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General Certificate of Secondary Education June 2012

Science B (Specification 4500) SCB1FP

Unit 1: My World

Report on the Examination

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GCSE Science B

SCB1FP

General Comments

Students and teachers should realise the importance of following the instruction to use black ink. They should also realise that if the work is illegible with poorly formed letters and numerals examiners may not be able to interpret what is written and so not be able to award marks. Where an answer space is given for numerical questions students should write their answer in the space provided. If their answer is buried in a maze of calculations it may well be missed.

Question 1 (Low demand)

(a) Students found it difficult to correctly identify the biological molecules generated from carbon dioxide, and think that oxygen is the product of decomposition. Fewer than a quarter of students gained both marks and a further quarter scored nothing.

(b) Many students do not appear to have read the question carefully and so suggest 'there is more to eat at the surface'. Generally the sole mark obtained was for light. Few mentioned photosynthesis, and many refer to nutrients or water being more abundant near the surface. Only a quarter of students gained any marks.

(c) A third of students gained this mark. The most common incorrect response was 'species'.

(d) Students who gave more than three responses automatically lost marks. Most common incorrect responses included using nuclear power and farming cattle. Very few students scored no marks.

Question 2 (Low demand)

(a) Most students gave the correct response, the most common incorrect response being 'liquid filtration'. A quarter of students failed to gain this mark.

(b) (i) This question was generally well done although neatness was sometimes an issue, as was incomplete or incorrect labelling, which cost 1 mark. Three-quarters of students gained all 3 marks. The use of a ruler to at least delineate the upper limit of a bar is advised to ensure that the tolerance of half a square is not exceeded.

(b) (ii) The most common error was to describe the bar chart rather than the pattern. Answers were sometimes too vague (eg 'it goes from low to high' or 'as one went up the other went up' or 'each substance goes higher and higher'). Some students think boiling point and temperature are interchangeable.

(b) (iii) Most students gave the correct response, with the most common incorrect response being 'viscosity decreases as chain length increases'.

Question 3 (Low demand)

(a) (i) Many students seemed not to understand the term *decay* and instead referred to organisms that feed on dead organisms rather than those causing decomposition. Some also didn't appear to understand what is meant by a group of organisms and instead referred to more specific organisms. Disappointingly few students gave the answer from the specification (decomposers), instead tending to use 'bacteria' or 'microorganisms'.

(a) (ii) Many students clearly did not understand the meaning of *conditions*. Students who did understand *conditions* often could not name the correct conditions: contradictory answers such as 'wet and dry', 'hot and cold' were not uncommon. Some thought that the health of the fox had an effect on decay. A number of students gave the answers for (a)(i)here.

(b) (i) A significant number of students do not understand what is meant by *percentage*. Values greater than 100 were relatively common. The method of calculating a percentage is also poorly understood, with 15 000 / 3000 frequently seen. Some more able students were able to arrive at 20% by realising that 3000 is a fifth of 15 000 and thus 20%. Fewer than one-fifth of students gained both marks.

(b) (ii) It was disappointing that nearly half of the students failed to gain any marks for this question. 'Warmth' and 'movement' were the most frequently seen responses. Some students gained a mark for correct reference to respiration as an alternative for heat. 'Used **for** respiration' is incorrect, and 'faeces', however described, is not the same as 'waste' in the context of energy transferred to **B** or **C**. Faeces contain energy that is not transferred. Terms such as 'wee' 'poo' 'going to the toilet' (and others) are unscientific, and so not acceptable at this level. A minority of students suggested that energy is recycled, evaporated, or is converted to, for example, carbon dioxide. Single words are not sufficient as an answer to this type of question.

Question 4 (Low demand)

(a) A quarter of students gained both marks here, but half scored nothing.

(b) (i) The majority of students gained the mark for this calculation.

(b) (ii) Many students responded incorrectly by stating that the mass increased due to the magnesium expanding, giving off gases, or by repeating information in the stem of the question. Very few students gained the second mark point, instead simply repeating how large an increase in mass there has been from the previous question. Several students seemed to believe that the oxide formed from carbon dioxide. Many students cannot distinguish between 'oxide' and 'oxygen'. Some also gave 'air' or 'carbon dioxide' and not oxygen. Too many students referred to 'it' throughout their answer, without specifying what 'it' was. Some students suggested that magnesium 'formed with oxygen', but 'formed' does not have the same meaning as 'reacted', 'bonded' or 'added to'. Three-quarters of students failed to gain any marks for this question.

Question 5 (Low demand)

(a) The only evidence students could use was what they could see in the pictures, which give no information about health of plants, the conditions to which they are exposed or the speed of growth. The number of leaves on the plants is the same. There is no information about speed of growth. Students were not asked to give reasons, such as competition for space, to justify their statements. 'Bigger' is not the best word to use as it can refer to a number of features: it does not necessarily mean taller. 'Taller' was the most common correct answer.

(b) 'Water' was the most common correct answer. Incorrect responses included 'space', 'heat', 'energy', 'sunlight', 'food', 'nutrition' and 'vitamins'.

(c) (i) It was surprising that many students do not appear to have seen this experiment in any form. A surprising number of students failed to realise the significance of the unilateral light and just grew longer stems straight up. Drawing longer stems was the only mark most students gained. A disappointing number were unable to even attempt the question. Some thought the seedlings would grow away from the light.

(c) (ii) Most students gained this mark.

(c) (iii) Many answers related to keeping either the seeds or the box the same. This clearly shows that these students didn't understand that they were monitoring the growth of the seeds over time. The most common 1-mark response related to the amount of light or amount of water. Very few students considered the amount of minerals or nutrients.

(d) (i) Most students gave the correct response, with the most common incorrect response being the middle diagram.

(d) (ii) Just over half of students gave the correct response, with the most common incorrect response being light.

Question 6 ((a) Low demand / (b) Standard demand)

(a) Some students found it very difficult to estimate the size of each sector, even though a generous tolerance was allowed. The most successful strategy seen was to allow oxygen and other gases to occupy about ¼ of the area, with oxygen being significantly bigger than other gases. The drawing of more than 3 sectors lost both the marks.

(b) This was the Quality of Written Communication question on the paper. Answers demonstrated a general lack of knowledge and understanding of this topic, both at Foundation and Higher tier. It is important that students are given plenty of opportunity to practice extended writing. Teachers should be aware of the common misconceptions and for this reason a number are listed here: 'Ocean currents move the continents'; 'The earth spinning moves the continents'; 'The continents were separated because of politics'; 'Continents migrate because of global warming or the big band' [sic]. Few students related tectonic plate movement to the movement of continents. It does students no service to expose them to alternative hypotheses such as the expansion of the Earth. The weight of evidence currently is that the diameter of the Earth has changed little over billions of years. Two-thirds of all students were unable to gain any marks for this question.

Question 7 (Standard demand)

(a) (i) Two-thirds of students selected the correct answer to this question.

(a) (ii) A significant number of students gave the correct calculation (66 x 62 / 12) but were unable to complete the calculation. A calculator is essential for these papers.

(b) Most students gained this mark by recognising the lack of camouflage, however spelled! It was sometimes impossible to distinguish between the X and Y written by a student as the letters looked identical due to carelessness in writing. The student had to convey the idea that the darker moth Y would be easier to see, so 'not well adapted' was not enough. Incorrect responses often referred to moth Y being seen because it was painted. The logic often presented for choosing X was that as it was camouflaged there would be more of them so more would be eaten!

(c) To gain full marks students had to include some reference to relative numbers in their answer. Many students did not answer fully, failing to give the consequence of better camouflage or the reason for less predation. Confusion between the terms predator and prey was evident. A number of students contradicted the information in the stem of the question and so answered in terms of moth X being better camouflaged. 'Hiding' is not equivalent to 'camouflaged', as moths of any colour could hide. Few students scored all 3 marks.

Question 8 (Standard demand)

(a) Students were asked to explain the effect of the relative motion of bike and observer on the sound produced by the bike, the frequency of which was given. Answers had to be comparative. Many students responded in terms of loudness, which is not appropriate given the instruction to answer in terms of frequency and wavelength. Most students seemed to be unaware of the correct terminology, 'high and low' for frequency, 'long and short' for wavelength. Bigger and smaller are not appropriate and can be ambiguous, and 'wavelengths move further apart' is incorrect. A significant number of students equate loudness with frequency: hence responses such as 'the frequency increases so it gets louder'. It is incorrect to relate frequency change to proximity: '**as** the motorbike approaches the frequency increas**es**' has a different meaning from '**when** the motorbike approaches the frequency **is increased**.' If the sound source is travelling towards the observer at a constant speed the frequency does not increase as it gets closer. It was sometimes difficult to interpret a student's meaning because of poor powers of expression.

(b) Some students still refer to red light rather than red shift; just over half of student gained this mark.

(c) Some students answered red shift here instead of big bang, although nearly three-quarters managed to gain the mark.

Mark Ranges and Award of Grades

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

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