



CAMBRIDGE ASSESSMENT

## Modelling question difficulty in an A-level Physics examination

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### Abstract

In the UK, there has been a body of research exploring the features of general qualification (e.g. GCSE) examination questions that affect difficulty. This research has suggested how features such as context, graphics and vocabulary may influence question difficulty. In the USA, question difficulty research has used a method known as 'item difficulty modelling'; however, this method has not previously been applied to UK examinations.

Item difficulty modelling is a method that involves statistically modelling the difficulty of examination questions using observable question features that reflect the knowledge, understanding and skills required to answer the questions. The resultant statistical model indicates the amount of variability in question difficulty that can be accounted for by the question features. This model may then be used to explore question validity, support question writing, and predict question difficulty.

This study aimed to use item difficulty modelling to explore the factors influencing question difficulty in a UK multiple choice A-level Physics examination and, consequently, to explore the usefulness of item difficulty modelling in our context. A range of question features thought to reflect the knowledge, understanding and skills required by the A-level Physics examination were coded and used to model the difficulty of the examination questions (as estimated using Rasch). The variability in question difficulty accounted for by the question features was then analysed using multiple linear regression and Rasch Linear Logistic Test Modelling (LLTM).

The conference paper reports on the results of this study, including an evaluation of the item difficulty modelling method.

