# Physics GCSE 2018
# Summary of Examiner reports

The introduction of the new '9-1' Science GCSEs of 2018 has been a challenging experience for students and teachers alike. This year, therefore, the examiners' reports are more useful than ever as a diagnostic tool, to help teachers provide targeted guidance to students taking these exams in future.

This blog provides a summary of the examiner's reports for the 2018 Physics papers. It covers both combined science and the separate sciences, foundation tier and higher tier. We have used the examiner reports prepared for the AQA exam board, but the same lessons apply to students taking Edexcel and OCR exams.

The links below provide tables of grade boundaries for all three sciences.

- Grade Boundaries – Combined Science
- Grade Boundaries – Separate Sciences

On the plus side, the examiners reported that students recalled equations well. Basic calculations in the foundation paper were well-addressed. Where the formula had been given and the numbers which needed to be used were obvious, answers were of a good standard. Students were also able to read from simplistic graphs when the scales were easy to interpret.

But the examiners also identified a large number of areas of the specification which will require increased intervention in future.

We've split the examiners comments into three broad (and overlapping) categories: 'Required practicals', 'Key exam skills' and 'Subject areas for development'.

## Required practicals

In both combined and separate science Physics, examiners identified student knowledge of required practicals as a key area for development.

Specifically:

- Students were often unable to state the correct names for pieces of laboratory equipment used to carry out the required practicals.
- Many students were unable to draw the relevant diagrams.
- Many students did not have a good grasp on the methods to use in practicals, or the detail needed to describe them.
- On the other hand, when asked to describe only *part* of a practical, some students explained the entire practical, thereby wasting time in the exam.
- Some foundation tier students had issues with understanding units of measure, thinking $cm^3$ meant that the value had to be cubed.
- Students need to practise using data from multiple sources (such as tables, graphs and diagrams) to answer questions and to understand how to draw conclusions from the correct data sets.
- There was confusion regarding key practical vocabulary such as the difference between random and systematic errors and between independent, dependent and control variables.
- Students were unsure of the meaning of the resolution of an instrument, or the interval between readings.

It's clear that, in preparing students for the 2019 exams, a focus on the teaching and learning of required practicals is essential for all schools.

My GSCE Science complements lab demonstrations of required practicals with learning videos on each of them. These videos are useful as preparation ahead of a class demonstration and can also be used for revision. My GSCE Science exam-style questions on practicals thoroughly test students' knowledge and help prepare them for the exams. All videos on required practicals are available directly from a student's video dashboard, by clicking on the PRACTICALS button at the top of the video dashboard, or by using the SEARCH function.

In addition, My GCSE Science teachers have prepared a number of blogs that deal directly with the issues raised by examiners and summarised above. The blogs are invaluable sources of advice on required practicals and graph skills, for teachers and students alike. They are freely available on www.my-GCSEscience.com.

- Practicals: key vocabulary
- Practicals: measurements and data
- Describing, explaining and comparing graphs

## Key exam skills

Examiners also highlighted multiple areas for improvement in exam technique: how students should approach questions in Physics papers.

- Examiners emphasised the importance of encouraging students to show their working in calculations. On many occasions, students would have gained some marks for showing their working, even if they arrived at the wrong answer.
- Examiners noted that students must be made more aware of mark allocation when answering questions. In a one-mark question, a single statement (sometimes a single word) will be adequate. If six marks are available, evidently much more information is required.
- Foundation students had some difficulty in calculations where values to compute had to be selected from others which were not relevant.
- Students need to practice reading from graphs with more complex scales and should pay close attention to axes labels, scales, and units. This was an issue across many questions on the Physics papers.
- Examiners noted that students lost marks for using a formula triangle, when asked to write down an equation. If students are asked to write an equation, they must… write an equation.

- Some students had difficulty in substituting the correct values into a given equation.
- Students lost marks for using incorrect symbols. Credit is given for writing out symbol equations only if the correct symbols are used.
- Many students were unable to recall the equation for the gravitational potential energy of an object (mass × gravitational field strength × height).
- Examiners recommended that students practise interpreting numerical information in questions that are based on *unfamiliar* situations.
- When asked in a question to use data from a table or graph or to refer to a diagram, students must follow the instructions. Failure to do may result in lost marks.
- Students found questions requiring longer answers especially difficult to handle. Longer questions need more practice.
- Examiners reported that students lost marks by failing to follow basic instructions:
    - Students must tick two boxes if asked (they must not stop at ticking one box);
    - If students are asked to complete a diagram, they must do so. Redrawing the diagram can result in lost marks.
- Examiners reported that students lost marks by writing contradictory statements, or by adding responses which negated those written previously.
- In list questions, students lost marks if part of the answer was wrong. For example, in a three-mark list question, two correct responses (only) would result in two marks being awarded. But two correct responses and a third *incorrect* response would result in losing one mark for the incorrect response, leaving the student with only one mark in total.

The errors above can be addressed by using My GCSE Science to help improve students' exam technique. My GCSE Science long-form exam-style questions (and corresponding mark schemes) help students build an in-depth understanding of each topic while at the same time developing exam technique.

My GCSE Science teachers have also prepared blogs that deal directly with exam skills and maths skills in Physics. These blogs cover all of the issues raised by the examiners and are freely available on www.my-GCSEscience.com.

- Maths skills in GCSE Physics
- Mathematical relationships in GCSE Physics
- Command words in GCSE Physics
- Multi-topic questions in GCSE Physics

## Subject areas for development

The examiners highlighted a number of specific areas which require increased focus:

- Students were often unable to recall that ammeters must always be connected in series and that voltmeters must always be connected in parallel.

- Students found it difficult to explain why the resistance of two resistors which have been connected in parallel is smaller than their combined resistance when connected in series:
    - Investigating resistance in circuits

- Examiners noted that many students were unsure about how static charge builds up on an object. Static charge builds up due to a flow of (negative) electrons and *not* due to a flow of positive charge. The object which gains electrons becomes negatively charged, and the object which loses electrons becomes positively charged.
    - Static electricity

- Students experienced difficulty with the concept of the *internal energy* of an object. The internal energy of an object is equal to the total amount of kinetic and potential energy of the particles which it contains. It can be increased by *heating* or when *work is done* by the action of a force (such as friction) or the flow of an electric current through a resistor.
    - Conservation and dissipation of energy

- Students found it difficult to explain why it's important that the radioactive source inside a smoke alarm has a long half-life.
    - Half-life

- Finally, it's necessary to learn all of the *recall and apply* equations on the physics equation sheet (available directly from a student's video dashboard on My GSCE Science). For comprehensive advice, read this blog:
    - Blog: Equations in GCSE Physics