

HIGHER		
Ref	1MA1 (2015)	1ST0 Spec refs (2017)
5 Probability		
P1	record, describe and analyse the frequency of outcomes of probability experiments using tables and frequency trees [S]	3p.01 Use collected data to calculate estimates of probabilities. [S]
P2	apply ideas of randomness, fairness and equally likely events to calculate expected outcomes of multiple future experiments [S]	3p.01 Use collected data to calculate estimates of probabilities. [S] 3p.03 Use probability values to calculate expected frequency of a specified characteristic within a sample or population. [S] 3p.05 Compare experimental data with theoretical predictions to identify possible bias within the experimental design. [S]
P3	relate relative expected frequencies to theoretical probability, using appropriate language and the 0-1 probability scale [S]	3p.01 Use collected data to calculate estimates of probabilities. [S] 3p.02 Compare the probability of different possible outcomes using the 0-1 or 0-100% scale and statements of likelihood. [S]
P4	apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one [S]	3p.07 Use two-way tables, sample space diagrams, tree diagrams and Venn diagrams to represent all the different outcomes possible for at most three events. [U]
P5	understand that empirical unbiased samples tend towards theoretical probability distributions, with increasing sample size [U]	3p.05 Compare experimental data with theoretical predictions to identify possible bias within the experimental design. [S] 3p.06 Recognise that experimental probability will tend towards theoretical probability as the number of trials increases when all variables are random. [S]
P6	enumerate sets and combinations of sets systematically, using tables, grids, Venn diagrams [S] and tree diagrams [U]	3p.07 Use two-way tables, sample space diagrams, tree diagrams and Venn diagrams to represent all the different outcomes possible for at most three events. [U]
P7	construct theoretical possibility spaces for single and combined experiments with equally likely outcomes and use these to calculate theoretical probabilities [S]	3p.07 Use ... sample space diagrams ... to represent all the different outcomes possible for at most three events. [U]
P8	calculate the probability of independent and dependent combined events, including using tree diagrams and other representations, and know the underlying assumptions [U]	3p.07 Use two-way tables, sample space diagrams, tree diagrams and Venn diagrams to represent all the different outcomes possible for at most three events. [U] 3p.08 Know and apply the formal notation for independent events. [U]
P9	calculate and interpret conditional probabilities through representation using expected frequencies with two-way tables, tree diagrams and Venn diagrams [B]	3p.07 Use two-way tables, ... tree diagrams and Venn diagrams to represent all the different outcomes possible for at most three events. [U] 3p.09 Know and apply the formal notation for conditional probability. [U]
6 Statistics		

S1	infer properties of populations or distributions from a sample, while knowing the limitations of sampling [U]	<p>1b.04 Know the difference between primary and secondary data. [S]</p> <p>1c.01 Know the difference between population ... and sample.</p> <p>1c.04 1. Know appropriate sampling techniques in the context of the problem to avoid bias; 2. Understand random ... sampling. [S]</p> <p>1c.05 Know the key features of a simple random sample [S] and demonstrate understanding of how different techniques, both physical and electronic, are used to select random members from a population: including, but not limited to, dice, cards, random number lists, and calculator functions. [U]</p> <p>1c.06 Use stratification and know when this is appropriate before sampling takes place. [U]</p> <p>1d.01 a. Know that data can be collected from different sources: ... census, population and sampling.</p> <p>1d.02 Know the importance of reliability and validity with regard to collected data. [U]</p> <p>2h.03 Know that sample size has an impact on reliability and replication. [S]</p> <p>2h.01 Use calculated or given summary statistical data to make estimates of population characteristics. ... [U]</p> <p>2h.02 Apply Petersen capture recapture formula to calculate an estimate of the size of a population. [B]</p>
S2	interpret and construct tables, charts and diagrams, including frequency tables, bar charts, pie charts and pictograms for categorical data, vertical line charts for ungrouped discrete numerical data [S], tables and line graphs for time series data [U] and know their appropriate use [S]	<p>1b.01 Know and apply terms used to describe different types of data ... [S] quantitative, qualitative, [U] categorical, ordinal, discrete, ... ungrouped, ... [S] ...</p> <p>2a.01 Represent data sets pictorially using calculated key values as necessary, and interpret and compare data sets displayed pictorially: tabulation, tally, pictogram, [S] pie chart, stem and leaf diagram, Venn diagram. [U]</p> <p>2a.03 Represent data sets graphically using calculated key values as necessary, and interpret and compare data sets displayed graphically: bar charts, line graphs, time series, ... [S] bar line (vertical line) charts, ... [U]</p> <p>2a.05 Justify the appropriate format and produce accurate visualisation of data. [S]</p> <p>2a.08 Select [S] and justify [U] appropriate form of representation [S] with regard to the nature of data. [U]</p> <p>2f.01 Identify trends in data through inspection [S] ...</p>

S3	construct and interpret diagrams for grouped discrete data and continuous data, i.e. histograms with equal and unequal class intervals and cumulative frequency graphs, and know their appropriate use [B]	<p>1b.01 Know and apply terms used to describe different types of data ... discrete, continuous, ... grouped, [S] ...</p> <p>1b.02 Know the advantages and implications of merging data into more general categories, and of grouping numerical data into class intervals. [S]</p> <p>2a.03 Represent data sets graphically using calculated key values as necessary, and interpret and compare data sets displayed graphically: ... frequency polygons, cumulative frequency (discrete and grouped) charts, histograms (equal class width) ... [U]</p> <p>2a.04 Calculate and use frequency density to draw histograms (unequal class width), and interpret and compare data sets displayed in histograms (unequal class width). [B]</p> <p>2a.05 Justify the appropriate format and produce accurate visualisation of data. [S]</p> <p>2a.08 Select [S] and justify [U] appropriate form of representation [S] with regard to the nature of data. [U]</p>
S4	<p>interpret, analyse and compare the distributions of data sets from univariate empirical distributions through:</p> <ul style="list-style-type: none"> • appropriate graphical representation involving discrete, continuous and grouped data, [S] including box plots [B] • appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers [S], quartiles and inter-quartile range [B]) 	<p>2a.01 Represent data sets pictorially using calculated key values as necessary, and interpret and compare data sets displayed pictorially: tabulation, tally, pictogram, [S] pie chart, stem and leaf diagram, ... [U]</p> <p>2a.02 Interpret and compare data sets displayed pictorially: [S] ... comparative 2D representations, ... [B]</p> <p>2a.03 Represent data sets graphically using calculated key values as necessary, and interpret and compare data sets displayed graphically: bar charts, line graphs, time series, scatter diagrams, [S] bar line (vertical line) charts, frequency polygons, cumulative frequency (discrete and grouped) charts, histograms (equal class width), and box plots. [U]</p> <p>2a.04 Calculate and use frequency density to draw histograms (unequal class width), and interpret and compare data sets displayed in histograms (unequal class width). [B]</p> <p>2a.07 Extract and calculate corresponding values in order to compare data sets that have been presented in different formats ... [S]</p> <p>2b.01 Calculate averages for discrete and grouped data: mode, median, arithmetic mean [S] ...</p> <p>2b.02 Justify the rationale for selecting appropriate types of average in context. [U]</p> <p>2b.03 Compare different data sets using appropriate calculated or given measure of central tendency: mode, modal class, median and mean. [S]</p> <p>2c.01 Calculate different measures of spread: range, quartiles, [S] interquartile range (IQR), ... [U] ...</p> <p>2c.02 Identify outliers by inspection [S] ...</p> <p>2c.03 Comment on outliers with reference to the original data. [U]</p> <p>2c.04 Compare different data sets using appropriate calculated or given measure of spread: range, interquartile range (IQR), ...</p> <p>2c.05 Use calculated or given median and interquartile range (IQR) [U] ... [B] to</p>

S5	apply statistics to describe a population [S]	<p>2b.03 Compare different data sets using appropriate calculated or given measure of central tendency: mode, modal class, median and mean. [S]</p> <p>2c.05 Use calculated or given median and interquartile range (IQR) [U] ... [B] to compare data samples and to compare sample data with population data. [U]</p> <p>2h.01 Use calculated or given summary statistical data to make estimates of population characteristics. ... [U]</p>
S6	use and interpret scatter graphs of bivariate data; recognise correlation [S] and know that it does not indicate causation; draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends while knowing the dangers of so doing [U]	<p>2e.01 Know and apply vocabulary of correlation: positive, negative, zero, causation, association, interpolation and extrapolation. [S]</p> <p>2e.02 Describe and make comparisons of correlation by inspection: strong or weak. [S]</p> <p>2e.03 Know that correlation does not necessarily imply causation [U] ...</p> <p>2e.04 Determine line of best fit by eye, [S] ...</p>

Notes
1ST0 guidance column includes reference to exhaustive events.
1ST0 requires general addition law.

1ST0 explicitly includes many aspects of sampling, many of which are implicit to 'knowing the limitations of sampling' in 1MA1.
(There is a greater emphasis on these in 1ST0.)

Awareness of capabilities of statistical software in producing graphs etc

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Includes extracting information from spreadsheets and graphs produced by software.

1STO includes extra calculations such as for outliers, percentiles and standard deviation.

Includes e.g. selecting the appropriate values from those produced by statistical software.
Including appropriate choice of axes.