AQA

General Certificate of Secondary Education

Science B 4462 / Physics 4451

PHY1H   Unit Physics 1

Report on the Examination

2010 examination – June series

Science B / Physics
Higher Tier PHY1H

General

Questions 1 to 3 were standard demand, targeting grades C and D. Questions, 4 to 6 were high demand, targeting grades A* to B.

There were many instances of answers which indicated that the candidates had not read the question thoroughly. For example, in Q3 (a)(iii) a large number of candidates merely defined the term efficiency. In Q4 (c)(ii) many candidates seemed to have read this as 'there is **not** a need for further research'.

There was a significant number of answers where candidates seemed to know the answer, but omitted a word or wrote a wrong word – errors which could be avoided if they had read through their answers.

Question 1 *(Standard Demand)*

(a)   Only just over half of the candidates scored this mark, the most common incorrect answer being 'convection'.

(b)   (i)   This was well answered by most candidates, the most common errors being 'amount of water' and 'temperature' without reference to hot/cold or starting.

(b)   (ii)   Only just over half of the candidates correctly gave the reason that one of the variables was 'categoric'.

(b)   (iii)   The majority of candidates correctly identified 'copper', with a suitable reason, however some lost a mark by repeating the information given in slightly different words, eg 'it exchanges the most heat'.

(c)   Of the candidates who understood the concept of the heat exchanger, the majority were able to explain themselves clearly. However, quite a few answers indicated that the dirtiness of the water was the reason for heat being transferred faster.

Question 2 *(Standard Demand)*

(a)   Just under three quarters of candidates scored at least one mark. A common mistake was to state the same fact in two different ways in the two answer spaces, eg 'alpha cannot pass through the body to be detected' as one answer and 'gamma can pass through the body to be detected' as the second answer. Whilst many candidates had the idea of the damage to cells, there was a significant number of absolute answers, eg all cells are damaged by alpha, alpha will kill you, gamma doesn't damage cells, etc. Answers referring to the generic properties of alpha and gamma, and not relating it to the situation in the question gained no credit.

(b)   (i)   This question was answered correctly by over three fifths of candidates; insufficient answers included comments such as 'the graphs change'.

(b)   (ii)   This was answered very well on the whole, with many candidates being able to interpret the graphs and explain their reasoning satisfactorily. It would benefit candidates to read through an extended answer like this to ensure it makes

sense – answers where kidneys, graphs, count-rates or blood were being passed into the urine were not uncommon.

(c) (i) This is a frequent question yet it is poorly answered with only one third of candidates giving an acceptable answer. Incorrect answers indicated many things being halved, such as atoms, molecules, mass, isotopes, radioactivity and the nucleus.

(c) (ii) Over half of the candidates scored one mark, but very few scored both (less than one twentieth). Marks were generally picked up for the short half-life isotope decaying quickly or the long half-life isotope's radiation remaining in the body for a long time. However answers referring to the level of radiation which the body would be exposed to were uncommon.

Question 3 *(Standard Demand)*

(a) (i) The majority of candidates indicated that they had correctly added together 1400 and 700 to get 2100. However, a large number of candidates failed to notice that the values given were in watts and that the question asked for the answer in kilowatts.
Of those who made an attempt to convert their answer, a large number of candidates were unable to do this correctly, the most common mistakes being to divide by 100 or to multiply by 1000. Another frequently seen error was an indication of 2100/1000 but then a failure to calculate this correctly.

(a) (ii) It was pleasing to see so many correct answers to this calculation, usually by those candidates who opted to work out the energy in kilowatt-hours.
Of those candidates who opted for joules, a common mistake was to multiply the power by a time of 90 minutes rather than converting to seconds.

(a) (iii) This question was correctly answered by three fifths of the candidates. Most of the candidates who failed to score the mark had either just defined the term efficiency or had not picked up on the question asking for 'very' efficient.

(b) This part question was correctly answered by only a very small minority of candidates (less than one twentieth). Incorrect responses often stated that the temperature of the room had become the same as the temperature of the heater.

Question 4 *(High Demand)*

(a) (i) It appeared that the term 'properties' was not understood by many candidates, and answers giving uses of the waves were more frequently seen. Candidates should be aware that they do not generally gain credit for repeating information which they have been given in the question, so saying that both waves were electromagnetic or that both could be used for communications did not score any credit.

(a) (ii) This question was correctly answered by just under three quarters of candidates, although some candidates gave 'visible light and microwaves' as an answer, failing to realise that the question had already referred to these waves.

(b) Although a large number of candidates were able to transform the equation and substitute values, the majority failed to convert the wavelength from centimetres.

The majority of candidates either did not read that they also had to give the unit, or perhaps did not know what the unit was, but those who gave the unit usually did so correctly.

(c) (i) Many candidates seemed to have the correct idea but failed to express themselves correctly. A common incorrect answer was to suggest that the politician should carry out an experiment.

(c) (ii) A surprisingly large number of answers indicated that candidates had read the question as asking why there was '**no** need for further research'. Other answers included terms such as 'bias', 'valid' and 'accurate' that did not answer the question.

Question 5 *(High Demand)*

(a) (i) Surprisingly only just over a third of candidates scored this mark, 'wave' and 'hydro-electric' were the most common incorrect answers.

(a) (ii) Many candidates were able to score two marks for sensible responses. Marks were often lost because of terms such as 'eco-friendly', 'green energy' 'not harmful to the environment' etc, which should have been expanded on in terms of carbon dioxide emissions or air pollution to score a mark.

(b) (i) This was poorly answered with only just over a third of candidates giving an acceptable reason. Although the information given had said that the new scheme would produce enough electricity for both towns, many answers indicated that candidates had not read this.

(b) (ii) There were many good answers to this question with just under half of the candidates scoring both marks.

Question 6 *(High Demand)*

(a) Only two fifths of candidates were able to give the meaning of 'red-shift'. A common incorrect answer was to refer to galaxies moving towards the red end of the spectrum.

(b) (i) Whilst this question was quite well answered, a significant number of marks were lost by candidates contradicting themselves, eg 'M is moving slower than M', an error which could be avoided if candidates were to read through their response. Quite a few answers explained what information could be gathered from red-shift data, but did not refer to the two galaxies mentioned.

(b) (ii) It was obvious that many candidates had not read the question carefully and as a consequence did not know that the gradient of a line needed to be calculated. Of those who did, many candidates counted squares up and across, rather than using values taken from the axes. When values were taken, common mistakes were not reading the values correctly or performing an incorrect calculation.

(b)   (iii)   Just under two thirds of candidates answered this correctly. However, a significant number of candidates think that in the 80 years between the two data sets, the universe will have expanded considerably so that the initial value would be more accurate.

(c)   This part was generally well answered by most candidates, although references to wavelength being 'squashed' and frequencies being 'longer' were not uncommon.

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