

What type of questions assess skills at grade C?

At grade C, candidates typically demonstrate competence in the following:

Data analysis and modelling

- ◆ calculating upper and lower fences and subsequent outliers
- ◆ calculating both simple and conditional probabilities
- ◆ calculating expectation and variance from discrete probability distributions
- ◆ calculating probabilities from distributions whose parameters are given
- ◆ using standard laws of expectation and variance on given random variable expressions

Statistical inference

- ◆ identifying a sampling method from its description
- ◆ working with distributions of sample means of normal distributions
- ◆ calculating confidence intervals from z - and t -distributions
- ◆ constructing limits for control charts
- ◆ applying the Western Electric rules to given control charts
- ◆ citing linear regression model assumptions, which are given in the data booklet, and their connection with a residual plot

Hypothesis testing

- ◆ performing any stated hypothesis test using formulae and information contained in the data booklet

This list is not exhaustive but indicates typical areas of competence across a broad range of skills.

What type of questions assess skills at grade A?

Grade-A candidates can synthesise the core procedural methods with underlying assumptions and further-reaching implications arising from the context of the question. They can interpret the given information to make strategic decisions about which method they use. They can adapt their approach to less familiar situations to derive the required information and/or summary statistics.

At grade A, candidates typically demonstrate competence in the following:

Data analysis and modelling

- ◆ interpreting complex set notation
- ◆ correctly determining when to use a multiple of a single random variable or repeated independent occurrences of a random variable
- ◆ using continuity correction

Statistical inference

- ◆ describing in detail how to conduct a given sampling method
- ◆ suggesting improvements to sampling methodology
- ◆ knowing when to use the central limit theorem and the conditions required
- ◆ working with the standard error of the sample proportion
- ◆ working 'backwards' from a given confidence interval to a statistic
- ◆ working 'backwards' from a control chart's limit(s) to an estimated parameter
- ◆ knowing the difference between regressing y on x , and x on y
- ◆ performing a transformation to obtain an improved linear model

Hypothesis testing

- ◆ selecting and justifying which hypothesis test to use
- ◆ stating the underlying assumptions for any hypothesis test and knowing how they might be validated
- ◆ calculating a p value from first principals for a Mann-Whitney test
- ◆ working with the normal approximation for a Wilcoxon signed-rank test or a Mann-Whitney test
- ◆ dealing with tied ranks in a Wilcoxon signed-rank test or a Mann-Whitney test
- ◆ dealing with equal values in a Wilcoxon signed-rank test
- ◆ dealing with small expected frequencies when performing a chi-squared test

This list is not exhaustive but indicates typical skills that are either less procedural, more subtle, or more technically complex.

Where the past paper marking instructions designate a mark as 'appropriate strategy', this is typically a grade-A mark because it requires the candidate to decide on a course of action. If an incorrect strategy is used, a grade-C candidate can still achieve many of the subsequent marks in the question. However, where a marking instruction states 'correct calculation' (or similar) rather than 'appropriate calculation', the only way a candidate can gain that mark is by giving the correct answer; no errors that the candidate carries forward can be accepted.

In Advanced Higher Statistics, grade-A marks are not always preceded by grade-C marks. For example, the assumptions behind performing a hypothesis test could be assessed in part (a) of a question, and then part (b) could require the candidate to perform the test. Grade-C candidates who do not gain all the marks in part (a) can still gain all the marks in part (b).