

## Physics



This update focuses on the development of Advanced Higher, with information relevant to your subject and details of the support available to you.

Updates regarding National 3 to National 5 and Higher can be found in the 'Updates and Announcements' section of the relevant **subject pages**. I would encourage you to make regular use of our subject pages, where you will find support documents, answers to common questions, and links to other areas of interest. You can also sign up for 'My Alerts', SQA's e-mail update service, that notifies you whenever content you are interested in is added or updated on SQA's website. Visit **[www.sqa.org.uk/myalerts](http://www.sqa.org.uk/myalerts)** to register.

I hope you find the following update helpful, and please contact me if you have any questions.

**Alison Plummer**  
Qualifications Development Manager

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## The Qualifications Development Team

**Alison Plummer**  
Qualifications Development Manager

**John Parker**  
Qualifications Development Consultant

**Judy Wasige**  
Qualifications Development Officer

## Assessment support

Package 1 of Unit assessment support for Advanced Higher is available now from SQA's secure website. You can arrange access to secure materials through your SQA Co-ordinator; these must be stored securely and treated as confidential.

Over the coming year, we will publish the following assessment support materials for Advanced Higher Courses:

<b>January 2015</b>	Course Comparison document Guidance on the use of past papers
<b>February 2015</b>	Specimen Question Paper and Marking Instructions Unit assessment support package 2
<b>March 2015</b>	Coursework information
<b>April 2015</b>	Unit assessment support package 3
<b>December 2015</b>	Exemplar Question Paper and Marking Instructions

## Updates to documents

We will make planned updates to the Advanced Higher documents, following the publication of Advanced Higher Specimen Question Papers, coursework information and Unit assessment support packs. We will also finalise package 1 of Unit assessment support, following the publication of packages 2 and 3.

The schedule for publishing the updated documents is as follows:

<b>April 2015</b>	Mandatory documents (Unit Specifications, Course Specifications and Course Assessment Specifications)
<b>May 2015</b>	Advice and guidance documents (Course and Unit Support Notes) and Unit assessment support packs

These updates are to ensure consistency between the assessment support materials, advice and guidance documents and the documents containing mandatory information.

The Notification of Changes spreadsheet will be updated for Advanced Higher following the publication of any revised documents.

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**Planned changes to Advanced Higher Physics documents:**

<b>Course Specification</b>	Minor changes to wording for consistency with other documents.
<b>Course Assessment Specification</b>	<ul style="list-style-type: none"> <li>• A small number of changes to wording in mandatory content and key area groupings (Rotational Motion and Astrophysics will be made — see Course and Units Support Notes below). Also some wording will be added that is specific to physics.</li> <li>• The Project will be 30 marks and the mark criteria are currently being finalised.</li> </ul>
<b>Unit Specifications:</b> <i>Physics: Rotational Motion and Astrophysics</i> <i>Physics: Quanta and Waves</i> <i>Physics: Electromagnetism</i>	<p><b>Outcome 1</b> Minor changes will be made to wording of Assessment Standards.</p> <p><b>Outcome 2</b></p> <ul style="list-style-type: none"> <li>• Assessment Standard 2.1 will be reworded to ‘Making accurate statements and giving clear descriptions/ explanations’.</li> <li>• Assessment Standards 2.2 and 2.3 will be removed.</li> <li>• Assessment Standard 2.4 will therefore become 2.2.</li> <li>• new Assessment Standard 2.2 — ‘selecting information’ will be removed from problem solving types</li> </ul> <p>Key areas for <i>Physics: Rotational Motion and Astrophysics</i> (only) will be regrouped to kinematic relationships, angular motion, rotational dynamics, gravitation, general relativity, and stellar physics.</p>
<b>Transfer of Evidence — all Units</b>	<ul style="list-style-type: none"> <li>• Both Outcome 1 and Assessment Standard 2. 2 will only need to be achieved once in any of the following Units of this Course: <i>Physics: Rotational Motion and Astrophysics</i>, <i>Physics: Quanta and Waves</i> and <i>Physics: Electromagnetism</i>.</li> <li>• Outcome 1 in the Investigating Physics Unit of this Course will be able to be used as evidence of the achievement of Outcome 1 in the <i>Physics: Rotational Motion and Astrophysics</i>, <i>Physics: Quanta and Waves</i> and <i>Physics: Electromagnetism</i> Units of this Course.</li> </ul>
<b>Course and Unit Support Notes</b>	<p><b><i>Physics: Rotational Motion and Astrophysics</i></b></p> <p>Key areas will be regrouped: kinematic relationships, angular motion, rotational dynamics, gravitation, general relativity and stellar physics.</p> <p>Kinematic relationships:</p> <ul style="list-style-type: none"> <li>• Includes constant or varying acceleration.</li> </ul> <p>Rotational dynamics:</p> <ul style="list-style-type: none"> <li>• Moments of inertia for several familiar shapes: <ul style="list-style-type: none"> <li>— rod about centre — <math>I = \frac{1}{12} ml^2</math></li> <li>— rod about end — <math>I = \frac{1}{3} ml^2</math></li> <li>— disc about centre — <math>I = \frac{1}{2} mr^2</math></li> <li>— sphere about centre — <math>I = \frac{2}{5} mr^2</math></li> </ul> </li> </ul> <p>Gravitation:</p> <ul style="list-style-type: none"> <li>• Variation of period of orbit with distance from centre.</li> </ul>

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### **Physics: Quanta and Waves**

- Introduction to quantum theory:  
Uncertainty principle in terms of location and momentum and in terms of energy and time — Heisenberg.
- Simple harmonic motion:  
Criteria for SHM: fixed equilibrium position and when particle is moved away from fixed equilibrium position its acceleration is proportional to the displacement and acts in the opposite direction to it.
- Car shock absorbers, bridges, bungee cords, trampolines, diving boards, etc. This refers to the damping. The terms 'critical damping' and 'overdamping' could be introduced.

Waves:

- $y = A \sin 2\pi(ft - \frac{x}{\lambda})$        $\phi = \frac{2\pi x}{\lambda}$
- The displacement  $y$  is given by the combination of the particle's transverse SHM and the phase angle between each particle.

Interference:

- Phase change of  $\pi$  at boundary  
Conditions for two light beams to be coherent.  
Optical path difference =  $n \times$  geometrical path difference.
- Conditions for constructive and destructive interference in terms of optical path difference and potential boundary phase changes.

Polarisation:

- Observe, using a polariser and analyser, the difference between linearly (plane) polarised and unpolarised waves.
- Liquid crystal displays, computer/phone displays, polarising lenses, optical activity, photoelasticity and saccharimetry.
- Stress analysis of Perspex models of structures.

### **Physics: Electromagnetism**

Circuits:

- $t = RC$  and an understanding of the definition of time constant as the time to increase the charge stored by 63% of the difference between initial charge and full charge, or the time taken to discharge the capacitor to 37% of initial charge.
- As well as the content changes above, substantial rewording, to improve clarity, will be made to Appendix 1: Further information on Units in the Course.

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***It is important that staff delivering the new Advanced Higher Courses in session 2015-16 read the full suite of documents for their subjects, as well as those relating to assessment. We also advise staff attending the Advanced Higher support events to read these documents in preparation.***

***For more information on documents and assessment support materials, visit [www.sqa.org.uk/supportdocuments](http://www.sqa.org.uk/supportdocuments)***

## **Support and guidance**

Unit assessment support package 2 for standard Units (Physics: Rotational Motion and Astrophysics; Physics: Quanta and Waves and Physics: Electromagnetism), similar to Package 1, will take a Unit-by-Unit approach and will provide an additional set of questions and guidance for candidates and assessors for relevant Outcomes.

As there are no questions in the Unit Assessment Support Package for the Physics Investigative Unit, only one Unit Assessment Support Package will be published.

## **Looking ahead to 2015–16**

The new Advanced Higher Courses go live from August 2015. SQA will continue to work closely with centres throughout the implementation of these Courses to ensure you have the support you need to prepare your learners for assessment.

We will also work closely with centres during the verification process to identify exemplar materials for Advanced Higher that can be shared with you, to help enhance your understanding of the standards required.

A series of implementation events for Physics will take place on the following dates:

- 5 March 2015 (Glasgow)
- 12 Mar 2015 (Stirling)
- 19 Mar 2015 (Inverness)
- 26 Mar 2015 (Aberdeen)
- 1 Apr 2015 (Edinburgh)

If you wish to attend any of these events, please follow this [link](#).

### **Contact SQA**

For centre enquiries, please contact our Business Development and Customer Support Team on:

**Tel:** 0303 333 0330

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**E-mail enquiries:** [mycentre@sqa.org.uk](mailto:mycentre@sqa.org.uk)

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