GCSE

SCIENCE A / PHYSICS

PH1FP

Report on the Examination

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General

Questions 1 to 6 were low demand, targeting grades E, F and G. Questions 7 to 9 were standard demand, targeting grades C and D.

The paper as a whole seemed accessible to the majority of students with very few unattempted items.

Students often failed to read the question carefully and sometimes simply wrote down all they knew, rather than restricting their answer to what was relevant to the question.

The poor quality of handwriting for some students is of concern and on occasions markers struggled to decipher what the student had written.

Question 1 (Low Demand)

(a)(i) Just over a half of all students correctly identified the energy transfers for an electric car.

(a)(ii) Just under two fifths of the students were able to state that waste energy is transferred into the surroundings. Weaker students forgot that the question was about an electric car and confused the wasted energy with exhaust gases. Others thought the waste energy is recycled and used again.

(b) The majority of students were able to substitute the energy values given in the question into a correct equation. Most tried to express the answer as a percentage, but about one third of students failed to gain maximum marks because they either neglected to insert the % sign after the number 70 or they quoted the efficiency as 0.7 but then put either a % sign or a unit after the number.

Question 2 (Low Demand)

(a)(i) Just under a half of the students correctly identified trace **A** as having the highest frequency.

(a)(ii) Four fifths of students correctly identified that trace **B** has the smallest amplitude.

(b) About four fifths of the students correctly calculated the speed of the sound wave. Just over a half of the students also correctly identified the correct unit.

(c) About a third of the students correctly stated the change in both the frequency and the wavelength. About two fifths of the students correctly stated the change in either the frequency or the wavelength.

Question 3 (Low Demand)

(a) Two thirds of the students could identify that convection cannot take place in a solid.

(b) A small proportion of the students correctly identified the changes in energy, spacing and density of air when it is cooled.

(c)(i) The majority of students were able to identify fridge A as costing the least to use and also stated it uses less energy. Students would benefit from remembering to use words which imply that a comparison with the fridges which were not chosen.

(c)(ii) Just under a half of the students correctly stated that as the volume of the fridge increased the energy used in one year also increased. A common incorrect response was to state that the volume in litres was always less than the energy used in kWh, a little like comparing apples to oranges.

(c)(iii) A small proportion of students appreciated that three fridges is too small a sample from which to draw conclusions for all other fridges.

Question 4 (Low Demand)

(a)(i) Only about a quarter of students correctly described how geothermal power stations work. Cold water being pumped down into the ground was the most frequent correct response out of the three. A common error was to state that a motor produces electricity.

(a)(ii) About three-quarters of the students correctly indicated that geothermal power stations provide a reliable source of electricity.

(b) About three quarters of the students correctly indicated that hydroelectric power stations need running water to operate.

Question 5 (Low Demand)

(a)(i) About one third of the students correctly chose two control variables, a further quarter were able to identify one control variable. A common reason for not gaining marks was not being specific with their answers, e.g. simply saying ‘temperature’ rather than ‘starting temperature’.

When a control variable is asked for, credit is not normally given for saying that the same equipment should be used, e.g. ‘use the same thermometer each time’.

(a)(ii) A low proportion of students appreciated that bar graphs are used when one of the sets of data is categoric. Most simply referred to the ease of comparing results or the ease of drawing bar graphs.

(a)(iii) About half of the students identified that concrete needed the most energy to increase its temperature by 5°C. The majority of these recognised this was because the heater had been on for longer. Students were expected to compare the time for heating concrete with the times for the other materials and not simply state that the bar was higher or that it took a long time.

(a)(iv) Three quarters of the students could correctly substitute into the appropriate equation and calculate the correct energy transfer.

(b)(i) Four fifths of the students correctly identified the anomalous result as the one after 10 minutes.

(b)(ii) Many students did not appreciate that when a line of best fit is required any anomalous results are ignored. A line of best fit should have as many points below the line as above the line. Just over a half of students drew an acceptable line of best fit.

(b)(iii) A third of the students appreciated that the block was at room temperature when the heater was switched on and were able to extrapolate their line of best fit back to the temperature axis and correctly record the intercept. Common incorrect responses were the lowest and highest plotted temperatures plotted on the graph.

(b)(iv) About three fifths of the students knew that the interval is the time between each reading.

Question 6 (Low Demand)

(a) About a third of the students correctly identified the change in the wavelength and energy of a light wave when its frequency is increased.

(b) A small proportion of students knew that some light energy is absorbed when it passes through a piece of glass. Most simply stated that it disappeared.

(c)(i) The majority of students failed to go further than stating the thickness was kept constant to make the test fair. A low proportion of students were able to state that the intensity of transmitted light depended on the thickness of glass and therefore needed to be controlled.

(c)(ii) Many students were distracted by the fact that brown colours are good absorbers of thermal energy. About two fifths of the students correctly stated that brown glass had the smallest intensity of transmitted light.

Question 7 (Standard Demand)

(a) A low proportion of students could give an advantage and a disadvantage of a nuclear power station compared with a gas-fired power station. A further quarter could give either an advantage or a disadvantage. Too many answers were vague and referred simply to pollution, rather than naming a gas. A common misunderstanding was to say that nuclear power stations give out carbon dioxide gas. A common misreading of the question was to give an advantage for a nuclear power station and a disadvantage for a gas-fired power station.

(b)(i) Nearly two thirds of the students were able to substitute a power and time value into the correct equation. A low proportion of students were able to convert the given power into kilowatts.

(b)(ii) Just over a half of students were able to state that the wind is a variable and unreliable source of energy. The figure of 30% proved a distractor for weaker students who often quoted that 70% of the energy was wasted. Those students who mentioned that the output was weather-dependent were not given credit. The key aspect is variation in wind speed or power. Some students appear to believe that wind turbines are operated by supplying them with electrical energy, and are shut down to conserve energy.

(c) Two fifths of the students were able to give an advantage of underground cables compared with overhead cables. Too many statements were vague, students were expected to give some detail of why underground cables are less likely to be damaged. There are still a large number of students who believe that birds will be electrocuted if they land on overhead power cables.

Question 8 (Standard Demand)

(a) Only a fifth of the students could state that hot objects emit infrared radiation.

(b) About half of the students could identify that increasing the power and decreasing the speed would increase the energy incident on the biscuits and therefore make them browner.

(c) Responses did not often include information specifying whether they were referring to the inside or the outside surface of the oven. Several explicitly referred to reflection of light, while others stated what would have occurred if the surfaces had been black. About half of the students appreciated that light shiny surfaces are good reflectors of infrared radiation. Only the most able students stated that a shiny outer surface would reduce emission of infrared, or that the amount of radiation reaching the biscuits would be increased.

Question 9 (Standard Demand)

A low proportion of students were able to make a relevant comment on the arrangements of particles in solids or gases.

Generally, most students made a good attempt at the question, with few students leaving it blank. Most were able to make sensible statements about the spacing and movement of particles in solids and gases, but rather fewer referred to the forces between the particles: fewer still attempted to use these statements to explain the properties given in the information box.

Too many students simply repeated the information given in the question and weaker students wrote all they knew, including about particles and their behaviour in a liquid The use of the term ‘kinetic theory’ in the question distracted some students into describing conduction and convection. Others became obsessed with the fact that free electrons make metals good conductors.

More able students could select the relevant property of particles to explain the macroscopic property of solids and gases.

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