Subject: Statistics – Higher Paper

Exam Board: AQA 8382
https://www.aqa.org.uk/subjects/mathematics/gcse/mathematics-8382/specification/subject-content

Overview

- Two Papers – Calculator Allowed
- The papers are 1 hour each

Revision Sites

Sparx Maths – https://www.sparxmaths.uk/

This has extensive revision opportunities via the Independent Study section on the GCSE Mathematics elements that overlap Statistics

Maths Genie - www.mathsgenie.co.uk/statistics

Although not fully containing material it has good practice questions on key higher grade topics. Although it has a lot of Edexcel related material it is suitable for AQA also

Stats Academy - www.statsacademy.co.uk/exam-practice and www.statsacademy.co.uk/revision
Exam practice and revision notes

Other Useful revision resources

- BBC Bitesize Learning - https://www.bbc.co.uk/bitesize/examspecs/z8sg6fr
- Oak National Academy - https://classroom.thenational.academy/subjects-by-key-stage/key-stage-4/subjects/maths
- Mrs Hodgetts' Statistics - https://mrshodgettsstatistics.com/edexcel-gcse-statistics-2018-onwards/

Revision Tips

Revision for Statistics is based upon practice (and more practice). You need to be confident at the skills and concepts that make up the course in order to be able to work through the more challenging problems. Revision should be interactive, not just reading notes

- RAG the topics (**Red** = not confident, **Amber** = have a grasp but need more practice, **Green** = Confident) in the revision list
- Work on the Red and Amber material first – return to the green from time-to-time
- Use the Revision Sites to start to work through these areas
- Work through maths problems and past papers – highlight questions you cannot do and ask friends, parents, teachers for help
- Do not just read your notes/revision guides as you need to practice your Maths skills.

Year 11 Revision Checklist - Statistics

	RAG	Revised?	Comments
1. The collection of data			
(a) Planning			
Understand a hypothesis		☐	
Understand factors involved in planning an investigation (eg: time, costs, ethical issues, confidentiality, convenience)		☐	
Develop stratagies to mitigate issues		☐	
(b) Types of data			
Know and apply the terms to describe the different data types:			
- raw data		☐	
- quantatative		☐	
- qualitative		☐	
- catagorical		☐	
- ordinal		☐	
- discrete		☐	
- continuous		☐	
- ungrouped		☐	
- bivariate		☐	
- **multivariate (Higher Tier Only)**		☐	
Know the advantages and implications of merging data into more general categories, and of grouping numerical data into class intervals.		☐	
Know and apply the terms explanatory (independent) variables and response (dependent) varia		☐	
Know the difference between primary and secondary data.		☐	
(c) Population and sampling			
Know the difference between population, sample frame and sample.		☐	
Know reasons for using convenience sampling, and the associated risks of bias when this technique is used.		☐	
a. Know appropriate sampling techniques in the context of the problem to avoid bias.		☐	
b. Understand random, systematic, and quota sampling.		☐	
Know the key features of a simple random sample and understand different techniques used to select a random sample: including dice, cards, random number lists, and calculator functions.		☐	
Understand stratified samples		☐	
(d) Collecting data			

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Understand the different sources of data (experimental, questionnaires, observation, reference, census, population and sampling.)		☐	
Know the importance of reliability and validity with regards to collected data		☐	
Determine factors that may lead to bias, including issues of sensitivity of the content matter and **level of control (Higher Tier Only)**		☐	
Know the key features to be considered when planning data collection:		☐	
- Leading Questions		☐	
- Biased Sources		☐	
- Time Factors		☐	
- Open/Closed Questions		☐	
- Interview Techniques		☐	
Problems that might arise with data		☐	
Know why data might need to be cleaned		☐	
Know the importance of identifying and controlling extraneous variables and the **use of control groups including matched pairs (Higher Tier Only)**		☐	
2. Processing, representing and analysing data			
(a) Tables, diagrams and representation			
Represent and compare data sets using:		☐	
- Tables		☐	
- Tally Charts		☐	
- Pictograms		☐	
- Pie Charts		☐	
- Stem and Leaf Diagrams		☐	
- Venn Diagrams		☐	
- Population Pyramids		☐	
- Choropleth Maps		☐	
- Comparative Pie Charts (Higher Tier Only)		☐	
Calculate key values, draw and compare data in:		☐	
- Bar Charts		☐	
- Line Graphs		☐	
- Time Seriers Graphs		☐	
- Scatter Diagrams		☐	
- Frequence Polygons		☐	

Year 11 Revision Checklist - Statistics

	RAG	Revised?	Comments
- Cumulative Frequency Charts		☐	
- Histograms with equal class widths		☐	
- Box Plots		☐	
Calculate and use frequency density to draw all histograms (Higher Tier Only)		☐	
Interpret and compare any Histograms (Higher Tier Only)		☐	
Justify the appropriate format and produce accurate diagrams for data		☐	
Recognise where errors in graphs and charts such as:		☐	
- incorrect scales		☐	
- truncated axis		☐	
- distorted sizing		☐	
- the misuse of formula when calculating the frequency densities of histograms (Higher Tier Only)		☐	
Change the format of data to make it easier to use		☐	
Use the most appropriate form of any data		☐	
Determine skewness from data by inspection		☐	
Use of: Skew = $\frac{3(\text{mean} - \text{median})}{\text{standard deviation}}$ {Formula will be given in the formulae sheet} (Higher Tier Only)		☐	
Understand what positive and negative skew mean		☐	
(b) Measures of central tendency			
Calculate averages for discrete and grouped data:		☐	
- Mode		☐	
- Median		☐	
- Mean		☐	
- Weighted mean (Higher Tier Only)		☐	
- Geometric mean (Higher Tier Only)		☐	
- Mean Seasonal Variation (Higher Tier Only)		☐	
Know the benefits and drawbacks of the mean, median and mode		☐	
Compare data sets using mean, median and mode		☐	
(c) Measures of dispersion			
Calculate different measures of spread:		☐	
- range		☐	

Year 11 Revision Checklist - Statistics

	RAG	Revised?	Comments
- quartiles		☐	
- Interquartile Range (IQR)		☐	
- Percentiles		☐	
- Interpercentile Range (Higher Tier Only)		☐	
- Interdecile Range (Higher Tier Only)		☐	
- Standard deviation {Formulae given on formulae sheet} (Higher Tier Only)		☐	
Standard deviation = $\sqrt{\frac{1}{n}\sum(x-\bar{x})^2}$ **or** **Standard deviation =** $\sqrt{\frac{\sum x^2}{n}-\left(\frac{\sum x}{n}\right)^2}$ **(Higher Tier Only)**		☐	
Identify outliers by inspection		☐	
Identify outliers by calculation (Higher Tier Only):		☐	
Small Outlier is < LQ - 1.5 x IQR (Higher Tier Only)		☐	
Large Outlier is > UQ + 1.5 x IQR (Higher Tier Only)		☐	
Outlier is outside μ ± 3σ (Higher Tier Only)		☐	
Compare different data sets using measure of spread:		☐	
- range		☐	
- interquartile range (IQR)		☐	
- percentiles		☐	
- standard deviation (Higher Tier Only)		☐	
Calculate standardised scores using the formula {not given in paper}: Standardised score = score - mean / standard deviation (Higher Tier Only)		☐	
Use standardised scores to compare data sets (Higher Tier Only)		☐	
(d) Further summary statistics			
Use different types of index and numbers in context		☐	
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		☐	
(e) Scatter diagrams and correlation			

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Know and apply vocabulary of correlation: positive, negative, zero, causation, association, interpolation and extrapolation.		☐	
Describe and make comparisons of correlation by inspection: strong or weak.		☐	
Determine line of best fit by eye, by drawing through a calculated double mean point ($\bar{x}$, $\bar{y}$)		☐	
Draw a line of best fit using a regression line (Higher Tier Only)		☐	
Understand and use regression lines (Higher Tier Only)		☐	
Apply formula to determine Spearman's rank correlation coefficient (Higher Tier Only)		☐	
Interpret Spearman's rank correlation coefficient in context		☐	
Interpret given Pearson's product moment correlation coefficient (PMCC) in context (Higher Tier Only)		☐	
Understand the distinction between Spearman's rank correlation coefficient and Pearson's product moment correlation coefficient (PMCC) (Higher Tier Only)		☐	
(f) Time series			
Identify trends in data through inspection and by calculation of 4 point moving averages		☐	
Use other moving averages (such as 3 point or 5 point) (Higher Tier Only)		☐	
Interpret seasonal and cyclic trends in context		☐	
Use such trends to make predictions (Higher Tier Only)		☐	
(g) Quality assurance			
Know that a set of sample means are more closely distributed than individual values from the same population (Higher Tier Only)		☐	
Use action and warning lines in quality assurance sampling applications (Higher Tier On		☐	
(h) Estimation			
Use calculated or given summary statistical data to make estimates of population characteristics		☐	
Use samples to estimate population mean		☐	
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 (Higher Tier Only)		☐	
3. Probability			
Use collected data to calculate estimates of probabilities		☐	

Year 11 Revision Checklist - Statistics

	RAG	Revised?	Comments
Compare the probability of different possible outcomes using the 0–1 or 0–100% scale and statements of likelihood		☐	
Use probability values to calculate expected frequency of a specified characteristic within a sample or population		☐	
Calculate and interpret relative risk using the formula: relative risk = $\frac{\text{risk for those in the group}}{\text{risk for those not in the group}}$ (not given in exam)		☐	
Compare experimental data with theoretical predictions to identify possible bias within the experimental design		☐	
Recognise that experimental probability will tend towards theoretical probability as the number of trials increases when all variables are random		☐	
Use two-way tables, sample space diagrams, tree diagrams and Venn diagrams to represent all the different outcomes possible for at most three events		☐	
Know and apply the formal notation for independent events		☐	
Know and apply the formal notation for conditional probability		☐	
Comment on the differences between experimental and theoretical values in terms of possible bias (Higher Tier Only)		☐	
Know and interpret the characteristics of a binomial distribution (Higher Tier Only)		☐	
Know and interpret the characteristics of a normal distribution (Higher Tier Only)		☐	
Know that, for a normal distribution, values more than three standard deviations from the mean are very unusual (Higher Tier Only)		☐	
Know that 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 (Higher Tier Only)		☐	