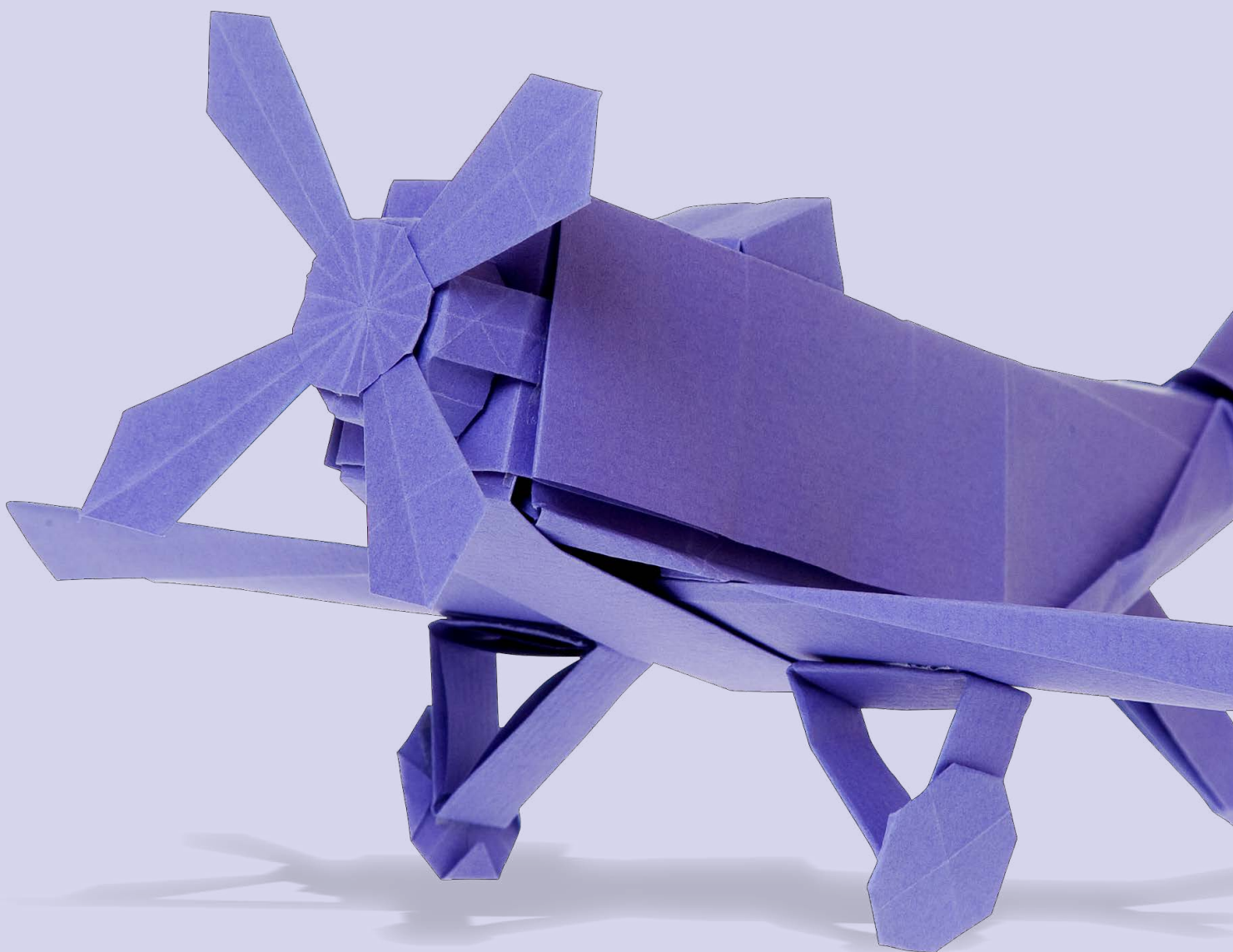


Your guide to our qualifications

AS and A level **Physics**



Hello and welcome

With our new **AS and A level Physics** qualifications, we've created courses that will engage and inspire the scientists of the future. We've worked with all parts of the science education community and used the opportunity of curriculum change to design courses that will encourage students to develop as scientists, and give them the skills to succeed in their chosen pathway. You can teach this qualification using a concept-led approach, or a context-led approach using the Salters Horners (SHAP) materials.

This guide gives you an **overview** of our **AS and A level Physics** qualifications. You can also learn more about the comprehensive help and support we are planning for you.

Take a look through our specification guide to find out more about:

- + Edexcel AS and A level Physics 3
- + The key features of Edexcel AS and A level Physics 4–5
- + How assessments work for AS and A level 6
- + AS assessment at-a-glance 7
- + A level assessment at-a-glance 8–9
- + Sample Assessment Materials 10–15
- + How we're supporting you 16–18
- + Published resources 18–19
- + Get in touch! 20

We're here to help you understand the AS and A level Physics so you're ready to teach. Whether it is on the phone, by email, or in person at a training event, we'll support you as you plan and teach the qualification.

We look forward to meeting you at our New to Edexcel events and answering any questions you might have about our new specifications.

Edexcel AS and A level Physics: what should you expect?

- + AS and A level Physics are **linear** qualifications; assessments for each qualification take place at the end of each course.
- + AS is a **stand-alone qualification**, meaning it will not form part of students' A level grades. However, the content of the AS is included in the A level content, to allow the two qualifications to be **co-taught**.
- + Questions assessing students' **use of mathematical skills** will make up **40%** of the exam papers.
- + There are **no coursework** elements in AS and A level Physics. Instead, students are required to complete a number of **core practicals** which cover specific skills and techniques.

Practical skills are assessed in **two** ways:
 - + investigative skills, knowledge and understanding of some core practicals will be assessed in **AS and A level exams** and contribute to students' overall grades.
 - + **teacher assessment** of students' competency when completing practical work will count towards the separate **Practical Endorsement** at A level (see page 9 for more details).
- + Some of your students will be hoping to study physics or a related subject at university. Wishing to encourage this, we've worked with **Higher Education** institutions to ensure that our qualifications provide the right preparation for further study.

The key features of Edexcel AS and A level Physics

Straightforward and balanced specifications

- ✚ The AS and A level specifications are **fully co-teachable**, to give you flexibility with your teaching arrangements.
- ✚ You can teach AS and A level Physics using a **concept-led approach**, or a **context-led approach** using the Salters Horners (SHAP) materials, as best suits your students, (see page 5 for more details).
- ✚ Specification content is arranged into **distinct topics** and linked to clear descriptive statements, so you and your students know the depth of understanding that's expected.
- ✚ Topics cover fundamental areas of physics, such as forces, waves and electricity; and later topics build on what has come before to give students a broad knowledge base for assessment, and for progression to further study and the workplace.
- ✚ Some aspects, such as mechanical properties of materials, have been removed to allow for the introduction of aspects of the subject more relevant for progression, such as optics.
- ✚ **Support** is available for each key aspect of the specifications, from transition units helping students make the move from GCSE to AS and A level study, to guidance on integrating mathematical and investigative skills into lessons.

*Inspiring students to **think as scientists***



Practical work is at the heart of the qualifications

- ✚ Core practicals have been designed to meet **assessment requirements** and to link directly to the specifications, so your students can develop their practical skills in a context they're familiar with.
- ✚ Our **choices** of core practicals are based on what you've told us **work well** in the classroom with experiments you and your students **enjoy**.
- ✚ The range of core practicals enables students to **build their confidence** by giving them more than one opportunity to master techniques. It also means if your students miss a lesson, they'll have a chance to try the technique again.
- ✚ You know your students best, so we've added extra **flexibility** around practical work, so you can substitute a core practical with one of your own, or do more, if you think they develop the same skills and techniques.
- ✚ We've created **tools** and **resources** to help you and your students with each aspect of practical work – from planning the experiments and selecting apparatus to honing investigative skills.

*Enabling students to **work as scientists***

Assessment you and your students can have confidence in

- ✚ Our exam questions include **clear command words** to ensure students understand the knowledge and skills they're being asked to demonstrate.
- ✚ There are a **range of question styles** to test students' breadth of knowledge and depth of understanding, and reward the different strengths students have.
- ✚ Our question papers are **ramped**, with the level of challenge increasing throughout the exam. Every question, where possible, will begin with a more **accessible** question part that all students can engage with.
- ✚ The assessment of students' **scientific investigative skills** in question papers are based on approaches we already know work well, from experience of our international exams.
- ✚ There are plenty of **tools** and **support** available to help you and your students with exam preparation. In addition to student exemplars with examiner commentaries and extra assessment materials, there's a range of free online services to help you and your students test, track and understand their progress and performance.

*Supporting students to **develop as scientists***

Support that's timely and tailored to your needs

- ✚ It's specialist: your Subject Advisor, Irine Muhiuddin, will be on-hand to answer any queries you may have; our Science Team also regularly send email updates so you know the latest news.
- ✚ It's local: training events and network events regularly take place near you.
- ✚ It's **driven by you**: we'll continue to develop our support based on what you tell us you need.

Guiding you and your students through the AS and A level courses

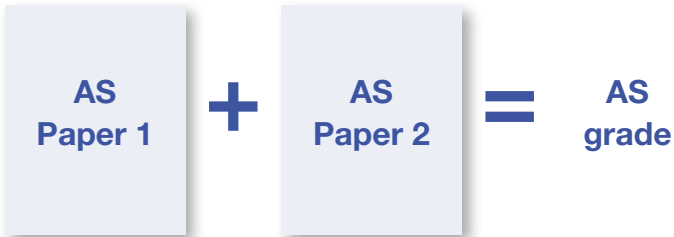
Teaching approaches to suit you and your students

- ✚ The concept-led approach to AS and A level Physics begins with a study of the laws, theories and models of physics, and finishes with an exploration of their practical applications.
- ✚ The Salters Horners context-led approach begins with the consideration of situations and applications that draw on one or more areas of physics, and then moves on to the underlying physics laws, theories and models.
- ✚ You can mix and match these approaches as you wish to best engage your students. Whilst there are two flexible teaching and learning approaches, the same content is taught to all students and tested through only one set of question papers for each of the AS and A level qualifications.

How assessments work for AS and A level

With AS being a stand-alone qualification, it does not form part of students' A level grades. As such, students can choose to take AS *and* A level exams to receive grades for both qualifications, or just the A level papers at the end of Year 13 to gain an A level grade.

To achieve an AS qualification, students need to take:

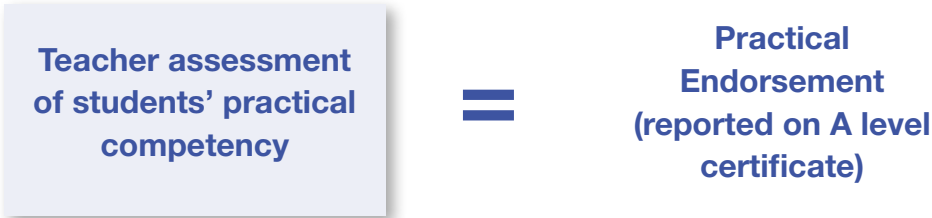


Note: AS exam papers will include questions on some of the **core practicals** in the AS specification.

To achieve an A level qualification, students need to take:



Note: A level exam papers will include questions on some of the **core practicals** in the specification. All content in the AS specification is included in the A level specification.



Note: see page 9 for more details.

AS assessment at a glance

- The papers consist of two sections: A and B. Section A will assess the topics listed for each paper. Section B can include questions involving data analysis, or set within an experimental context, and will draw on topics from the whole specification.
- You can mix and match the concept-led and Salters Horners context-led approaches during teaching because students will all sit the same set of question papers at AS.
- Both exam papers will also test students' knowledge and understanding of experimental methods, based on the core practicals in the specification.
- Question types: multiple choice, short and long answer questions, and calculations.
- Questions assessing students' use of mathematical skills will make up 40% of the exam papers.

| AS Paper 1 – Core Physics I | | |
|--|---|---------------------|
| ✓ 80 marks | ⚖ 50% weighting | 🕒 1 hour 30 minutes |
| Concept-led approach <ul style="list-style-type: none">• Working as a Physicist• Mechanics• Electric Circuits | Salters Horners context-led approach <ul style="list-style-type: none">• Working as a Physicist• Higher, Faster, Stronger (HFS)• Technology in Space (SPC) (except items 92–96)• Digging up the Past (DIG) (except items 84–86) | |

| AS Paper 2 – Core Physics II | | |
|---|---|---------------------|
| ✓ 80 marks | ⚖ 50% weighting | 🕒 1 hour 30 minutes |
| Concept-led approach <ul style="list-style-type: none">• Working as a Physicist• Materials• Waves and the Particle Nature of Light | Salters Horners context-led approach <ul style="list-style-type: none">• Working as a Physicist• The Sound of Music (MUS)• Good Enough to Eat (EAT)• Technology in Space (SPC) (only items 92–96)• Digging up the Past (DIG) (only items 84–86)• Spare-Part Surgery (SUR) | |

Note: All AS exams must be taken in the same examination series. Results from AS examinations will count towards the AS grade but do not form part of the A level grade.

Learn more at quals.pearson.com/edexcelasandalevel/physics/exammaterials

A level assessment at a glance

- Exam questions will test students' knowledge and understanding of the relevant specification topics.
- You can mix and match the concept-led and Salters Horners context-led approaches during teaching because students will all sit the same set of question papers at A level.
- Paper 3 will also test students' knowledge and understanding of experimental methods, based on the core practicals in the specification.
- Question types: multiple choice, short and long answer questions, and calculations.
- Questions assessing students' use of mathematical skills will make up 40% of the exam papers.

A level Paper 1 – Advanced Physics I

✓ 90 marks ⚖️ 30% weighting 🕒 1 hour 45 minutes

Concept-led approach

- Working as a Physicist
- Mechanics
- Electric Circuits
- Further Mechanics
- Electric and Magnetic Fields
- Nuclear and Particle Physics

Salters Horners context-led approach

- Working as a Physicist
- Higher, Faster, Stronger (HFS)
- Technology in Space (SPC) (except items 70 and 92–95)
- Digging up the Past (DIG) (except items 83–87)
- Transport on Track (TRA)
- The Medium is the Message (MDM)
- Probing the Heart of Matter (POR)

A level Paper 2 – Advanced Physics II

✓ 90 marks ⚖️ 30% weighting 🕒 1 hour 45 minutes

Concept-led approach

- Working as a Physicist
- Materials
- Waves and the Particle Nature of Light
- Thermodynamics
- Space
- Nuclear Radiation
- Gravitational Fields
- Oscillations

Salters Horners context-led approach

- Working as a Physicist
- The Sound of Music (MUS)
- Good Enough to Eat (EAT)
- Technology in Space (SPC) (only items 70 and 92–95)
- Digging up the Past (DIG) (only items 83–87)
- Spare-Part Surgery (SUR)
- Build or Bust? (BLD)
- Reach for the Stars (STA)

A level Paper 3 – General and Practical Principles in Physics

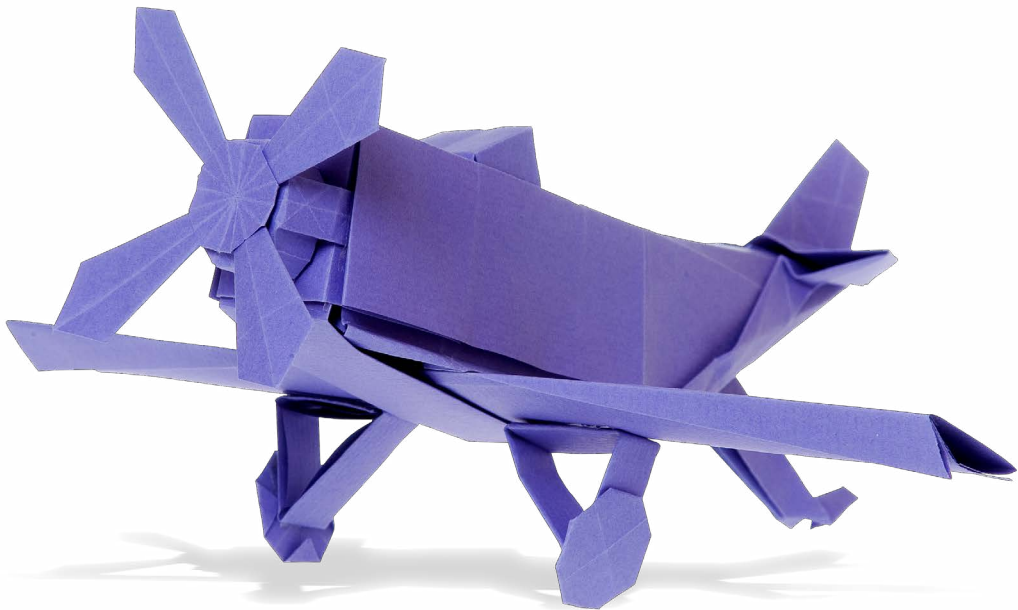
✓ 120 marks ⚖️ 40% weighting 🕒 2 hours 30 minutes

- All topics across the full A level specification.
- Half of the paper will also focus on testing students' knowledge and understanding of practical skills and techniques.

Practical Endorsement

As you'll see from the assessment models, exam papers will feature questions allowing students to demonstrate investigative skills in the context of the core practicals.

Students' skills and technical competency when completing practical work will be assessed by teachers. This will form the basis for the award of a Practical Endorsement at A level. This is separate to the A level grade and, if awarded, will be reported as a 'Pass' on A level certificates for students who achieve it.



Looking for more information about AS and A level exams?
Visit quals.pearson.com/edexcelasandalevel/physics/exammaterials

Sample Assessment Materials

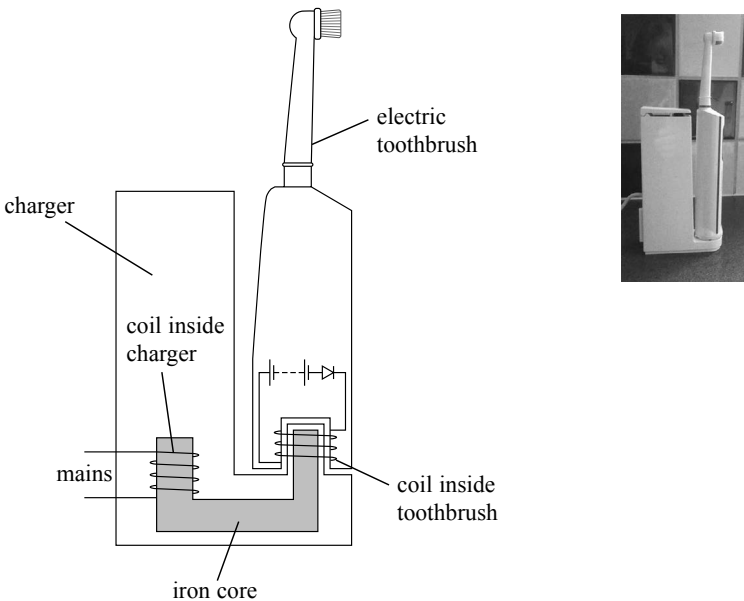
This question comes from **A level Paper 1 - Advanced Physics I**.

Clear images and diagrams help students' understanding of the applications used to test their Physics.

16 The diagram shows the inside of an electric toothbrush and a charger.

The charger contains a coil wrapped around an iron core. The coil is plugged into the mains a.c. supply.

The toothbrush also contains a coil that sits around the iron core when the toothbrush is placed on the charger to recharge the battery of the toothbrush.



***(a)** Describe how the charger is able to charge the low-voltage battery.

(6)

The **asterisk** shows that this is a question testing the **logical presentation of information and ideas** in students' answers.

Asterisked questions will usually be worth **6 marks**. Of these marks, **4 marks** are awarded to the points made by students; and up to 2 marks are awarded for the logical presentation of these points.

Example Mark Scheme

Marks for this type of question are a combination of the **points** made by the student and the **structure** of their answer.

16 (b)*

This question assesses a student's ability to show a coherent and logically structured answer with linkages and fully-sustained reasoning. Marks are awarded for indicative content and for how the answer is structured and shows lines of reasoning.

6

Indicative content

- The supply creates a changing magnetic field in the iron core
- Rate of change of flux in toothbrush coil is equal to rate of change of flux in charger coil (for an ideal transformer)
- The changing flux linkage in the coil of the toothbrush induces an emf according to Faraday's law
- $E = -N \frac{d\phi}{dt}$, so to step down the emf there must be fewer turns in the toothbrush coil
- The emf in the toothbrush coil must be larger than in the toothbrush battery
- A diode is included, so the battery is not discharged by the alternating emf

The following table shows how the marks should be awarded for indicative content.

| Number of indicative marking points seen in answer | Number of marks awarded for indicative marking points |
|--|---|
| 6 | 4 |
| 5 - 4 | 3 |
| 3 - 2 | 2 |
| 1 | 1 |
| 0 | 0 |

The following table shows how the marks should be awarded for structure and lines of reasoning.

| | Number of marks awarded for structure of answer and sustained line of reasoning |
|--|---|
| Answer shows a coherent and logical structure with linkages and fully sustained lines of reasoning demonstrated throughout | 2 |
| Answer is partially structured with some linkages and lines of reasoning | 1 |
| Answer has no linkages between points and is unstructured | 0 |

Guidance on how mark scheme should be applied

An answer with five indicative marking points which is partially structured with some linkages and lines of reasoning scores 4 marks (3 marks for indicative content and 1 mark for partial structure and some linkages and lines of reasoning).

Students can gain up to **four marks** for the points that they make in their answer.

The **'indicative content'** shows the credit-worthy statements that students can make in their answer.

Here's one example of how this mark scheme can be applied to a student's answer.

Learn more at [quals.pearson.com/edexcelasandalevel/physics/SAMS](https://www.pearson.com/edexcelasandalevel/physics/SAMS)

Sample Assessment Materials

This question comes from **A level Paper 2 - Advanced Physics II**.

- 14 (a) One type of optical fibre is made from a glass core surrounded by a glass cladding of lower refractive index. The light ray passes along the fibre by total internal reflection. The diagram shows a light ray incident on one end of the fibre.



A light ray enters the core with an angle of incidence θ and the angle of refraction is 20° .

Show that the light ray will be totally internally reflected when it meets the boundary between the core and the cladding.

$$n_{\text{core}} = 1.56$$

$$n_{\text{cladding}} = 1.44$$

(4)

'Show that' questions require students to prove that a statement or calculated value is correct.

Data needed in a question is provided for students.

- (b) Magnifying 'bug boxes' are used to observe small insects. One type consists of a clear plastic pot with a snap-on lid.



© 2004 Educational Field Equipment UK Ltd.

The lid acts as a converging lens of focal length 8.5 cm.

An insect inside the box appears to be 3.5 times bigger when viewed through the lid.

- (i) Draw a ray diagram to show the formation of the image by the lens when used in this way.

(3)

Although this is an A level question, this part of the question tests knowledge gained by students in the **first (AS) year** of the course.

- (ii) Calculate the distance of the insect from the lid.

(3)

'Calculate' questions are common in exam papers. Students will need to provide units for their answer.

(Total for Question 14 = 10 marks)

Learn more at [quals.pearson.com/edexcelasandalevel/physics/SAMS](https://www.quals.pearson.com/edexcelasandalevel/physics/SAMS)

Sample Assessment Materials

This question comes from **A level Paper 3 - General and Practical Principles in Physics**.

3 Small electrical devices are often powered by electric cells; different devices use different types of cell.

(a) The cells normally used in a television remote control have an e.m.f. of 1.5 V.

(i) Describe a procedure to determine the internal resistance and e.m.f. of an electrical cell. You should include a circuit diagram.

(3)

This question assesses aspects of **practical skills**.

This question is, essentially, a **planning exercise**; but also tests the ability of candidates to **design** an electrical circuit.

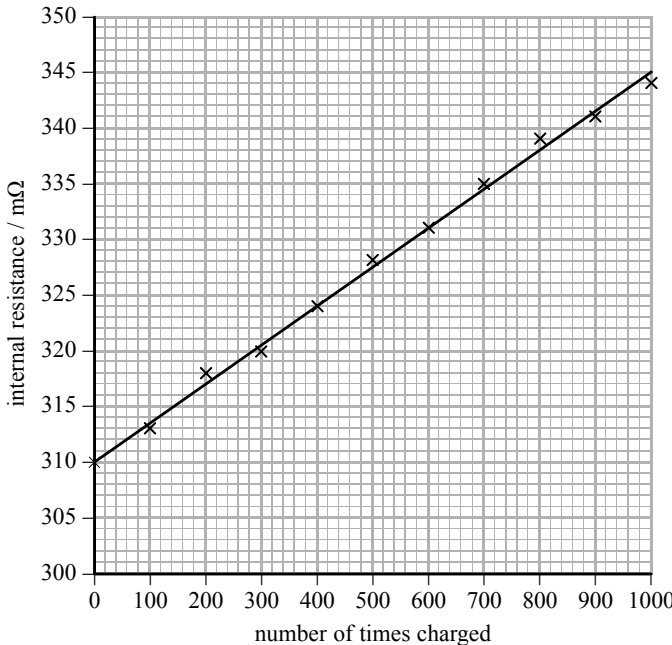
(ii) Describe how you would use your results to find a value for the e.m.f. and internal resistance of the cell.

(3)

This question again tests **practical skills**: the ability of students to show how experimental results can be used to come to a conclusion.

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(b) The cells used in a camera to charge the flash unit are 3.6 V lithium ion rechargeable cells. The data sheet supplied with such a cell includes a graph which shows how the internal resistance of the cell varies with the number of times it has been charged and discharged.



The cell is recommended for use in a camera flash charger which typically draws a supply current of 800 mA. The manufacturer claims that even after 500 charging cycles the cell terminal potential difference (p.d.) will be more than 99% of the terminal p.d. when new and supplying the same current.

Analyse the data from this graph to explain whether it supports the claim, supporting your answer with a calculation.

(4)

'**Analyse**' helps students to see that they must use information from the graph.

This **instruction** makes it clear to students that they cannot score full marks with a written explanation only.

(Total for Question 3 = 10 marks)

107

How we're supporting you

Based on what you've told us, we've looked in depth at how we can give you the support you need to **plan** and **implement** Edexcel AS and A level Physics specifications successfully. We've thought about how we can help you and your students overcome those critical barriers to progress in science. Whether it's getting started with the qualifications, helping students to master fundamental mathematical and practical skills, or getting an answer to a query, we'll be there to help with a wide range of **free** support.

Designing your curriculum

- ✚ **Getting Started Guide** – summarising the changes to AS and A level Physics from 2015, our assessment models and specification content.
- ✚ **Mapping documents** showing changes to the AS and A level specifications, so you know the content that's been removed, added, or changed in emphasis – all at a glance.
- ✚ Editable **schemes of work** and **course planners** for teaching AS and A level courses separately or together, to account for the different teaching approaches your centre may choose.

Preparing for practical work

- ✚ A handy list of **core practicals** enabling you to get the information you need from the specifications quickly and easily.
- ✚ **Mapping documents** matching the core practicals to the essential skills appendix in our specifications.
- ✚ **Teacher, technician and student worksheets** which detail the procedure, apparatus and safety instructions for each core practical.
- ✚ **Teacher materials for developing investigative skills**, helping you integrate practical work and the teaching of investigative skills into your lessons.
- ✚ **Student materials for developing investigative skills** encouraging a deeper understanding of the underlying science behind practicals, guiding students to think independently as scientists and helping their preparations for AS and A level assessment.

Understanding the new standard

- ✚ A **bank of exemplar student work** and **examiner commentaries**, available before first teaching to help you and your students understand the standard that's expected.
- ✚ **Additional sample assessment materials** to help you familiarise yourself with the new assessment styles and to use with your students to help assess their progress throughout the course.
- ✚ **Enhanced examiner reports** and **feedback training events*** after each exam series.

Teaching and learning

- ✚ **Transition units** – written by experienced teachers, these classroom materials are designed for those initial AS lessons, to help your students develop the essential skills they need to transition from GCSE to A level study successfully.
- ✚ **Topic delivery guides** to refresh your knowledge on some of the AS and A level content, and offer teaching suggestions.
- ✚ **Teacher and student materials for developing maths skills** to help you and your students understand the mathematical requirements of the AS and A level specifications and give opportunities to practise applying these essential skills.

Tracking and progression

- ✚ **ResultsPlus**
A free online service giving detailed, instant feedback on your students' exam performance.
- ✚ Free **secure mock papers** that will be released when you need them.
- ✚ **Mocks Analysis** – a specific component of our free **ResultsPlus** service that allows you to use past papers as mocks and receive the same detailed analysis of students' exam performance.
- ✚ **examWizard**
A free, easy-to-use exam preparation tool containing a bank of past questions to help you create your own mock exams and tests.

*There may be a charge for these events.

Subject and local support when you need it

- ✚ **New to Edexcel events** to support you as you prepare to teach our courses.
- ✚ **Local network events** for the latest updates and providing opportunities to network and share best practice with fellow teachers.
- ✚ **Training events*** throughout the academic year to help with delivering the AS and A level courses.
- ✚ **Regular email updates** from our Science Team.
- ✚ **An expert Subject Advisor, Irine Muhiuddin, and specialist Science Team** available to answer your queries.

Learn more at quals.pearson.com/edexcelasandalevel/physics/teachingsupport

Published resources

Endorsed resources for Edexcel AS and A level Physics

We're committed to helping teachers deliver our new AS and A level Physics and students to achieve their full potential. To do this, we aim for our qualifications to be supported by a wide range of high-quality resources, produced by a range of publishers, including ourselves.

We work with a range of publishers who have their resources endorsed:

- ✚ Hodder Education: Edexcel A level Physics Year 1 and Year 2
- ✚ Hodder Education: Edexcel A level/AS Physics Student Guide 1 and Guide 2
- ✚ Pearson: Edexcel A level Physics 1 and 2
- ✚ Pumpkin Interactive

It is not necessary to purchase endorsed resources, including those published by Pearson, to deliver our qualifications.

*There may be a charge for these events.

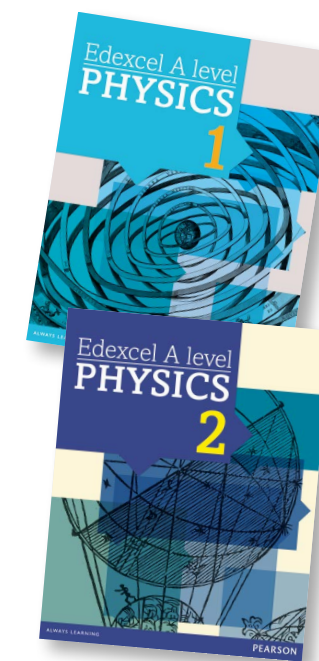
Brand-new published resources from Pearson

Our paid-for resources are written specifically to help you teach **Edexcel A level Physics** and to develop successful independent scientists able to progress from GCSE and to further study at Higher Education and beyond.

Developing a deep subject understanding: help your students understand the bigger picture and recognise connections across topics.

Removing the barriers to learning: understanding core conceptual knowledge and acquiring key scientific skills are essential to removing barriers to learning and developing confident and independent learners.

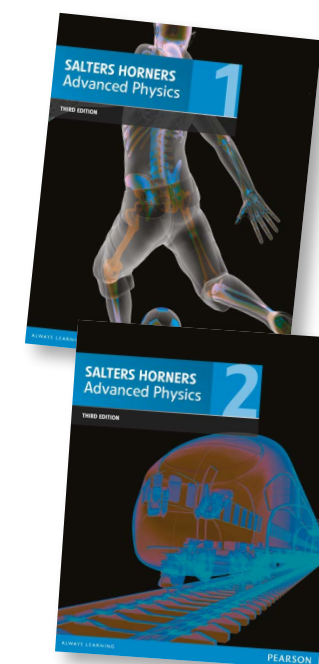
Synoptic learning and exam preparation: our Edexcel A level Physics course approaches synoptic learning, consolidation and revision.



Salters Horners Advanced Physics

Developed in conjunction with leading subject experts from the University of York Science Education Group (UYSEG), in collaboration with schools, educational specialists and scientists from universities and industry, the new 2015 editions of Salters Horners Advanced Physics (SHAP) continue to offer a context-led approach to A level Physics designed to stimulate scientific interest and enquiry set in real-life contexts.

Drawing on years of experience and successful use in centres around the country, these new editions of the tried and trusted 2008 Salters Horners resources offer exciting new features throughout, helping to develop successful independent learners able to progress from GCSE and to further study at Higher Education and beyond.

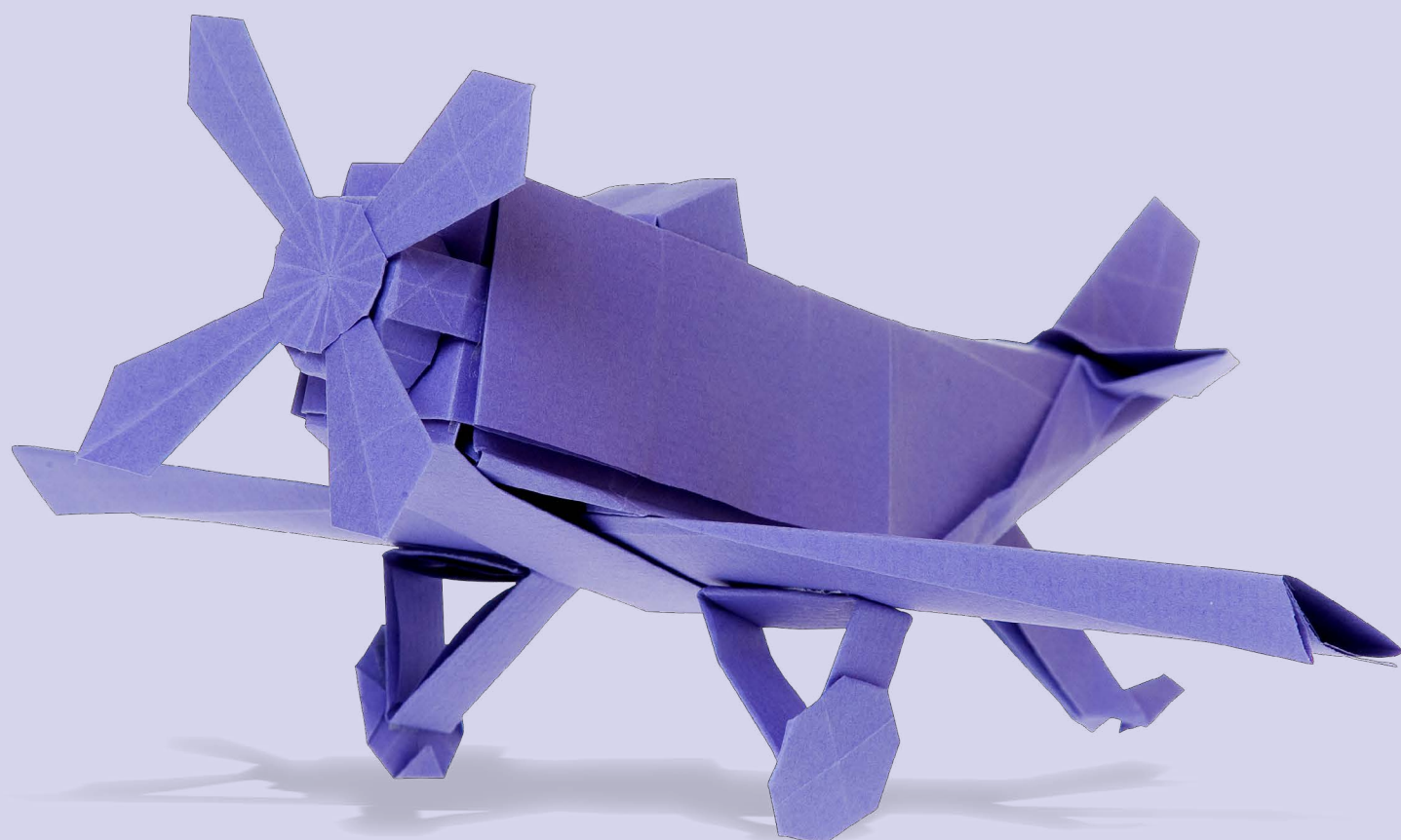


Find out more at pearsonschoolsandfecolleges.co.uk/secondary/Science/16Physics/edexcel-a-level-science-2015/Edexcel_AS_and_A_level_Science.aspx

Get in touch!

**Supporting you for all your science
qualification needs**

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