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General Certificate of Secondary Education

Science B 4462 / Physics 4451

PHY1F Unit Physics 1

Report on the Examination

2008 examination - June series

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Physics
Foundation Tier PHY1F

General

Most candidates attempted each part of each question; there were very few parts of questions left blank. It would therefore appear that very few candidates found themselves short of time in answering the paper.

Although the general standard of legibility was good, in a few cases it was extremely poor; in some cases the examiners found it impossible to decipher what the candidate had written. Some candidates had used a pen that was of such a light colour that it was almost impossible to read. Candidates are instructed to use black ink.

A few of the questions require candidates to choose a correct word from a list. Candidates should be reminded that the answer must therefore be one of these words, and not one of their own choosing.

Question 1 *(Low Demand)*

(a) Most candidates could correctly name the other three appliances designed to transform electrical energy into heat. A few included the fan heater amongst their choices which was given in the question and a very small number wrote down the names of appliances that were not shown in the pictures.

(b) Most candidates correctly chose sound energy as being the form in which the fan heater wasted energy. A few however selected heat, perhaps thinking that this is always the answer to a 'wasted energy' question.

(c) The majority of candidates correctly identified that fan heater **L** was more efficient than fan heater **M**.

Question 2 *(Low Demand)*

(a) Most candidates correctly chose gas and oil as being the two energy sources likely to be used up first. A few candidates ignored the rubric and selected more than two energy sources.

(b) Many answers to this question were very vague, such as “they both have turbines”. The correct response required a reference to a step in the process.

(c) A well-answered question, with the majority of candidates obtaining the correct answer of 140 °C. Some candidates misread the scale and gave a wrong answer of 40 °C.

(d) Candidates usually realised that one advantage of geothermal energy was either that it saved using fossil fuels or that it is a renewable energy source. Some candidates simply restated the question, saying that the scientists would tell the government that this method could generate one quarter of the world’s electricity.

Question 3 *(Low Demand)*

(a) Many candidates, perhaps based on penetrating abilities, believe that alpha is the ‘weakest’ and gamma is the ‘strongest’ type of radiation. This led them to linking alpha “will not harm living cells” and gamma is “the most strongly ionising”.

(b) Most candidates knew that the centre of an atom is called the nucleus.

(c) Most candidates correctly chose substance **Y** as the best substance to use as a tracer, and could usually give at least one correct reason for the choice. Many

candidates incorrectly chose substance **Z** despite the information given in the question.

Some candidates failed to follow the rubric and instead of writing down the letter of the substance wrote down "gamma". This led to confusion as two of the substances in the table were gamma emitters.

(d) Almost half of the candidates were able to score a mark here as they realised that killing bacteria on the food would reduce the risk of food poisoning or would lead to longer shelf lives. Some candidates merely repeated the question, saying that irradiating food would kill the bacteria.

Question 4 ***(Low Demand)***

(a) Many answers referred to the size of the mirror rather than referring to the effects of the atmosphere.

(b) Only a small number of candidates realised that the James Webb telescope would be very much further from the Earth and therefore be very difficult if not impossible to reach. Many candidates believed that the Hubble telescope would be easier to service either because it was smaller than the James Webb or that it was older and therefore used a well-tried technology that the astronauts would be familiar with. Some candidates failed to realise that, although the James Webb is currently on Earth, it will ultimately be in space.

(c) Most candidates realised that the idea of building a scale model was to ensure that the design will work.

(d) Many candidates could interpret from the diagram that gamma rays and X-rays are unable to reach the surface of the Earth and therefore cannot be detected by a telescope placed on the Earth. Some candidates perhaps misread the question and thought that they were being asked which types of wave *can* be detected by a telescope on Earth.

(e) Apart from a few candidates who thought that the theory was called Red Shift, the great majority of candidates correctly named the Big Bang theory.

Question 5 ***(Low Demand)***

(a) Although many candidates could correctly manipulate the data to arrive at the figure 1920, many candidates either omitted the decimal point or omitted to state whether the figure was in pounds or pence. Some candidates are apparently unperturbed at the prospect of paying a quarterly bill of £1920.

(b) A third of candidates were able to work out the correct value of 340 kilowatt-hours. Many candidates incorrectly added the two readings together.

Question 6 ***(Standard Demand)***

(a) (i) Many candidates failed to read the label on the *y*-axis of the graph correctly, believing that it showed absorption rather than reflection. This led them to giving snow as the best absorber of ultraviolet radiation, rather than soil.

(a) (ii) It was disappointing to note the very small number of candidates who realised that the bar chart was more appropriate as the data was categoric and not continuous.

(a) (iii) Candidates who had misinterpreted the bar chart in part (a)(i) of the question tended to perpetuate their error here. Thus, it was common to see wrong answers such as "The golfer will be more exposed to radiation because the snow absorbs all the radiation so that it does not reach the skier".

(a) (iv) It was encouraging to note that nearly all candidates are now aware of the fact that over-exposure to ultraviolet radiation may lead to skin cancer.

(b) (i) Some candidates failed to explain how the student's results supported the claims made on the label, and instead merely re-stated the claims made on the label. However, many candidates did sensibly refer to the data in the graph to show how it did support the claims.

(b) (ii) In both (b)(i) and (b)(ii), many candidates were confused between absorption and transmission. It was therefore common to see wrong answers such as "The dark tinted glass absorbs far too much UV radiation". Some candidates, who did know the difference, often made the reason clear by saying that the dark tinted glass transmitted almost as much ultraviolet light as did no absorber at all.

(c) (i) A third of candidates chose the correct response, ie publicity and education will make people aware of the dangers.

(c) (ii) Candidates who understood the term bias usually referred to the desire of the manufacturers to improve profits. Many candidates however clearly did not understand what was meant by the term 'biased', and were referring to the philanthropic desires of the manufacturers to work in harmony with the eye care charity.

Question 7 ***(Standard Demand)***

(a) Many candidates appeared to be led astray by the presence of the metal skewer, and were thus basing their answers on the process of conduction. Many of the other candidates simply stated that the heat was transferred by the process of convection; as this fact was stated in the stem of the question, they therefore gained no marks. A number of candidates wrote 'heat rises' rather than 'heated air rises' and so did not gain credit. Overall there was a disappointing response to this question.

(b) Most candidates correctly identified the process of conduction.

(c) A well-answered question, with most candidates referring either to the temperature of the room or to whether or not the skewer was removed as being the main factor influencing the rate at which the potatoes will cool down. Some candidates appeared not to understand the term 'factor'.

(d) Some candidates offered vague answers such as "The foil traps the heat inside". Many candidates however realised that the shiny foil will reflect the heat back into the potatoes.

Mark ranges and award of grades

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