Statistics

Resources:

- GCSE Statistics Revision Guide and Workbook
- Mathsgenie GCSE Statistics https://www.mathsgenie.co.uk/statistics.html
- www.mymaths.co.uk   GCSE Statistics course

Exam structure (Edexcel)
- Two equally weighted papers.
- Foundation and Higher levels
- Calculators may be used on both papers
- Both papers include short, medium and open response questions
- All the content will be assessed on both papers.
- "The examination is split into two evenly weighted papers that focus on the same content and skills. **This gives students and teachers an opportunity after the first paper to reflect on the areas they need to work on in order to strengthen performance in the second paper.**"

Paper 1 (Foundation/Higher)	Paper 2 (Foundation/Higher)
Written examination: 1 hour 30 minutes 50% of the qualification 80 marks	Written examination: 1 hour 30 minutes 50% of the qualification 80 marks
AO1: 27.5% of total assessment AO2: 12.5% of total assessment AO3: 10% of total assessment	AO1: 27.5% of total assessment AO2: 12.5% of total assessment AO3: 10% of total assessment

AO1 Demonstrate knowledge and understanding, using appropriate terminology and notation, of standard statistical techniques used to:
- *collect and represent information*
- *calculate summary statistics and probabilities.*

AO2 Interpret statistical information and results in context and reason statistically to draw conclusions.

AO3 Assess the appropriateness of the statistical methodologies and the conclusions drawn through the application of the Statistical Enquiry Cycle.

(Bold/italic indicates Higher tier only)

Unit 1 - The collection of data
- Use correct terminology to describe different types of data and know the differences between them.
- Know how to group rounded and unrounded data into class intervals or categories and the advantages and disadvantages of doing so.
- Understand population, sample and sample frame, and identify these for given data.
- ***Use the Petersen capture–recapture formula to estimate the size of a population and know the assumptions made when using this method.***
- Know and be able to describe different methods of random and non-random sampling, including the advantages and disadvantages of each.
- Select a sample stratified by one category and by more than one category.
- Know the key features to consider when planning interviews and questionnaires.
- Write and identify suitable questions for investigations.
- Write a hypothesis and decide on suitable data to collect to test it.
- Design a data collection sheet and collect data from different sources.
- Know the advantages of using a pilot survey.
- ***Use the random response method for sensitive questions.***
- Know possible constraints on an investigation and how to deal with difficulties such as non-response.

- Know potential problems with collected data and how to deal with them.
- Know how and why to clean data. Identify and control extraneous variables.
- ***Understand and know when to use control groups and matched pairs.***

Unit 2: Processing, representing and analysing data
- Select the appropriate representation to use.
- Decide whether to group data into class intervals.
- Recognise well-presented and poorly presented data.
- Construct, draw, use and understand:
  - two-way tables
  - pictograms
  - vertical line graphs
  - pie charts
  - choropleth maps
  - histograms
  - ***comparative pie charts***
  - tally charts
  - bar charts
  - stem and leaf diagrams
  - population pyramids
  - cumulative frequency graphs and cumulative frequency step polygons
  - frequency polygons
  - ***histograms with unequal class widths***

Unit 3: Summarising data: measures of central tendency and dispersion
- Calculate:
  - The mean, mode, median (including by interpolation) and range for a list of numbers and discrete and/or continuous data listed in a table
  - The minimum, lower quartile, median, upper quartile, and maximum value for a list of numbers
  - The interquartile range and the percentiles for a set of data.
- Understand the advantages and disadvantages of each of the three measures of central tendency, and which is appropriate to use in different situations.
- Understand the effect of transformations on the mean, mode and median.
- Construct, use and interpret box plots from summary statistics and cumulative frequency graphs.
- Identify and interpret outliers by inspection and show them on box plots.
- Use box plots as a method to compare sets of data for dispersion, measures of central tendency and skewness.
- Given the median and interquartile range, make comparisons between different data samples to compare the sample and population data.
- Identify simple properties of the shape of distributions of data including symmetry, positive and negative skew.

Unit 4: Scatter diagrams and correlation
- Draw a scatter diagram.
- Interpret data presented in the form of a scatter diagram.
- Describe and make comparisons of correlation:
  - positive, negative or zero.
  - strong or weak.
- Understand what is meant by a causal relationship and that correlation does not imply causation.
- Draw a line of best fit by eye and by drawing through the mean point.
- Understand and comment on the reliability of values found through interpolation and extrapolation.
- ***Find the equation of a line of best fit.***
- ***Draw a regression line on a scatter diagram, given the equation.***
- ***Interpret the value of the gradient of a regression line .***
- Interpret Spearman's rank correlation coefficient.
- ***Calculate Spearman's rank correlation coefficient***
- ***Interpret Pearson's product moment correlation coefficient.***
- ***Understand the distinction between Spearman's rank correlation coefficient and Pearson's product moment correlation coefficients.***

Unit 5: Time Series
- Draw and interpret line graphs and time series.
- Draw trend lines on time series graphs and use inspection to identify trends.
- Know that a trend line shows the general trend of data.
- Interpret rising, falling and level trends on a time series graph.
- Identify seasonal variation on a time series graph.

- Calculate a four-point moving average.
- Draw a trend line through moving averages by eye.
- *Calculate the estimated mean seasonal variation.*
- *Know that the predicted value = trend line + seasonal variation.*

Unit 6: Probability
- Understand the meaning of the words impossible, certain, very likely, likely, unlikely, possible and evens.
- Use fractions, decimals and percentages to represent probabilities.
- Use probability values to calculate expected frequencies and compare them with actual frequencies.
- Use probability to assess risk.
- Use sample space diagrams, Venn diagrams and tree diagrams to represent all the different outcomes possible for up to three events.
- Understand the terms mutually exclusive and exhaustive.
- Use the addition law P(A or B) = P(A) + P(B) for two mutually exclusive events.
- *Use the general addition law for events that are not mutually exclusive.*
- Understand what it means for two events to be independent.
- Use the multiplication laws for independent events.
- Understand what it means for two events to be conditional.
- Calculate conditional probability using a tree diagram, two-way table or Venn diagram.
- Use the formula for conditional probability.
- Know that for independent events A and B, P(A) = P(A|B).

Unit 7: Index numbers
- Calculate index numbers.
- Interpret index numbers, including Retail Price Index (RPI) and Consumer Price Index (CPI).
- Interpret Gross Domestic Product (GDP) values.
- Calculate and interpret weighted index numbers.
- *Calculate chain base index numbers.*
- *Calculate rates of change over time, including crude birth and death rates.*
- *Calculate standardized birth and death rates.*

Unit 8: Probability Distributions
- *Know the conditions for a binomial distribution to be a suitable model.*
- *Understand the notation $B(n, p)$.*
- *Calculate probabilities using a binomial distribution.*
- *Know the mean of a binomial distribution is np.*
- *Know the conditions for a normal distribution to be a suitable model.*
- *Understand the notation $N(\mu, \sigma^2)$.*
- *Know the shape of a normal distribution curve and how this occurs.*
- *Know that 68% of data lie within one standard deviation of the mean, 95% of data lie within two standard deviations of the mean and 99.8% of data lie within three standard deviations of the mean.*
- *Draw normal distribution curves, including two curves on the same graph.*
- *Use standardized scores to compare two samples of data.*
- *Understand the process of quality assurance and why it is necessary in the real world.*
- *Calculate warning limits and action limits for means.*
- *Draw warning limits and action limits on a control chart for means, medians or ranges.*
- *Understand how warning limits and action limits are used in the manufacturing process.*