

Topic	What students need to learn:		
		Content	Guidance
<b>6</b> <b>Chi Squared Tests</b>	6.1	<p><b>Goodness of fit tests and Contingency Tables</b></p> <p>The null and alternative hypotheses.</p> <p>The use of <math>\sum_{i=1}^n \frac{(O_i - E_i)^2}{E_i}</math> as an approximate <math>\chi^2</math> statistic.</p> <p>Degrees of freedom.</p>	<p><b>Applications to include the discrete uniform, binomial, Poisson and geometric distributions.</b></p> <p><b>Lengthy calculations will not be required.</b></p> <p><b>Students will be expected to determine the degrees of freedom when one or more parameters are estimated from the data. Cells should be combined when <math>E_i &lt; 5</math></b></p> <p><b>Students will be expected to obtain p-values from their calculator or use tables to find critical values.</b></p>
<b>7</b> <b>Probability generating functions</b>	7.1	<p>Definitions, derivations and applications.</p> <p>Use of the probability generating function for the negative binomial, geometric, binomial and Poisson distributions.</p>	
	7.2	Use to find the mean and variance.	Proofs of standard results may be required.
	7.3	Probability generating function of the sum of independent random variables.	$G_{X+Y}(t) = G_X(t) \times G_Y(t)$ Derivation is not required.
<b>8</b> <b>Quality of tests</b>	8.1	<p>Type I and Type II errors.</p> <p>Size and Power of Test.</p> <p>The power function.</p>	<p>Calculation of the probability of a Type I or Type II error. Use of Type I and Type II errors and power function to indicate effectiveness of statistical tests.</p> <p>Questions will use any of the distributions in A level Mathematics or A level Further Statistics 1</p>

\*This paper is also the **Paper 4 option 4B** paper and will have the title '*Paper 4, Option 4B: Further Statistics 1*'. Appendix 9, 'Entry codes for optional routes' shows how each optional route incorporates the optional papers.