



**General Certificate of Secondary Education
June 2011**

**Applied Science (Double Award) APSC/2H
Science for the Needs of Society
Unit 2**

***Report on the
Examination***

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**Applied Science (Double Award)
Higher Tier APSC/2H****General**

The quality of some responses would suggest that a number of candidates were entered inappropriately for this tier of paper. Many candidates found it difficult to structure their answers both in prose and mathematical situations.

Question 1 (Standard Demand)

- (a) (i) Many candidates misinterpreted the question and answered in terms of preventing the spread of swine flu rather than avoiding catching it. This meant that the most likely mark awarded was for 'washing hands'.
- (a) (ii) A significant number of candidates disqualified a correct answer, 'antibiotics do not kill viruses', by qualifying their answer. 'Antibiotics don't kill **this** virus' implying that they do kill some, or 'flu virus is too strong'. Some candidates were clearly confused about the function of different drugs by suggesting that antibiotics only treat the symptoms.
- (b) (i) There was clearly some confusion about antibiotics and antibodies with some candidates clearly making the word illegible in the hope it would be credited. Not a successful strategy!

Many answers were poorly structured. Many answers were in vague general terms. Few candidates explained that vaccination enables a rapid response on infection with the virulent organism. A significant number failed to say that the virus was weakened or inactivated, however expressed, preferring the incorrect terms 'small dose' or 'dilute'. Less than half of the candidates gained two or three marks.

- (b) (ii) It was very easy to gain the mark for identifying a group, but many candidates were then unable to suggest a matching explanation.

Question 2 (Standard Demand)

It was disappointing to find that many candidates were not able to cope with this question.

- (a) This question requires a comparative answer so the frequent 'strong' was not sufficient for a mark. Many responses did not convert the context, angling, into a simple experiment. Many students suggested a fishing trip to catch the same fish repeatedly.
- (b) (i) A very common incorrect response was to 'keep the diameter constant', when this is clearly the independent variable. Similarly frequent responses included 'use the same rod', 'have the same person fishing', and, 'catch the same fish'.
- (b) (ii) A very considerable number of candidates were unable to construct a logical sequence for their experiment, and it was not uncommon to find a single sentence answer filling the space. Many suggestions were completely unworkable, with candidates gaining the odd mark here and there for one correct stage of an unworkable whole. 'Time' was a common factor which was not

credited, and many candidates suggested 'adding weights to see which is strongest' without explaining how this would work.

- (c) (i) Very few candidates recognised that the plots clearly were a curve, so drew a straight line with a rule. Few candidates ignored the plot at 1.0, 10.
- (c) (ii) Most candidates could take a reading from their line so gained this mark. The most common difficulty candidates demonstrated was interpretation of the scale of one or both axes.
- (c) (iii) Again, most candidates made a successful attempt at this question, though the expression of the conclusion was often poor.

Question 3 (Standard Demand)

- (a) (i) Many candidates struggled to write down their ideas clearly. The most common error was to write that 'heat rises'. A number of novel suggestions included 'heat particles' and 'heat molecules'.
- (a) (ii) Disappointingly, fewer than half of the candidates were able to name conduction or radiation to gain this mark.
- (b) (i) This question was generally well answered with a majority of candidates scoring at least one mark. A small number of candidates rounded to the nearest whole number when the table is clearly to 2dp.
- (b) (ii) A surprising number of candidates failed to gain this mark when all that was required was to select the smallest number in the £ column.
- (b) (iii) This question required a comparative response, all of the methods save money, but sheep's wool saves the most in a given time. Many candidates misunderstood the meaning of R-value and wrote in terms of durability.

Question 4 (High Demand)

- (a) Most frequent response correctly given was for either trachea or diaphragm. Incorrect responses often related to a confusion between rib and rib muscle.
- (a) (i) Most candidates were able to gain at least one mark for this question with a majority gaining two or three marks.
- (b) (i) Most candidates were able to give 'red blood cell' to gain this mark.
- (b) (ii) Candidates were required to match a feature with an explanation to gain this mark and many found this difficult. Common misconceptions included the idea that 'oxygen fits into the dimple'. More commonly was the idea that oxygen is carried on the surface so a 'bigger surface area means more room for oxygen to be carried'. Very few candidates gave the correct response that increased surface area increases the rate of loading / unloading of oxygen, however expressed.
- (c) (i) A minority of candidates did not know the effect of nicotine and gave for example 'clogs lungs' or the catch all, 'causes cancer'.

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- (c) (ii) Many answers here were lacking the precision to gain the mark. Vague answers included, 'stops you breathing', 'damages lungs', and, 'poisons you'. 'Causes cancer' was not an uncommon response.
- (d) (i) A number of candidates failed to use the pictograph in their response or miscounted. A few incorrectly stated that '83% of the women smokers had cancer' when clearly all of the women, smokers or non-smokers, had cancer. Many responses suggested that a significant number of candidates did not realise that that pictograph was about women with cancer, rather than smokers with cancer leading them to state that '83% of women smokers get cancer'.
- (d) (ii) A number of candidates failed to take their evidence from the information provided, which was that 17 women non-smokers had cancer. Candidates often offered an explanation for non-smokers having cancer instead of using the evidence provided. Examples of suggested explanations included passive smoking, genetics or other environmental factors.
- (d) (iii) The mark scheme allowed some marks for incomplete answers, or answers clearly based on miscounting of the pictograph. These marks were not available for candidates who failed to show their working as instructed and just wrote an incorrect answer in the space. A surprising number of candidates clearly did not have calculators and were unable to perform the relatively straightforward calculation required. A small number decided to round to the nearest 10.
- (e) The majority of candidates were able to give at least one acceptable response to this part, liver damage and brain damage being the most popular.

Question 5 (High Demand)

- (a) (i) This question required a clear definition of the term 'hydrocarbon' as given in the specification. The majority of candidates who failed to gain the mark did so because their definition was incomplete. Many compounds 'contain hydrogen and carbon', but this definition does not exclude other elements unless suitably qualified. The weakest responses were written in terms of 'substances', 'mixtures' and even 'atoms'.
- (a) (ii) Fewer than half of the candidates were able to correctly balance this equation to gain the mark.
- (b) Many candidates lacked the necessary skills to extract information from the table and combine it with knowledge to formulate an adequate response. As a consequence, very few gained all three marks. Candidates were required to state from the table that methane always has a higher effect on global warming than carbon dioxide over the given time scale, and that the effect reduces with time. These were two straightforward points which often were not appreciated. The third mark was for the realisation that burning methane to generate electricity was a better option than releasing it to the atmosphere, in spite of the fact that carbon dioxide is produced. Responses would suggest that the meaning of the word 'combustion' is not clear to a significant minority of candidates. A surprising number of responses suggested that power stations produce methane or use carbon dioxide. It is surprising to find that many candidates still equate the hole in the ozone layer with global warming.

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- (c) (i) Very few candidates were able to provide a full, or even partially correct response to this question. Even when the equation was essentially correct the misuse of upper and lower case letters, and subscript and superscript numerals disqualified the mark. For example, 'CaCo³', 'Co²', and even 'LS = QL + CD'. A number of candidates thought that the limestone had to be heated with something, usually oxygen or carbon, which disqualified one of the possible marks.
- (c) (ii) More candidates gave the acceptable response, 'heat it', than 'thermal decomposition'. A small number of incorrect responses included 'heat it with e.g. carbon', 'add water', 'neutralise', and 'fractional distillation'.
- (c) (iii) Approximately half of the candidates were able to name water to gain this mark.
- (c) (iv) Few candidates were able to answer this question correctly making similar errors to those described for 5(c)(i).

Question 6 (High Demand)

- (a) (i) A majority of candidates scored at least one mark for this question.
- (a) (ii) A majority of candidates were able to name the two types of radiation required by this question.
- (a) (iii) The term 'relationship' does not appear to be well understood. A significant number of responses were in terms of definitions of frequency and wavelength. This question requires a formal response as given in the specification. The words 'higher' or 'lower' to describe frequency, and 'longer' or 'shorter' to describe wavelength. 'Bigger' and 'smaller' are not adequate.
- (a) (iv) Similar comments to those for 6(a)(iii) apply here.
- (b) (i) More than half of the candidates were able to gain this mark.
- (b) (ii) Almost any internal organ was an acceptable response to this question so few candidates failed to gain the mark.
- (b) (iii) Most candidates who attempted this question were able to give the names of two acceptable electromagnetic waves but many of them were unable to give an appropriate matching medical use. Using gamma rays for chemotherapy was a not uncommon combination. Common incorrect responses included ultrasound (for detecting babies) and alpha rays.

Question 7 (Standard Demand)

- (a) This was very poorly answered and only a quarter of the candidates picked up any marks. Some candidates seem to think that insulin absorbs or catches glucose. Very few mentioned the liver or glycogen at all. Few just wrote that insulin controls glucose levels without qualification or that insulin is released from the pancreas.

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- (a) (i) Most candidates were able to gain one mark by describing a feature, though this was often poorly expressed. Many failed to gain the second mark which required the implication of increased uptake of water or minerals. 'Collecting light' was a not uncommon suggestion for function.
- (a) (ii) Many candidates answered in terms of a leaf rather than a leaf cell so often gave 'stomata' as the structural feature. When 'chlorophyll' was given, candidates often failed to give an adequate explanation. 'Make it green' and 'attract light' were not uncommon responses.
- (a) (iii) Surprisingly few candidates made the link between 'chlorophyll' in part 7(a)(ii) and the mineral, magnesium, required. A minority of candidates did not appear to understand the meaning of 'mineral'.
- (b) (i) The mark scheme allowed some marks for incomplete answers, or answers clearly based on misreading of the graph. These marks were not available for candidates who failed to show their working as instructed and just wrote an incorrect answer in the space. A surprising number of candidates clearly did not have calculators and were unable to perform the relatively straightforward calculation required. '20' was the most common incorrect response.
- (b) (ii) To obtain marks for this question candidates were required to give a numerical response with a matching reason. A number of candidates having given 750 as a value went on to misinterpret the graph and go on to say 'because after 750 photosynthesis stops' which is not the case.

Question 8 (High Demand)

- (a) (i) Very few candidates were able to work out the answer '9' to gain this mark.
- (a) (ii) Just over a third of candidates achieved this mark.
- (a) (iii) Most candidates appeared to be unfamiliar with the production of ethanol by fermentation, and many who were failed to appreciate the link with 'renewable'. Incorrect responses include, 'renewable fuel can be used over and over again', 'ethanol is produced by fractional distillation' and 'the elements C H and O won't run out'. There was some confusion of ethanol with methane.
- (b) (i) Many candidates failed to take notice of the advice to use word equations in their answers and made their task much harder by attempting to use symbol equations. These would only gain marks if completely correct. Few candidates were able to construct a logical sequence to their answer and used simplistic language, 'carbon steals oxygen from iron ore' for a question at this level. A response explaining that reduction reactions are involved was often the only one which gained a mark.
- (b) (ii) Only just over half of the candidates were able to gain this mark.

Question 9 (High Demand)

- (a) The mark scheme allowed some marks for incomplete answers. These marks were not available for candidates who failed to show their working as instructed and just wrote an incorrect answer in the space. A surprising number of candidates clearly did not have calculators and were unable to perform the calculation required. Very few candidates realised that the question could be answered by either calculating the speed of car A or the time car B would take. Setting out of calculations was generally very poor, giving the examiner little chance to understand the thinking behind a response. Calculations were not linked to a car and units were generally not given. This caused many candidates to try to compare speed with time taken to decide the outcome of the race.
- (b) This was a straightforward question which a significant number of candidates felt the need to make more complex. A surprising number felt that they had to use the distance travelled in their calculation which in reality is a direct substitution into the equation given. A number of candidates clearly did not have calculators and were unable to perform the simple calculation required. $6r^2$ is not appropriate! Very few candidates could give either of the correct alternatives for the units of acceleration.
- (c) (i) Many responses to this question were ambiguous in that the use of the term 'longer' could be taken as time or distance. 'It takes longer to stop' was not acceptable for greater distance which the question required. A number of candidates thought that a heavy car would stop in a shorter distance because of 'gravity', or talked about 'slower' stopping distances.
- (c) (ii) Most candidates were able to give tyres or brakes to gain this mark.

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