AS AND A-LEVEL PHYSICS

A companion guide to our accredited specifications

aqa.org.uk/physics-guide

Changes to A-level Physics

A-levels are changing, with government introducing new regulations for subject content and assessment.

The new regulations apply to all exam boards. These are the main changes for A-level Physics.

Structure

- Changing from modular to linear assessment, with all exams at the end of the course.
- The AS becomes a stand-alone qualification, which doesn't contribute to the A-level grade.

Exams

- New assessment objectives.
- The minimum total number of hours for exams is 3 hours for AS and 6 hours for A-level.
- 40% of the total A-level marks require the use of Level 2 (Higher tier GCSE) mathematical skills.

Practical work

- There will be **no** internal assessment that leads to marks that contribute towards the AS or A-level grades. In other words, no coursework or controlled assessment.
- Practical work will be assessed in the written papers. 15% of the total A-level marks will be for practical knowledge and understanding.
- A separate 'endorsement' of practical work will be assessed by teachers. This will not be graded. If students pass, it will be reported on their certificate, otherwise it will not be reported.

AS and A-level Physics: key dates	
Schemes of work and practical handbook	Available spring 2015
Full details of the practical endorsement	Spring 2015
Practice papers and mark schemes available on AQA website	September 2015
First teaching of new AS and A-level Physics	September 2015
Additional practice papers and mark schemes for you to use in mock exams – on e-AQA	Winter 2015
First exams for new AS Physics	Summer 2016
First exams for new A-level Physics	Summer 2017

Our approach to change

Turning new rules into classroom inspiration

As an education charity and the largest provider of qualifications in England and Wales, meeting the needs of teachers and students is central to what we do. So our approach to these changes has been to listen and learn before acting, to produce a specification that you'll want to teach.

Listening to teachers

We've listened to hundreds of science teachers by visiting schools and colleges, hosting workshops, sending surveys, attending conferences, not to mention reading all your emails and talking to you on the phone. We wanted to know what you need – not guess what you might want. Your views, hopes and aspirations have been crucial.

Working with teachers

Teachers have contributed to every aspect of our new qualifications, including the specifications, question papers and resources. Teachers have also trialled our new arrangements for practicals and tested our specimen question papers with their students.

Building support

While the views of teachers have been crucial, we've also worked with universities and subject associations. This ensured that our new specifications have the content, credibility and rigour to support your students into the next stage of their lives, whether at university or in employment.

Taking to the road

In February 2014 teachers gave us even more feedback on our draft specifications and question papers when we took two double-decker buses to 24 locations, meeting teachers from 274 schools and colleges. Again, we listened to all the feedback and refined our new specifications and question papers to ensure we hit the mark.

We also took the opportunity to speak with many more A-level teachers when we took to the road again in November/December 2014 for feedback on our new GCSE's.

Creating something better

Now we have created specifications, question papers, resources and support that will inspire learning and help to realise potential.

Read the specifications and specimen question papers: aqa.org.uk/physics-guide

Speak to us: call 01483 477 756 or email alevelscience@aqa.org.uk

See how we're supporting teachers through the changes to A-levels at: aqa.org.uk/changes-to-exams

AS and A-level Physics

A great choice

By listening to teachers and involving them throughout the process, we've been able to develop a new physics specification that will help you to inspire students, nurture their passion for physics and lay the foundations for further study in physics or engineering.

Familiar content

The core content of our new specification is largely the same, so that whatever exam board you're with currently, you'll be able to use many of your existing resources.

Flexibility built in

The new specification is context-free, which means you can select the applications and contexts you wish to bring the subject to life. You can choose a familiar starting point such as mechanics, or begin with a fresh topic such as particle physics.

More choice

You choose one of five optional topics as part of the full A-level course so your students can focus on one area in depth and gain an even better understanding of physics.

Teach AS and A-level together

While the AS is a stand-alone qualification, the content is identical to and co-teachable with the first year of the A-level. This straightforward approach will help your planning, timetabling and resourcing.

Practical at the heart of physics

Practical work is at the heart of good science teaching. The new regulations mean the end for coursework and you'll have more choice about your practical activities.

Straightforward exams with no surprises

We've tested our specimen question papers with students to ensure that they're clear and straightforward. We've used a variety of question types, including multiple choice, allowing breadth and depth of knowledge and understanding to be tested.

Great progression – from GCSE to HE

We've developed our AS and A-level with the GCSE in mind to ensure seamless progression between qualifications, with continuity of content and question type. We've also worked with universities to ensure that your students will develop the skills and knowledge that universities want to see.

Great resources and support

We've developed new resources which link directly to the specification, including practice question papers, exemplar student answers, schemes of work, guidance for teaching maths skills and comparisons with current specifications to make the changes as simple as possible.

> Our new physics specification will inspire and motivate students

Matthew Bennett, Qualifications Manager

Matthew Bennett is Qualifications Manager for our AS and A-level sciences. Matthew has a successful career as a science teacher, head of department and principal examiner behind him. Now he has put this experience to great use in managing the development of our new specifications.

"Many of the changes to physics and the other sciences have been demanded by government, but we've taken the chance to review our offer and work with teachers, universities and others to develop a new specification that will inspire and motivate students. We've produced relevant, up-to-date and comprehensive specifications that will suit a variety of interests and abilities.

Much of the content will be familiar to any physics teacher, but some may wonder what impact the changes to practical assessment will have. I can reassure them that practical work is at the heart of all our new science specifications. There will actually be a greater focus on practical work. The skills and knowledge students learn will stand them in good stead in their future scientific careers and at university.

One thing we've insisted on is to make sure that we have the resources and support in place to help teachers deliver our new specification from the start. So I'm delighted that we're working with three publishers to develop high-quality textbooks and digital materials. We will also host face-to-face and online events and provide free resources directly related to the new specification. And we'll only be a phone call or email away to provide more support.

The whole process we've been through to get to where we are has been very positive and I'm particularly proud that we've involved so many teachers in the development of this specification and the question papers. For example, teachers told us that they wanted engineering included in the options, and that students would do better in exams if multiple choice questions were at the end of the paper. You'll see that we've listened and made these and many more improvements, so I'm confident that our new specification will be the basis for great teaching and learning in this important subject."

Practice makes perfect

Changes to practicals in physics

Our new specification includes a fresh approach to practical work, increasing choice, removing the constraints of tasks that are set by exam boards and putting purposeful practical work at the heart of teaching.

1 No coursework

Coursework is being removed, so coursework practicals will no longer contribute towards the final AS or A-level grade.

2 More practicals

Students will do at least 12 practical activities across the two-year A-level.

- Students will have more opportunities to learn and use practical skills to link theory with practice, deepening their knowledge and understanding.
- Teachers will have the freedom to integrate practicals into day to day teaching. You'll have a wider variety of practical activities and you won't have to prepare new practicals every year.
- We have a balanced approach. We'll tell you which practicals to do, so you'll be confident you're doing the right thing. But you'll have more flexibility than you do now.

3 Exams will test practical knowledge and understanding

Students will be asked to apply the knowledge and understanding they learn from these practicals in their written exams. Practical-based questions will form about 15% of the total assessment. We've put these questions in one section of paper 3 of the A-level, so that students know what to expect and can prepare.

4 Teachers will monitor students' practical performance

We've collaborated with CLEAPSS on the practical competencies that will be assessed in the practical endorsement. You will monitor your students' practical work in lessons and decide, at the end of the course, whether they pass. If they pass, it will be recorded on their certificate alongside their final grade.

5 We're here to help

We'll provide support, including highlighting opportunities for developing practical skills throughout the specification, a *Practical handbook* to help you deliver practicals, and guidance to help students document their practicals.

Physics: AS and A-level subject content

You can see the detailed subject content in the draft AS and A-level specifications at **aqa.org.uk/physics-guide**

Practical

We will provide a list of practical activities that students must carry out. Exam questions will be based on these practicals. We will also signpost further opportunities for practicals throughout the specification.

AS and first year of A-level

1. **Measurements and their errors**, including use of SI units and their prefixes, limitations of physical measurement, estimation of physical quantities
2. **Particles and radiation**, including constituents of the atom, particle interactions, collisions of electrons with atoms
3. **Waves,** including progressive waves, interference, diffraction
4. **Mechanics and energy,** including projectile motion, Newton's laws of motion
5. **Electricity,** including current/voltage characteristics, circuits, electromotive force and internal resistance

Second year of A-level

6. **Further mechanics and thermal physics,** including periodic motion, thermal energy transfer, molecular kinetic theory model
7. **Fields,** including Newton's law of gravitation, orbits of planets and satellites, magnetic flux density
8. **Nuclear physics,** including evidence for the nucleus, radioactive decay, nuclear instability

Plus one option from:

- **Astrophysics,** including classification of stars by luminosity, Doppler effect, detection of exoplanets
- **Medical physics,** including physics of vision, ECG machines, x-ray imaging
- **Engineering physics,** including rotational dynamics, thermodynamics and engines
- **Turning points in physics,** including discovery of the electron, Einstein's theory of special relativity
- **Electronics,** including discrete semiconductor devices, data communication systems

A-level Physics exams

Paper 1	+	Paper 2	+	Paper 3
Content • Topics 1 – 5 • and periodic motion		**Content** • Topics 6 – 8		**Content** • Practical skills • Data analysis • Optional topic
Assessment • Written exam: 2 hours • 85 marks • 34% of A-level		**Assessment** • Written exam: 2 hours • 85 marks • 34% of A-level		**Assessment** • Written exam: 2 hours • 80 marks • 32% of A-level
Questions • 60 marks: a mixture of short and long answer questions • 25 marks: multiple choice questions		**Questions** • 60 marks: a mixture of short and long answer questions • 25 marks: multiple choice questions		**Questions** • 45 marks: questions on practical experiments and data analysis • 35 marks: questions on optional topic

These are the only exams that contribute to the A-level grade. The AS is a separate qualification.

Changes from the current AQA specification

The content is largely the same as now, with minor changes based on teachers' feedback, including:

- momentum is included in the AS (first year of A-level)
- Medical physics: details of physiology of the heart have been removed
- Astrophysics: detection of exoplanets has been added
- Electronics has been added as an optional topic
- angular velocity is now included the subject criteria.

AS Physics exams

Paper 1	+	Paper 2
Content • All AS topics		**Content** • Practical skills • Data analysis • All AS topics
Assessment • Written exam: 1 hour 30 minutes • 70 marks • 50% of AS		**Assessment** • Written exam: 1 hour 30 minutes • 70 marks • 50% of AS
Questions • 70 marks: questions divided into sections on each topic		**Questions** • 20 marks: questions on practical skills and data analysis • 20 marks: questions from across AS topics • 30 marks: multiple choice questions

Don't forget the AS content is identical to the first year of the A-level, so you can teach them together in the same class.

The AS papers include all types of questions that are in the A-level, but at a lower level, helping students to progress towards the more challenging A-level questions.

Students who are studying for the A-level qualifications do not need to take the AS exams as well.

Find out more

See our specimen question papers and mark schemes at aqa.org.uk/physics-guide

The results your students deserve

Assessment you can trust

After your students have taken their exams, you need to be confident that their work is marked fairly, consistently and reliably. That's our priority too.

Clear question papers

Following feedback from teachers, we've designed clear and concise question papers that use a variety of question types, including multiple choice, to give students the chance to show their breadth and depth of knowledge. We've followed guidance from the Association for Science Education (ASE) on how we use scientific terminology.

Well-structured mark schemes and exemplar answers

Our mark schemes are designed to give you insights into what's needed to earn the best marks. We'll provide exemplar student answers and commentaries from our most senior examiners, so you can see how the mark schemes are applied in different contexts. You can also use relevant questions from past exams with Exampro at exampro.co.uk

Getting the marking right

Quality of marking is at the heart of our assessment procedures and we do everything to ensure we publish the right results first time. To achieve this we recruit high calibre examiners, train and standardise them to a high standard and monitor their marking through rigorous quality control.

Assessment support

You won't be left to your own devices as our new resources and direct support from our experienced Physics subject team will help you to plan, teach and assess your students and ensure they're in good shape for their exams.

Understanding assessment

To show exactly how we award grades and give you a better understanding of how assessment works, we've produced a short animated film called *Explaining assessment.*

- Visit aqa.org.uk/explaining-assessment to see our *Explaining assessment* and *How a specification is created* animations
- You can analyse your students' results with Enhanced results analysis (ERA), our free online results analysis tool. Register at aqa.org.uk/era

Resources to support great teaching

We're working with teachers, examiners and publishers to develop a new suite of resources.

Free resources

Here's an overview of our free resources. For all our resources, visit aqa.org.uk/physics-guide

- question papers and mark schemes, which give insights into the type of questions students can expect:
  - specimen question papers and mark schemes
  - additional practice question papers and mark schemes, which are only available on e-AQA so you can use them for mock exams
- exemplar student answers with examiner commentary to show how marks are awarded
- schemes of work to show different approaches to the specification
- a Practical handbook to help teachers deliver practical work
- help to switch from your current specification
- guidance on teaching AS and A-level together
- guidance on teaching the maths content.

AQA approved textbooks and digital resources

Our free resources and the fact that there isn't much change mean that you can use your existing textbooks. But if you want new resources, you'll have a choice, including:

- Exampro: an online bank of relevant past questions, great for exam preparation
- resources from three established publishers, specifically for our new specification.

Events and training

- We're holding free face-to-face and online events in spring and summer 2015 to help you get to grips with the new specification, ask questions and network with your peers. You can book online at: aqa.org.uk/launchevents
- You'll have a choice of CPD opportunities to enhance your skills and knowledge. Visit aqa.org.uk/cpd

Telephone and email support

You can always talk directly to our Physics subject team by phone and email. Our knowledgeable staff will be pleased to help with any queries.

Who's who

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To receive regular updates about our science subjects, register with us at aqa.org.uk/update

Also see our companion guides to the new A-level Biology and Chemistry specifications at aqa.org.uk/science

You will always find the most up-to-date information on our website at aqa.org.uk/physics-guide

aqa.org.uk

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