GCSE

SCIENCE A / PHYSICS

PH1HP

Report on the Examination

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General

Questions 1 to 6 were standard demand, targeting grades D and C. Questions 4 and 7 were standard and high demand, targeting grades D to A. Questions 5, 6 and 8 were high demand targeting grades B and A.

The majority of students attempted all parts of all of the questions, with very few questions not attempted.

Those questions involving calculations were generally answered well. However, it would benefit students to write the relevant equation and substitute numbers in to it first, before re-arranging. If the student transposes the equation incorrectly, they would then be able to score a mark for the substitution.

It seemed that a large number of the students had been well prepared for the exam, demonstrating a good understanding of the topics covered on this paper. In some cases, students might benefit from exam practice such as looking for the command words in the question and reading instructions and information carefully – also reading what they have written to check that it makes sense and there are no contradictions.

The standard of hand writing for some students is poor and markers sometimes struggled to read student's answers.

Question 1 (Standard Demand)

(a) Less than one-third of students scored both marks, and around one-third failed to score at all. Often, insufficient detail was given, for instance referring to 'waste' rather than 'nuclear waste' or 'radioactive waste'.

(b)(i) The calculation was quite well done, with around half of students achieving both marks. A significant number failed to convert from W to kW correctly.

(b)(ii) Over three-quarters gave a correct answer. Failure to score the mark was often because of vagueness, for instance referring to poor 'weather' rather than specifying 'wind'.

(c) Around two-thirds of students gained this mark. Again, marks were lost not because students did not know an advantage, but because the answers lacked detail; an example would be to say that underground power cables were 'safer' rather than giving a specific example of how they might be safer, e.g. low flying aircraft won't hit them.

Question 2 (Standard Demand)

Some very good answers were seen, with many students expressing themselves clearly and coherently. However, it should be emphasised that a well thought-out answer including the salient points is preferable to a rambling account where the same point is repeated several times. Too many students wasted time repeating information given in the question. Students do not need to give an introductory paragraph stating what they are going to do.

Nearly three-quarters of students scored four or more marks out of the six available. It appeared that a minority of students were not familiar with the term 'kinetic theory', indicating that they were

writing about kinetic energy and giving answers in terms of heat transfer and change of state. Nevertheless, they were able to score marks if they gave correct information about particles. A significant number wrote about particles in liquids, either instead of gases, or in addition to gases.

Question 3 (Standard Demand)

(a) Just under half of students correctly identified the radiation emitted from a heating element as infrared; the most common incorrect answer was 'microwaves'.

(b) Around two-thirds of students gained both marks. Despite Figure 2 showing the oven's two control knobs, and the question asking about 'this' oven, many answers failed to refer to increasing the power or reducing the speed of the grid, but instead focused on changes to the design of the oven.

(c) Only a very small number of answers scored all three marks for this question. The main error was not distinguishing between the inner and outer surfaces of the oven, and statements such as 'light-coloured and shiny surfaces are poor emitters and absorbers, but good reflectors' were common. Of those who referred to the outer surface separately, many thought that it would reflect heat from the sun, or from the room, so keeping it cool. Whilst many students realised that less energy would be lost, many referred to the absolute of '**no** heat loss' or '**al**l the heat will stay in the oven' – this did not score a mark.

Question 4 (Standard and High demand)

(a)(i) This was a standard demand question. Around a third of students correctly answered the question asked. Many students answered the question 'what does frequency mean?'

(a)(ii) This was a high demand question. Around one-quarter of students achieved all three marks. Nearly two-thirds were able to carry out the calculation correctly, but either failed to see the instruction to give their answer to three significant figures, or did not understand what this meant.

(b) This was a standard demand question. Although around a half of students scored one or two marks out of the four available, very few achieved all four. Many students seemed confused as to what the question was asking, and stated a fact about the first wave for 'Conclusion 1' and a fact about the second wave for 'Conclusion 2'. It was common to see 'a louder sound' linked to 'increased wavelength'. Whilst many correctly identified the second wave as having a greater frequency, the reason often referred to a shorter wavelength, instead of more waves in the same time. Students need to recall that the horizontal axis on a CRO represents time.

Question 5 (High Demand)

(a) A very low proportion of students did not attempt this question. Out of those who did answer nearly one-quarter failed to score any marks; answers referring to burning fossil fuels, wind turbines, waves and tides were not uncommon. Some answers started correctly with water falling, but then reverted to the water being heated up. A significant number of students either failed to include the useful energy transfers taking place, or just referred to the kinetic energy of the moving water transferring to 'electricity'.

(b) The majority of students were able to gain at least one mark out of the three, with more than one-fifth giving good descriptions of the consequences of burning fossil fuels. Some missed the reference to 'better for the environment' and answered in terms of saving money on fuel bills.

(c) Slightly less than half of students scored the mark. Many demonstrated an understanding of legal power made by government, but few mentioned economic factors. Incorrect suggestions included 'letting the people decide' or concern about the disposal of appliances which did not comply with the suggested new rule.

Question 6

(a) This question was well answered on the whole, with around half of students scoring at least three of the four marks. Many answers started with warmer air rising, rather than with the cooler air falling. Whilst many students made reference to changes in density, they often incorrectly referred to the 'particles becoming denser'.

(b) Around a fifth of students achieved both marks. Many answers indicated that 'directly proportional' meant that the two values had to be the same, as in fridge D. Some students worked out the difference in volume between each fridge and the previous one, and also the difference in energy used. As these were not the same, they stated that the data did not show proportionality.

To check if results are directly proportional, either the ratio of the volume to energy used needs to be a constant or the volume and energy used needs to change by the same multiplier.

(c) Nearly two-thirds scored at least one mark, but only around a fifth scored both. Many students seem to have overlooked the instruction to ignore the cost of buying a new fridge. Many answers indicated that 'more efficient' meant that the new fridge was colder, or kept food fresher for longer.

Question 7 (Standard and High Demand)

(a) A very small amount of students did not identify conduction as the process by which energy is transferred through copper.

(b) The majority of students answered correctly, of those who did not score the mark, the most common error was misreading the number on the x-axis (for a temperature increase of 35°C) as 30,500 instead of 35,000.

(c) Around half of students scored two of the three marks available. This was usually for performing the calculation correctly, but failing to give the correct unit.

(d) A very low proportion of students did not attempt this question, with less than a fifth scoring the mark. The most common incorrect answers referred to faulty apparatus, incorrect measurements or values not as stated in the question, e.g. the block was not 2kg.

Question 8 (Standard and Higher Demand)

(a)(i) Three fifths of the students were able to substitute into the equation and rearrange it to find the useful power output. The main error was not selecting the equation using efficiency as a fraction rather than as a percentage.

(a)(ii) Around half of the students answered correctly. Common incorrect responses were to subtract their answer to the previous part from 1 or from 100.

(b)(i) Around three-quarters of students scored at least one mark, usually for stating that the input power was less for the LED bulbs. Whilst many appreciated that the efficiency was also less, few explained the consequence of this in terms of less energy wasted meaning the temperature of the cabinet would increase more slowly, resulting in the cooler unit being used less often.

(b)(ii) This was a standard demand question. Whilst the majority of answers recognised that a line graph (or scattergram) should be drawn, a small proportion gave a correct reason by saying that both variables were continuous. It would appear that many students do not think to transfer their knowledge from ISAs to this written paper.

(c) Around a fifth of students scored full marks. Good answers included clearly drawn, mathematically-based conclusions, showing all calculations. Those who chose to write a larger amount of prose often missed a vital part of the information, for instance just comparing the purchase costs and ignoring the operating costs.

Mark Ranges and Award of Grades

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

Converting Marks into UMS marks

Convert raw marks into Uniform Mark Scale (UMS) marks by using the link below.

UMS conversion calculator