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General Certificate of Secondary Education

Science B 4462 / Physics 4451

PHY1H Unit Physics 1

Report on the Examination

2010 examination - January series

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Science B / Physics
Higher Tier PHY1H

General

Questions 1 and 2 were standard demand, targeting grades C and D. Questions 3 and 4 were standard to high demand. Questions 5 to 7 were high demand, targeting grades B to A*.

Most candidates attempted all parts of the paper, suggesting that time was not a problem in completing the paper.

The numerical questions were generally not well attempted. Many candidates seem to be able to substitute figures into a given equation but are unable to complete the arithmetic correctly.

Question 1 (Standard Demand)

(a) (i) Answers appeared to be evenly divided between radiation (correct) and conduction (incorrect).

(a) (ii) Whilst many candidates knew that the fleece was a good insulator, not many referred to the air trapped between the fibres as the main reason for this.

(b) (i) Most answers merely stated that the water was hotter at the start, rather than referring to the greater temperature difference between the water and the surroundings.

(b) (ii) Many candidates failed to gain the mark because of imprecise answers such as 'the temperature' rather than 'the initial temperature' or 'the amount of fleece' rather than 'thickness'. Some answers referring to the 'same amount of water' indicated that candidates had not read the question carefully.

(b) (iii) Whilst some candidates realised that the water would reach the room temperature of 18 °C, there were a range of answers, some higher than the 60 °C starting temperature and some well into negative values.

(b) (iv) This question was very well answered with practically all candidates correctly choosing material **M**, and being able to give a correct reason for the choice.

Question 2 (Standard Demand)

(a) (i) This question was very well answered with nearly all candidates giving the answer: kinetic.

(a) (ii) Again a well answered question with most candidates giving both sound and thermal / heat.

(b) On the whole, this question was answered well, although a number of answers repeated the question and simply referred to the energy being wasted.

(c) It was pleasing that the majority of candidates knew that efficiency related to energy being usefully converted, or energy being wasted, and so were able to score 1 mark. However, only a minority referred to the useful or wasted energy as a percentage or proportion of the input energy.

(d) (i) Just under half of the candidates scored both marks. Common mistakes were reading the energy values from the graph wrongly, or working out the cost at one of the temperatures rather than finding the difference between the two costs.

(d) (ii) Whilst many candidates seemed to understand the link between reducing energy use and reducing carbon dioxide emissions, not all gained the mark because of imprecise answers. A significant minority of candidates indicated that the washing machines themselves give off carbon dioxide.

Question 3 (Standard / High Demand)

(a) (i) Answers were divided between microwaves and radio waves, with fewer than half of the candidates choosing the correct answer.

(a) (ii) Not many answers were linked to the satellite communication idea; instead general properties of microwaves or radio waves were given.

(b) This question was quite well answered, with the majority of candidates correctly describing a digital signal, although the continuous variation of an analogue signal was not always referred to.

(c) The majority of answers to this question were correct.

(d) Few candidates scored both marks. Many candidates were able to transform the equation correctly, and substitute values to give an answer of 15 000 000, however the majority of answers were left at this value and not converted into kHz.

Question 4 (Standard / High Demand)

(a) (i) Just over half of the answers were correct, as well as answers of beta and gamma there were a few ‘thermal’ and ‘electromagnetic’ answers.

(a) (ii) Most candidates gave the correct answer.

(a) (iii) Many candidates seem to have mis-read this question and referred to the difference in the number of neutrons.

(b) (i) This proved to be a difficult question for many candidates, the most common answers being 9000 million years and 9000 years.

(b) (ii) Not many candidates scored both marks on this question. Some drew a correct general shape, but didn’t think about the number of nuclei after 4500 million years and 9000 million years. Other candidates correctly identified these two points and then drew two straight lines.

Question 5 (High Demand)

(a) (i) There were few correct answers, most candidates referred to closing down the power station but few discussed the removal of radioactive material from the site.

(a) (ii) A mix of answers with many candidates attempting to give a reason.

(b) (i) A large number of answers failed to mention the efficiency, which is what the question was about. Of those candidates which did, some compared the efficiency of the three power stations to each other, some discussed the change in efficiency of each power station over the years, but very few gave both answers.

(b) (ii) A large number of vague answers were seen, such as 'anything could happen in the future' or 'we can't predict that far into the future'. Just over half of the candidates scored at least 1 mark.

Question 6 (High Demand)

(a) (i) Considering the regularity of this or a similar question it seems surprising that over half of the candidates scored zero. Many of these candidates just refer to the creation of the earth or the solar system.

(a) (ii) Many candidates referred to red shift, although quite a few seemed to think that the galaxies themselves undergo red shift or that the galaxies were turning red.

(b) There seemed to be some confusion between the terms 'theory' and 'data', with a large number of candidates reading the question as a new theory having been stated.

(c) Just over half of the candidates scored the mark with references either to the fact that there is no evidence or the question being a matter of philosophical or religious beliefs.

Question 7 (High Demand)

(a) (i) This was the best answered numerical question with many candidates able to transform the equation and substitute values to arrive at the correct answer.

(a) (ii) This proved difficult for the majority of candidates, even with the correct answer to the previous part.

(b) Very few correct answers were seen, the majority being too imprecise and not giving a reason for the variation in sunlight.

Mark Ranges and Award of Grades

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