

Awards in Statistical Methods

Specification

Edexcel Level 1 Award in Statistical Methods (AST10)

Edexcel Level 2 Award in Statistical Methods (AST20)

Edexcel Level 3 Award in Statistical Methods (AST30)

For first teaching from January 2013

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Introduction

The Edexcel Level 1, Level 2 and Level 3 Awards in Statistical Methods are designed for use in schools and colleges. They are part of a suite of mathematics qualifications offered by Edexcel.

Qualification Objectives

The Edexcel Level 1, Level 2 and Level 3 Awards in Statistical Methods enable students to:

- develop an understanding of concepts in statistics and a sound foundation of statistical methods when:
 - calculating with data
 - displaying data
 - analysing data
 - interpreting statistical calculation and representations
 - using probability
- acquire confidence when using data to move into further study in the subject or related areas
- solve statistical problems
- enjoy using mathematics and become confident when using data
- develop a proficiency in statistics to support progression in their studies, in the workplace and in training.

These qualifications support progression to other level 1, level 2 and level 3 qualifications, such as GCSE and GCE. The awards give statistical proficiency to support study in other subjects such as business, economics, biology and geography.

Contents

Specification at a glance	1
External assessment	2
Calculators	3
Qualification content	5
National Qualifications Framework (NQF)	5
Knowledge, skills and understanding	5
Assessment overview	5
Edexcel Level 1 Award in Statistical Methods	7
Overview	7
Edexcel Level 2 Award in Statistical Methods	11
Overview	11
Edexcel Level 3 Award in Statistical Methods	15
Overview	15
Assessment	19
Assessment summary	19
Assessment objectives and weightings	20
Relationship of assessment objectives to papers	21
Entering your students for assessment	21
Student entry	21
Access arrangements and special considerations	21
Assessing your students	22
Awarding and reporting	22
Language of assessment	22
Malpractice and plagiarism	22
Student recruitment	23
Prior learning	23
Guided learning hours	23
Progression	24
Level descriptors	24
Support and training	26
Edexcel support services	26
Training	26
Appendices	27
Appendix 1: Calculators	29
Appendix 2: Wider curriculum	31
Appendix 3: Codes	33
Appendix 4: Normal Distribution Tables	35
Appendix 5: Mapping of the Level 1 Award content to GCSE Mathematics content	37

Appendix 6: Mapping of the Level 1 Award content to GCSE Statistics content	43
Appendix 7: Mapping of the Level 2 Award content to GCSE Mathematics content	47
Appendix 8: Mapping of Level 2 Award content to GCSE Statistics content	55
Appendix 9: Mapping of Level 3 Award content to GCE Mathematics Statistics 1 (S1) unit content	61

Specification at a glance

- These Level 1, Level 2 and Level 3 Awards qualifications consist of a single assessment at each level.
- Students are entered at either level 1, level 2 or level 3.
- Each Award is either pass or unclassified.

Level 1	Paper code: AST10
<ul style="list-style-type: none"> • Externally assessed. • Availability: January and June series. • First assessment: June 2013. 	100% of the Award
<p>Overview of content</p> <ul style="list-style-type: none"> • Collecting and displaying data. • Calculating and interpreting data. • Probability. 	
<p>Overview of assessment</p> <ul style="list-style-type: none"> • The award is assessed through a 1 hour and 30 minutes examination set and marked by Edexcel. • The total number of marks for the paper is 80. • The qualification is awarded at pass or unclassified. 	

Level 2	Paper code: AST20
<ul style="list-style-type: none"> • Externally assessed. • Availability: January and June series. • First assessment: June 2013. 	100% of the Award
<p>Overview of content</p> <ul style="list-style-type: none"> • Collecting and displaying data. • Calculating and interpreting data. • Probability. 	
<p>Overview of assessment</p> <ul style="list-style-type: none"> • The award is assessed through a 1 hour and 30 minutes examination set and marked by Edexcel. • The total number of marks for the paper is 80. • The qualification is awarded at pass or unclassified. 	

Level 3	Paper code: AST30
<ul style="list-style-type: none"> Externally assessed. Availability: January and June series. First assessment: June 2013. 	100% of the Award
<p>Overview of content</p> <ul style="list-style-type: none"> Collecting and displaying data. Calculating and interpreting data. Probability. 	
<p>Overview of assessment</p> <ul style="list-style-type: none"> The award is assessed through a 2 hour examination set and marked by Edexcel. The total number of marks for the paper is 90. The qualification is awarded at pass or unclassified. 	

External assessment

In all examination papers:

- diagrams will not necessarily be drawn to scale and measurements should not be taken from diagrams unless instructions to this effect are given
- each student may be required to use mathematical instruments, eg ruler and protractor
- calculators may be used.

Calculators

Students will be expected to have access to a suitable electronic calculator. Details are given below. Students will be expected to know how to use estimation to evaluate approximations to numerical calculations and to show the appropriate stages of their working out.

The electronic calculator to be used by students attempting the level 1 examination paper should have these functions as a minimum:

- +, −, ×, ÷, memory, brackets.

The electronic calculator to be used by students attempting the level 2 examination paper should have these functions as a minimum:

- +, −, ×, ÷, x^2 , \sqrt{x} , memory, brackets

The electronic calculator to be used by students attempting the level 3 examination paper should have these functions as a minimum:

- +, −, ×, ÷, x^2 , \sqrt{x} , memory, x^y , $x^{1/y}$, brackets, statistical and reciprocal functions

Calculators with any of the following facilities are prohibited in all examinations:

- databanks; retrieval of text or formulae; QWERTY keyboards; built-in symbolic algebra manipulations; symbolic differentiation or integration.

Qualification content

National Qualifications Framework (NQF)

These qualifications comply with the requirements of the statutory regulation of qualifications in England, Wales and Northern Ireland which are prescribed by the regulatory authorities.

Knowledge, skills and understanding

The Edexcel Level 1, Level 2 and Level 3 Awards in Statistical Methods require students to demonstrate competency in statistical methods, concepts and techniques.

Level 1, Level 2 and Level 3 content contains:

- 1. Data**
- 2. Displaying data**
- 3. Calculating with data**
- 4. Interpreting data**
- 5. Probability**

Assessment overview

- One written paper taken at the end of the course.
- The Level 1 Award:
 - is assessed through a 1 hour and 30 minutes examination set and marked by Edexcel
 - Total number of marks for the paper is 80.
- The Level 2 Award:
 - is assessed through a 1 hour and 30 minutes examination set and marked by Edexcel
 - Total number of marks for the paper is 80.
- The Level 3 Award:
 - is assessed through a 2 hour examination set and marked by Edexcel
 - Total number of marks for the paper is 90.
- Each Award is pass or unclassified.
- Available in January and June.
- First assessment: June 2013.

Edexcel Level 1 Award in Statistical Methods

Overview

Content overview

This qualification contains:

- 1. Data**
- 2. Displaying data**
- 3. Calculating with data**
- 4. Interpreting data**
- 5. Probability**

Level 1

What students need to learn:

Topic	Concepts and skills
1. Data	<ol style="list-style-type: none">1. Understand and use discrete, continuous and categorical data2. Design and use simple data collection sheets for discrete and continuous data, using tallies including grouped frequencies3. Criticise a question for a questionnaire4. Understand reliability (including the significance of the number of trials)
2. Displaying data	<ol style="list-style-type: none">1. Draw pictograms, bar charts, line graphs, dual bar charts, two-way tables, pie charts, simple time-series graphs and scatter graphs2. Identify simple misuse of visual representations
3. Calculating with data	<ol style="list-style-type: none">1. Find totals, mean, mode, median and range for lists of data2. Find range and mode from a stem and leaf diagram
4. Interpreting data	<ol style="list-style-type: none">1. Read and interpret data presented in tables2. Interpret pictograms, bar charts, line graphs, dual bar charts, two-way tables, pie charts, simple time-series graphs, and scatter graphs3. Find totals and modes from frequency tables or diagrams4. Describe correlation in scatter graphs5. Identify trend in time-series graphs6. Compare data using frequencies, totals, mean, median, mode and range7. Make comparisons and predictions from data and representations of data

Topic	Concepts and skills
5. Probability	<ol style="list-style-type: none">1. Use and interpret a probability scale2. Write down theoretical/experimental probabilities ($\frac{1}{n}$ and $\frac{a}{n}$)3. Estimate probabilities from practical situations4. Add two probabilities (including $1 - p$)5. List outcomes in theoretical and practical situations

Edexcel Level 2 Award in Statistical Methods

Overview

Content overview

This qualification contains:

- 1. Data**
- 2. Displaying data**
- 3. Calculating with data**
- 4. Interpreting data**
- 5. Probability**

All level 1 content is assumed knowledge and can be tested at level 2.

Level 2

What students need to learn:

All level 1 content is assumed knowledge and can be tested at level 2.

Topic	Concepts and skills
1. Data	<ol style="list-style-type: none">1 Classify discrete, continuous and categorical data2 Recognise the difference between a sample and a population and give a simple reason for sampling3 Design a question for a questionnaire4 Identify possible sources of bias in sampling methods5 Calculate a stratified sample using one category
2. Displaying data	<ol style="list-style-type: none">1. Draw composite bar charts, two-way tables and time-series graphs with or without moving averages, ordered and unordered stem and leaf diagrams, complete grouped frequency tables, frequency polygons, cumulative frequency diagrams, box plots, histograms (equal class interval) and sample space diagrams2. Identify misuse of visual representations
3. Calculating with data	<ol style="list-style-type: none">1. Calculate means for grouped and ungrouped data2. Find the median, quartiles and interquartile ranges for grouped and ungrouped data3. Calculate moving averages, combined means and fixed base index numbers4. Calculate means and standard deviation5. Understand and use summation notation in statistical calculations

Topic	Concepts and skills
4. Interpreting data	<ol style="list-style-type: none"> 1. Interpret and compare composite bar charts, frequency polygons, scatter diagrams, cumulative frequency diagrams and box plots, histograms with equal class intervals, and sample space diagrams. 2. Find the modal class interval from a frequency table or diagram 3. Find the class interval which contains the median 4. Identify outliers 5. Draw lines of best fit on scatter graphs and trend lines by eye with or without mean point 6. Identify and describe skew 7. Compare data using interquartile range, skew and standard deviation 8. Make comparisons and predictions from data and representations of data and describe trend 9. Interpret and compare moving averages and fixed base index numbers
5. Probability	<ol style="list-style-type: none"> 1. Compare theoretical and experimental probabilities 2. Add two or more probabilities (including $1 - p$) 3. Use sample space diagrams to calculate probabilities 4. Use probability to estimate outcomes 5. Multiply probabilities using tree diagrams

Edexcel Level 3 Award in Statistical Methods

Overview

Content overview

This qualification contains:

- 1. Data**
- 2. Displaying data**
- 3. Calculating with data**
- 4. Interpreting data**
- 5. Probability**

All level 2 content is assumed knowledge and can be tested at level 3.

Level 3

What students need to learn:

All level 2 content is assumed knowledge and can be tested at level 3.

Topic	Concepts and skills
1. Data	<ol style="list-style-type: none">1. Understand and explain census, population, sampling frame, discrete, continuous, categorical, qualitative, quantitative, primary and secondary data2. Calculate a stratified sample using two categories3. Use Peterson's capture and recapture method to estimate the size of populations
2. Displaying data	<ol style="list-style-type: none">1. Draw back-to-back stem and leaf diagrams, box plots (with outliers) and generated from cumulative frequency graphs, histograms (unequal class intervals), sketch normal distributions and Venn diagrams
3. Calculating with data	<ol style="list-style-type: none">1. Calculate geometric means, mean seasonal variation and moving base index numbers2. Calculate means and standard deviations for grouped and ungrouped data, including using summation notation3. Use $LQ - 1.5 \times IQR$ and $UQ + 1.5 \times IQR$ to identify outliers4. Calculate measures of correlation including Spearman's coefficient of rank correlation and Product-moment correlation coefficient (PMCC)5. Calculate variances S_{xx}, S_{yy} and S_{xy} from given information [NB Questions will state the expected formulae used to calculate variance: typically$S_{xx} = \sum x^2 - \frac{1}{n} \left(\sum x \right)^2$ or equivalent6. Calculate standardised scores

Topic	Concepts and skills
4. Interpreting data	<ol style="list-style-type: none"> 1. Compare histograms and normal distributions 2. Identify and describe correlation in scatter graphs and interpret measures of correlation 3. Identify trend and seasonality in time-series graphs (including moving averages) 4. Interpret and compare data using frequencies, totals, mean/median/mode/range, interquartile range, skew and standard deviation and standardised scores 5. Interpret and compare geometric means and chain base index numbers 6. Interpret back to back stem and leaf diagrams, box plots with outliers, venn diagrams, and data from a variety of representations to solve a problem
5. Probability	<ol style="list-style-type: none"> 1. Use probability and relative frequency to estimate outcomes or make predictions 2. Use sample space and Venn diagrams to calculate probabilities 3. Multiply and add probabilities using tree diagrams 4. Understand mutually exclusive and independent events, that $P(A \text{ or } B) = P(A) + P(B)$ 5. Use $P(A \text{ and } B) = P(A) \times P(B)$ for independent events A and B $P(A \text{ or } B) = P(A \cup B)$ $= P(A) + P(B) - P(A \cap B)$ 6. Find conditional probabilities and use $P(A B) = \frac{P(A \cap B)}{P(B)}$ 7. Identify and calculate binomial probabilities 8. Find probabilities using standard normal distribution tables

Assessment

Assessment summary

Level 1**Paper code: AST10**

- One written examination paper.
- The paper is assessed through a 1 hour and 30 minute examination, set and marked by Edexcel.
- The total number of marks for the paper is 80.
- The qualification is awarded at pass or unclassified.

Level 2**Paper code: AST20**

- One written examination paper.
- The paper is assessed through a 1 hour and 30 minute examination, set and marked by Edexcel.
- The total number of marks for the paper is 80.
- The qualification is awarded pass or unclassified.

Level 3**Paper code: AST30**

- One written examination paper.
- The paper is assessed through a 2 hour examination, set and marked by Edexcel.
- The total number of marks for the paper is 90.
- The qualification is awarded pass or unclassified.

Assessment Objectives and weightings

Level 1	% in Award
AO1: Demonstrate knowledge, understanding and skills in collecting and representing data	25%–35%
AO2: Demonstrate understanding, knowledge, and skills in performing statistical calculations	15%–25%
AO3: Demonstrate understanding, knowledge, and skills in interpreting and discussing data	20%–30%
AO4: Demonstrate understanding, knowledge, and skills in probability	20%–30%
TOTAL	100%

Level 2	% in Award
AO1: Demonstrate knowledge, understanding and skills in collecting and representing data	25%–35%
AO2: Demonstrate understanding, knowledge, and skills in performing statistical calculations	25%–35%
AO3: Demonstrate understanding, knowledge, and skills in interpreting and discussing data	15%–25%
AO4: Demonstrate understanding, knowledge, and skills in probability	15%–25%
TOTAL	100%

Level 3	% in Award
AO1: Demonstrate knowledge, understanding and skills in collecting and representing data	20%–30%
AO2: Demonstrate understanding, knowledge, and skills in performing statistical calculations	25%–35%
AO3: Demonstrate understanding, knowledge, and skills in interpreting and discussing data	10%–20%
AO4: Demonstrate understanding, knowledge, and skills in probability	25%–35%
TOTAL	100%

Relationship of assessment objectives to papers

Paper number	Assessment objective				
	A01	A02	A03	A04	Total for A01, A02 and A03 and A04
Level 1	25-35%	15-25%	20-30%	20-30%	100%
Level 2	25-35%	25-35%	15-25%	15-25%	100%
Level 3	20-30%	25-35%	10-20%	25-35%	100%

Entering your students for assessment

Student entry

Students are entered at either level 1, level 2 or level 3. Details of how to enter students for this qualification can be found in Edexcel's *Information Manual*, copies of which (in CD format) are sent to all active Edexcel centres. The information can also be found on Edexcel's website: www.edexcel.com

Access arrangements and special considerations

Edexcel's policy on access arrangements and special considerations for GCE, GCSE, International GCSE, and Entry Level qualifications aims to enhance access to the qualifications for students with disabilities and other difficulties without compromising the assessment of skills, knowledge, understanding or competence.

The access arrangements and special arrangements for these qualifications will comply with this policy.

Please see the Edexcel website (www.edexcel.com/sfc) for:

- the Joint Council for Qualifications (JCQ) policy Access Arrangements, Reasonable Adjustments and Special Considerations 2010-2011
- the forms to submit for requests for access arrangements and special considerations
- dates for submission of the forms.

Requests for access arrangements and special considerations must be addressed to:

Special Requirements
Edexcel
One90 High Holborn
London WC1V 7BH

Assessing your students

The first assessment opportunity for these qualifications will take place in the June 2013 series and in each January and June series thereafter for the lifetime of the qualifications.

Your students' assessment opportunities

All papers	June 2013	January 2014	June 2014	January 2015
Level 1, Level 2 and Level 3	✓	✓	✓	✓

Awarding and reporting

The awarding and certification processes for these qualifications will comply with the current GCSE/GCE Code of Practice, which is published by the Office of Qualifications and Examinations Regulation (Ofqual). The Level 1, Level 2 and Level 3 Awards qualifications will be pass only.

The first certification opportunity for the Edexcel Level 1, Level 2 and Level 3 Awards in Statistical Methods will be June 2013.

Students whose level of achievement is below the minimum judged by Edexcel to be of sufficient standard to be recorded on a certificate will receive an unclassified (U) result.

Language of assessment

Assessment of this qualification will be available in English only. Assessment materials will be published in English only and all work submitted for examination must be produced in English.

Malpractice and plagiarism

For up-to-date advice on malpractice and plagiarism, please refer to the JCQ's *Suspected Malpractice in Examinations: Policies and Procedures* document on the JCQ website: www.jcq.org.uk.

Student recruitment

Edexcel's access policy concerning recruitment to our qualifications is that:

- they must be available to anyone who is capable of reaching the required standard
- they must be free from barriers that restrict access and progression
- equal opportunities exist for all students.

Prior learning

For Level 1 and Level 2, these qualifications build on the content, knowledge and skills developed in the Key Stage 3 Programme of Study for Mathematics as defined by the National Curriculum Orders for England.

For Level 3, this qualification builds on the content, knowledge and skills taught as part of GCSE mathematics.

Guided learning hours

The number of guided learning hours (GLH) required for these qualifications is 60-70 GLH.

These qualifications can be co-taught as part of other mathematics programmes, so the delivery time allocated may be more or less than this, according to delivery plans and individual learner needs.

Progression

At Level 1 and Level 2, these qualifications support progression to:

- GCSE in Mathematics
- GCSE in Statistics
- further level 2 qualifications in numerate disciplines, such as the sciences and geography
- further education or employment where statistical skills are required.

At Level 3, this qualification supports progression to:

- GCE AS and A Level Mathematics
- further level 3 qualifications in numerate disciplines, such as psychology and geography.
- further education or employment where statistical skills are required.

Level descriptors

The following level descriptors indicate the level of attainment characteristic of the given level. They give a general indication of the required learning outcomes at each specified level. The descriptors should be interpreted in relation to the content outlined in the specification; they are not designed to define that content. The level awarded will depend in practice upon the extent to which the candidate has met the Assessment Objectives overall. Shortcomings in some aspects of the examination may be balanced by better performance in others.

Level 1

Candidates understand and use the mean of discrete data. They choose suitable methods to represent data. They compare two simple distributions using the range and one of the mode, median or mean. They interpret graphs and diagrams, including pie charts, and draw conclusions. They understand and use the probability scale from 0 to 1. Candidates make and justify estimates of probability by selecting and using a method based on equally likely outcomes or on experimental evidence as appropriate. They understand that different outcomes may result from repeating an experiment.

Level 2

Candidates understand sampling and design questions for questionnaires. They construct and interpret frequency diagrams. They determine the modal class and estimate the mean, median of a set of grouped data, selecting the statistic most appropriate to a line of enquiry. They use measures of average and range with associated frequency polygons, as appropriate, to compare distributions and make inferences. They use and understand moving averages, cumulative frequency, stem and leaf diagrams, index numbers, probability tree diagrams and sample space diagrams. Candidates understand relative frequency as an estimate of probability and use this to compare outcomes of experiments.

Level 3

Candidates are increasingly sophisticated in their handling of data. They use stratified sampling, histograms with unequal class intervals, back-to-back stem and leaf diagrams, outliers, seasonal variation and chain base index numbers. They calculate standard deviation, geometric means, Spearman's coefficient of rank correlation and product moment correlation coefficient. They use Venn Diagrams and the Normal distribution.

Candidates interpret and construct histograms. They recognise when and how to work with probabilities associated with independent and mutually exclusive events and they find conditional probabilities.

Support and training

Edexcel support services

Edexcel has a wide range of support services to help you implement this qualification successfully.

ResultsPlus – ResultsPlus is an application launched by Edexcel to help subject teachers, senior management teams, and students by providing detailed analysis of examination performance. Reports that compare performance between subjects, classes, your centre and similar centres can be generated in 'one-click'. Skills maps that show performance according to the specification topic being tested are available for some subjects. For further information about which subjects will be analysed through ResultsPlus, and for information on how to access and use the service, please visit www.edexcel.com/resultsplus.

Ask the Expert – To make it easier for you to raise a query with us online, we have merged our **Ask Edexcel** and **Ask the Expert** services.

There is now one easy-to-use web query form that will allow you to ask any question about the delivery or teaching of Edexcel qualifications. You'll get a personal response, from one of our administrative or teaching experts, sent to the email address you provide.

We'll also be doing lots of work to improve the quantity and quality of information in our FAQ database, so you'll be able find answers to many questions you might have by searching before you submit the question to us.

Examzone – The Examzone site is aimed at students sitting external examinations and gives information on revision, advice from examiners and guidance on results, including remarking, resitting and progression opportunities. Further services for students – many of which will also be of interest to parents – will be available in the near future. Links to this site can be found on the main homepage at www.examzone.co.uk.

Training

A programme of professional development and training courses, covering various aspects of the specification and examination, will be arranged by Edexcel. Full details can be obtained from our website: www.edexcel.com

Appendices

Appendix 1: Calculators	29
Appendix 2: Wider curriculum	31
Appendix 3: Codes	33
Appendix 4: Normal Distribution Tables	35
Appendix 5: Mapping of the Level 1 Award content to GCSE Mathematics content	37
Appendix 6: Mapping of the Level 1 Award content to GCSE Statistics content	43
Appendix 7: Mapping of the Level 2 Award content to GCSE Mathematics content	47
Appendix 8: Mapping of Level 2 Award content to GCSE Statistics content	55
Appendix 9: Mapping of Level 3 Award content to GCE Mathematics Statistics 1 (S1) unit content	61

Appendix 1: Calculators

The range of functions on calculators is increasing all the time. Current models can be used to answer questions on a number of topics, including fractions. It would clearly be unfair if sophisticated calculators gave candidates an advantage in the examination.

In addition to ensuring fairness to candidates, another of our aims as examiners is to encourage good classroom practice. Appropriate and efficient use of calculators is desirable but reliance on them at the expense of understanding and learning mathematical techniques is not.

Appendix 2: Wider curriculum

Signposting and development suggestions

Issue	Paper	Opportunities for development
Spiritual	All papers	<p>These qualifications will enable centres to provide courses in mathematics that will allow students to discriminate between truth and falsehood. As students explore mathematical models of the real world there will be many naturally arising moral and cultural issues, environmental and health and safety considerations and aspects of European developments for discussion, for example:</p> <ul style="list-style-type: none"> • use and abuse of statistics in the media • financial and business mathematics • how mathematics is used to communicate climate change • cultural and historical roots of mathematics • use of mathematics in cultural symbols and patterns.
Moral	All papers	
Ethical	All papers	
Social	All papers	
Legislative	All papers	
Economic	All papers	
Cultural	All papers	
Sustainable	All papers	
Health and safety	All papers	
European initiatives	All papers	

Appendix 3: Codes

Type of code	Use of code	Code number
National Qualifications Framework (NQF) codes	<p>Each qualification title is allocated a National Qualifications Framework (NQF) code.</p> <p>The National Qualifications Framework (NQF) code is known as a Qualification Number (QN). This is the code that features in the DfE Funding Schedule, Section 96, and is to be used for all qualification funding purposes. The QN is the number that will appear on the student's final certification documentation.</p>	<p>The QNs for the qualifications in this publication are:</p> <p>Level 1: 600/7262/3 Level 2: 600/7264/7 Level 3: 600/7266/0</p>
Cash-in codes	<p>The cash-in code is used as an entry code to aggregate the student's scores to obtain the overall grade for the qualification. Centres will need to use the entry codes only when entering students for their qualification.</p>	<p>Level 1: AST10 Level 2: AST20 Level 3: AST30</p>
Entry codes	<p>The entry codes are used to:</p> <ul style="list-style-type: none"> enter a student for assessment aggregate the student's paper scores to obtain the overall grade for the qualification. 	<p>Please refer to the <i>Information Manual</i>, available on the Edexcel website.</p>

Appendix 4: Normal Distribution Tables

These tables are included in the paper for the Level 3 Award in Statistical Methods.

THE NORMAL DISTRIBUTION FUNCTION

The function tabulated below is $\Phi(z)$, defined as $\Phi(z) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^z e^{-\frac{1}{2}t^2} dt$.

z	$\Phi(z)$								
0.00	0.5000	0.50	0.6915	1.00	0.8413	1.50	0.9332	2.00	0.9772
0.01	0.5040	0.51	0.6950	1.01	0.8438	1.51	0.9345	2.02	0.9783
0.02	0.5080	0.52	0.6985	1.02	0.8461	1.52	0.9357	2.04	0.9793
0.03	0.5120	0.53	0.7019	1.03	0.8485	1.53	0.9370	2.06	0.9803
0.04	0.5160	0.54	0.7054	1.04	0.8508	1.54	0.9382	2.08	0.9812
0.05	0.5199	0.55	0.7088	1.05	0.8531	1.55	0.9394	2.10	0.9821
0.06	0.5239	0.56	0.7123	1.06	0.8554	1.56	0.9406	2.12	0.9830
0.07	0.5279	0.57	0.7157	1.07	0.8577	1.57	0.9418	2.14	0.9838
0.08	0.5319	0.58	0.7190	1.08	0.8599	1.58	0.9429	2.16	0.9846
0.09	0.5359	0.59	0.7224	1.09	0.8621	1.59	0.9441	2.18	0.9854
0.10	0.5398	0.60	0.7257	1.10	0.8643	1.60	0.9452	2.20	0.9861
0.11	0.5438	0.61	0.7291	1.11	0.8665	1.61	0.9463	2.22	0.9868
0.12	0.5478	0.62	0.7324	1.12	0.8686	1.62	0.9474	2.24	0.9875
0.13	0.5517	0.63	0.7357	1.13	0.8708	1.63	0.9484	2.26	0.9881
0.14	0.5557	0.64	0.7389	1.14	0.8729	1.64	0.9495	2.28	0.9887
0.15	0.5596	0.65	0.7422	1.15	0.8749	1.65	0.9505	2.30	0.9893
0.16	0.5636	0.66	0.7454	1.16	0.8770	1.66	0.9515	2.32	0.9898
0.17	0.5675	0.67	0.7486	1.17	0.8790	1.67	0.9525	2.34	0.9904
0.18	0.5714	0.68	0.7517	1.18	0.8810	1.68	0.9535	2.36	0.9909
0.19	0.5753	0.69	0.7549	1.19	0.8830	1.69	0.9545	2.38	0.9913
0.20	0.5793	0.70	0.7580	1.20	0.8849	1.70	0.9554	2.40	0.9918
0.21	0.5832	0.71	0.7611	1.21	0.8869	1.71	0.9564	2.42	0.9922
0.22	0.5871	0.72	0.7642	1.22	0.8888	1.72	0.9573	2.44	0.9927
0.23	0.5910	0.73	0.7673	1.23	0.8907	1.73	0.9582	2.46	0.9931

z	$\Phi(z)$								
0.24	0.5948	0.74	0.7704	1.24	0.8925	1.74	0.9591	2.48	0.9934
0.25	0.5987	0.75	0.7734	1.25	0.8944	1.75	0.9599	2.50	0.9938
0.26	0.6026	0.76	0.7764	1.26	0.8962	1.76	0.9608	2.55	0.9946
0.27	0.6064	0.77	0.7794	1.27	0.8980	1.77	0.9616	2.60	0.9953
0.28	0.6103	0.78	0.7823	1.28	0.8997	1.78	0.9625	2.65	0.9960
0.29	0.6141	0.79	0.7852	1.29	0.9015	1.79	0.9633	2.70	0.9965
0.30	0.6179	0.80	0.7881	1.30	0.9032	1.80	0.9641	2.75	0.9970
0.31	0.6217	0.81	0.7910	1.31	0.9049	1.81	0.9649	2.80	0.9974
0.32	0.6255	0.82	0.7939	1.32	0.9066	1.82	0.9656	2.85	0.9978
0.33	0.6293	0.83	0.7967	1.33	0.9082	1.83	0.9664	2.90	0.9981
0.34	0.6331	0.84	0.7995	1.34	0.9099	1.84	0.9671	2.95	0.9984
0.35	0.6368	0.85	0.8023	1.35	0.9115	1.85	0.9678	3.00	0.9987
0.36	0.6406	0.86	0.8051	1.36	0.9131	1.86	0.9686	3.05	0.9989
0.37	0.6443	0.87	0.8078	1.37	0.9147	1.87	0.9693	3.10	0.9990
0.38	0.6480	0.88	0.8106	1.38	0.9162	1.88	0.9699	3.15	0.9992
0.39	0.6517	0.89	0.8133	1.39	0.9177	1.89	0.9706	3.20	0.9993
0.40	0.6554	0.90	0.8159	1.40	0.9192	1.90	0.9713	3.25	0.9994
0.41	0.6591	0.91	0.8186	1.41	0.9207	1.91	0.9719	3.30	0.9995
0.42	0.6628	0.92	0.8212	1.42	0.9222	1.92	0.9726	3.35	0.9996
0.43	0.6664	0.93	0.8238	1.43	0.9236	1.93	0.9732	3.40	0.9997
0.44	0.6700	0.94	0.8264	1.44	0.9251	1.94	0.9738	3.50	0.9998
0.45	0.6736	0.95	0.8289	1.45	0.9265	1.95	0.9744	3.60	0.9998
0.46	0.6772	0.96	0.8315	1.46	0.9279	1.96	0.9750	3.70	0.9999
0.47	0.6808	0.97	0.8340	1.47	0.9292	1.97	0.9756	3.80	0.9999
0.48	0.6844	0.98	0.8365	1.48	0.9306	1.98	0.9761	3.90	1.0000
0.49	0.6879	0.99	0.8389	1.49	0.9319	1.99	0.9767	4.00	1.0000
0.50	0.6915	1.00	0.8413	1.50	0.9332	2.00	0.9772		

Appendix 5: Mapping of the Level 1 Award content to GCSE Mathematics content

Progression opportunities are shown in green

Higher tier GCSE content is shown in bold

Level 1 Award in Statistical Methods		GCSE Mathematics – Statistics content	
Topic	Concepts and skills	Ref	Content descriptor
1. Data	1. Understand and use discrete, continuous and categorical data	SP d	Design data-collection sheets distinguishing between different types of data
	2. Design and use simple data collection sheets for discrete and continuous data, using tallies including grouped frequencies		
	3. Criticise a question for a questionnaire	SP c	Design an experiment or survey
	4. Understand reliability (including the significance of the number of trials)	SP b	Identify possible sources of bias
			Concepts and skills
			<ul style="list-style-type: none"> Design and use data-collection sheets for grouped, discrete and continuous data Sort, classify and tabulate data and discrete or continuous quantitative data Group discrete and continuous data into class intervals of equal width
			<ul style="list-style-type: none"> Criticise questions for a questionnaire Identify which primary data they need to collect and in what format, including grouped data Consider fairness Understand sample and population Design a question for a questionnaire
			<ul style="list-style-type: none"> Understand how sources of data may be biased Discuss how data relates to a problem, identify possible sources of bias and plan to minimise it Understand how different sample sizes may affect the reliability of conclusions drawn

Level 1 Award in Statistical Methods		GCSE Mathematics – Statistics content		
Topic	Concepts and skills	Ref	Content descriptor	Concepts and skills
2. Displaying Data	1. Draw pictograms, bar charts, line graphs, dual bar charts, two-way tables, pie charts, simple time-series graphs and scatter graphs	SP g	Produce charts and diagrams for various data types	<ul style="list-style-type: none"> Produce: Pictograms, composite bar charts, comparative and dual bar charts, pie charts, histograms with equal class intervals, frequency diagrams for grouped discrete data, line graphs, scatter graphs, frequency polygons for grouped data, ordered stem and leaf diagrams
	2. Identify simple misuse of visual representations	SP h		
3. Calculating with data	1. Find totals, mean, mode, median and range for lists of data	SP h	Calculate median, mean, range, mode and modal class	<ul style="list-style-type: none"> Calculate: mean, mode, median, range, modal class, interval containing the median Estimate the mean of grouped data using the mid-interval value Find the median for large data sets with grouped data Estimate the mean for large data sets with grouped data
	2. Find range and mode from a stem and leaf diagram	SP i	Interpret a wide range of graphs and diagrams and draw conclusions	<ul style="list-style-type: none"> Find the range, mode, median and greatest and least values from stem and leaf diagrams

Level 1 Award in Statistical Methods		GCSE Mathematics – Statistics content		
Topic	Concepts and skills	Ref	Content descriptor	Concepts and skills
4. Interpreting Data	1. Read and interpret data presented in tables	SP e	Extract data from printed tables and lists	<ul style="list-style-type: none"> Extract data from lists and tables
	2. Interpret pictograms, bar charts, line graphs, dual bar charts, two-way tables, pie charts, simple time-series graphs, and scatter graphs	SP i	Interpret a wide range of graphs and diagrams and draw conclusions	<ul style="list-style-type: none"> Interpret: composite bar charts, comparative and dual bar charts, pie charts, stem and leaf diagrams, scatter graphs, frequency polygons
	3. Find totals and modes from frequency tables or diagrams	SP i	Interpret a wide range of graphs and diagrams and draw conclusions	<ul style="list-style-type: none"> From pictograms, bar charts, line graphs, frequency polygons, frequency diagrams and histograms with equal class intervals: read off frequency values, calculate total population, find greatest and least values
	4. Describe correlation in scatter graphs	SP k	Recognise correlation and draw and/or use lines of best fit by eye, understanding what these represent	<ul style="list-style-type: none"> Draw lines of best fit by eye, understanding what these represent Distinguish between positive, negative and zero correlation using lines of best fit Use a line of best fit to predict values of one variable given values of the other variable Interpret scatter graphs in terms of the relationship between two variables Interpret correlation in terms of the problem Understand that correlation does not imply causality

Level 1 Award in Statistical Methods		GCSE Mathematics – Statistics content		
Topic	Concepts and skills	Ref	Content descriptor	Concepts and skills
4. Interpreting Data (<i>continued</i>)	5. Identify trend in time-series graphs			
	6. Compare data using frequencies, totals, mean, median, mode and range	SP I	Compare distributions and make inferences	<ul style="list-style-type: none"> • Compare distributions and make inferences, using the shapes of distributions and measures of average and spread, including median and quartiles • Compare the mean and range of two distributions, or median and interquartile range, as appropriate
	7. Make comparisons and predictions from data and representations of data	SP I	Compare distributions and make inferences	<ul style="list-style-type: none"> • Compare distributions and make inferences, using the shapes of distributions and measures of average and spread, including median and quartiles • Compare the mean and range of two distributions, or median and interquartile range, as appropriate • Use dual or comparative bar charts to compare distributions • Compare the measures of spread between a pair of box plots/cumulative frequency graphs
		SP K	Recognise correlation and draw and/or use lines of best fit by eye, understanding what these represent	<ul style="list-style-type: none"> • Use a line of best fit, or otherwise, to predict values of one variable given values of the other variable

Level 1 Award in Statistical Methods		GCSE Mathematics – Statistics content		
Topic	Concepts and skills	Ref	Content descriptor	Concepts and skills
5. Probability	1. Use and interpret a probability scale	SP m	Understand and use the vocabulary of probability and probability scale	<ul style="list-style-type: none"> Distinguish between events which are; impossible, unlikely, even chance, likely, and certain to occur Mark events and/or probabilities on a probability scale of 0 to 1 Write probabilities in words, fractions, decimals and percentages
	2. Write down theoretical/experimental probabilities ($\frac{1}{n}$ and $\frac{a}{n}$)	SP n	Understand and use estimates or measures of probability from theoretical models (including equally likely outcomes), or from relative frequency	<ul style="list-style-type: none"> Find the probability of an event happening using theoretical probability Find the probability of an event happening using relative frequency Estimate the number of times an event will occur, given the probability and the number of trials Use theoretical models to include outcomes using dice, spinners, coins
	3. Estimate probabilities from practical situations			
	4. Add two probabilities (including $1 - p$)	SP p	Identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1	<ul style="list-style-type: none"> Add simple probabilities Identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1 Use $1 - p$ as the probability of an event not occurring where p is the probability of the event occurring Find a missing probability from a list or table
	5. List outcomes in theoretical and practical situations	SP o	List all outcomes for single events, and for two successive events, in a systematic way and derive relative probabilities	<ul style="list-style-type: none"> List all outcomes for single events systematically List all outcomes for two successive events systematically Use and draw sample space diagrams

Appendix 6: Mapping of the Level 1 Award content to GCSE Statistics content

Progression opportunities are shown in green
Higher tier GCSE content is shown in bold

Level 1 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
1. Data	1. Understand and use discrete, continuous and categorical data	Types of data	<ul style="list-style-type: none"> Recognise the difference between discrete and continuous data
	2. Design and use simple data collection sheets for discrete and continuous data, using tallies including grouped frequencies	Collecting data Processing, representing and analysing data	<ul style="list-style-type: none"> Design and use efficient and effective data capture sheets and methods of recording data Construct frequency tables by tallying raw data where appropriate
	3. Criticise a question for a questionnaire		
	4. Understand reliability (including the significance of the number of trials)	Collecting data	<ul style="list-style-type: none"> Understand the aspects of accuracy, reliability, relevance and bias as related to secondary data. <i>Questioning the reliability of secondary sources and data is expected.</i> Understand and use measures of probability from a theoretical perspective and from a limiting frequency or experimental approach. <i>Formal definition and notation of a limit will not be required but terminology such as 'as the number of trials increases' is expected.</i>

Level 1 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
2. Displaying data	1. Draw pictograms, bar charts, line graphs, dual bar charts, two-way tables, pie charts, simple time-series graphs and scatter graphs	Diagrams and representations	<ul style="list-style-type: none"> • Draw, use and understand: <ul style="list-style-type: none"> • pictograms, bar charts, multiple or composite bar charts and pie charts for qualitative, quantitative and discrete data • vertical line (stick) graphs for discrete data • for continuous data: pie charts, histograms with equal class intervals, frequency diagrams, cumulative frequency diagrams, population pyramids • stem and leaf diagrams for discrete and continuous data, scatter diagrams for bivariate data, line graphs and time series, choropleth maps (shading) • Understand the distinction between well-presented and poorly presented data. <i>Poorly presented data can be misleading.</i> • The potential for visual misuse, by omission or misrepresentation. <i>Knowledge of causes such as unrepresentative scales is expected.</i>
	2. Identify simple misuse of visual representations	Diagrams and representations	<ul style="list-style-type: none"> • Work out and use the mean, mode and median of raw data presented as a list • Work out and use the range for data presented in a list or frequency distribution
3. Calculating with data	1. Find totals, mean, mode, median and range for lists of data	Measures of dispersion	<ul style="list-style-type: none"> • Draw, use and understand stem and leaf diagrams for discrete and continuous data
	2. Find range and mode from a stem and leaf diagram	Diagrams and representations	

Level 1 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
4. Interpreting Data	1. Read and interpret data presented in tables	Processing, representing and analysing data	<ul style="list-style-type: none"> Read and interpret data presented in tabular or graphical form
	2. Interpret pictograms, bar charts, line graphs, dual bar charts, two-way tables, pie charts, simple time-series graphs, and scatter graphs	Reasoning, interpreting and discussing results	<ul style="list-style-type: none"> Interpret all forms of statistical tables, diagrams and graphs
	3. Find totals and modes from frequency tables or diagrams	Measures of central tendency	<ul style="list-style-type: none"> Work out the mean, mode and median for discrete data presented as a frequency distribution. <i>Graphical and other methods for the median are expected.</i>
	4. Describe correlation in scatter graphs	Scatter diagrams and correlation	<ul style="list-style-type: none"> Recognise positive, negative and zero linear correlation by inspection Interpret correlation as a measure of the strength of the association between two variables. <i>The use of words such as 'weak' or 'strong' are expected.</i>
	5. Identify trend in time-series graphs	Time series	<ul style="list-style-type: none"> Plot points as a time series; draw a trend line by eye and use it to make a prediction Calculate and use appropriate moving averages Identify and discuss the significance of seasonal variation by inspecting time series graphs
	6. Compare data using frequencies, totals, mean, median, mode and range	Measures of dispersion	<ul style="list-style-type: none"> Use an appropriate measure of central tendency, together with range, quartiles, interquartile range and percentiles to compare distributions of data.

Level 1 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
4. Interpreting Data (continued)	7. Make comparisons and predictions from data and representations of data	Reasoning, interpreting and discussing results	<ul style="list-style-type: none"> Compare distributions of data and make comparisons using measures of central tendency, measures of dispersion and percentiles. <i>The shapes of distributions and graphs may be used.</i>
		Scatter diagrams and correlation	<ul style="list-style-type: none"> Use interpolation and extrapolation and understand the pitfalls. <i>Particularly the problem of extrapolating beyond the range.</i>
		Time series	<ul style="list-style-type: none"> Plot points as a time series; draw a trend line by eye and use it to make a prediction
		Reasoning, interpreting and discussing results	<ul style="list-style-type: none"> Make predictions. The use of a trend line by eye, drawing or formula will be expected.

Appendix 7: Mapping of the Level 2 Award content to GCSE Mathematics content

Progression opportunities are shown in green
Higher tier GCSE content is shown in bold

Level 2 Award in Statistical Methods		GCSE Mathematics – Statistics content		
Topic	Concepts and skills	Ref	Content descriptor	Concepts and skills
1. Data	1. Classify discrete, continuous and categorical data		<i>Assumed Knowledge</i>	
	2. Recognise the difference between a sample and a population and give a simple reason for sampling	SP c	Design an experiment or survey	<ul style="list-style-type: none"> Understand sample and population
	3. Design a question for a questionnaire	SP c	Design an experiment or survey	<ul style="list-style-type: none"> Identify which primary data they need to collect and in what format, including grouped data Consider fairness Design a question for a questionnaire Critique questions for a questionnaire
	4. Identify possible sources of bias in sampling methods	SP b	Identify possible sources of bias	<ul style="list-style-type: none"> Understand how sources of data may be biased Discuss how data relates to a problem, identify possible sources of bias and plan to minimise it Understand how different sample sizes may affect the reliability of conclusions drawn
	5. Calculate a stratified sample using one category	SP c	Design an experiment or survey	<ul style="list-style-type: none"> Design an experiment or survey Select and justify a sampling scheme and a method to investigate a population, including random and stratified sampling Use stratified sampling

Level 2 Award in Statistical Methods		GCSE Mathematics – Statistics content	
Topic	Concepts and skills	Ref	Content descriptor
2. Displaying data	1. Draw composite bar charts, two-way tables and time-series graphs with or without moving averages, ordered and unordered stem and leaf diagrams, complete grouped frequency tables, frequency polygons, cumulative frequency diagrams, box plots, histograms (equal class interval) and sample space diagrams	SP 9	Produce charts and diagrams for various data types
	1. Draw composite bar charts, two-way tables and time-series graphs with or without moving averages, stem and leaf diagrams, frequency polygons, cumulative frequency diagrams, box plots, histograms (equal class interval) and sample space diagrams	SP 9	Produce charts and diagrams for various data types
	2. Identify misuse of visual representations		
			<ul style="list-style-type: none"> Produce: Composite bar charts, comparative and dual bar charts, pie charts, histograms with equal class intervals, frequency diagrams for grouped discrete data, scatter graphs, line graphs, frequency polygons for grouped data, grouped frequency tables for continuous data, ordered stem and leaf diagrams, cumulative frequency tables, cumulative frequency graphs, box plots from raw data and when given quartiles and median, histograms from class intervals with unequal width Use and understand frequency density
			<ul style="list-style-type: none"> Produce: Composite bar charts, comparative and dual bar charts, pie charts, histograms with equal class intervals, frequency diagrams for grouped discrete data, scatter graphs, line graphs, frequency polygons for grouped data, grouped frequency tables for continuous data, ordered stem and leaf diagrams, cumulative frequency tables, cumulative frequency graphs, box plots from raw data and when given quartiles and median, histograms from class intervals with unequal width Use and understand frequency density

Level 2 Award in Statistical Methods		GCSE Mathematics – Statistics content		
Topic	Concepts and skills	Ref	Content descriptor	Concepts and skills
3. Calculating with data	1. Calculate means for grouped and ungrouped data	SP h	Calculate median, mean, range, mode and modal class	<ul style="list-style-type: none"> Calculate: mean, mode, median, range, modal class, interval containing the median Estimate the mean of grouped data using the mid-interval value Estimate the mean for large data sets with grouped data
	2. Find the median, quartiles and interquartile ranges for grouped and ungrouped data	SP h	Calculate median, mean, range, quartiles and interquartile range , mode and modal class	<ul style="list-style-type: none"> Calculate: mean, mode, median, range, modal class, the interval which contains the median Find the median, quartiles and interquartile range for large data sets with grouped data Use cumulative frequency graphs to find median, quartiles and interquartile range Interpret box plots to find median, quartiles, range and interquartile range
	3. Calculate moving averages, combined means and fixed base index numbers			
	4. Calculate means and standard deviation			
	5. Understand and use summation notation in statistical calculations			

Level 2 Award in Statistical Methods		GCSE Mathematics – Statistics content	
Topic	Concepts and skills	Ref	Content descriptor
4. Interpreting data	1. Interpret and compare composite bar charts, frequency polygons, scatter diagrams, cumulative frequency diagrams and box plots, histograms with equal class intervals, and sample space diagrams.	SP i	Interpret a wide range of graphs and diagrams and draw conclusions
	2. Find the modal class interval from a frequency table or diagram	SP h	Calculate median, mean, range, quartiles and interquartile range , mode and modal class
	3. Find the class interval which contains the median	SP h	Calculate median, mean, range, quartiles and interquartile range , mode and modal class
	4. Identify outliers		
	5. Draw lines of best fit on scatter graphs and trend lines by eye with or without mean point	SP k	Recognise correlation and draw and/or use lines of best fit by eye, understanding what these represent
			Concepts and skills <ul style="list-style-type: none"> Interpret: composite bar charts, comparative and dual bar charts, pie charts, stem and leaf diagrams, scatter graphs, frequency polygons, box plots, cumulative frequency diagrams, histograms Calculate: mean, mode, median, range, modal class, the interval which contains the median Calculate: mean, mode, median, range, modal class, the interval which contains the median
			Concepts and skills <ul style="list-style-type: none"> Draw lines of best fit by eye, understanding what these represent Distinguish between positive, negative and zero correlation using lines of best fit Use a line of best fit to predict values of one variable given values of the other variable Interpret scatter graphs in terms of the relationship between two variables Interpret correlation in terms of the problem Understand that correlation does not imply causality

Level 2 Award in Statistical Methods		GCSE Mathematics – Statistics content		
Topic	Concepts and skills	Ref	Content descriptor	Concepts and skills
4. Interpreting data (continued)	6. Identify and describe skew			
	7. Compare data using interquartile range, skew and standard deviation	SP I	Compare distributions and make inferences	<ul style="list-style-type: none"> Compare distributions and make inferences, using the shapes of distributions and measures of average and spread, including median and quartiles Compare the mean and range of two distributions, or median and interquartile range, as appropriate
	8. Make comparisons and predictions from data and representations of data and describe trend	SP I	Compare distributions and make inferences	<ul style="list-style-type: none"> Compare distributions and make inferences, using the shapes of distributions and measures of average and spread, including median and quartiles Compare the mean and range of two distributions, or median and interquartile range, as appropriate Use dual or comparative bar charts to compare distributions Compare the measures of spread between a pair of box plots/cumulative frequency graphs
	9. Interpret and compare moving averages and fixed base index numbers	SP k	Recognise correlation and draw and/or use lines of best fit by eye, understanding what these represent	<ul style="list-style-type: none"> Use a line of best fit, or otherwise, to predict values of one variable given values of the other variable

Level 2 Award in Statistical Methods		GCSE Mathematics – Statistics content	
Topic	Concepts and skills	Ref	Content descriptor
5. Probability	1. Compare theoretical and experimental probabilities	SP s	Compare experimental data and theoretical probabilities
	2. Add two or more probabilities (including $1 - p$)	SP p	Identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1
	3. Use sample space diagrams to calculate probabilities	SP o	List all outcomes for single events, and for two successive events, in a systematic way and derive relative probabilities
	4. Use probability to estimate outcomes	SP n	Understand and use estimates or measures of probability from theoretical models (including equally likely outcomes), or from relative frequency
			<p>Concepts and skills</p> <ul style="list-style-type: none"> Compare experimental data and theoretical probabilities Add simple probabilities Identify different mutually exclusive outcomes and know that the sum of the probabilities of all these outcomes is 1 Use $1 - p$ as the probability of an event not occurring where p is the probability of the event occurring Find a missing probability from a list or table List all outcomes for single events, and for two successive events, systematically Use and draw sample space diagrams Understand and use estimates or measures of probability, including relative frequency Use theoretical models to include outcomes using dice, spinners, coins Find the probability of successive events, such as several throws of a single dice Estimate the number of times an event will occur, given the probability and the number of trials

Level 2 Award in Statistical Methods		GCSE Mathematics – Statistics content	
Topic	Concepts and skills	Ref	Content descriptor
5. Probability (continued)	5. Multiply probabilities using tree diagrams	SP r	Use tree diagrams to represent outcomes of compound events, recognising when events are independent
		SP q	<p>Know when to add or multiply two probabilities: when A and B are mutually exclusive, then the probability of A or B occurring is $P(A) + P(B)$, whereas when A and B are independent events, the probability of A and B occurring is $P(A) \times P(B)$</p>
			<p>Concepts and skills</p> <ul style="list-style-type: none"> Draw a probability tree diagram based on given information (no more than 3 branches per event) Use a tree diagram to calculate conditional probability
			<ul style="list-style-type: none"> Understand conditional probabilities Understand selection with or without replacement

Appendix 8: Mapping of Level 2 Award content to GCSE Statistics content

Progression opportunities are shown in green

Higher tier GCSE content is shown in bold

Level 2 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
1. Data	Classify discrete, continuous and categorical data	Types of data	<ul style="list-style-type: none"> Recognise the difference between discrete and continuous data
	Recognise the difference between a sample and a population and give a simple reason for sampling	Population and sampling	<ul style="list-style-type: none"> Understand the meaning of the term population. Understand the reasons for sampling and that sample data is used to estimate values in the population. <i>Reasons to include time and efficiency, and impossibility of reaching the whole population in many circumstances.</i>
	Design a question for a questionnaire	Collecting data	<ul style="list-style-type: none"> Collect or obtain data by observation, surveys, experiments (including controlled experiments), counting, data logging, questionnaires and measurement. <i>Writing improved or good questions for a questionnaire is expected.</i>
	Identify possible sources of bias in sampling methods	Population and sampling	<ul style="list-style-type: none"> Have a basic idea of the concept of bias, how it might occur in a sampling procedure and how it might be minimised Understand the strengths and weaknesses of various sampling methods, including bias, influences and convenience
	Calculate a stratified sample using one category	Population and sampling	<ul style="list-style-type: none"> Be able to select a simple random sample or a stratified sample by more than one category as a method of investigating a population. <i>An appreciation of an appropriate sample size is expected, as is the ability to make a random selection or sample from a population using calculators or computers.</i>

Level 2 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
2. Displaying data	1.1. Draw composite bar charts, two-way tables and time-series graphs with or without moving averages, ordered and unordered stem and leaf diagrams, complete grouped frequency tables, frequency polygons, cumulative frequency diagrams, box plots, histograms (equal class interval) and sample space diagrams	Diagrams and representations	<ul style="list-style-type: none"> Draw, use and understand: pictograms, bar charts, multiple or composite bar charts and pie charts for qualitative, quantitative and discrete data and comparative pie charts with area proportional to frequency, vertical line (stick) graphs for discrete data and cumulative frequency step polygons, for continuous data: pie charts, histograms with equal class intervals, frequency diagrams, cumulative frequency diagrams, population pyramids, histograms with unequal class intervals and the concept of frequency density, stem and leaf diagrams for discrete and continuous data, scatter diagrams for bivariate data, line graphs and time series, choropleth maps (shading)
	2. Identify misuse of visual representations	Diagrams and representations	<ul style="list-style-type: none"> The distinction between well-presented and poorly presented data. <i>Poorly presented data can be misleading, for example, 3-D angled pie charts and 3-D pie charts with slices pulled out, scales that do not start at 0</i> The potential for visual misuse, by omission or misrepresentation. <i>Knowledge of causes such as unrepresentative scales or other measures is expected.</i>

Level 2 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
3. Calculating with data	1. Calculate means for grouped and ungrouped data	Measures of central tendency	<ul style="list-style-type: none"> • Work out and use the mean, mode and median of raw data presented as a list • Work out the mean, mode and median for discrete data presented as a frequency distribution • Work out and use estimates for the mean and median of grouped frequency distributions for discrete or continuous data
	2. Find the median, quartiles and interquartile ranges for grouped and ungrouped data	Measures of central tendency	<ul style="list-style-type: none"> • Work out the quartiles, percentiles and interquartile range for discrete and continuous data presented either as a list, frequency table or grouped frequency table
	3. Calculate moving averages, combined means and fixed base index numbers	Time series	<ul style="list-style-type: none"> • Calculate and use appropriate moving averages. <i>Up to and including a 5-point moving average.</i>
	4. Calculate means and standard deviation	Further summary statistics	<ul style="list-style-type: none"> • Chain base index numbers. Used to calculate the annual percentage change.
	5. Understand and use summation notation in statistical calculations	Measures of dispersion	<ul style="list-style-type: none"> • Calculate and use variance and standard deviation

Level 2 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
4. Interpreting data	1. Interpret and compare composite bar charts, frequency polygons, scatter diagrams, cumulative frequency diagrams and box plots, histograms with equal class intervals, and sample space diagrams.	Reasoning, interpreting and discussing results	<ul style="list-style-type: none"> Interpret all forms of statistical tables, diagrams and graphs
	2. Find the modal class interval from a frequency table or diagram	Measures of dispersion	<ul style="list-style-type: none"> Construct, interpret and use box plots. <i>The use of box plots includes comparisons.</i>
	3. Find the class interval which contains the median	Measures of central tendency	<ul style="list-style-type: none"> Identify the modal class interval for grouped frequency distributions for discrete or continuous data. <i>Frequency distributions with equal class intervals only.</i>
	4. Identify outliers	Measures of dispersion	<ul style="list-style-type: none"> Work out and use estimates for the mean and median of grouped frequency distributions for discrete or continuous data. <i>Graphical and other methods for the median are expected.</i> Understand how to discover errors in data and recognise data that does not fit a general trend or pattern, including outliers. Analytical definition of an outlier will be required. Formally identify outliers Formally identify outliers using quartiles. Dealing with outliers is expected.
	5. Draw lines of best fit on scatter graphs and trend lines by eye with or without mean point	Reasoning, interpreting and discussing results Scatter diagrams and correlation	<ul style="list-style-type: none"> Fit a line of best fit passing through (\bar{x}, \bar{y}) to the points on a scatter diagram, by eye may be required

Level 2 Award in Statistical Methods		GCSE Statistics content		
Topic	Concepts and skills	Content descriptor	Concepts and skills	
4. Interpreting data (continued)	6. Identify and describe skew	Diagrams and representations	<ul style="list-style-type: none"> Understand simple properties of the shape of distributions of data including symmetry, positive and negative skew 	
	7. Compare data using interquartile range, skew and standard deviation	Measures of dispersion	<ul style="list-style-type: none"> Use an appropriate measure of central tendency together with range, quartiles, interquartile range, percentiles, deciles, interpercentile range, variance and standard deviation to compare distributions of data 	
	8. Make comparisons and predictions from data and representations of data and describe trend	Reasoning, interpreting and discussing results	<ul style="list-style-type: none"> Compare distributions of data and make comparisons using measures of central tendency, measures of dispersion and percentiles. <i>The shapes of distributions and graphs may be used.</i> 	<ul style="list-style-type: none"> Use interpolation and extrapolation and understand the pitfalls. <i>Particularly the problem of extrapolating beyond the range.</i>
			Scatter diagrams and correlation	
	9. Interpret and compare moving averages and fixed base index numbers	Reasoning, interpreting and discussing results	Time series	<ul style="list-style-type: none"> Plot points as a time series; draw a trend line by eye and use it to make a prediction
			<ul style="list-style-type: none"> Make predictions. The use of a trend line by eye, drawing or formula will be expected. Explore connections and look for and examine relationships between variables, including fitting the equation to a line of best fit or trend line. For example, height and weight, age and depreciation of a car, GNP and mortality in infants. 	<ul style="list-style-type: none"> Interpretations of gradient and intercept are expected.

Level 2 Award in Statistical Methods		GCSE Statistics content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
5. Probability	1. Compare theoretical and experimental probabilities	Probability	<ul style="list-style-type: none"> Understand and use measures of probability from a theoretical perspective and from a limiting frequency or experimental approach Compare expected frequencies and actual frequencies
	2. Add two or more probabilities (including $1 - p$)	Probability	<ul style="list-style-type: none"> Understand the terms mutually exclusive and exhaustive and understand the addition law $P(A \text{ or } B) = P(A) + P(B)$ for two mutually exclusive events Know, for mutually exclusive outcomes, that the sum of the probabilities is 1 and in particular the probability of something not happening is 1 minus the probability of it happening If $P(A) = p$ then $P(\text{not } A) = 1 - p$
	3. Use sample space diagrams to calculate probabilities	Probability	<ul style="list-style-type: none"> Produce, understand and use a sample space. <i>Listing all outcomes of single events and two successive events, in a systematic way is expected.</i>
	4. Use probability to estimate outcomes		
	5. Multiply probabilities using tree diagrams		<ul style="list-style-type: none"> Draw and use tree diagrams and probability tree diagrams for independent events and conditional cases. <i>Listing all possible joint or compound outcomes with and without replacement for up to three outcomes and three sets of branches.</i>

Appendix 9: Mapping of Level 3 Award content to GCE Mathematics Statistics 1 (S1) unit content

Progression opportunities are shown in green

Higher tier GCSE content is shown in bold

Level 3 Award in Statistical Methods		S1 content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
1. Data	1. Understand and explain census, population, sampling frame, discrete, continuous, categorical, qualitative, quantitative, primary and secondary data		
	2. Calculate a stratified sample using two categories		
	3. Use Peterson's capture and recapture method to estimate the size of populations		

Level 3 Award in Statistical Methods		S1 content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
2. Displaying Data	1. Draw back-to-back stem and leaf diagrams, box plots (with outliers) and generated from cumulative frequency graphs, histograms (unequal class intervals), sketch normal distributions and Venn diagrams	2. Representation and summary of data	<ul style="list-style-type: none"> Histograms, stem and leaf diagrams, box plots. Using histograms, stem and leaf diagrams and box plots to compare distributions. Back-to-back stem and leaf diagrams may be required. Drawing of histograms, stem and leaf diagrams or box plots will not be the direct focus of examination questions.
		3. Probability	<ul style="list-style-type: none"> Sum and product laws. Use of tree diagrams and Venn diagrams. Sampling with and without replacement.
		6. The Normal distribution	<ul style="list-style-type: none"> The Normal distribution including the mean, variance and use of tables of the cumulative distribution function. Knowledge of the shape and the symmetry of the distribution is required. Knowledge of the probability density function is not required. Derivation of the mean, variance and cumulative distribution function is not required. Interpolation is not necessary. Questions may involve the solution of simultaneous equations.

Level 3 Award in Statistical Methods		S1 content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
3. Calculating with data	1. Calculate geometric means, mean seasonal variation and moving base index numbers		
	2. Calculate means and standard deviations for grouped and ungrouped data, including using summation notation	2. Representation and summary of data	<ul style="list-style-type: none"> Measures of location – mean, median, mode. Calculation of mean, mode and median, range and interquartile range will not be the direct focus of examination questions. Students will be expected to draw simple inferences and give interpretations to measures of location and dispersion. Significance tests will not be expected. Data may be discrete, continuous, grouped or ungrouped. Understanding and use of coding.
	3. Use $LQ - 1.5 \times IQR$ and $UQ + 1.5 \times IQR$ to identify outliers	2. Representation and summary of data	<ul style="list-style-type: none"> Skewness. Concepts of outliers. Students may be asked to illustrate the location of outliers on a box plot. Any rule to identify outliers will be specified in the question.
	4. Calculate measures of correlation including Spearman's coefficient of rank correlation and Product-moment correlation coefficient (PMCC)	4. Correlation and regression	<ul style="list-style-type: none"> The product moment correlation coefficient, its use, interpretation and limitations. Derivations and tests of significance will not be required.

Level 3 Award in Statistical Methods		S1 content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
3. Calculating with data (continued)	5. Calculate variances S_{xx} , S_{yy} and S_{xy}	4. Correlation and regression	<ul style="list-style-type: none"> The product moment correlation coefficient, its use, interpretation and limitations. Derivations and tests of significance will not be required.
	6. Calculate standardised scores		
4. Interpreting Data	1. Compare histograms and normal distributions	2. Representation and summary of data	<ul style="list-style-type: none"> Histograms, stem and leaf diagrams, box plots. Using histograms, stem and leaf diagrams and box plots to compare distributions. Back-to-back stem and leaf diagrams may be required. Drawing of histograms, stem and leaf diagrams or box plots will not be the direct focus of examination questions.
	2. Identify and describe correlation in scatter graphs and interpret measures of correlation	4. Correlation and regression	<ul style="list-style-type: none"> Scatter diagrams. Linear regression. Calculation of the equation of a linear regression line using the method of least squares. Students may be required to draw this regression line on a scatter diagram.
	3. Identify trend and seasonality in time-series graphs (including moving averages)		

Level 3 Award in Statistical Methods		S1 content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
4. Interpreting Data (continued)	4. Interpret and compare data using frequencies, totals, mean/median/mode/range, interquartile range, skew and standard deviation and standardised scores	2. Representation and summary of data	<ul style="list-style-type: none"> Measures of location — mean, median, mode. Calculation of mean, mode and median, range and interquartile range will not be the direct focus of examination questions. Students will be expected to draw simple inferences and give interpretations to measures of location and dispersion. Significance tests will not be expected. Data may be discrete, continuous, grouped or ungrouped. Understanding and use of coding.
	5. Interpret and compare geometric means and chain base index numbers		
	6. Interpret back to back stem and leaf diagrams, box plots with outliers and venn diagrams, and data from a variety of representations to solve a problem		

Level 3 Award in Statistical Methods		S1 content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
5. Probability	1. Use probability and relative frequency to estimate outcomes or make predictions	3. Probability	<ul style="list-style-type: none"> Elementary probability.
	2. Use sample space and Venn diagrams to calculate probabilities	3. Probability	<ul style="list-style-type: none"> Sample space. Sum and product laws. Use of tree diagrams and Venn diagrams. Sampling with and without replacement.
	3. Multiply and add probabilities using tree diagrams	3. Probability	<ul style="list-style-type: none"> Sum and product laws. Use of tree diagrams and Venn diagrams. Sampling with and without replacement.
	4. Understand mutually exclusive and independent events	3. Probability	<ul style="list-style-type: none"> Exclusive and complementary events.
	5. Use $P(A \text{ and } B) = P(A) \times P(B)$, $P(A \text{ or } B) = P(A) + P(B) - P(A \cap B)$	3. Probability	<ul style="list-style-type: none"> Understanding and use of: <ul style="list-style-type: none"> $P(A \cap B) = P(A) P(B)$ $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
	6. Find conditional probabilities and use $P(A B) = \frac{P(A \cap B)}{P(B)}$	3. Probability	<ul style="list-style-type: none"> Conditional probability. Understanding and use of: <ul style="list-style-type: none"> $P(A \cap B) = P(A) P(B A)$
	7. Identify and calculate binomial probabilities		

Level 3 Award in Statistical Methods		S1 content	
Topic	Concepts and skills	Content descriptor	Concepts and skills
5. Probability (continued)	8. Find probabilities using standard normal distribution tables		<ul style="list-style-type: none"> The Normal distribution including the mean, variance and use of tables of the cumulative distribution function. Knowledge of the shape and the symmetry of the distribution is required. Knowledge of the probability density function is not required. Derivation of the mean, variance and cumulative distribution function is not required. Interpolation is not necessary. Questions may involve the solution of simultaneous equations.

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