



**General Certificate of Secondary Education  
June 2012**

**Science B  
(Specification 4500)**

**SCB1HP**

**Unit 1: My World**

***Report on the Examination***

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## GCSE Science B

### SCB1HP

#### 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.

It was noted that very few students were able to provide responses to questions such as 3(a), 4(d), 7(a) and 7(b) that would gain them full marks. More and longer continuous prose responses are a requirement of the new specifications and it is essential that students are given the opportunity to develop the necessary skills. These skills include:

- reading the question carefully and think about what is actually being asked of them
- organising their thoughts into a logical sequence that conveys the correct meaning without ambiguity
- writing clearly and legibly.

#### Question 1 (Standard demand)

- (a) Most students managed to plot the three points correctly, but then did not appreciate that a line of best fit can be a curve, as it is in this case. Do- to-dot with straight lines, and multiple fuzzy lines, are not acceptable.
- (b) (i) Most students were able to read the appropriate value from **their** line of best fit.
- (b) (ii) The most commonly seen answer related to the negative correlation, however expressed. Very few students realised the need to add that the effect was not linear, which was required for the second mark. No mark was available for the interpretation that viscosity changes with temperature. Students should be aware that 'heat' and 'temperature' do not have the same meaning. A student's response should demonstrate an understanding of cause and effect; that is, that the rate of flow depends upon the temperature, not the temperature depends on the rate of flow. Most students were able to score only 1 mark on this question.
- (c) The line drawn should be to the right of the answer to (a) and be an approximately similar shape. The fact that a significant number of students in both this part and (a) drew lines ending on or below the x axis demonstrates a significant lack of understanding of the meaning of the graph. They failed to appreciate that it can never take 0 seconds to pass through the viscometer.

## Question 2 (Standard demand)

- (a) (i) Most students were able to select the correct answer to this question.
- (a) (ii) The majority of students were able to carry out this calculation successfully.
- (b) Most students were able to explain why moth Y was more likely to be eaten. 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. About a third of students gained all 3 marks, and very few gained nothing.

## Question 3 (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 not acceptable. 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 increases' 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. Often it was 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', but most gained this mark.
- (c) Some students answered 'red shift' here instead of 'big bang' but nearly all students gained this mark.

**Question 4 ((a), (d) Standard demand / (b), (c) High demand)**

- (a) A surprising number of students were not able to answer this question correctly, with just over half gaining any marks. Often oxygen was given as the major sector and carbon dioxide was given in place of oxygen.
- (b) (i) Very few students gained this mark, with almost every famous pairing in any pursuit being given.
- (b) (ii) It is important that, when asked for two examples, students give only two examples. If they give more than two they will lose marks if they give incorrect answers.
- (c) This only mark gained by most students was  $\text{H}_2 + \text{N}_2$ , or  $\text{NH}_3$ . A number of students gave word equations and a small number gave  $\text{Fe}_2\text{O}_3$ . No student was able to balance an otherwise correct symbol equation, and three-quarters of students gained no marks.
- (d) 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. Most students were able to gain at least 1 mark for this question.

**Question 5 ((a) Standard demand / (b), (c), (d) High demand)**

- (a) (i / ii) Many students were unable to calculate the required percentage, or to convert percentage into mass, with about a third of students in each case gaining the 2 available marks. Students do need to practise this sort of question in order to learn how to order their thoughts in a clear and concise way.
- (a) (iii) This question requires the student to think about the nature and lifestyles of producers, primary consumers and secondary consumers and relate these to how much respiration these organisms need to carry out. The amount of food consumed and material lost in elimination and excretion are not relevant. A mark was allowed for the idea of secondary consumers usually being bigger than primary consumers. Nearly half of students failed to gain any marks.
- (b) Many students seemed to be unfamiliar with the term *organic molecules*, which meant that few gained all three marks. 'Glucose' was the most commonly seen correct answer.

### Question 6 (High demand)

- (a) Once again it is evident that this topic is poorly understood. Atmospheric carbon dioxide **dissolves** in sea water. It is incorporated in the **shells / bones / skeletons** of marine animals. These animals die and become part of sediments, which over **millions** of years are compressed to form limestone. Half of the students failed to gain any marks on this very straightforward question.
- (b) Very few students could attempt this question, and fewer than a quarter gained any marks. The small minority who had learned the reaction scored 3 marks, while the rest of the students who gained any marks did so for CO<sub>2</sub>. A number of new compounds were suggested: CO<sub>3</sub>, CO<sub>5</sub>, CO<sub>6</sub>.
- (c) Some students were unable to interpret the chart in terms of carbon dioxide uptake and release. The most common mark gained was for the absorption of carbon dioxide by trees in the production of timber. Only a small number of students were able to give a complete answer that linked carbon dioxide with the method of extracting metals, the chemistry of the production processes or the energy required. Half of the students gained no marks for this question.

### Question 7 (High demand)

- (a) Most students recognised that the absence of predators reduced the need for flight. However, few were able to go on to suggest the origin of the flightless condition and the survival and reproductive advantages this gave to flightless birds in terms of energy requirements.
- (b) Students were required to refer to adaptations in the population that have helped the Weka to survive over 50 years, not to speculate on future evolution. Pre-existing camouflage, running ability and sharp beak and claws for defence were the most common answers that gained marks.

### 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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