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General Certificate of Secondary Education

Applied Science 4861

APSC/2F Science for the Needs of Society

Report on the Examination

2009 examination – January series

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General Comments

There were relatively few really low scoring candidates again and few scoring the top end of marks, probably because those candidates who would score high on this paper were entered for the higher tier instead. The first four questions were at least attempted by all but a handful of candidates. As usual, the problem questions for foundation candidates were those involving calculations. Even when the equation was given, few candidates scored full marks.

Question 1

1a) The majority of candidates collected the full three marks for this question.

1b) Candidates need to be taught that viruses are not involved in the useful production of anything in the specification. It seems that many candidates just guessed this question as the marks were roughly equal with a third gaining two marks, a third gaining one mark and the final third nothing.

1ci/ii) This question was mostly well answered with not many candidates answering fungi at all. Quite a few candidates wrote bacteria then correctly identified something made with bacteria for one mark. Most candidates wrote yeast or bread as the answer. Some wrote malted barley or hops taken from the question information in their answer. Other candidates were linking yeast with yoghurt production or linking fungi and cheese production.

1ciii) Mostly well answered but there was an alarming amount of store at room temperature so bacteria cannot grow or just simply heating, both of which show a fundamental misunderstanding of bacterial growth. Many think that the fermenting bucket itself stops the bacteria growing. A good number of candidates wrote things that were not in the method including washing hands and keeping the fridge. Some think that yeast itself would kill the bacteria.

Question 2

2a) Some candidates calculated that there would be 5 parts to the diluted drink so did 1000 / 5 = 200. Other candidates divided the correct answer by 5 at the end. A number of candidates worked out 10% of 1000. Half of the candidates got this correct, scoring two marks, the other half scored nothing.

2b) Only half of the candidates managed to pick out the preservative for the mark here.

2ci/ii) Three quarters of the candidates know what a solution is but less than half correctly identified the suspension with the most common incorrect answer being emulsion.

2di) Two thirds of candidates gained the mark for the right order here.

2dii) Many candidates added the two masses together and some multiplied them. Quite a lot of candidates getting 1.57 –1.38 = 0.19 for two marks but few then multiplied by 10 to gain three marks. Many did not attempt the question at all and half of the candidates got no marks.

Question 3

3ai/ii) Only a handful of candidates did not get the marks for these questions.

3aiii) There were few completely blank responses and all the others were correct. Most candidates wrote mains gas as the answer with the next most common answer being mains electricity.

3bi) Three quarters of the candidates correctly identified wind. Of the rest, nuclear was the most common answer.

3bii) Most candidates answered won't run out which was awarded the mark. Some mentioned no pollution or it's cheaper. There were also quite a few vague statements about it being bad for the environment. Half scored one mark and the other half, nothing.

3ci) Almost two thirds managed to gain full marks for this question, and half the rest gained one mark.

3cii) Most got at least one mark, usually petrol and a third of the candidates got both marks. Of those that did not the most common answers were gas, oil, coal, carbon, tar or fuel.

3di) The majority of candidates gained no marks for this question even with the chemical formula for propane on the same page.

3dii) Many candidates only got one mark for oxygen.

Question 4

4ai) Very few did not answer this question, most correctly identifying a positive correlation. Some candidates showed a levelling off which was accepted while only a few showed a negative correlation.

4aii) Most candidates were able to read from the graph, occasional responses to this question included a sum of the 2009 value – the 2006 value. Some candidates lost marks as they did not include enough zeros in their answer or struggled with the small divisions on the y axis scale. A few candidates gave a range and not a single value.

4aiii) This question was generally answered well although a few candidates answered two types of contact so only gained one mark. Half of the candidates gained two marks. The most common answers related to physical contact, open wounds or needles. Quite a few student answers were related to inheritance or genes.

4b) Half of the candidates gained at least one mark for this question. Some candidates named organs or just wrote the blood for the first missing word. Most candidates knew that white blood cells attack the micro organisms although inevitably a number answered red ones. Many candidates lost marks by confusing antibodies with antitoxins.

4ci) Three quarters of candidates gained the mark for antibiotic.

4cii) Most candidates ringed vaccine. The most common incorrect answer was painkiller.

Question 5

5a) A great number of candidates answered this incorrectly. An alarming number of candidates just wrote Na on it's own. Some candidates wrote Na + Cl. Candidates need to be taught to make it really clear when they write a lower case letter 'l' in this case that it does not look like it's a capital or the number one.

5b) Here candidates were again using the plus sign to separate the name of this ionic compound. Other incorrect responses include magnesium oxide, magnesium sulfide and magnesium sulfuroxygen. More candidates answered this question correctly than 5a).

5c) A third of the candidates gained all three marks. Many candidates lost marks by failing to state strong forces between the particles.

5d) A mixed bag of responses to this question which was not answered well at all with few candidates collecting all three marks available. A disappointing number of candidates believed that filtering would separate the ionic compounds. A lot of candidates added ionic compounds to the sea water first. It is worth noting that some candidates seem to believe that dissolving substances does not increase the mass of the solution up to the point of saturation and then only the extra causes the weight gain. Most candidates managed to collect the 1000g of water but marks were lost when a student only collected 'some' water. Candidates do need to be taught that the word measuring is never enough, they need to mention what type of measuring should take place, in this case the mass. Nearly a quarter of the candidates left this question unanswered.

5ei) This was mostly answered well with three quarters of the candidates gaining at least one mark however some believe that chemicals are used to make the food taste better. Others just wrote to keep animals away, which was not enough for the mark or answered the same response twice eg bigger and stronger so only gained one mark. An alarming minority responded with to kill pesticides. A few just wrote simply to get more money but did not link as to how this would happen.

5eii) A great many candidates think that the chemicals evaporate then rain on the sea. Many think that the wind blows them there. Some candidates believe that chemicals get into the sea because farmers throw them in there or that we throw things away into the sea that have chemicals on them. A significant minority believe that birds carry the chemicals into the sea. For this question and for many others, candidates need to look at the number of marks available for the question and how many lines they are given to write on, so they wrote enough information down. Only a third of candidates gained any marks.

Question 6

6a) For both parts of 6a half of the candidates gained the mark and half gained nothing.

6bi) A well answered question with the most common incorrect response being shut windows.

6bii) A number of candidates answered under-floor or under-carpet insulation which was not enough for the mark here. Very few candidates know about underlay so nearly every correct response was carpet. Some candidates believe that under-floor heating would prevent heat loss.

6biii) Again, many answers of insulate the walls or even wallpaper, plaster or paint them. There were not many correct responses where the exact words, cavity wall insulation was given but a description of it eg putting foam between the walls was common

6ci) Some candidates made this a much more complicated problem by changing the 3 hours into 180 minutes first to get 90 kWh.

6cii) An error carried forward from 90 kWh would get 1.2% which was sufficient for both of the marks available. A number of candidates performed the equation 1.1/ 0.5 x 100 so they were using 0.5 in the formula instead of 1.5 from the previous question.

6ciii) Many candidates only wrote it is wasted but did not specify how. Most common correct answer identifies it being wasted as heat energy. Two thirds gained no marks.

Question 7

7a) There was some confusion between organic and GM foods. Many candidates did not refer to the stem in order to answer the question and so did not mention any specific characteristics in their answer. Many more answers were to do with profit. Some candidates wrote vague statements eg grow better. Most candidates correctly stated grow faster or referred to higher yield. Common incorrect comments related to using less chemicals so it is better for the environment/pollution or tastes better and safe to eat.

7b) Here again, there was some confusion between organic and GM foods with candidates believing that GM has lots of chemicals and there were many cost and taste related answers. Some candidates had not read the question properly and have answered the question, why do some shoppers not prefer GM foods?

7ci) Many candidates know which gases are involved but got them the wrong way round. A few candidates just answered carbon or gave CO^2. Others guessed at energy, sun/light, heat, sugar, food or soil. Commonly one mark was given for oxygen in the correct place and not carbon dioxide.

7cii) A poorly answered question mostly answered with the words a natural reaction, a reaction that can happen during the day or it involves heat. Nearly two thirds gained no marks.

7di) Most candidates answered this well with the common response of vacuole and cell wall. The incorrect responses included water, root hair cell and soil particle, cell membrane, cytoplasm and nucleus.

7dii) Very few candidates know that a root hair cell has a large surface area although many did manage long. Some candidates guess that the cell moves about to get the water or that the hair sucks water in. Again two thirds gained no marks.

7diii) Half of the candidates did not know the answer to this question.

Question 8

8a) An easy question although some candidates confused the conductors and insulators, and there were responses of high boiling point or strong, so half collected no marks.

8b) Two thirds gained no marks for this question with only a handful collecting both marks.

8c) Very few candidates gained the second mark for chemically combining or carbon dioxide formation. Some candidates answered the question with the word reducing without describing what that means. Others believe the iron oxide is dissolved or that the oxygen is needed for the fire in the furnace. There was confusion with limestone. A third of the candidates did not attempt this question.

8d) A surprisingly poorly answered question with many candidates not knowing anything about steel at all and guessing that it is not magnetic, does not rust or that it is weaker than iron. A significant number of candidates thought that one or the other of them is a non-metal. The majority of candidates achieved the mark for 'steel is harder or stronger than iron 'and very few knew the word alloy. Quite a lot of answers incorrectly referred to melting points, conduction of heat and corrosion rate. Many wrote either that steel is a 'mixture' or a 'compound'. Only a third of the candidates gained any marks at all.

8ei) This was poorly done or not answered. Common correct formula was the formation of carbon dioxide from carbon and oxygen. Very few candidates managed an attempt at a balanced equation with the most common incorrect response $Fe_2 + O_3 = CO_2$ or iron oxide + carbon = carbon dioxide or even carbon dioxide = iron + steel. Many candidates wrote simply CO_2 or C + O = CO_2.

8eii) The mark here was gained mainly for air pollution. Some candidates misread the question and gave a CO_2 linked response. Over half of the candidates gained no marks and over a quarter gave no answer

Question 9

9a) This was generally quite well done, with most candidates getting one or two marks. Again some candidates had not read how many marks are available for this question and only made one point. Some answers were to do with acceleration or with price ie, cheaper to run, without any qualification. Other responses were to do with accidents, or how much room/space on the road the car takes, giving single values and not comparing them or vaguely stating less pollution.

9b) Many candidates just took two numbers from the table to answer this question and there were many responses of 221 x 8.6. Most candidates had difficulty with 1 minute in terms of hours with the most common mistakes being 221 x 0.1 or 221 x 0.6. Only a fifth of candidates gained any marks for this question.

9ci) Another poorly answered question with a lot of candidates dividing 100,000 by 27.78. Quite a few candidates incorrectly tried to use 8.8, from the previous question, in calculations. A significant number of candidates wrote nothing at all for this question.

9cii) A great many candidates did not attempt this question at all while others made it much more complicated than necessary. Very few candidates know this equation. Some unfortunately referred back to the table to get numbers for the calculation. Quite a few calculated1000/8.8 or 206/8.8. Many of candidates wrote nothing at all for this question.

Mark Ranges and Award of Grades

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