

Year 12 Maths - Pure and Statistics Teacher

Topic		Ref	Ex
Algebraic Manipulation, Indices and Surds	Algebraic manipulation <ul style="list-style-type: none"> • Multiply and divide integer powers. • Expand single brackets and collect like terms. • Expand the product of two or three expressions. • Factorise linear, quadratic and cubic expressions. 	P2.1	P1A P1B P1C
	Indices <ul style="list-style-type: none"> • Understand and be able to use the laws of indices • Evaluate expressions including negative, fractional and zero indices • Understand that fractional indices correspond to roots • Powers of negative bases 	P2.1	P1D
	Surds <ul style="list-style-type: none"> • Be able to use and manipulate surds • Multiplication and division • Difference of squares • Rationalise denominators of the forms $a\sqrt{b}$ and $(a \pm \sqrt{b})$. 	P2.2	P1E P1F
Statistical Sampling	Sampling Terminology <ul style="list-style-type: none"> • Understand and be able to use the terms 'population' and 'sample' • Use samples to make informal inferences about the population. • Describe advantages and disadvantages of sampling compared to census. 	A1.1	A1A
	Sampling Techniques <ul style="list-style-type: none"> • Understand and be able to use sampling techniques <ul style="list-style-type: none"> • Simple random sampling • Stratified sampling • Systematic sampling • Quota sampling • Opportunity (or convenience) sampling • Describe advantages/disadvantages of techniques • Select or critique sampling techniques in the context of solving a statistical problem; • Understand that different samples can lead to different conclusions about the population. 	A1.1	A1A
Data Presentation and Interpretation	Measures of location and variation <ul style="list-style-type: none"> • Calculate measures of central tendency (location) - mean, median and mode; • Calculate measures of variation - standard deviation, variance, range and interpercentile range • Use linear interpolation to calculate percentiles from grouped data. • Be able to interpret and draw inferences from summary statistics. 	A2.3	A2A A2B A2C A2D A2E
	Coding <ul style="list-style-type: none"> • Understand and use coding for both mean and standard deviation calculations. 	A2.3	A2F
Assessment 1			

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Topic		Ref	Ex
Further Algebra	Algebraic Division <ul style="list-style-type: none"> • Cancel factors in algebraic fractions • Divide a polynomial by a linear expression 	P2.6	P7A P7B
	Factor Theorem <ul style="list-style-type: none"> • Know and be able to apply the factor theorem • Use the factor theorem to fully factorise a cubic expression 	P2.6	P7C
	Proof <ul style="list-style-type: none"> • Understand and be able to use the structure of mathematical proof, proceeding from given assumptions through a series of logical steps to a conclusion. • Use the following methods of proof: <ul style="list-style-type: none"> • Proof by deduction • Proof by exhaustion • Disproof by counter example 	P1.1	P7D P7E
Binomial Expansion	<ul style="list-style-type: none"> • Understand and be able to use the binomial expansion of $(a+bx)^n$ for positive integer n • Use Pascal's triangle or factorial notation for expansions • Find an individual coefficient in a binomial expansion • Use a binomial expansion to make approximations 	P4.1	P8A P8B P8C P8D
Data Presentation and Interpretation	Single Variable Data <ul style="list-style-type: none"> • Interpret diagrams for single variable data: <ul style="list-style-type: none"> • Histograms • Frequency polygons • Cumulative frequency diagrams • Box and Whisker plots (including outliers) 	A2.1	A3A A3B A3C A3D
	Bivariate Data <ul style="list-style-type: none"> • Interpret scatter diagrams and regression lines for bivariate data • Recognise the explanatory (independent) and response (dependent) variables • Be able to make predictions using the regression line and understand its limitations (danger of extrapolation) • Identify and interpret correlation, using terms 'positive', 'negative', 'zero', 'strong' and 'weak'. • Understand that correlation does not imply causation 	A2.2	A4A A4B
	Outliers and Cleaning Data <ul style="list-style-type: none"> • Recognise and interpret possible outliers in data sets and statistical diagrams. (Any rule to be used will be specified in the question.) • Select or critique data presentation techniques in the context of a statistical problem. • Clean data, including dealing with missing data, errors and outliers. 	A2.4	A3A
Assessment 2			

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Topic		Ref	Ex
Differentiation	Definition and differentiating polynomials <ul style="list-style-type: none"> • Understand and be able to use the derivative of $f(x)$ as the gradient of the tangent to the graph of $y=f(x)$ at a general point (x,y) • Interpret dy/dx as the rate of change of y with respect to x. • Differentiation from first principles for small positive integer powers of x • Sketch the gradient function for a given curve • Differentiate x^n, for rational values of n, and related constant multiples, sums and differences. Including those that require algebraic manipulation first. • Understand and use the second derivative as the rate of change of gradient. 	P7.1 P7.2	P12A P12B P12C P12D P12E
	Applications of differentiation <ul style="list-style-type: none"> • Use the derivative to solve problems involving gradients, tangents and normal. • Identify increasing and decreasing functions • Find stationary points of functions and determine their nature. 	P7.3	P12F P12G P12H P12I P12J
Trigonometry	Trigonometric Ratios and Graphs <ul style="list-style-type: none"> • Use the definitions of sine, cosine and tangent for all arguments • Sketch the graphs of the sine, cosine and tangent functions • Sketch simple transformations of these graphs 	P5.2	P9E P9F P9G
	Trigonometric Identities and Equations <ul style="list-style-type: none"> • Know and use the relationships: $\tan x = \frac{\sin x}{\cos x} \text{ and } \sin^2 x + \cos^2 x = 1$ • Solve trigonometric equations within a given interval including one of the form: <ul style="list-style-type: none"> • $\sin(x + 70^\circ) = 0.5$ • $3 + 5 \cos 2x = 1$ • $6 \cos^2 x + \sin x - 5 = 0$ • Find multiple solutions in a given range using CAST diagram or graphs 	P5.3 P5.4	P10A P10B P10C P10D P10E P10F
	Sine rule, cosine rules and $\frac{1}{2} AB \sin C$ <ul style="list-style-type: none"> • Be able to use the sine and cosine rules to find missing sides and angles • Find the area of a triangle using $\frac{1}{2} AB \sin C$ 	P5.1	P9A P9B P9C P9D
Assessment 3			

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Topic		Ref	Ex
Probability	<ul style="list-style-type: none"> • Identify mutually exclusive events and use the addition rule. • Identify independent events and use the multiplication rule. • Make use of Venn diagrams and tree diagrams when solving probability problems. • Link to discrete and continuous distributions – probability represents area under a curve for continuous distribution. 	A3.1	P5A P5B P5C P5D
Statistical Distributions	<p>Probability Distributions</p> <ul style="list-style-type: none"> • Understand and be able to use simple, discrete probability distributions (NO mean or variance) • Know and be able to identify the discrete uniform distribution • Calculate probabilities using the binomial distribution • Use a calculator to find individual or cumulative binomial probabilities. 	A4.1	P6A P6B P6C
Hypothesis testing (introduction)	<p>Principles and language of hypothesis testing</p> <ul style="list-style-type: none"> • Understand the language and concept of hypothesis testing, developed through a binomial model • Understand that a sample is used to make an inference about a population • Understand the terms: <ul style="list-style-type: none"> • Null hypothesis H_0 • Alternative hypothesis H_1 • Critical value • Critical region • Significance level • one-tail test • two-tail test • Acceptance region • p-value 	A5.1 A5.2	P7A P7B
Hypothesis testing	<p>Conducting hypothesis testing</p> <ul style="list-style-type: none"> • Find critical values of a binomial distribution using tables or a calculator • Appreciate that the significance level is the probability of incorrectly rejecting the null hypothesis • Be able to calculate the critical region and the p-value • Carry out a one-tailed or two-tailed test for the proportion of the binomial distribution and interpret the results in context. 	A5.1 A5.2	P7C P7D
Assessment 4			