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Science A / Physics PH1HP

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Unit: Physics 1

Report on the Examination

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General

Questions 1 to 3 were standard demand, targeting grades C and D. Question 4 was a mixture of standard and high demand. Questions 5 to 7 were high demand, targeting grades A and B.

Some of the numerical questions were poorly answered. Whilst students generally seem to be able to substitute figures into a given equation, they are often unable to complete the arithmetic correctly. Students should be encouraged to show all working out.

There were indications that students did not always read the question carefully, and also did not read through their answers to check that they made sense.

Question 1 (Standard demand)

(a) (i) Whilst most answers showed that students understood the need to add the given values, a surprising number failed to perform the addition correctly.

(a) (ii) Many students selected the correct equation and multiplied their previous answer by 7. However, a common error was to convert 7 hours into minutes or seconds.

(a) (iii) Around half of the students scored the mark here. However a significant number of students showed a lack of common sense about the answer, for instance indicating that the cost of heating a house for one day would be £525.

(a) (iv) Whilst many students correctly stated that the rate of energy transfer would decrease, few related this to a decrease in temperature difference between inside and outside. The most common incorrect response was ‘because the temperature decreases’.

(b) (i) Very few students achieved both marks for this question. Marks are not awarded for merely re-stating the information given in the question; that the plastic foam reduces energy transfer by convection. Many answers referred to ‘hot air from the room’ getting trapped in the foam.

(b) (ii) Around one-third of students gained this mark.

(c) Just under half of the students gained one mark for stating that the rate of energy transfer would increase, but few were able to give a correct reason. A common incorrect answer was to say that double glazing is a good insulator, so it would reduce the rate of energy transfer; such answers indicated that students had failed to read the context of the question correctly.

Question 2 (Standard / High demand)

(a) Many students are unable to distinguish between a hot object emitting infrared radiation, and a cold object absorbing it. However, by stating that matt black objects are good emitters and absorbers, many were able to achieve one mark.

(b) This question was answered well, with over half of the responses correctly stating a relationship between the number of fins and the rate of energy transfer; of these responses, about half also referred to the increased surface area.

(c) The majority of students were able to substitute the correct numbers into the correct equation and perform the calculation. Common mistakes were converting the 2 kg mass to grams, and not calculating the difference between 97 and 112 correctly.

(d) Some very pleasing answers were seen, students clearly expressing that energy which would have been wasted had now been converted into useful energy.

Question 3 (Standard demand)

(a) Some responses indicated that no electricity was being generated at all before the 24 hour period in the question, or that at night no electricity needed to be generated.

(b) There was evidence that some students are planning their responses before writing; these students often scored well. Many answers were well structured, giving advantages and disadvantages of both systems, but not all gave a conclusion. Some statements were often insufficiently detailed, for instance that the biogas generator is not 'environmentally friendly'.

Question 4 (High demand)

(a) Just under half of the students scored both marks on this question showing correctly the refraction into and out of the block.

(b) (i) A large number of students were able to conclude that the angle of refraction increases as the angle of incidence increases. Fewer students were able to give a second correct conclusion.

(b) (ii) When students answered in terms of angle of refraction, they were generally able to identify that "into water" was greater than "into plastic". However when referring just to refraction, not many students realised that refraction was greater into plastic than into water.

(c) (i) Fewer than one-fifth of students were able to state a practical improvement which the water bottle 'lights' would bring. Many answers lacked detail, merely stating 'it will help them to see'.

(c) (ii) Around one-fifth of students were able to identify an ethical implication. Many answers gave environmental implications. There was evidence that students had not read the question thoroughly, with many answers relating to the water bottles in the roof. Comments such as "they may need the water to drink", or "they only have access to dirty water" were not uncommon.

Question 5 (Standard / High demand)

(a) (i) Over half of students correctly identified gamma. There was a range of other responses, some of which were not electromagnetic waves, indeed some were not waves of any kind.

(a) (ii) Almost half of the students gave a correct answer. Common incorrect responses referred to uses of these waves.

(b) Many students were able to identify the correct equation, and substitute numbers into it. Common errors were wrongly transposing the equation and attempting to convert 25 metres into cm or km.

(c) (i) Over three-quarters of the responses were correct.

(c) (ii) Nearly two-thirds of students were able to identify at least one correct piece of information which can be obtained from the size of the red-shift.

(c) (iii) The vast majority of responses were correct. There are still a number of students who confuse the 'Universe' with 'Earth'.

Question 6 (High demand)

(a) This question was quite well answered by around half of the students.

(b) The majority of students seemed unfamiliar with the term 'decommissioning'.

(c) Around three-quarters of students scored at least one mark. There was evidence that some students had not taken on board that the question referred to 'companies generating electricity', as their answers referred to 'energy saving appliances' or 'switching lights off'.

(d) Under half of the students were able to score at least one mark, with only a small number of responses scoring all three marks. Common errors were to talk about 'electricity' being lost in the cables, or 'no energy will be lost'.

Question 7 (High demand)

(a) Whilst many answers referred to the arrangement of particles in solids and gases, fewer responses referred to the forces between the particles.

(b) (i) Just under half of the students answered correctly in terms of particles leaving the container / liquid. Other answers seen just referred to the particles 'rising.'

(b) (ii) Many answers referred to particles needing energy to escape, but often just stated 'gaining energy', without specifying that they had more energy than the particles that remained. Very few students gained the second marking point because they did not refer to "mean / average" energy. A fair number of students gained the third mark by linking a decrease in energy to the decrease in temperature.

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA website

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