

# Consultation on SQA proposal for a revised physics Higher qualification

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An Institute of Physics response to the  
SQA consultation on a revised physics  
Higher qualification

A full list of the Institute's responses and  
submissions to consultations can be found  
at <http://www.iop.org>

25 March 2010

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Scottish Qualifications Authority



Dear Sir/Madam

## Consultation on a revised physics Higher qualification.

The Institute welcomes the opportunity to respond to the SQA's consultation document.

The Institute of Physics is a scientific charity devoted to increasing the practice, understanding and application of physics. It has a worldwide membership of over 36,000 (3,000 in Scotland) and is a leading communicator of physics-related science to all audiences, from specialists through to government and the general public. The Institute of Physics represents its members in Scotland through an active volunteer network and two members of staff based in Scotland.

The attached annex details responses to the questions in the consultation document, drafted by the Education Committee of the IOP in Scotland on behalf of the Institute's Education Board.

If you need any further information on the points raised, please do not hesitate to contact me.

Yours sincerely

A handwritten signature in black ink that reads 'A. McLure'.

**Alison McLure** MInstP FRMetS  
National Officer (Scotland)

## Proposals for revised Physics Higher

### **Introduction**

This response is based on consultations with representatives of the Institute's members, largely via the IOP in Scotland's Education Committee. These representatives were teachers of physics in schools and further education colleges, lecturers in physics in higher education establishments and members working in industry. This response is intended to cover the general points of the proposals. Comments on details in the guidance will be addressed using other fora.

The Institute welcomes the philosophy behind the new proposals overall. In particular, the move towards promoting greater depth of understanding and development of problem solving skills for students is welcomed. The balance between acquiring knowledge and developing skills in the revised Higher is deemed to be about right. In terms of developments for teachers, the increased flexibility allowing teachers to exercise professional judgement and opportunities/encouragement to introduce wider range of teaching and learning strategies are welcomed.

### **Content of revised Higher**

In general, the new content is welcomed by the Institute, especially the inclusion of up to date, potentially inspiring topics, which highlight developments in contemporary physics. However, we have concerns about the potential lack of opportunity for practical work, the low level of mathematical underpinning and the perceived lack of relevance to more engineering oriented students. There is concern that the lack of strong statements on practical work (outside the researching physics section) may result in senior management teams reducing priority for expenditure on equipment in schools for practical work for the students throughout the course as a whole.

The Institute agrees that prior learning, giving a good grounding in physics, is essential for a student to progress successfully to Higher. We realise that it has become unfashionable to "subsume" the content of lower level courses in a course descriptor, perhaps for fear of excluding students who had not completed the lower level courses. However, this can lead to a situation where students, and in some cases their inexperienced teachers, may have unrealistic ideas about the likelihood of success in the Higher course. It is felt that some sort of statement about required prior learning would help to clarify this situation. An example occurs in the 'Equations of Motion' section which addresses the resolution of vectors into components, without having first defined vectors or dealt with their simple addition.

### **Researching Physics Unit**

The Institute is, on the whole, in favour of the principles of the Researching Physics unit. In particular, we welcome the opportunities for students to develop essential life and work skills. There is a feeling that the proposals should prepare students well for the requirements of Advanced Higher and the Scottish Baccalaureate. We hope that these developments will represent a continuation of the skills requirements of National 4/5s.

That said, the Institute has reservations about the practicalities of this unit. Will enough resources be provided by the school to undertake the practical work required? Will there be sufficient guidance/CPD in marking the unit? As with all group work, there will need to be strategies in place for dealing with non-active members of groups. Likewise aspects of plagiarism may need to be considered carefully, especially if about one third of Scotland's Higher physics students are all undertaking the same topic. It is important that the options available for the Researching Physics Unit are regularly updated to reduce the likelihood of outdated applications being used.

### **Assessment**

Again, in principle, the Institute is in favour of the move towards open-ended questions. However, we would like to emphasise that physics logic/mathematical thinking should underpin the questions. We have concerns that some students may be put off by apparently greater emphasis on language skills (this also applies to the Researching Physics Unit), rather than mathematical or logical skills. The Institute is also concerned that it is more difficult to develop objective marking schemes for open-ended work. It will be important to ensure that students are marked on their achievements in physics and understanding rather than as a language exercise. That said, we acknowledge the importance of language skills in physics, especially in terms of logical coherence and lack of ambiguity.

The Institute is concerned that pressure on schools to see that students pass examinations may negate some of the good elements of the revised Higher. In particular, there is concern that the continuing compulsory nature of the National Assessment Bank (NABs) would result in "teaching to the test" rather than giving a good grounding in physics. Also, it is felt that NABs contribute to putting unnecessary additional pressure on pupils.

### **Implementation**

The Institute would like to emphasise the point that, while it favours these proposals in the main, the successful implementation will depend on whether sufficient resources and support are put in place. We have significant concerns about the low levels of funding in science education and that funds for practical equipment, technician support and the Continuing Professional Development, needed to ensure the effective implementation of the new programme, will not be available. We would also like to see good articulation with the Mathematics Higher, so that students have sufficient mathematical skills to be successful in physics.

The Institute believes that it will be essential for provision to be made for a review and refinement of the revised Higher in the short term after implementation. A mechanism should be established to gather and collate feedback from teachers in the light of their experiences in teaching the new programme. This will allow the qualification to maintain its gold standard and to remain up to date.

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**IOP** | Institute of Physics  
In Scotland  
22-26 George Street  
Edinburgh  
EH2 2PQ

Tel: +44 (0) 7917855940  
Email: [alison.mclure@iop.org](mailto:alison.mclure@iop.org)  
Website: <http://www.iopscotland.org>  
Registration No SC040092