How assessment will work for AS and A level

With AS being a stand-alone qualification from September 2015, it will no longer form part of students’ A level grades. As such, students could choose to take AS 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.

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.

To achieve an AS qualification, students need to take:

| AS Paper 1 | + | AS Paper 2 | = | AS grade |

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:

| A level Paper 1 | + | A level Paper 2 | + | A level Paper 3 | = | A level grade |

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.

Teacher assessment of students’ practical competency = Practical Endorsement (reported on A level certificate)

Note: see page 9 for more details.
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.

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.
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.

(b)(i) The supply creates a changing magnetic field in the iron core. The rate of change of flux in a rectangular coil is equal to rate of change of flux in the change coil (for an ideal transformer). The changing flux induces an e.m.f. according to Faraday's law.

E = \frac{\phi}{\Delta t}

where \( E \) is the induced e.m.f., \( \phi \) is the magnetic flux, and \( \Delta t \) is the time interval.

(b)(ii) The e.m.f. in the toothbrush coil must be larger than the e.m.f. induced in the toothbrush coil to charge the battery. A diode is included so that the battery is not discharged by the alternating e.m.f.

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

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

16 (b)(i) The supply creates a changing magnetic field in the iron core. The rate of change of flux in a rectangular coil is equal to rate of change of flux in the change coil (for an ideal transformer). The changing flux induces an e.m.f. according to Faraday's law.

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(b)(ii) The e.m.f. in the toothbrush coil must be larger than the e.m.f. induced in the toothbrush coil to charge the battery. A diode is included so that the battery is not discharged by the alternating e.m.f.

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

![Diagram of optical fibre](Image)

A light ray enters the core with an angle of incidence $\theta$ and the angle of refraction is $20^\circ$.

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

\[
\theta_{\text{critical}} = \frac{\sin^{-1} \left( \frac{1.44}{1.56} \right)}
\]

(4)

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

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.

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

(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.
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.

(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.

(i) Describe a procedure to determine the internal resistance and e.m.f. of 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.

The cell is recommended for use in a camera flash unit 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.

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**Sample Assessment Materials**


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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.

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

"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.