Whole school curriculum intent

Develop a broad and balanced curriculum that enables students to learn, recall and apply knowledge and skills across different contexts, supported by a robust and consistent approach to assessment. This will lead to successful and resilient lifelong learners who can cope in a range of changing contexts.

Key stage 3/4 subject curriculum intent

We believe that it is vital that young people have a good understanding of statistics to help in their work, further study and more generally to understand the use of statistics by the media, government and other agencies to help make informed judgements. It is a crucial life skill.

Year Group		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 10	Topic	1. The collection of data	Population and sampling	2. Processing, representing and analysing data	2a. Representing data	2(b) Measures of central tendency	2(e) Scatter diagrams and correlation

	Core knowledge from this topic	**1(a) Planning**
		• Hypotheses
		• Designing investigations
		• Strategies to deal with potential problems
		1(b) Types of data
		• Describing data
		  o Raw data, quantitative, qualitative, categorical, ordinal, discrete, continuous, ungrouped, grouped, bivariate and multivariate
		• Advantages and implications of merging/grouping data
		• Primary/secondary data
		  o Advantages and disadvantages
		1(c) Population and sampling
		• Population, sample frame and sample
		• Judgment, opportunity (convenience) and quota sampling
			1(c) Population and sampling
			• Random, systematic and quota sampling
			  o Advantages of each method
			  o Techniques to avoid bias
			• Stratified sampling
			2(h) Estimation
			• Use summary statists to make estimates of population characteristics
			• Use sample data to predict population proportions
			• Know that sample size has an impact on reliability and replication
			• **Apply Petersen capture recapture formula to calculate an estimate of the size of a population**
			
			1(d) Collecting data
			• Collection of data
			  o Experimental (laboratory, field and natural), simulation, questionnaires, observation, reference, census, population and sampling
			  o Reliability and validity
			  o Collecting sensitive content matter
			  o **Random response**
			• Questionnaires and interviews
			  o Leading questions, avoiding biased
				2(a) Tabulation
				• Tally, tabulation, two-way tables
				• Frequency tables
				2(a) Representing data
				• Pictogram
				• Pie chart
				• Bar charts
				• Stem and leaf diagram
				• Population pyramid
				• Choropleth map
				• **Comparative pie chart**
				• **Comparative 2D representations/comparative 3D representations**.
				• Interpret and compare data sets represented pictorially
				• Line graphs
				• Bar line (vertical line) charts
				• Frequency polygons
				• Cumulative frequency (discrete and grouped) charts
				• Histograms (equal class width)
				• Box plots
				Interpret and compare data sets represented graphically
					2(a) Representing data
					
					• **Histograms unequal class widths**
					  o **Frequency density**
					  o **Interpret and compare data sets displayed in histograms**
					2(a) Representing data
					• Justify appropriate form to represent data
					• Graphical misrepresentation
					• Determine skewness by inspection
					  o Interpreting a distribution of data with reference to skewness
					  o **Calculating skewness**
					Comparing data sets represented in different formats
						2(b) Measures of central tendency
						• Averages from raw or grouped data
						  o Mean, median, mode
						• **Weighted mean**
						• **Geometric mean**
						• Justify appropriate average to use in context
						2(c) Measures of dispersion
						• Range, quartiles, interquartile range (IQR), percentiles
						• **Inter-percentile range, inter-decile range**
						• **Standard deviation**
						• Identifying outliers by inspection
						• **Identifying outliers by calculation**
						• Comment on outliers in context
						Compare data sets using appropriate measure of central tendency and measure of dispersion
							• Explanatory (independent) variables and response (dependent) variables
							• Correlation
							  o Positive, negative, zero, weak, strong
							  o Distinction between correlation and causation
							• Line of best fit
							  o **Using the regression equation $y = a + bx$**
							• **Calculate Spearman's rank correlation coefficient**
							• Interpret Spearman's rank in context
							• **Interpret Pearson's product moment correlation coefficient (PMCC) in context**
							Understand the distinction between Spearman's rank correlation coefficient and Pearson's product moment correlation coefficient (PMCC)

		sources, time factors, open/closed questions, different types of interview technique • Problems with collected data o Missing data, non-response, 'cleaning' data • Controlling extraneous variables and **Control groups**				
	Co-teaching opportunity with GCSE Mathematics	**S5** apply statistics to describe a population	**S1** infer properties of populations or distributions from a sample, while knowing the limitations of sampling	**S2** interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data, tables and line graphs for time series data and know their appropriate use	**S3** construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use	**S4** interpret, analyse and compare the distributions of data sets from univariate empirical distributions	**S6** use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of so doing
	Key vocabulary						
	Development of cultural capital	• *Defining a question or hypothesis to investigate.* • *Developing a strategy for how to process and represent data.* • *Designing methods for collecting primary data.*	• *Deciding what data to collect and how to collect and record it, giving reasons.* • *Making inferences and/or predictions.* • *Organising, processing and 'cleaning' data, using technology.*	• *Generating diagrams and visualisations to represent the data, including an understanding of outputs generated by appropriate technology.*	• *Suggesting improvements to presentation.*	• *Generating statistical measures to compare data, understanding the advantages of using technology to automate processing.* • *Analysing and interpreting diagrams and calculations.*	• *Reaching conclusions that relate to the questions and hypotheses addressed.*
	Development of reading	Edexcel GCSE (9 –1) **Statistics Pg. 14 (Collection of data and investigation)**	Edexcel GCSE (9-1) **Statistics Pg. 17 (Populations) with case studies.**	Edexcel GCSE (9 –1) **Statistics Pg. 103 (The shape of distribution)**	Edexcel GCSE (9 –1) **Statistics Pg.107 (Histograms with unequal class widths)**	Edexcel GCSE (9 –1) **Statistics Pg. 161 (Measure of dispersion)**	Edexcel GCSE (9 –1) **Statistics Pg.207-210 (Scatter graphs and correlations)**
	Concepts –what will students be able to do at the end of the topic	Students should be able to understand the difference between a census and a sample, possibly referencing the National Census as an example.	Students should be able to understand how to apply Petersen capture recapture formula to calculate an estimate of the size of a population.	Students should be able to understand how to develop Comparative pie chart	Students should be able to understand use and create Histograms with unequal class widths.	Students should be able to understand and work out the Range, quartiles, interquartile range (IQR), percentiles.	Students should be able to understand on how to calculate the Spearman's rank correlation coefficient.
Year Group		**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Year 11	Topic	2f. Time series and Venn Diagrams	3. Experimental and theoretical probability	3. Probability distributions	Statistical Enquiry Cycle/A03 Practice	Revision	Revision

| Core knowledge from this topic | 2(f) Time series
• Moving averages
• Identifying trends
• Interpreting seasonal and cyclical trends in context
• Mean seasonal variation
  o **Predictions using average seasonal effect**
3. Probability
3. Experimental and theoretical probability
• Likelihood

• Expected frequency of a specified characteristic within a sample or population
• Use collected data and calculated probabilities to determine and interpret risk
• Compare experimental data with theoretical predictions
• Understand that increasing sample size generally leads to better estimates of probability and population parameters

• Use two-way tables, sample space diagrams, tree diagrams and Venn diagrams to represent all the different outcomes possible for at most three events | • Independent events

• Conditional probability

• The difference in terms of bias

2. Processing, representing and analysing data

2(d) Further summary statistics
• Index numbers / **weighted index numbers**
  o Retail price index (RPI)
  o Consumer price index (CPI)
  o Gross domestic product (GDP)
• Interpret data related to rates of change over time when given in graphical form
Calculate and interpret rates of change over time from tables using context specific formula | • **Binomial distribution**
  Notation B(n, p)
  o **Conditions that make binomial model suitable**
  o **Mean (np)**
  o **Calculation of binomial probabilities**
• **Normal distribution**
  o **Notation N(μ, σ^2)**
• **Characteristics of Normal distribution**
• **Conditions that make Normal model suitable**
• **Approximately 95% of the data lie within two standard deviations of the mean and that 68% (just over two thirds) lie within one standard deviation of the mean**
2(c) Measures of dispersion
• **Standardised scores**
2(g) Quality assurance
• **Know that a set of sample means are more closely distributed than individual values from the same population.**
• **Control charts**
Use action and warning lines in quality assurance sampling applications. | Statistical Enquiry Cycle/A03 Practice
Mini-investigation
Use this time to carry out an investigation. Students should have the opportunity to work with real world data sets. They may choose to investigate a problem from the sciences, geography, business, economics or other relevant field. Students should:
• Define a hypothesis to be investigated
• Decide data to collect
• Plan a strategy on how to process and represent data
• Generate diagrams to represent data
• Generate statistical measures
• Analyse diagrams and calculations
• Draw conclusions relating to hypotheses
  o Discuss reliability
  o Identify weaknesses
  o Suggest improvements
Make refinements | A   Revision - 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

B   Revision - 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.

C   Revision - 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 | D   Revision - Calculate statistical measures to compare data.

E   Revision - 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.

Bespoke revision reflecting the classes needs |
| Co-teaching opportunity with GCSE Mathematics | **P3**
   use appropriate language and the | **P8**
calculate the probability of independent and dependent combined events, including using tree diagrams and | | | | |

		0–1 probability scale **P2** apply ideas of randomness to calculate expected outcomes of multiple future experiments **P3** relate relative expected frequencies to theoretical probability **P5** understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size **P6** enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams and tree diagrams	other representations, and know the underlying assumptions **P9** calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams			
	Key vocabulary					
	Development of cultural capital	• *Making predictions.* • *Making inferences and/or predictions.*	• *Interpreting the diagrams and calculations.*			
	Development of reading	Edexcel GCSE (9 –1) **Statistics Pg.250 (Variations of time series)**	Edexcel GCSE (9 –1) **Statistics Pg. 290 (Mutually exclusive and exhaustive probability)**	Edexcel GCSE (9 –1) **Statistics Pg. 343 (Binominal Distributions)**	Edexcel GCSE (9 –1) **Statistics Pg. 371 (Thinking statistically)**	
	Concepts –what will students be able to do at the end of the topic	Students should be able to understand why there is the need to compare experimental data with theoretical predictions.	Students should be able to understand processing, representing and analysing data.	Students should be able to understand attempt the Binominal distribution questions.	Students should be able to understand and apply the Statistical Enquiry Cycle.	Students will be given a chance to revisit topics to fill in knowledge gap.

Students should be able to understand focus on exam-based questions and given the opportunity practise exam skills.