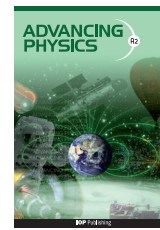
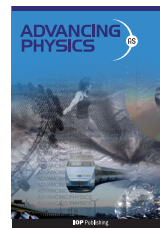


# ADVANCING PHYSICS

## Newsletter

December 2007



## New resources for Advancing Physics

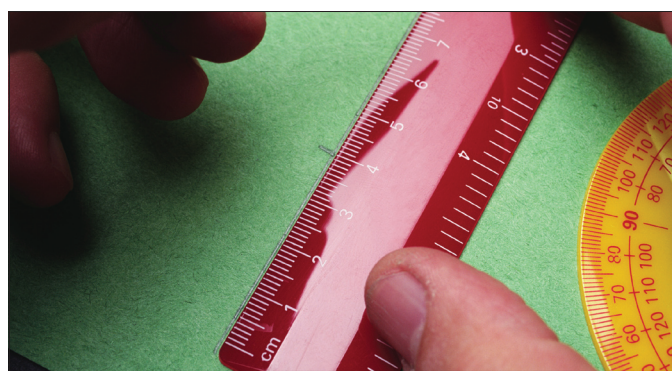
In revising *Advancing Physics* we have set out to provide all the new teaching resources required for the new specification and to fill gaps in the existing resources (not to mention correcting a variety of errors noticed by you over the years).

For AS level, the main new teaching resources concern the new emphasis on quality of measurement, which is reflected in the modified (and reduced) coursework, and the new advanced notice section of the second examination unit.

First in line is a new final chapter in the AS students' book of case studies on quality of measurement. Case studies include the story of how the arrival of an El Niño event can be predicted by using satellite radar ranging to detect small changes in ocean level; how the calibration of ultrasound transducers used in medicine and physiotherapy can be improved; how a 1.3 mm zero error led to the main mirror of the Hubble Space Telescope being made extremely precisely but to slightly the wrong shape; and how some unusual uranium concentrations in ores led to the discovery that natural fission reactors once existed in West Africa.

Each case study emphasises a selection of crucial measurement ideas: resolution, systematic error, calibration, sensitivity, noise, zero error, range of values and detection of outlying values.

These case studies are not an additional chapter to be taught, but rather the glue that holds together all the small pieces of work you do as the AS course



The new AS case studies focus on how well measurements are taken.

develops. This starts in chapters 1 and 2 with exercises on resolution and sensitivity, leading on to the calibration of a sensor. In chapters 4 and 5 there are measurements of breaking strength, Young modulus and electrical conductivity to be made. Chapter 6 provides the chance to improve measurements of the wavelength of light, and chapter 7 to see how hard it is to get a good value for the Planck constant. Chapters 8 and 9 offer many different opportunities to measure displacement, speed and acceleration.

In every case the experiment is one that you probably already do, but with the extra dimension of looking more carefully at how well the measurement job has been done. The resources for these experiments have all been rewritten to reflect this new focus, and new questions about measurement have been added. All this lays the groundwork for the new "Quality of measurement" coursework task to be done towards the end of the year.

At both AS- and A2-level teach-

ers have pointed out that in some chapters there were not enough good questions, particularly straightforward introductory ones. Where they were lacking we have now added more. They are, of course, much harder to write than more advanced questions.

For A2, the students' book and CD resources have been edited to include a small extra section on relativistic time dilation in chapter 12, and one on  $E_{\text{rest}} = mc^2$  in chapter 16 (a topic that is needed in chapters 17 and 18). It was always strange that the Qualifications and Curriculum Authority required  $E_{\text{rest}} = mc^2$  as part of the core but required nothing about where the famous equation comes from. This anomaly has now been removed, and suitable extra displays and questions have been added.

While editing the AS and A2 students' books, we set out to deal with the fact that not all students (and maybe not every teacher) realise the importance and value of the yellow boxes (repeated as displays on the CDs) in which every important theo-

retical argument in the course is set out in a visual form. These have now been made much more distinctive, as Key summaries, which appear both in the books and on the CDs.

One of the most important improvements has been the *Teacher's Guides*. Teachers generally find it difficult to choose the teaching resources that they need and to weld them into a teaching plan. The *Teacher's Guides* have been completely rewritten to be more concise and to distinguish between "Key resources" and "Further resources". The "Key resources" are the first ones you need to consider; the "Further resources" offer alternatives and extensions.

Finally, we have strengthened the links between the books and the CDs. Each section of each chapter now lists the questions that students should go to for practise, activities they might try, key terms to look up in the A-Z, and displays and revision material that they should review, plus reading material that may be of interest. These lists appear in clickable form on the CDs, taking the student directly to the selected resource. The student checklists on the CD for each chapter have also been augmented with links to revision materials and renamed "Revision checklists".

All these changes will make the teaching resources much easier to find and use, and make *Advancing Physics* an even greater pleasure to teach.

**Jon Ogborn**, director, revised *Advancing Physics*

# Altered assessment model emphasises measurement and reduces coursework

The new specification is now in schools, and training on the new developments will continue throughout the year. It is worth seeing how the examinations and coursework in the 2008 specification compare with the current ones.

## The examinations “How science works” and “Stretch and challenge”

One difference in all the new science specifications is that two issues must be addressed. “How science works”, following on from GCSE, is now an integral part of all the sciences at AS and A level, and “Stretch and challenge”, with the new A\* grade, applies to all A-level subjects in the A2 year from September 2009.

The new aspects of “How science works” will be noticeable in two different areas: the treatment of data, and a broadening of the scope of responses to questions of a technological, social or ethical nature. The former is reflected in the major emphasis of the new specification – measurement – and is described below. The latter will only occur where it arises naturally in the physics.

“Stretch and challenge” will feature only in the A2 papers. You will notice that questions aimed at the higher grades will have larger allocations, worth perhaps four or five marks, allowing the students to make their own decisions about how to structure their answers rather than being led by the hand.

## Points of similarity with the old Advancing Physics

The length and structure of the first AS module, G491, is identical to the first two sections of the old 2860, so should feel the same but with section C removed.

In the same way, the first A2 module, G494, will have the same feel as the old 2863, but there will be slightly fewer marks – having to work a bit harder for the marks reflects the new emphasis on “Stretch and challenge” in all A2-level assessments.

		Time (min)	UMS	Mode	Weight (%)	
AS Unit					AS	A GCE
G491	Physics in action	60	90	written	30	15
G492	Understanding processes, and experimentation and data handling	105	150	written with advance notice component	50	25
G493	Physics in practice: ● quality of measurement ● physics in use		60	centre-based assessment	20	10

		Time (min)	UMS	Mode	Weight (%)	
A2 Unit					AS	A GCE
G494	Rise and fall of the clockwork universe	75	90	written	30	15
G495	Field and particle pictures, and advances in physics	120	150	written with advance notice component	50	25
G496	Researching physics: ● practical investigation ● research briefing		60	centre-based assessment	20	10

## New aspects of Advancing Physics

The longer papers, G492 in AS and G495 in A2, make use of advance notice material.

At A2 level, the longer paper, G495, assesses “Field and particle pictures”, while the advance notice is a shorter version of the one currently used in 2865. As at present, this advance notice section of the paper will address issues of synoptic assessment, including aspects of “How science works”.

The longer AS paper, G492, is analogous to this A2 paper. The first two sections, identical in structure to G491, examine “Understanding processes”. The third section, based on advance notice material, will assess the “Measurement” theme.

## Measurement

In the revised *Advancing Physics*, an aim of the AS course is to develop the students’ ability to do good experimental work, to

make measurements and observations as well as they can, and to know how good they are.

This is reflected in the AS coursework, in which the practical task is to make a measurement as well as possible. This could be a refined version of something done earlier in the course – the Young modulus of a metal, or the use of a diffraction grating to obtain the wavelength of a spectral line – but students will need to identify sources of largest uncertainty and possible systematic error, and suggest ways to improve the measurement.

## Coursework

The coursework in each year is reduced from 15% of the A-level marks to 10%. Of that 10%, two-thirds (40 UMS marks) will be for the practical component, with the rest for the non-practical.

As with the examinations, it is worth noting what is unchanged: the non-practical “Physics in

use” at AS level, which is now called the “Materials research and presentation” task, and the “Practical investigation” at A2 level – both of which many teachers wanted to be retained.

The “Quality of measurement” task at AS level has been outlined above, while the A2-level “Research briefing” is a modified and reduced version of the present “Research report”.

The assessment of coursework will be based on the same 1–3–5 system with which schools are familiar, but the number of different areas that you will need to assess has been greatly reduced, from eight to four for the practical tasks, and from eight to two for the non-practical ones. It is hoped that this reduction will ease the assessment burden for teachers and so give simple and reliable assessment of coursework.

**John Miller**, *Advancing Physics* specification development team leader

# New packages and better prices for the revised Advancing Physics 2008

You already know about the changes we have made to *Advancing Physics* to reflect the changes in the specification and advances in physics since the first edition. We have also made changes to the packages and prices of resources to reflect the comments made by the *Advancing Physics* community, on “Connecting *Advancing Physics* teachers” (CAPT) and at meetings.

Our aim has been to make the resources as cost-effective and easy to use as possible – you will notice that the 15% discount has been replaced by a package price for the materials, representing a discount of 20–25%.

## AS + A2 Teacher’s pack

The complicated and costly current provision of resources for teachers will be replaced by a great value simple teacher’s pack, containing:

- AS + A2 combined teacher’s CD-ROM. This CD has both network and stand-alone installation options, so there is no need for separate network and stand-alone versions.

- AS student textbook
- A2 student textbook
- Teacher’s Guide – a folder containing printed versions of all the Teacher’s Guides from the CD.

- AS + A2 Revision CD-ROM

**£85.00**

## Student packages

The cost of textbook plus CD-ROM and/or network licence can be prohibitive for both schools and students, so we have created package prices that represent a large discount for buying the materials together, allowing students to have access to a full range of the highest quality support materials available:

- AS student package: AS textbook plus AS student stand-alone CD-ROM

**£27.99**

- A2 student package: A2 textbook plus A2 student stand-alone CD-ROM

**£27.99**

- AS student network package: AS textbook plus AS student network licence × 1

**£24.99**

- A2 student network package: A2 textbook plus A2 student network licence × 1

**£24.99**

Items are still available individually at 2000 prices, although the prices of the AS/A2 Revision Guide CD-ROM and the price of a student network licence have been reduced. The enclosed order form has details of individual item prices. You can also pre-order for 2008 now – simply fill in the enclosed order form.

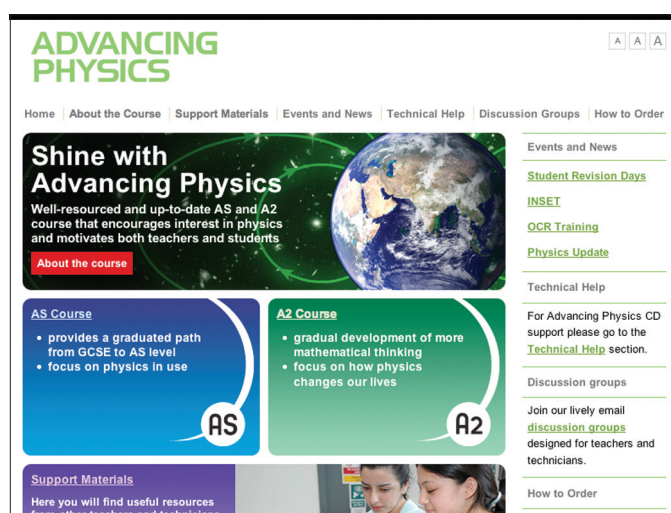
## Updated website to be launched at ASE

Along with reviewing and updating the *Advancing Physics* textbooks and CDs, we are developing the *Advancing Physics* website, creating a new design and adding new content to its structure. Our aim is to provide a user-friendly and interactive website that is an invaluable teaching and learning resource.

Bristol-based company Paul Matson Design is involved in designing the structure and creating the look of the website. We have invited a usability expert to work with us on developing the website and are planning to run end-user tests in several schools to ensure we achieve our aim of a user-friendly and interactive website.

The new website will retain all the previous resources and new information will be added to it. Resources now on the CD that may need regular updating will be moved to the website, including the specification and coursework advice. In this way the website will be able to provide more support to the users.

Some of the new content that will appear on the website, such as *Advancing Physics* news and useful links, will provide teachers, students and parents with links to physics-related websites and



The new *Advancing Physics* website is designed to be user-friendly.

with updates to resources.

Another useful feature – an online conference booking facility – will be added to the website, enabling teachers to book places on the Revision Roadshows and INSET online. Booking forms will also be available to download and print out.

The development of the website is running to schedule and we hope that it will go live just before the ASE annual conference in January 2008. You are welcome to explore the new *Advancing Physics* website at our stand.

## ASE

The updated *Advancing Physics* resources will be launched at the ASE annual conference, which takes place at the University of Liverpool on 3–5 January 2008. You are welcome to visit the *Advancing Physics* stand, where you will have the opportunity to meet the publishers, take a look at the sample copies of the new *Advancing Physics* resources, try out the new edition of the CD and explore the redesigned website.

You are also invited to take part in a discussion forum that will take place at 2.00 p.m.

on 4 January in the Proudman Room of the Maths Building. The *Advancing Physics* authors will highlight changes and updates to specification, assessment structure and resources. You will then be welcome to ask questions and raise discussion points.

At the end of the forum you can enjoy a Revision Roadshow taster session, presented by one of the revision days’ speakers. This session will feature interactive experiments and demonstrations, giving you just a taster of the student experience at the roadshow events.

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# Advancing Physics Students Revision Roadshows 2008

March and April 2008 will see the return of the ever-popular *Advancing Physics* Revision Roadshows. All venues will feature AS and A2 roadshows, and a session for teachers about the changes in specification for 2008 delivered by the OCR representative.

**Science Learning Centre, York Thursday 20 March 2008**

**University College London Thursday 27 March 2008**

**University of Bristol Friday 28 March 2008**

**University of Birmingham Monday 31 March 2008**

**University College London Thursday 17 April 2008**

The cost is £20 a student, which includes revision lectures, student handbooks, lunch and refreshments. Accompanying teachers are free. To book, please download and fill in the relevant booking form available online at [advancingphysics.iop.org](http://advancingphysics.iop.org).

# Advancing Physics INSET 2008 Birmingham University

Are you new to *Advancing Physics*, or do you feel the need to do a bit of catching up? Our INSET course covers all aspects of teaching and learning, including a session on coursework and an introductory CD session. This year's INSET will be coordinated jointly with OCR and will take place at the University of Birmingham's Department of Physics on the following dates:

**Introduction to AS Tuesday 1 July 2008**

**Introduction to A2 Wednesday 2 July 2008**

**Technicians' INSET Thursday 3 July 2008**

Special rates are available for early bookers and schools that are affiliated to the Institute of Physics. To secure your place, please complete the booking form, which can be found online at [advancingphysics.iop.org](http://advancingphysics.iop.org).