

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
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
Binomial Expansion	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
	<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
Assessment 1			

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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	Probability Distributions <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
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
Assessment 2			

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Topic		Ref	Ex
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: $\tan x = \frac{\sin x}{\cos x}$ 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
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

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Topic		Ref	Ex
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 Understand and use coding for both mean and standard deviation calculations.	A2.3	A2F
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 3			

Year 12 Maths - Pure and Statistics Teacher

Topic		Ref	Ex
Hypothesis testing	Principles and language of hypothesis testing <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
	Conducting hypothesis testing <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
Year 12 Pure Maths Mock			
Functions	The modulus function $y = f(x)$ <ul style="list-style-type: none"> Understand and use the modulus function $y = f(x)$. Sketch graphs of modulus functions of the form $y = f(x)$ or $y = f(x)$. Use graphs to solve equations and inequalities involving the modulus function. 	P2.7	P2A P2E
	Function definition <ul style="list-style-type: none"> Understand mappings and functions Use domain and range to define a function.	P2.8	P2B
	Composite Functions <ul style="list-style-type: none"> Combine two or more functions to make a composite function. Find the domain and range for composite functions.	P2.8	P2C
	Inverse Functions <ul style="list-style-type: none"> Know how to find the inverse of a function both algebraically and graphically. State the domain and range for an inverse function.	P2.8	P2D
	Combining Transformations <ul style="list-style-type: none"> Apply a combination of two (or more) transformations to the same curve. Transform the modulus function $y = f(x) $.	P2.9	P2F P2G

Year 12 Maths - Pure and Statistics Teacher

Topic		Ref	Ex
Start Year 13 Maths Course			
Algebraic manipulation	Using Partial Fractions <ul style="list-style-type: none"> Review of simplifying algebraic fractions Use and apply models that involve quadratic functions, expressing as partial fractions 	P4.1	1B,C,D,E,F
Sequences and Series	Arithmetic Sequences <ul style="list-style-type: none"> Find the nth term of an arithmetic sequence. Understand the difference between a sequence and a series. Prove and use the formula for the sum of the first n terms of an arithmetic series. 	P4.4	P3A P3B
	Geometric Sequences <ul style="list-style-type: none"> Find the nth term of a geometric sequence. Prove and use the formula for the sum of a finite geometric series. Prove and use the formula for the sum to infinity of a convergent geometric series.	P4.5	P3C P3D P3E
	Sigma notation Use and understand sigma \sum notation to describe series	P4.3	P3F
	Recurrence Relations <ul style="list-style-type: none"> Generate sequences from recurrence relations of the form $u_{n+1} = F(u_n)$. Be able to recognise increasing, decreasing and periodic sequences written as a recurrence relation.	P4.2	P3G P3H
	Modelling with Series Model real-life situations with sequences and series.	P4.6	P3I