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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Science B 4462 / Physics 4451

PHY1F Unit Physics 1

Report on the Examination

2010 examination – January series

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Science B / Physics
Foundation Tier PHY1F

General

Questions 1 to 5 were low demand, targeting grades E, F and G. Questions 6 and 7 were standard demand, targeting grades C and D.

The majority of candidates attempted all parts of all questions, with few questions being left unattempted.

This year there seemed to be more candidates whose standard of handwriting was so poor as to be almost illegible. Such candidates should be given the opportunity to use a scribe if they are entitled to one. There also seemed to be an increase in the number of candidates whose writing was so faint or so small that it was almost impossible to read. Candidates should be reminded to use a black pen for writing.

The standard of numeracy was varied. Many candidates could substitute the correct numbers into an equation that they were given, but could not then complete the arithmetic correctly. Candidates also need reminding that the answers to numerical questions are realistic.
For example, in question 2(b)(iii) it was not uncommon to have a power station that supplies electricity to a fraction of a home and in question 7(d)(i) for a saving of several hundred pounds to have been made by reducing the temperature of the wash cycle by 10 ^{o}C.

Question 1 (Low Demand)

(a) Most candidates could score all 3 marks here. If a mark was dropped it was most likely to be the TV remote control.

(b) (i) Most candidates scored a mark for skin cancer however a significant minority simply answered ‘cancer’ which did not gain credit.

(b) (ii) Many candidates made a good attempt at this question and realised that the effects of over-use of sun beds would give symptoms very similar to over-exposure to the Sun. Worryingly, a few candidates stated that sunbeds could not cause skin cancer.

(b) (iii) Just over half of the candidates realised that it enabled users to then make a decision for themselves as to whether to use a sunbed. Some candidates however simply restated the question by saying that then young people would know the dangers.

Question 2 (Low Demand)

(a) (i) Almost all candidates correctly identified gas as being the fuel that produces the smallest amount of carbon dioxide.

(a) (ii) Disappointingly less than half of the candidates realised that one variable is categoric and the other is continuous.

(a) (iii) A poorly answered question with few candidates realising that nuclear power stations do not burn any fuel.

(b) (i) A good response to this question, with many candidates obtaining all 4 marks. Where marks were lost, it was generally caused by confusing the turbine with the generator.

(b) (ii) Surprisingly only just over half of the candidates were able to name a suitable energy source, usually wind or solar power. Many candidates failed to read the question with sufficient care and named another biofuel. A significant number of candidates named a fossil fuel or gave nuclear.

(b) (iii) A good response to this question, with many candidates obtaining the correct answer. Some candidates however used the power of the power station in MW but kept the figure for the average power used in the home in watts ending up with a fraction of a home. Other candidates multiplied the figures ending up with an answer of 72 000 000 000 homes. It is unfortunate that such candidates do not realise how unrealistic these figures are.

Question 3 (Low Demand)

(a) Many candidates gave a correct answer to this question. However, a significant number of candidates supplied an answer that was in excess of 100 %.

(b) (i) The better candidates were able to identify the thickness of the glass as being the variable that had been controlled, but many other candidates thought that it was the light intensity that had been controlled.

(b) (ii) Many candidates scored 1 mark on this question, but very few candidates made the connection between infrared radiation and the heating effect sufficiently clear. There was also confusion between transmission, absorption and reflection.

(c) Only just over half of the candidates scored this mark, **Y** was a popular incorrect choice.

Question 4 (Low Demand)

(a) A generally good response to this question. In almost equal numbers, those candidates who scored the mark chose either to change the word ‘can’ to ‘cannot’, or changed the word ‘lead’ to ‘paper’. A significant number of candidates however incorrectly chose to change the word ‘thin’ to ‘thick’ or substitute beta or gamma for alpha.

(b) (i) Answers were disappointing with only just over half of the candidates scoring the mark. A significant number of candidates took no care, failed to draw straight lines, and consequently were often judged to be insufficiently accurate for credit to be awarded.

(b) (ii) Very poorly answered, with most candidates choosing 9000 million years, possibly because that is where the graph line ended.

(b) (iii) Most candidates responded by stating either that the school would not have the correct equipment or that the experiment would be too dangerous. Some scored 1 mark for realising that the experiment would take too long. Only a handful of candidates realised that the count rate would show no significant change during the time over which it could be measured.

Question 5 (Low Demand)

(a) (i) Surprisingly few candidates realised that an optical telescope is designed for use with visible radiation.

(a) (ii) Many candidates responded by stating that you would be closer to the stars on the top of a mountain, and therefore see more detail. The most frequent correct explanation was usually in terms of either light pollution or atmospheric pollution; some candidates however failed to give sufficient detail by simply saying 'less pollution'. As in previous years, several candidates believe that telescopes are designed purely for looking at the Earth, and were therefore stating that you could see more of the Earth from the top of a mountain.

(b) Only just over a quarter of the candidates correctly stated that the gamma ray telescope should be positioned in space, or above the Earth's atmosphere. Some candidates thought that the telescope needed to be protected from gamma rays, and should therefore be positioned to face away from the Sun.

(c) The majority of candidates correctly chose the third option.

Question 6 (Standard Demand)

(a) (i) Very few candidates gave the correct answer to this question.

(a) (ii) Very few candidates answered this question correctly, in terms of air being trapped between the fibres of the fleece. Most candidates simply stated that the fleece was an insulator, or that the fleece lining was very thick. There are still many candidates who talk in terms of 'heat particles' being unable to escape.

(b) (i) Almost no correct answers were seen to this question, with the majority of candidates simply repeating the question in their answer.

(b) (ii) The better candidates were able to deduce that the starting temperature of the water had been kept the same. However, most candidates simply referred to the temperature of the water, without stating that it was the starting temperature.

Other candidates correctly stated that the thickness of the fleece should have been kept the same: weaker candidates simply referred to the 'amount' of fleece, which was not sufficiently specific.

(b) (iii) There were very few correct answers to the question. Several candidates thought that the temperature would rise during the next 20 minutes. Some candidates unfortunately failed to read the graph scale correctly and estimated a temperature of 19 °C.

(b) (iv) Many candidates correctly identified jacket **M** as being the one that should be recommended. However, the reasons given for the choice were often very vague.

Question 7 (Standard Demand)

(a) (i) Kinetic energy was correctly identified by most candidates.

(a) (ii) Most candidates correctly stated that sound and thermal / heat were the two forms of wasted energy.

(b) This was poorly answered, with only just over a quarter of candidates realising that the energy was transferred to the surroundings.

(c) Most candidates were able to earn 1 mark here for stating that the more efficient machine would waste less energy. Very few candidates answered in terms of the **proportion** of the input energy that was wasted was less.

(d) (i) Few candidates were able to score both marks here. Many of the weaker candidates had difficulty in placing the decimal point correctly. Another common mistake was to calculate the cost for either 40 °C or for 30 °C, but not work out the difference.

(d) (ii) Few correct answers. Many candidates thought that washing machines produced carbon dioxide directly.

Mark Ranges and Award of Grades

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