AQA
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GCSE COMBINED SCIENCE: TRILOGY

Insight report: 2018 results at a glance

Published: October 2018

Responsible for multiple sciences?

Results insights are available for all our GCSE specifications:

- Biology
- Chemistry
- Physics
- Combined Science: Synergy

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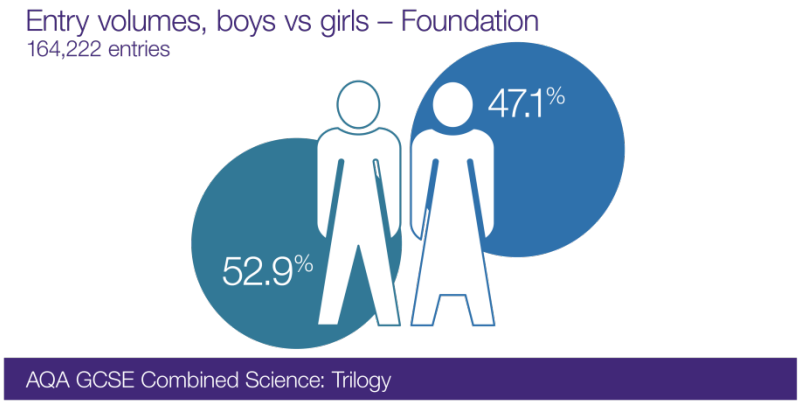
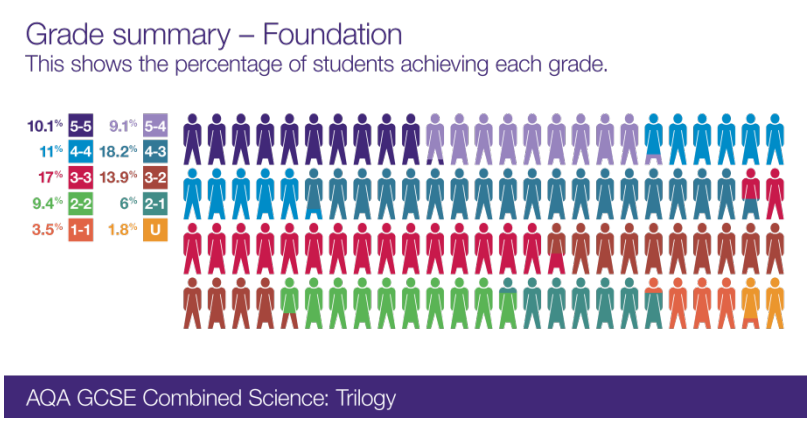
Foundation tier analysis

Conduct your own analysis using data relevant to you. Watch short tutorials on using Enhanced Results Analysis (ERA) for school, subject, group or student performance; or log straight in through aqa.org.uk/log-in



Entry volumes, boys vs girls

86,803 boys
77,419 girls.

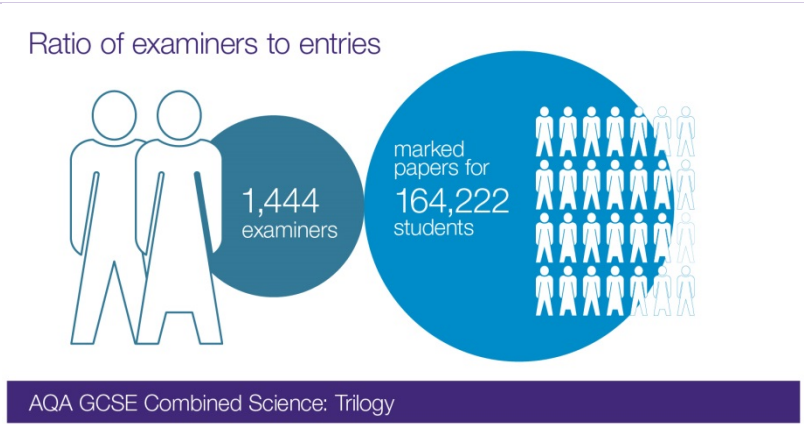


Grade summary

Watch tutorials on using ERA for results analysis, or log straight in via e-AQA.

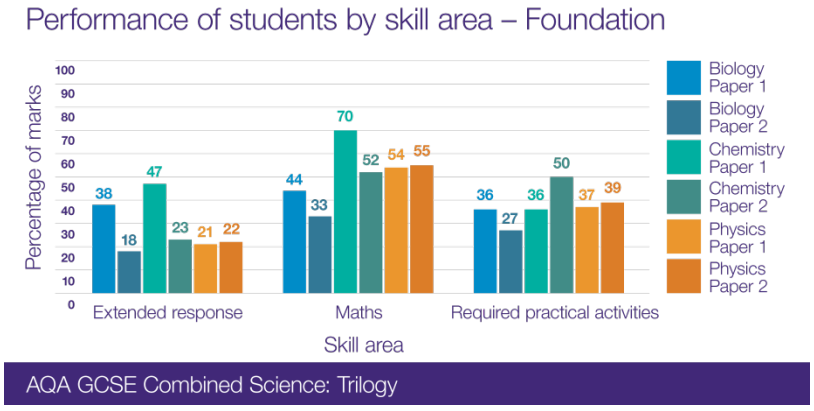
Foundation tier analysis cont.

Conduct your own analysis using data relevant to you. Watch short tutorials on using Enhanced Results Analysis (ERA) for school, subject, group or student performance; or log straight in through aqa.org.uk/log-in



Ratio of examiners to entries

1,444 examiners marked papers for 164,222 entries.



Performance of students by skill area – Foundation

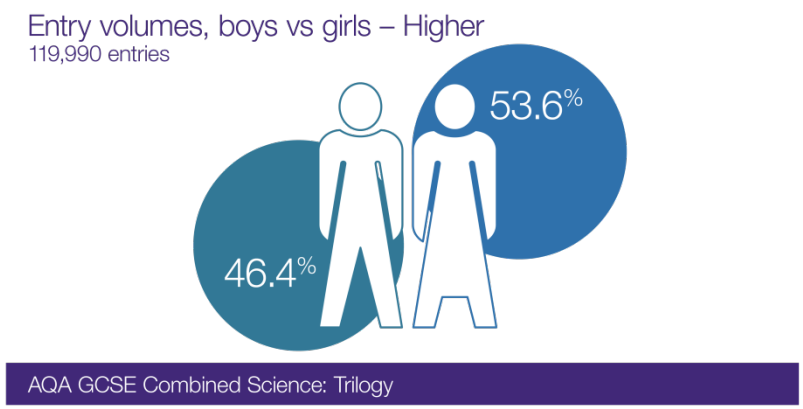
On each paper, a number of marks are allocated to test the following skill areas: extended response, maths, and practical skills.

This graphic shows the mean percentage of marks achieved for each skill area.

Watch tutorials on using ERA for results analysis, or log straight in via e-AQA.

Higher tier analysis

Conduct your own analysis using data relevant to you. Watch short tutorials on using Enhanced Results Analysis (ERA) for school, subject, group or student performance; or log straight in through aqa.org.uk/log-in



Entry volumes, boys vs girls – Higher

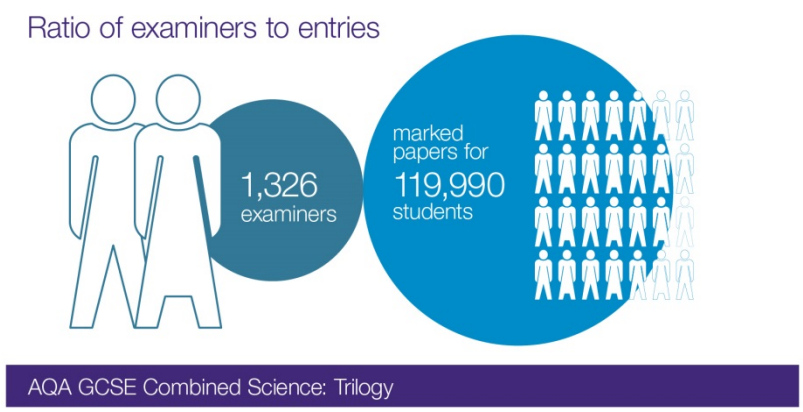
55,707 boys
64,283 girls.

Grade summary

Watch tutorials on using ERA for results analysis, or log straight in via e-AQA.

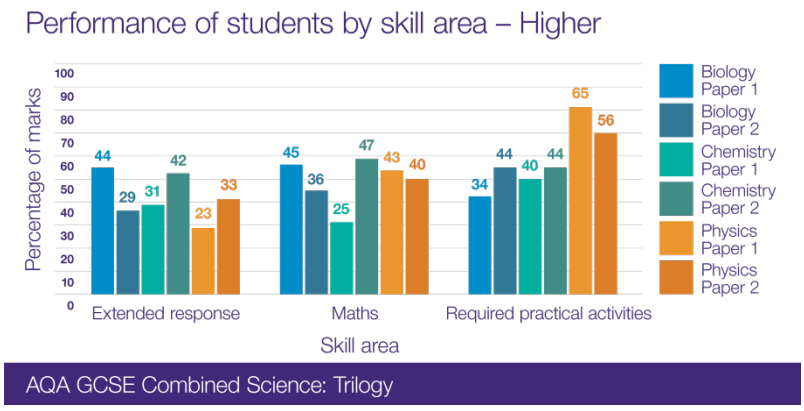
Higher tier analysis cont.

Conduct your own analysis using data relevant to you. Watch short tutorials on using Enhanced Results Analysis (ERA) for school, subject, group or student performance; or log straight in through aqa.org.uk/log-in



Ratio of examiners to entries

1,326 examiners marked papers for 119,990 students.



Performance of students by skill area – Higher

On each paper, a number of marks are allocated to test the following skill areas: extended response, maths, and practical skills.

This graphic shows the mean percentage of marks achieved for each skill area.

Watch tutorials on using ERA for results analysis, or log straight in via e-AQA.

Grade boundaries

Subject or paper	Max mark	Summer 2018 grade boundaries (raw mark)								
Trilogy, 8464 (Higher)	420	9-9	9-8	8-8	8-7	7-7	7-6	6-6	6-5	5-5*
		289	270	251	232	213	193	174	155	136
		5-5*	5-4	4-4	4-3	3-3	3-2	2-2	2-1	1-1
		136	117	98	79	60	-	-	-	-

*Note the Higher Tier 5-5 grade boundary is deliberately shown in all rows of the above table.

Subject or paper	Max mark	Summer 2018 grade boundaries (raw mark)								
Trilogy, 8464 (Foundation)	420	5-5*	5-4	4-4	4-3	3-3	3-2	2-2	2-1	1-1
		253	235	218	193	168	143	119	95	71

How to interpret grade boundaries

This is the first year this reformed specification has been awarded. For 2018, Ofqual agreed that all exam boards should award an allowed grade 3-3 on the Higher tier of GCSE Synergy and Trilogy. In addition, the grade 4-3 boundary was widened, making the distance between a 4-4 and an allowed grade 4-3 the same as the distance between a 4-4 and a 4-5.

Ofqual acknowledged that with the structural changes to the sciences – including the removal of untiered controlled assessment, and moving to a double award GCSE – tiering decisions were more complex this year. This decision ensured that Higher tier students who would have been better suited to the Foundation tier were not disadvantaged. Ofqual have indicated this won't be repeated in future, so schools should consider their entry policy carefully for summer 2019. You can read more on Ofqual's blog.

Grade boundaries are set using a mix of statistics and expert judgement

Our Centre for Education Research and Practice (CERP) uses a range of statistics to make predictions that suggest the most appropriate grade boundaries. The statistical evidence considers the prior attainment of the given cohort as well as the distribution of marks. Senior examiners then review a script sample to confirm the statistically recommended marks are sensible for the grade.

Boundary setting is overseen by Ofqual. To find more grade boundaries and learn how they are set, visit aqa.org.uk/exams-administration/results-days/grade-boundaries-and-ums

Feedback on the exam courses use student responses to explore what happened in each exam series. Visit aqa.org.uk/trilogy-cpd

Qualification summary

The question papers and mark schemes were designed to allow students to gain marks for showing their knowledge, understanding and ability to apply these in each of the areas of science. Students should be prepared to expect unfamiliar contexts and information that assess the Assessment Objectives (AOs). Familiar contexts are those mentioned in the specification and assess recall, selection and communication of students' knowledge and understanding. Basic knowledge and understanding in familiar and in unfamiliar situations, including in the laboratory, are tested – so it's essential that students read and analyse the information provided, then read and understand the question before writing their response. Students should then check their answers, especially those that are descriptions or explanations. Many students use 'it' or 'they' without any clear indication of what they're referring to.

There were some common misinterpretations of questions either due to lack of familiarity with common scientific terms or misalignment with key words like 'describe' and 'explain'. Other problems in interpretation seemed to stem from not reading the question carefully enough to grasp what was being asked.

A few students used up a lot of space by repeating the question, which doesn't gain credit. A number of scripts were particularly difficult to read, either because of poor handwriting, use of pens with ink that wasn't black, or both.

Students were generally good at fitting their answers into the space available, but a number used additional pages either for working purposes (which needs to be crossed out) or to write a few words, which would have fitted on to the original paper. Students need to understand the list principle. If they give two answers (one right and one wrong) when only one is required then no mark can be awarded.

Levels of demand

Questions are set at four levels of demand for this specification with different levels of demand within each of the tiers:

Foundation tier

- Low demand questions are targeted at students working at grades 1–3.
- Standard demand questions are targeted at students working at grades 4–5.

Higher tier

- Standard demand questions are targeted at students working at grades 4–5.
- Standard/high demand questions are targeted at students working at grades 6–7.
- High demand questions are targeted at students working at grades 8–9.

A student's final grade is based on their attainment across the qualification as a whole, not just on questions that may have been targeted at the level they are working to.

Biology Paper 1, Foundation

This is a snapshot. Learn more about every question from the summer 2018 series in our reports on the exam. Visit aqa.org.uk/log-in and follow:

e-AQA > Secure Key Materials > GCSE > Science/PE > Combined Science: Trilogy (new specification) > Reports on the exam

Highlights from summer 2018

Practical skills

It was clear from questions targeting the required practicals that although students may have carried them out, many didn't really understand **why** they were doing the steps. Students found it difficult to answer questions where they had to explain why different steps were important. For example, in the rate of photosynthesis experiment, many did not know why using the LED bulb was important. Similarly in the osmosis question, students didn't understand the need to dry the potato. The question on using a microscope, which directly assessed Apparatus and Techniques statement 7, was poorly answered at both tiers and indicated that students were not aware of what they were actually doing when using the microscope to make images clearer; many also found calculating magnification difficult, with 56% scoring no marks.

Maths skills

Students demonstrated good basic maths skills across the paper, including plotting graphs and taking readings from graphs. However, students found it much more difficult to analyse graphs in order to make conclusions. Students must offer some explanation or say what the data is showing rather than just write a description of the data when making a conclusion.

Knowledge and understanding

Students struggled with some basic biological knowledge including the term root hair, what a double pump is in context of how the heart works, and why the left ventricle is thicker than the right. As with all Biology papers, some students showed that they either didn't understand that energy is released (not made) or found it difficult to express their ideas around energy. Other areas students didn't seem to be familiar with included stem cells and therapeutic cloning.

Reports on the exam are written by senior examiners who see more responses than anyone else. Access full reports via aqa.org.uk/log-in

Biology Paper 1, Higher

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Highlights from summer 2018

Practical skills

Students found applying key working scientifically terms difficult in the practical questions. It was clear that many students didn't have a full understand of what the practicals were about or what the provided data showed. In these questions a detailed understanding of the purpose of each experimental step is needed, along with an understanding of the science underlying the concept. In the question on photosynthesis for example, students often couldn't suggest:

- ways to improve the collection of results
- why the temperature needs to be controlled
- how to change the method if a different factor was investigated.

Similar gaps in understanding were seen in the microscope (see Foundation paper comments) and osmosis questions. In the osmosis question students were able to plot the graph of the results but found it much harder to apply their knowledge of osmosis to explain what was actually happening.

Maths skills

Many students showed a good command of the basic maths skills needed on the papers but some found it challenging when applied in a biological context. Simple mistakes included forgetting there are 360^0 in a circle, failing to convert hours and minutes, and rounding numbers incorrectly. Some students didn't understand the term 'standard form' and gave a decimal number instead.

Although most students knew how to apply the inverse square law to calculate light intensity, many found it difficult to fully explain the relationship – this does require real understanding of the maths and the science behind the idea.

Linking questions with knowledge and understanding

Few students successfully linked ideas from different but related parts of the specification. In the osmosis question, the vegetable is being used to model a cell, so behaves in the same way when heated. Linking ideas is a demanding skill and students will need more opportunities in class to develop this.

Students demonstrated gaps in basic biological knowledge such as: what a non–communicable disease is, being able to describe each of the three stages of the cell cycle, and therapeutic cloning – particularly the disadvantages of use in medical treatment.

Biology Paper 2, Foundation

This is a snapshot. Learn more about every question from the summer 2018 series in our reports on the exam. Visit aqa.org.uk/log-in and follow:

e-AQA > Secure Key Materials > GCSE > Science/PE > Combined Science: Trilogy (new specification) > Reports on the exam

Highlights from summer 2018

Practical skills

Many students struggled to gain full marks on the required practical question on plant distribution. The answers given indicated that many students hadn't covered this practical in enough depth to gain a basic understanding of how to carry out the investigation or what a study like this is trying to establish. Many did not know the names of the basic equipment, what the relationships between the variables were, or how to make the investigation valid.

Maths skills

Most were able carry out the basic maths questions but found the calculation of percentages difficult. Many students found the calculation of the total area sampled in the investigation of plant distribution question extremely challenging. 81% of students did not gain any marks. When students are required to use maths skills, many found it difficult to identify what was needed and struggled to use knowledge from maths lessons.

Knowledge and understanding

Students struggled with some of the biological knowledge including the different structures of a nerve pathway, the position of the pituitary gland and the function of Luteinising hormone (LH). Some students still found difficulty with the definition of key genetic terms, e.g. phenotype. Many understood what a mutation is, but weren't clear what effect a mutation can have. 85% of students got this wrong.

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Biology Paper 2, Higher

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Highlights from summer 2018

Practical skills

The practical skills assessed by the plant distribution question revealed the same gaps in knowledge and understanding as on the foundation papers. Equally high numbers of students performed poorly, suggesting this practical was not carried out or understood as well as other required practicals. This question could form a useful check point in the future when students carry out this required practical, and reveal whether they understand the underlying principle of this investigation.

Maths skills

Most students performed well on the maths questions but dropped marks for simple errors such as not converting units and misreading values from graphs.

Linking questions and knowledge and understanding

Questions on this paper required students to write logically, using precise scientific language to explain concepts. They needed to bring knowledge and understanding from different but related areas of the specification together to answer the questions. If students were only able to recall facts and didn't have a very good understanding of the biological principle being assessed, then answering these, more thoughtful questions would be very difficult.

As the examiner report explains in more detail, some students gave a seemingly 'prepared answer' which did not actually fit the question.

There were some areas of the specification that the students clearly had not mastered. These include some topics students found challenging in the legacy specification which remain problematic in the new ones, such as how messages travel around a reflex arc and conscious actions differ from reflexes, the principles behind selective breeding rather than genetic modification, the pros and cons of GM crops and how hormones interact during the menstrual cycle. Questions on new areas of the specification to do with the classification system and domains were equally poorly answered.

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Chemistry Paper 1, Foundation

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e-AQA > Secure Key Materials > GCSE > Science/PE > Combined Science: Trilogy (new specification) > Reports on the exam

Highlights from summer 2018

This paper was affected by a security breach at a school and as a result, the document '*Additional Guidance- using the 2018 Combined Science Trilogy Chemistry…*' from e-AQA, should be consulted. Follow: Secure Key Materials > GCSE > Science/PE > Combined Science: Trilogy (new specification).

Knowledge and use of scientific terms

To improve performance, students need to know and use scientific terms correctly. They need to learn the different types of bonding in elements and compounds, and understand reactions represented by chemical equations.

Maths working missing

In calculations, some students didn't show working. This was not an issue when they provided the correct answer (and gained full marks), but many did not and therefore gained no credit as it was not possible to see how they arrived at their answer.

Knowledge of conversion between units

Few students understood and were able to demonstrate their application of the concept of conversion between units, such as cm^3 and dm^3.

Extended response question based on the required practical activity

Students found it difficult to identify errors in the supplied method and most were unable to mention an improvement to the method, and when they did they often failed to explain the reason for the change.

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Chemistry Paper 1, Higher

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Highlights from summer 2018

Use of scientific terminology and command words

Some students misinterpreted questions due to a lack of familiarity with common scientific terms. Students also need to be able to identify the key words and command words in questions, such as 'describe' and 'explain', and respond to these appropriately. Students should check their answers carefully, especially those that are descriptions or explanations – many students use 'it' or 'they' without a clear indication of what's being referred to.

Structuring responses

Students were generally good at fitting their answers into the space available, but a number of students used additional pages for working purposes which need to be crossed out. Remind students of the list principle – if they give two answers (one right and one wrong) when only one is required then no mark can be awarded.

Demand of the paper

The majority of students had enough time to complete the paper. There was plenty of opportunity for higher-attaining students to demonstrate their knowledge, with a good degree of differentiation amongst students with a wide spread of marks. There appeared to be a significant number of students who may have been more suited to the Foundation Tier.

Familiar and unfamiliar contexts

Basic knowledge and understanding in familiar and unfamiliar situations, including in the laboratory, are tested throughout this paper. This means it's essential for students to read and analyse the information provided, and read and understand the question before writing their response.

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Chemistry Paper 2, Foundation

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Highlights from summer 2018

Practical-based questions

It was clear from students' responses that many weren't familiar with the chromatography practical. First-hand experience is crucial for students to perform well on practical-based questions. Many students were unable to select the apparatus needed to separate substances and often demonstrated a lack of understanding of the processes involved eg evaporation, distillation or filtration.

Extended response questions

Some struggled with these questions. Understanding the command word is key to success. When asked to 'Compare' and 'Explain', some students gave a description but did not go on to offer a comparison or explanation as required by the question. When provided with a table of data, some had difficulty interpreting the information and a number were unable to express comparisons of the data from the table clearly or accurately.

Mathematical skills

The requirement across the chemistry questions on the specification is for 20% of the marks to assess mathematical skills, and many students made good attempts at the questions on this paper. However, many students found percentage calculations challenging and some students confused percentage calculation with angle measurement when using the data provided in the pie chart.

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Chemistry Paper 2, Higher

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Highlights from summer 2018

Extended response questions

A few students struggled with these questions where understanding the command word is key to success. When asked to 'Compare' and 'Explain', some students gave a description but did not go on to offer a comparison or explanation as required by the question. In one question, students writing the least creditworthy responses discussed the issues in general terms and made little reference to the information provided in the table. Higher-attaining students had logically worked their way down the information in the table, comparing and calculating differences when constructing their answer.

Mathematical skills

The requirement across the chemistry questions on the specification is for 20% of the marks to assess mathematical skills, and many students made good attempts at the questions on this paper. When calculating answers many students who knew the correct method failed to convert the units correctly (eg from grams to kilograms); others rounded their answers part way through a calculation, giving rise to an incorrect final answer. Students shouldn't round answers until they reach their final answer.

Demand levels of the questions

The demand levels of the questions are designed to increase from 'standard' demand to 'high' demand through the paper. As expected, students had more difficulty gaining credit in the high demand questions. The majority of students had enough time to complete all questions.

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Physics Paper 1, Foundation

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Highlights from summer 2018

Energy

The 'energy stores' approach appears to have caused confusion for students. Examiners felt that there was greater evidence of misconceptions this year than previously. Students who refer to a 'type' of energy will receive credit if it clearly indicates a store.

Use of data in answers

Students should be encouraged to use data, especially when describing trends shown in tables or on graphs.

Understanding what the question is actually asking

In one question, students were shown 'before' and 'after' pie charts and asked to explain the environmental impact of the changes. Many didn't attempt this question, and many more simply described the differences in the data.

Calculations and unit conversions

Many students didn't identify when they needed to perform a unit conversion – kg is the SI unit for mass and doesn't ordinarily need converting. Where numbers contain a number of zeros, students need to carefully check they copy them correctly between calculator and paper. Powers of ten were an issue, with many unclear how to manipulate numbers with powers.

Practical skills and extended response

Students need to link appropriate apparatus to the dimensions they measure – a beaker will not usually have a high enough resolution to measure the volume of water displaced by a small object. To access the higher levels, a method needs to lead to a valid outcome. Students need to think about controlling variables and how to use the data they would be collecting.

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Physics Paper 1, Higher

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Highlights from summer 2018

Energy

The 'energy stores' approach appears to have caused confusion for students. Examiners felt that there was greater evidence of misconceptions this year than previously. Students who refer to a 'type' of energy will receive credit if it clearly indicates a store.

Calculations and unit conversions

Numbers with zeroes and powers of ten were a source of some confusion for students. Students need to check they are copying the correct number of zeroes when working out a calculation. Students need to be familiar with common prefixes such as mega and what this looks like in numeric form. Maths skills did seem better than that seen in previous series, which was good to see.

Practical skills

Students need to be able to construct methods that will lead to valid outcomes. This includes thinking about appropriate apparatus, what data needs to be collected and structuring their method into a logical sequence.

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Physics Paper 2, Foundation

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Highlights from summer 2018

Practical skills and drawing graphs

Students need to think about what variables they must measure. Students were asked to plot data and draw a line of best fit, which should have been a curve. Many attempted to draw a straight line.

Calculations

Students need to be careful with units that include a power of 2 (such as the units of acceleration). When calculating a force from mass and acceleration, many squared the value for the acceleration. Calculations were quite well done, but students need to be careful to select the correct data. Students should be prepared to convert centimetres into metres.

Explanations and descriptions

Many gave simple answers to questions asking for an explanation – often a basic description. When asked to give descriptions of relationships shown on a graph, examiners are generally looking for descriptions of the shape of the graph, rather than just recognition that as one variable increases, so does the other.

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Physics Paper 2, Higher

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Highlights from summer 2018

Calculations

Some students confused mean and mode. For the multi-step calculation, a lot of students did not realise the question was asking for the total extension (given an increase in the force applied to a spring) and instead calculated the initial extension. Students should check if an answer needs be given to a specific number of significant figures – many omitted to do this.

Scientific language

Many students appeared confused about the meaning of the term accuracy, thinking that the more decimal places a value had, the more accurate it was. Whilst many could describe a zero error shown in a diagram, most did not refer to it as this and simply described it as a 'human error'.

Explanations and detail of response

Students should expect to give linked statements when writing an explanation – examiners need to see what is happening and why. For example, when asked to explain how an electromagnet can pick up and move blocks, few wrote about how the electromagnet worked.

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Notes

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Responsible for multiple sciences?

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