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GCSE
PHYSICS

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Report on the Examination

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General Introduction to the Autumn Series

This has been another unusual exam series in many ways. Entry patterns have been very different from those normally seen in the summer, and students had a very different experience in preparation for these exams. It is therefore more difficult to make meaningful comparisons between the range of student responses seen in this series and those seen in a normal summer series. The smaller entry also means that there is less evidence available for examiners to comment on.

In this report, senior examiners will summarise the performance of students in this series in a way that is as helpful as possible to teachers preparing future cohorts while taking into account the unusual circumstances and limited evidence available.

Overview of Entry

The entry for this series is very small in comparison to a normal summer series. The majority of the entries are single entries from single schools. For the Higher Tier paper a significant minority of the students are private entries. Whilst there were a number of students that were clearly well prepared for the examination a significant number of the students at both tiers showed a lack of basic understanding of Physics.

Comments on Individual Questions

Question 1 (Common Question)

Part **01.1** asked students to explain factors and not simply list them. However, this is what many of the students did. Another common error was to explain factors affecting thinking distance rather than as asked, braking distance. The required equations were well known and the calculation required to answer **01.3** was often given correctly. Reading values from a graph proved difficult with only about half of the students answering **01.4** correctly.Less than 50% of the students scored full marks in part **01.6**. Generally only those students completing the calculation correctly scored the unit mark. However many of the students did score the mark for correctly giving a calculated incorrect numerical answer in standard form.

Question 2 (Common Question)

Students seemed unfamiliar with the term ‘elastically deformed’ and in **02.1** described an object that was ‘inelastically deformed’. When describing a method to obtain given results, students must include what measuring instruments are used, how each quantity is obtained and the interval and range of the given results. Most of the students understood the term ‘risk assessment’. Answers to part **02.5** that simply stated ‘positive correlation’ or ‘extension increases with force’ were insufficient to gain credit. A minority of the students gave a very succinct answer worth two marks. In part **02.6** the most common errors were a failure to convert 20 cm to metres or failing to square the extension.

Question 3

This question was poorly answered. Few of the students knew which forces act during the main sequence stage or what happens to a star after the main sequence ends. To gain full marks it was not sufficient to simply state the names of the subsequent stages correctly. A significant number of the students gave answers that referred to both stars of the same size and mass of the Sun (the required answer) and to stars much larger than the Sun. These answers scored no marks as the

students had produced a list without indicating which of the options presented was correct. In part **03.3** the correct choice (option A) needed to be accompanied by a comparative reason to score both marks. Simply stating something like 'it has a low speed' was insufficient.

Question 4

Few of the students showed knowledge of lenses, were able to describe a trend in detail, the meaning of uncertainty in measurements or why objects appear different colours. In part **04.1** few students could describe the image shown. Answers such as 'not real' and 'fake image' are not acceptable for the term 'virtual'. In **04.2** the ray diagram was not completed well by most students. Some of the students drew a correct diagram for a concave lens, however, this did not answer the question asked so did not gain credit.

Question 5

Although a number of correct uses were given for ultraviolet a number of the students appeared to confuse UV with ultrasound. The meaning of the prefix 'nano' was not well known. However the students that knew the correct equation for part **05.3** (about 35% did not) did go on to use the value chosen in **05.2** to calculate a correct answer. Only about half of the students could use the data presented in Table 1 to correctly answer part **05.4.** Most of the students scored no marks for part **05.5**, with many either simply giving an example of each type of wave, or failing to link the direction of oscillation to either direction of energy transfer or direction of wave travel.

Question 6

Although it was frequently seen, an answer only in terms of removing anomalous results was insufficient. The reason being that the question asked not only the advantage of repeating but also taking a mean. Very few of the students gave a precise answer in terms of reducing the effect of random errors. The calculation produced a full range of marks with most of the students scoring 2 or less. For part **06.3** there were a number of very good answers covering all three marking points. However, most of the students failed to answer the question asked as they simply described a way that the teacher could have measured the wavelength.

Question 7

In part **07.1**, few students could name a force. Most of the students gave answers such as 'energy', momentum' and 'speed'. Once again reading a correct value from a graph proved difficult and prevented many of the students from scoring full marks. Despite part **07.3** using both the word 'force' and the word 'moment' few of the answers used either word and so scored no marks. Clear working out in part **07.4** allowed some students to gain some credit even when the final answer was wrong. An approach that was often seen was to first calculate time and then acceleration. However, those doing this tended to use the final velocity, instead of the average velocity. The final part produced few totally correct answers. Common errors included: showing the wrong direction, or not indicating the direction, of the resultant force; inaccurate scale drawing; no indication of what angle was being given; and giving a calculated answer with no vector diagram attempted.

Question 8

Very few of the students had any idea how a moving-coil loudspeaker works to produce a sound. Generally answers were partially explaining how electric motors, generators or microphones worked. In part **08.3** few of the students scored both marks with 60% scoring no marks. The most frequently seen incorrect answers were to do with lack of data, no repeats or loudness being in arbitrary units.

Question 9

Whilst many of the students could quote Fleming's Left Hand rule, few were able to apply it in order to explain how to predict the direction of the copper rod given in Figure 16. In part **09.2** an answer 'bigger magnet' is not necessarily the same as a 'stronger magnet' and neither is 'changing the current' necessarily the same as 'increasing the current'. In part **09.3** whilst there were few answers scoring all six marks many of the students gained partial credit by showing their working out clearly. A very common error was not to convert 4 g to kg.

Concluding Remarks

The paper presented to the students was broadly similar to that seen in previous series. Many of the errors made by the students were similar to those seen in previous series.

The failure to be able to accurately present information requiring recall from the specification (AO1), for example understanding the term 'elastically deformed' or describing the difference between a transverse wave and a longitudinal wave was commonly seen. Incorrect recall of equations stopped many students from scoring marks in calculations. Students often seemed to be unsure what the command word in a question meant. For example being asked to 'Explain' an application of Fleming's Left Hand rule is not the same as 'Describe'.

Areas of the specification that were particularly poorly answered were sections 4.7 (Magnetism and Electromagnetism), 4.8 (Space physics) and 4.6.2.5 (Lenses). Vector diagrams did not appear to be well understood.

Many of the students now understand the importance of showing clear working out when completing a calculation. This is crucial in the more complex calculations.

Similar to previous series a significant number of the students were unable to read values from graphs accurately and failed to realise when numerical values were not given in standard SI units.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.