General Certificate of Secondary Education

Science B 4462 / Physics 4451

PHY1H Unit Physics 1

Report on the Examination

2012 Examination – June series

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Set and published by the Assessment and Qualifications Alliance.

Science B / Physics
Higher Tier PHY1H

General

Around a tenth of students did not attempt the last two questions 7(c)(i) and 7(c)(ii), suggesting either that they ran out of time or that they found these questions difficult.

Many students lost marks by not reading the question sufficiently carefully and so answered their own question and not the one being asked.

Question 1 *(Standard Demand)*

(a) Approximately two thirds of students gave a correct response. The most common incorrect response was 'it can be used again'.

(b) Around half of the answers scored the mark for this question, commonly answering in terms of putting the animal waste to good use or the farmer saving money.

(c) Students generally understood how to calculate payback time, but did not always note that the £300 electricity cost was per month, so answers of 60 years were common.

(d) The vast majority of students were able to score at least one mark, with about two fifths scoring both marks. The most common answers referred to the reliability of the biogas generator compared to the wind turbine, or that it would not cause visual pollution as it was inside a farm building. Some students lost sight of what the question was asking, and gave disadvantages of the wind turbine without referring to the biogas generator.

Question 2 *(Standard Demand)*

(a) (i) The majority of students were able to identify the correct type of UV radiation, and give a correct explanation.

(a) (ii) This was quite well answered, although some students did not focus on what the question was asking and did not refer to the effect on the health risk.

(b) (i) Despite the first sentence in the given information referring to the answer to this question, only a quarter of students answered correctly. The most common wrong answer was the position of the dummy head.

(b) (ii) Many students recognised the need to take repeat readings, but not many included the need to find an average.

(b) (iii) Around three quarters of the students chose the correct surface. Answers explaining the reason were fairly evenly divided between references to the data and statements about snow being white.

(c) Around three quarters of the students were able to explain that the manufacturer's claim was incorrect as some UV was still detected, but not many students referred to the fact that this occurred at all wavelengths tested.

Question 3 *(Standard Demand)*

(a) Fewer than half of the students gave the correct response; a common incorrect response was to state that microwaves were 'gamma' radiation.

(b) Around three quarters of students were able to gain both marks for this question. In the incorrect responses, a number of drawings of analogue and digital clocks were seen.

(c) (i) This was well answered, with most students giving a correct response.

(c) (ii) Just over half of the students answered this correctly.

Question 4 *(Standard and High Demand)*

(a) Whilst three quarters of students were able to state that the image would be clearer, only about half were able to give a correct reason. A common incorrect response was to state that the satellite was nearer to the galaxies it was observing.

(b) (i) A number of students merely re-stated the question by saying that red-shift gives an indication of distance, without stating a relationship.

(b) (ii) The majority of students answered this correctly.

Question 5 *(High Demand)*

(a) (i) The vast majority of students attempted this calculation, with over three quarters getting the correct answer. The most common errors were in transposing the equation incorrectly, or including the water temperature of $60^{o}C$ in the calculation.

(a) (ii) Around half of the students were able to use the total cost of £30 and the cost per kWh of 15p to calculate a figure of 200; however that is the point at which most stopped, quoting an answer of 200 hours. A few then attempted to involve the power, with only a minority ending up with the correct answer. A few students did not attempt to answer this question.

(b) Most students gave at least one correct point in answer to this question, with around half being able to give two points correctly.

Question 6 *(High Demand)*

(a) Less than half of the students were able to give a good description of convection, and nearly one third scored zero.

(b) (i) The description of conduction through the metal chimney was less well answered with just over one tenth of students gaining both marks. Few answers referred to the free electrons in the metal.

(b) (ii) Around two thirds of students realised that the chimney would be able to heat the rooms up. Of the incorrect responses, a significant number stated that it would be cheaper not to insulate the chimney.

Question 7 *(High Demand)*

(a) A few students scored all three marks for this question, with nearly three quarters scoring zero. Many students gave the impression, both here and in (b)(i), that the food would become radioactive, therefore a short half-life would be beneficial so that the radiation would have decreased to an insignificant level by the time the food was purchased. The most common incorrect response was Technetium-99, for this reason.

(b) (i) Whilst a large number of students scored this mark, many students indicated, as stated previously, that the food would be radioactive.

(b) (ii) The majority of students realised that independent scientific committees would remove the risk of bias. Sometimes this idea is not very well expressed, for instance quite a few answers indicated that the 'government would lie' to further their own aims.

(b) (iii) Around one third of the students were able to state two valid points from the data given, with a further half of students stating one point. The most common responses were that the content of three vitamins increased on irradiation, and that of two vitamins decreased.

(b) (iv) Over three quarters of students answered this correctly.

(c) (i) Whilst many students knew that a beta particle is an electron, and many knew that it is emitted from the nucleus of an atom, less than half the students were able to state both parts of the answer correctly.

(c) (ii) Around one third of students answered this correctly. Whilst a number of students were able to show the count rate halving in stages, many stated the answer as '3' instead of realising that it was 3 half-lives. Some students also halved the half-life in stages, and some halved the 137 of caesium-137.

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