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Applied Science 4861

APSC/2H Science for the Needs of Society

Report on the Examination

2008 examination – June series

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General comments

As usual the Higher tier paper produced a wide range of marks and candidates at the lower end of the mark range would have been better advised to enter the Foundation tier examination. Examiners have noted that candidates often lose marks by not reading the question properly and then rushing to write an answer to the question they think has been asked. The question requiring knowledge of some simple molecular formulae was poorly answered. The quality of answers to questions that require a calculation seems to have improved, although there are still plenty of examples of candidates making careless errors during the calculation.

Question 1

There were relatively few candidates, who scored the mark for 1(a)(i). Answers that referred to the cell wall and vacuole were more common than those that referred to chloroplasts. The second part (ii) was better with many more candidates obtaining at least one mark here, because they knew that leaf cells carry out photosynthesis.

Although a high proportion of candidates scored a mark in question 1(b)(i), higher CO_2 concentration was a common wrong answer. Part (ii) was also generally well answered, although there was some evidence of confusion between photosynthesis and respiration.

The use of intensive farming methods for 1(c)(i) was well known. 1(c)(ii) was also well answered. The most successful answers were based on the use of artificial fertilisers or pesticides. A good proportion of candidates scored marks by describing the toxic effects of pesticides or the effect of fertiliser washed from the fields into streams and ponds, for the final part of the question.

Question 2

The majority of candidates scored the mark for naming $CaCO_3$ in question 2(a).

Many scored at least one mark in 2(b)(i) for describing the flow of water in and solution out of the deposit. In part (ii) the full range of marks was awarded. There were some good explanations of how water may be removed from the solution by evaporation. A lot of students, however, think that filtering will separate salt from salt solution.

Question 2(c) was not well answered. Even on this higher tier paper the chemical formulae of simple substances was not well known.

Part 2(d)(i) was generally well answered, but a wide range of incorrect responses was noted. When responding to part (ii), candidates commonly suggested the use of plastic, others scored the mark by identifying less preferable properties of glass, like its brittleness.

Question 3

3(a)(i) was a well answered question, but candidates should be advised to draw a single thin line when asked to draw a smooth curve. Double lines, really thick lines and curves that missed one or more of the points were not given credit. Some candidates seemed to have guessed the position of Venus to plot first and then adjust the shape of the curve accordingly. The majority of candidates scored the mark for part (ii). Candidates should be reminded to draw small clear crosses, with a sharp pencil as this did make some answers unclear and most candidates estimated a reasonable value from their graph to get the mark for 3(a)(iii).

The first part for 3(b) was an easy mark for most. Gamma rays was the most common answer, but radio waves, X-rays and light were all selected by a significant number of candidates. Although some based their answer on low frequency/less harmful for 3(b)(ii), most scored this mark by matching the expected answer in the mark scheme. The final part of 3(b) was poorly answered. Relatively few candidates suggested reasons that matched the mark scheme. Cleaner air, less clouds and light pollution were the most common correct answers. It was surprising that some candidates thought that radiation (produced by the telescope) would be less harmful to people, if the telescope was sited in a remote area.

Some good answers were seen for 3(c)(i), but few candidates had any idea about the decrease in frequency associated with a light source moving away from an observer. It was also noticeable that few candidates seemed to be aware that the red shift is an indication that the universe is expanding (3(c)(ii)).

Question 4

Question 4(a) was quite well answered, but the candidates who wrote vague statements about the infection entering the wound failed to score any marks.

Cleaning the wound and applying a bandage were common suggestions for 4(b) that enabled a high proportion of candidates to score two marks for this question. Fewer students this year referred to disinfecting the wound than previously.

The full range of marks was scored for question 4(c). A good proportion of candidates know about the role of platelets and white blood cells.

In question 4(d)(i) many candidates seemed confused about the role of blood capillaries and few could describe their cooling effect. A number of students described changes in the number of capillaries or they misunderstood the question and described what happens to the capillaries if the body temperature is too low. Part (ii) was poorly answered. Relatively few candidates described the use of heat energy for evaporation. Some students seemed to think that heat leaves the body through the pores with the sweat.

Question 5

PVC linked to the manufacture of window frames was the most common correct answer for 5(a)(i), but many candidates failed to score because they could not name a polymer. Wood was well known as a material obtained from a living organism to answer part (ii). When answering 5(a)(iii) stainless steel and brass were common correct choices, but aluminium, copper and iron could not be given credit.

Although some added stones to their mixture to make concrete, many candidates knew they should mix together sand, cement and water, in response to 5(b). Very few, however, mentioned the need to measure out the components of the mixture.

In question 5(c) unfortunately many of the candidates failed to name a source of energy. Many good answers were based on solar energy.

Question 6

(a) The full range of marks was scored on this question. The transfer of energy from the turbine to the generator was the mark most often missed by candidates.
(b)(i) Although many failed to score any marks here, an encouraging number of candidates knew how to calculate efficiency. The most common error was 30/12.5 instead of the other way round. A lot of students are losing marks from incorrectly rounding up or down.
(ii) Vague answers about energy being wasted were not given any credit.
(iii) A poorly answered question. Some candidates suggested a different source of energy but few focussed on ways to make the electricity generation process more efficient.
(c) Many candidates referred to the non-renewable nature of fossil fuels rather than the pollution caused by their continuing use. A common error was discussing the effect of carbon dioxide and global warming, despite this information being given in the question.

Question 7

7(a) was a well answered question. Many candidates scored both marks. The most common error was working out 10% of 33,000 and submitting that as the answer.

A wide variety of responses was allowed for 7(b) and most candidates scored at least one mark.

Although many described the decreasing number of smokers in 7(c), few went on to link this to a probable decrease in the number of new cases of lung cancer in the future. It was common for candidates to write a lot while describing the patterns without actually answering the question.

The use of X-rays or gamma rays was often mentioned in question 7(d), but few candidates described the uses of both types of radiation. Others were able to describe how cancers are identified and treated but did not give the names of the waves used to do it.

Question 8

A high proportion of candidates scored the mark for question 8(a).

Relatively few candidates could name the type of bonding in SiO_2 to get a mark for 8(b)(i). Ionic bonding was a fairly common incorrect answer. Part (ii) was poorly answered. Few candidates seemed to be able to relate high melting point to the strong covalent bonds holding the atoms together in a giant covalent structure.

8(c) was another poorly answered question. Few candidates were able to pick out a characteristic metallic property that could be tested simply in the laboratory e.g. electrical conductivity. A surprisingly large number of candidates think that all metals are magnetic.

The reduction of lead oxide by heating with carbon was not as well known as expected for question 8(d).

Question 9

Part (a) of question 9 was well answered. A pleasing number of candidates knew how to calculate power. Some students answered the question by using energy and time values from the table. Some did not complete the conversion of watts onto kilowatts. A lot of students lost marks because they were incorrectly dividing by 10 or 100 when trying to convert units – a concern at this level.

The first section of part 9(b) was very well answered. A high proportion of candidates knew how to calculate energy used. The most common mistake was using a value from part (a), instead of the value for the vacuum cleaner. The final section (9(b)(ii)) proved to be a difficult question. Relatively few candidates were able to use the data in the table to enable them to calculate the cost of 0.6 Units of energy.

Mark Ranges and Award of Grades

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