of mass, length, time, money and other measures (including standard						

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	compound measures) using decimal quantities where appropriate						
N14	estimate answers; check calculations using approximation and estimation, including answers obtained using technology						
N15	round numbers and measures to an appropriate degree of accuracy (for example to a specified number of decimal places or significant figures); use inequality notation to specify simple error intervals due to truncation or rounding						

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Key Stage 3

Students can:

Probability

- 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
- understand that the probabilities of all possible outcomes sum to 1
- enumerate sets and unions/intersections of sets systematically, using tables, grids and Venn diagrams
- generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities.

Statistics

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

Year 10

Students can:

Understand the importance of the careful planning of a clear strategy for collecting, recording and processing data in order to address an identified question or hypothesis.

- Know that a hypothesis can only be tested through the appropriate collection and analysis of data.
- Know the constraints that may be faced in designing an investigation to test a hypothesis.
- Determine proactive strategies to mitigate issues that might arise during the statistical enquiry process.

Recognise the opportunities, constraints and implications for subsequent mathematical analysis involved in obtaining appropriate data through careful design of primary data collection techniques or through the use of reference sources for secondary data to ensure unbiased research.

- Know and apply terms used to describe different types of data that can be collected for statistical analysis
- Know the advantages and implications of merging data into more general categories, and of grouping numerical data into class intervals.
- Know the difference between primary and secondary data
- Determine factors that may lead to bias.
- Know the difference between population, sample frame and sample.
- Know that 'population' can have different meanings within a stated context.
- Know reasons for employing judgement or opportunity (convenience) sampling, and the associated risks of bias when these techniques are used.

- Use appropriate sampling techniques in the context of the problem to avoid bias

- Know the key features of a simple random sample.
- Use stratification and know when this is appropriate before sampling.
- Know the key features to be considered when planning data collection
- Demonstrate understanding of techniques used to deal with problems that may arise with collected data

Generate data visualisation and understand the mathematics required to derive these visualisations.

- Represent data sets pictorially using calculated key values as necessary.
- Represent data sets graphically using calculated key values as necessary, and interpret and compare data sets displayed graphically
- Justify the appropriate format and produce accurate visualisation of data Y10
- Recognise where errors in construction lead to graphical misrepresentation
- Extract and calculate corresponding values in order to compare data sets
- Select appropriate form of representation.

Year 11

Students can:

Use visualisation and calculation to interpret results with reference to the context of the problem, and to evaluate the validity and reliability of statistical findings.

- Compare the probability of different possible outcomes
- Use probability values to calculate expected frequency of a specified characteristic within a sample or population
- Compare experimental data with theoretical predictions to identify possible bias
- Recognise that experimental probability will tend towards theoretical probability as the number of trials increases when all variables are random.
- Compare different data sets using appropriate calculated or given measure of central tendency
- Compare different data sets using appropriate calculated or given measure of spread
- Interpret data presented in a variety of tabular forms
- Interpret a distribution of data in terms of skewness identified from inspection
- Interpret data related to rates of change
- Use different types of index numbers in context, including but not limited to retail price index (RPI), consumer price index (CPI) and gross domestic product (GDP).

- Know and apply vocabulary of correlation

- Make comparisons of correlation by inspection: strong or weak

- Understand the distinction between Spearman's rank correlation and Pearson's product moment correlation coefficients
- Know that sample size has an impact on reliability and replication
- Know and interpret the characteristics of a normal distribution.
- Know and interpret the characteristics of a binomial distribution.

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Year	Autumn				Spring				Summer			
	Topic	Assessment	Skills tested	Links	Topic	Assessment	Skills tested	Links	Topic	Assessment	Skills tested	Links
10	Unit 1 Collection of data Describing data Grouping data Primary and secondary data Populations Peterson capture recapture formula Random sampling Non-random sampling Stratified sampling Collection of data Questionnaires and interviews Problems with collected data Controlling extraneous variables Hypotheses Designing investigations Unit 2 Processing and representing data Tables Two-way tables Pictograms Choropleth maps	Base line assessment at start of the year End of unit assessment either foundation or higher	AO1 AO2 AO3		Stem and leaf diagrams Pie charts Comparative pie charts Population pyramids Histograms and frequency polygons Cumulative frequency charts The shape of a distribution Histograms with unequal class widths Misleading diagrams Choosing the right format Unit 3 Summarising data Averages Averages from frequency tables Averages from grouped data Transforming data Geometric mean and weighted mean Measure of dispersion for discrete data Measures of dispersion for grouped data Standard deviation	End of unit assessment either foundation or higher	AO1 AO2 AO3		Box plots and outliers Skewness Deciding which average to use Comparing data sets Making estimates Unit 4 Scatter diagrams and correlation Scatter diagrams Correlation Causal relationships Line of best fit Interpolation and extrapolation The equation of a line of best fit Spearmans rank correlation coefficient	End of year assessment End of unit assessment either foundation or higher	AO1 AO2 AO3	
11	Unit 5 Time series Line graphs and time series Trend lines Variations in a time series Moving averages Estimating seasonal variations and making predictions Unit 6 probability	Base line assessment at the start of the year Mock exam using unreleased past papers either foundation or higher End of unit assessment either higher or foundations	AO1 AO2 AO3		Unit 7 Index numbers Index numbers RPI, CDI and GDP Chain base index numbers Rates of change Unit 8 Probability distributions Binomial distributions Normal Distribution Standardised scores	End of unit assessment either higher or foundation End of year assessment	AO1 AO2 AO3		Program or targeted revision identified from analysis of end of year assessments and mock exam practice		AO1 AO2 AO3	



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The meaning of probability Experimental probability Using probability to assess risk Sample space diagrams Venn diagrams Mutually exclusive and exhaustive events The general addition law Independent events Tree diagrams Conditional probability The formula for conditional probability				Quality assurance and control charts							
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