AS Physics assessment at a glance

First assessment: summer 2016.

- The papers will 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

- Working as a Physicist
- Mechanics
- Electric Circuits

Salters Horners context-led approach

- 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

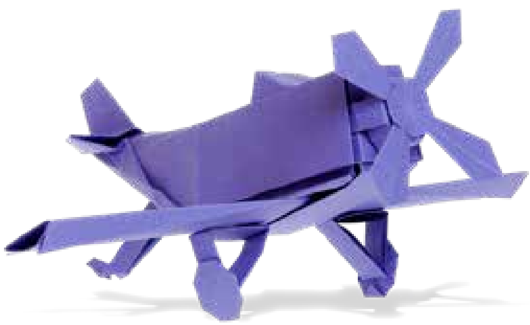
Concept-led approach

- Working as a Physicist
- Materials
- Waves and the Particle Nature of Light

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 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.



A level Physics assessment at a glance

First assessment: summer 2017

- 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

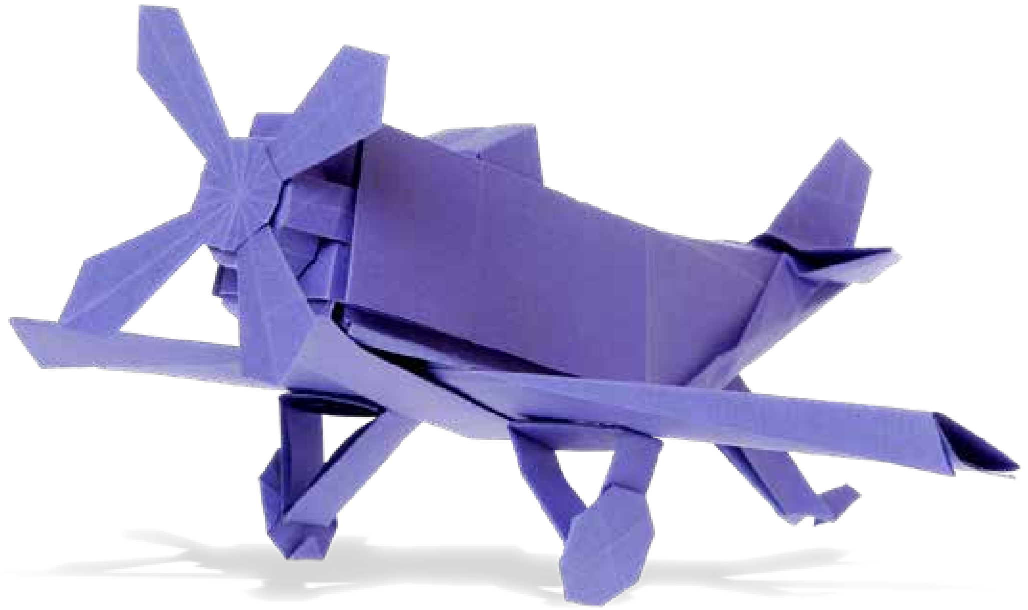
✓ 120 marks | 40% weighting | 2 hours 30 minutes

- 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.



Sample Assessment Materials

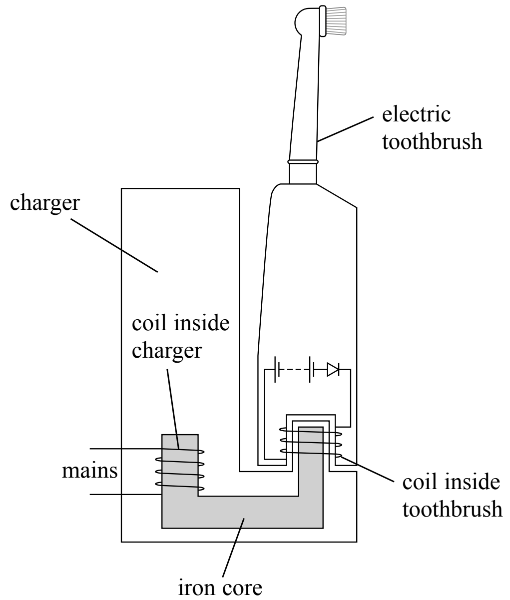
This question comes from **A level Paper 1 - Advanced Physics I.**

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

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

<table>
<tr><th>Question number</th><th>Acceptable answers</th><th>Additional guidance</th><th>Mark</th></tr>
<tr><td>16 (a)*</td><td>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.

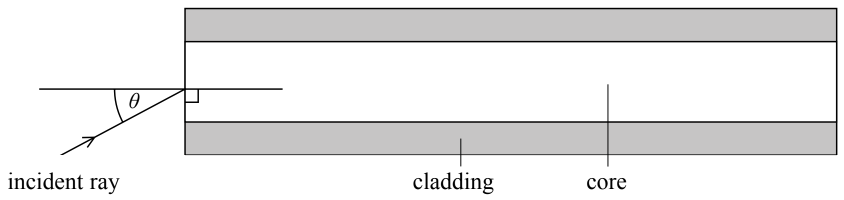
The following table shows how the marks should be awarded for indicative content.
<table>
<tr><td>Number of indicative marking points seen in answer</td><td>Number of marks awarded for indicative marking points</td></tr>
<tr><td>6</td><td>4</td></tr>
<tr><td>5–4</td><td>3</td></tr>
<tr><td>3–2</td><td>2</td></tr>
<tr><td>1</td><td>1</td></tr>
<tr><td>0</td><td>0</td></tr>
</table></td><td>Guidance on how the mark scheme should be applied:
The mark for indicative content should be added to the mark for lines of reasoning. For example, 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).
If there are no linkages between points, the same five indicative marking points would yield an overall score of 3 marks (3 marks for indicative content and no marks for linkages).</td><td></td></tr>
<tr><td>16 (a)*
(continued)</td><td>The following table shows how the marks should be awarded for structure and lines of reasoning.
<table>
<tr><td></td><td>Number of marks awarded for structure of answer and sustained line of reasoning</td></tr>
<tr><td>Answer shows a coherent and logical structure with linkages and fully sustained lines of reasoning demonstrated throughout</td><td>2</td></tr>
<tr><td>Answer is partially structured with some linkages and lines of reasoning</td><td>1</td></tr>
<tr><td>Answer has no linkages between points and is unstructured</td><td>0</td></tr>
</table></td><td></td><td></td></tr>
<tr><td>16 (a)*
(continued)</td><td>Indicative content

• The supply creates a changing <u>magnetic field</u> 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 <u>flux linkage</u> in the coil of the toothbrush induces an e.m.f. according to Faraday's law
• $E = -N\,d\varphi/dt$ so to step down the e.m.f. there must be fewer turns in the toothbrush coil
• The e.m.f. in the toothbrush coil must be larger than the toothbrush battery
• Diode is included so battery is not discharged by the alternating e.m.f.</td><td>Allow provides dc to charge battery or similar.</td><td></td></tr>
</table>

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.

$n_{core} = 1.56$

$n_{cladding} = 1.44$

(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.

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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)

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**.

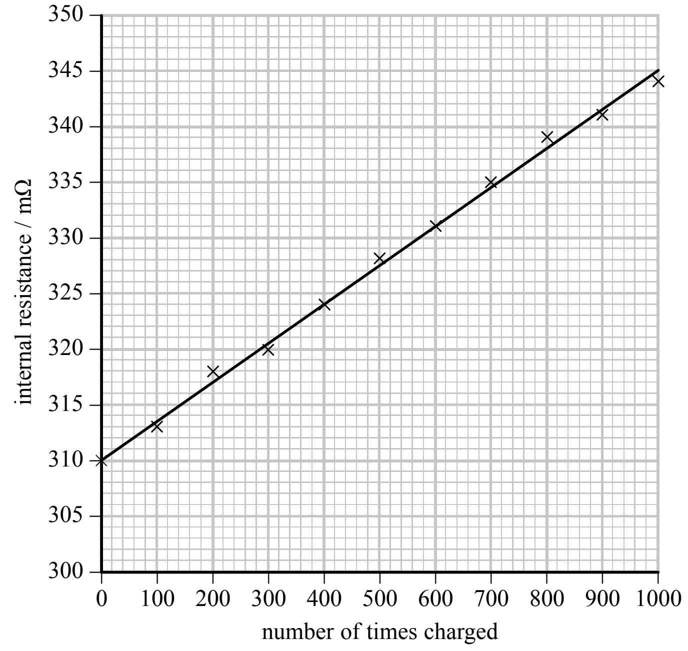
This question is, essentially, a **planning exercise**; but also tests the ability of candidates to **design** an electrical circuit.

(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.

(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)

Images: **tobkatrina, pakhnyushchyy, Tiwakorn Dhupagupta.** Original origami artwork: **Mark Bolitho.** Origami photography: **Pearson Education Ltd / Naki Kouyioumtzis.**