



General Certificate of Secondary Education

**Additional Science 4463 /
Biology 4411**

BLY2H Unit Biology 2

Report on the Examination

2009 Examination – January Series

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Additional Science / Biology Higher Tier BLY2H

General

There continues to be evidence from the wide range of marks achieved on this paper that careful consideration should be made before selecting the tier of entry for candidates.

Candidates are becoming more aware of the need to write in black ink and there was much less evidence of scripts written in pale colours or pencil. However the problem still exists and centres are requested to ensure their candidates have the correct writing instruments. It is also of credit to centres that fewer candidates appear to be continuing their answers into the spaces at the edge of the pages. Hopefully the message that these spaces are not scanned and cannot be marked in any circumstances is beginning to filter through to candidates.

A number of examiners voiced concern about the quality of written English, both in terms of its legibility and the inability of candidates to write in coherent sentences or support arguments effectively.

It remains essential that candidates should read the information in questions and then respond in the way requested. It is not uncommon for candidates to answer a question requesting explain with a description, or vice versa, to miss instructions such as compare or to miss key terms in the question, such as other (reasons).

Question 1 (*Standard Demand*)

Most candidates correctly identified the sun, or light, as the source of energy for plants in part (a). A number of incorrect responses appeared regularly, including water and minerals. In questions such as this candidates should be advised not to hedge their bets with two answers as almost inevitably no marks will be awarded for a list including an incorrect response.

In part (b), it was evident that a number of candidates had merely guessed, commonly suggesting 2 or 3. Another possibility was that some had worked out the correct ratio in their head and then rounded it up to 3; unfortunately, for these, no mark was available, without the requested working. Those who followed the instructions and showed correct working were rewarded with both marks for an answer of 3. Despite a number of candidates showing that they could read the scale, many were unable to convert this to the correct ratio, with 0.4 being given by a significant minority of candidates.

The majority of candidates clearly did not read the information well enough, in part (c), or perhaps did not understand the significance of biomass, as there were many answers in terms of a pyramid of numbers, suggesting that frogs are bigger than insects, one frog needs lots of insects or that insects reproduce faster; which, whilst being true, do not answer the question. Some candidates did not seek to explain at all giving responses such as numbers are always lower higher up (in a pyramid) or biomass always looks like a pyramid. Those candidates who began to get close to the marks often explained that energy is lost at each step in the food chain but then failed to give examples as to how it is lost. The examiners were willing to accept correct losses of biomass or energy from either insects or frogs; however the suggestion that energy is used for respiration is a not uncommon misconception that was not credited.

The broad mark scheme, in part (d), should have given plenty of scope for candidates to score high marks and many responded positively, sometimes giving six or seven of the points in the mark scheme. A number of candidates were confused between detritivores and decomposers, suggesting detritus feeders such as bacteria or, bacteria eat the dead insect. Weaker candidates remain confused by the gases used in photosynthesis and respiration, suggesting

that carbon dioxide is used for respiration and photosynthesis or that plants turn carbon dioxide into oxygen.

Question 2 (Standard Demand)

The most common incorrect response in part (a)(i) was liver. However the majority of candidates correctly identified the pancreas, even if spelling was not always accurate.

In part (a)(ii) it was evident that many candidates had been taught beyond this specification as reference to glycogen was common. Centres should be aware that the spelling of this term is paramount, with there being frequent hybrid terms, such as glucogen or glycagon, which were not awarded the mark. A significant number of candidates suggested that glucose is converted to starch for storage. The terminology used in the specification, that insulin allows glucose to move from the blood into the cells was very rarely used.

Candidates were expected to draw on their knowledge and understanding of 'How Science Works' in part (b). Some seemed unprepared for this, outside the context of ISAs, although the majority performed relatively well.

In part (b)(i), there were few who incorrectly chose claim 2, the majority of wrong answers were from candidates who selected statements from elsewhere in the question, such as ways of monitoring diabetics, rather than the manufacturer's claims.

Bias was referred to frequently in part (b)(ii) but was ignored by examiners. Some suggested that the number involved in the trials was not known or that they did not have diabetes, despite the information given, or that those taking part in the trial were not representative. It remains evident that many candidates are unaware that large samples or repetition are needed in order to improve reliability. The relatively small effect of the treatment on glucose attached to red blood cells was identified by a majority of candidates.

In part (b)(iii), however it was less common for candidates to answer the question in full, by explaining why the manufacturer might not wish to highlight this. A minority of candidates used the data regarding blood glucose after fasting and/or blood insulin after fasting despite the question asking for the glucose attached to red blood cells.

A wide variety of spellings of bias was accepted in part (b)(iv), incorrect responses often referred to fair testing, accuracy or reliability, each of which were ignored if bias was also given.

Question 3 (High Demand)

Given the information provided, it was noticeable that a significant minority of candidates chose not to use it, in part (a). The suggestion that the more concentrated starch would be thicker was not considered to be worthy of the mark.

Part (b)(i) was not answered well. Once again, the instruction to show clearly how you worked out your answer was ignored by many candidates who might otherwise have been credited with one mark for getting part way; responses such as 5.4 were not uncommon. In this case, it appeared that candidates may have read off the value on graph 2 at 40% light but had misinterpreted the time scale. Unfortunately with no evidence for this, either on graph 2 or in the space for working, no mark could be awarded. Many candidates seemed unaware that they needed to use both graphs to arrive at their answer and merely read off from 2% on graph 2, getting an answer of around three quarters of a minute.

In part (b)(ii) the significance of 40°C, being at or near the optimum was identified by most candidates, however it was less common for candidates to go on to explain why other temperatures were less or not appropriate. Some candidates misinterpreted the information and believed that the carbohydrase would be working in the body, so it would be important to test it at temperatures close to body temperature, whilst others thought that it is microorganisms, rather than carbohydrase which were being tested. There remains the

misconception that enzymes are denatured at temperatures below, as well as above, their optimum. It was pleasing to note that very few candidates referred to enzymes as being killed.

Isomerase was not a well known term, in part (c)(i). It was clear that the majority of candidates had not considered this important in their revision, amylase and protease were both frequent incorrect responses, as were fructase and glucase, although these latter at least suggested that candidates were trying to use some logical thought.

Again in part (c)(ii), some candidates had clearly omitted this area of the specification from their revision. Those who had learned it often scored both marks, some giving more detail about the relative calorific content of glucose and fructose than was required, but showed a good understanding of the topic. Weaker candidates often suggested that fructose contains less sugar, is less fattening or contains less energy.

Question 4 (High Demand)

This proved to be a relatively straightforward question for all but the weakest candidates.

Responses to part (a) were generally correct, most referring to increasing light or carbon dioxide or suggesting ways in which these could be achieved; using heaters or leaving the lights on at night. A few candidates referred vaguely to keeping conditions optimal or reducing limiting factors without explaining how this might be achieved.

In part (b)(i) it was common for candidates to suggest that imported tomatoes may be cheaper than those from British growers; this was, of course acceptable. Candidates, however, sometimes struggled to make a second suggestion that was not inextricably bound up with the first; hence faster growing and needing less artificial light were considered to be the reason for the low cost of imported tomatoes and not awarded a further mark. Some considered that bigger tomatoes might be bought from overseas but this did not gain credit. However a significant number did suggest improved quality or the all-year-round availability of imported tomatoes.

Many candidates in part (b)(ii) made their understanding clear although there were vague references to fumes as an alternative to carbon dioxide which was not considered worthy of credit at this level. Relatively few candidates actually stated that the imported tomatoes had to be transported a greater distance, however the mark was gained for the implication of greater distance by referring to shipping or air transport.

Question 5 (High Demand)

Overall, responses to this question were disappointing. The link between physiological responses and relative temperature changes was often poorly made. Misconceptions about changes to blood flow to the skin surface, such as capillaries dilating or blood vessels moving through the skin, were often seen.

In part (a), specific reference to respiration was not commonly given, candidates preferring to answer in terms of muscles contracting, which was also acceptable. There were many incorrect responses referring to the heart pumping or blood passing around the body faster.

Descriptions of the link between the lack of water for sweat and the reduced cooling effect were more convincing in part (b)(i). Many showed excellent understanding of the cooling effects of evaporation. There was occasional confusion about water being obtained from respiration to compensate for the lack of fluid intake.

Part (b)(ii) raised all the old misconceptions about blood flow. The lack of muscle in capillary walls means that they cannot dilate, however the capillaries dilate was quoted by over half of the candidates, suggested a flawed understanding. Less common, though by no means infrequent, was the idea that blood vessels actually migrate through the skin, in order to lose heat. Some candidates failed to score by not identifying to where the blood was flowing, or

which blood vessels were dilating, making reference to blood flow in the (general) body, only. Few references to vasodilation were seen and even fewer to hair lying flat, or the effect this change would have on insulation. Additionally the examiners identified that a surprising number of candidates failed to notice the word other in the question and, consequently, gave unnecessary details of sweating here.

In part (c)(i) it was not uncommon for candidates to fail to make a comparison between the temperature fall at the two shower temperatures, again ignoring a vital word in the question, difference. Unspecific descriptions such as a shock to the body also gained no credit. Many candidates clearly had no idea of the value of normal body temperature, suggesting 35°C would warm you up (because of the temperature difference).

Part (c)(ii) was not well answered. Many candidates compared the changes between 4 and 10 minutes with those between 0 and 2 minutes. Many others referred to the temperature rise, when showering at 15°C, between 2 and 4 minutes, however implied that this was part of what happened between 4 and 10 minutes. Although there were many suggestions that, when showering at the lower temperature the body tries to warm up, there were relatively few attempts to explain how this could be achieved. Shivering was the commonest suggestion from those who recognised the need to explain, although few of the candidates who got this far went on to explain that shivering would generate heat, or describe what causes shivering (ie muscle contraction).

Question 6 (High Demand)

Clearly, many candidates do not find proportions easy, writing 1 in 4 as 1:4, in part (a). Others realised that one child has the disorder and three do not, but failed to recognise that the question required the first part of the proportion to be for the child with the disorder and so gave 3:1. A significant number misinterpreted the family tree, believing that A and B had six children two of which have the disorder and so put 2:6. A number of candidates, again, gave several answers, some of which were incorrect, appearing to be the candidates' attempt to give alternative forms to their answer, such as 1 out of 4, $\frac{1}{4}$, 1:4 and so no mark was awarded.

In part (b) candidates commonly referred to parents A and B, thus limiting themselves to only two of the three marks, as a complete answer could not be given by this route. When only one mark was gained here, it was because the genotypes of A and B were not specifically identified. Sometimes, although the Punnett square was set out correctly the genotypes were in the wrong boxes ie offspring genotypes did not match the gamete genotypes. Others attempted to explain all the parent-offspring relationships, including the irrelevant G and H. The more astute candidates recognised that parents C and D, along with their offspring, were the key to this question and made a good attempt to explain their understanding, although often failed to specifically refer to offspring I or J. The best answers came from those few candidates who showed a good grasp of the principles of genetics by explaining that if the allele was recessive, then all of the offspring of C and D would have the disorder, with this short statement gaining all three marks.

Examiners noted the many references to carriers in responses to this question and part (c), as candidates continue to use the term incorrectly; as the allele is dominant. It was good to see that several candidates correctly used other terms such as homozygous and heterozygous, which although not a requirement of the specification certainly make describing the genetic make up of individuals much easier.

In part (c)(i), most candidates referred to screening being used to identify whether an embryo has a disease or disorder, however relatively few gained the mark by explaining that this screening would only identify inherited disorders. A few candidates appeared to believe that screening would cure the disorder.

In part (c)(ii) was well answered by the majority of candidates. Most explained that C and D had the disorder and so there was a chance that their offspring would also inherit the disorder. Similarly most explained that G and H do not have the disorder and therefore their children will not have it. A few candidates went on to point out the possible consequences of having a child with the disorder in relation to abortion or preparation for caring. Again there were many references to carriers.

Mark ranges and award of grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA website.