



General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Report on the Examination

2008 Examination – June Series

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Additional Science / Biology

Higher Tier BLY2H

General

In the January examination it was apparent that a number of candidates had been inappropriately entered for the Higher Tier paper. The wide range of marks achieved on this paper is further evidence that careful consideration should be made before selecting the tier of entry for candidates.

Candidates are requested to write in black ink or black ball-point pen. Several examiners reported an apparent deterioration in the quality of written English and of writing, some of which was virtually illegible.

It was pleasing to note that many candidates had heeded the advice in the previous report to keep answers away from the edge of the page, as they may be removed during scanning, and had continued their answers on additional paper. However, candidates are advised that the space or lines should be more than sufficient for a complete response, provided that they do not use up space simply repeating the question.

It was evident to all examiners that there is a greater need for candidates to carefully read the information which sets the scene for the questions and then to answer the questions asked, paying particular notice of prompts such as explain, describe etc. It was by no means uncommon for candidates to attempt to explain their answers when this was not required, or only to describe, when both a description and an explanation was required

In a new specification there are likely to be areas that candidates have not fully prepared for. This was evident in question 4(b)(i), on genetic fingerprinting, and in question 5(d) where evaluation was required. Centres are advised to ensure that their candidates experience the whole range of demands as laid out in the specification and the Teachers' Guide. Those questions which required understanding of the impact of science on society, such as 2(c) and 6(b), were also not generally done well, except by stronger candidates.

Question 1 (*Standard Demand*)

In part (a) a wide variety of spellings for lipase was accepted, although it was expected that the name would end appropriately. A considerable number of candidates suggested different enzymes, notably amylase and protease, whilst others suggested lipid.

The first marking point in part (b)(i) did not discriminate against those candidates who had focussed on the wrong curve, however weaker candidates only described one half of the pattern. The second marking point required identification of the best temperature for the existing detergent, here a considerable minority showed poor reading of the question, quoting temperatures in the range 31–33°C or wasting time by describing both curves. Others included explanations, which were ignored.

In part (b)(ii), most candidates circled yes and followed this by an explanation that less energy, however described, would be required when using the new detergent, however only better candidates went further than this, explaining how this made the detergent more environmentally-friendly. Even when they did, some candidates did not offer sufficient qualification, suggesting that it would create less pollution, emissions or waste or that it would conserve resources. Many candidates commented on the financial consequences of using less energy, at least this shows that they are thinking about the impact of science on society. Unfortunately on this occasion, no marks were available as such answers did not address the question.

Part (c) was well done by most candidates, referring to enzymes being denatured or destroyed, although it was clear that some struggled to bring the correct word to mind, suggesting such terms as deterganised or desalinised. Thankfully, after many years of training, most candidates no longer refer to enzymes as being killed, although examiners comment that reminding candidates not to use this term inevitably means that for a number of candidates, it is the only one they remember.

Question 2 (Standard Demand)

In part (a), the nervous system proved to be too attractive a discriminator for many candidates, although relatively few offered blood or kidneys.

Some candidates had a good appreciation of the inheritance of cystic fibrosis and gained full marks, in part (b)(i), often with the help of clearly labelled diagrams. Many picked up the point that Carol must have been a carrier for the condition, although the term carrier was often misunderstood as being a person who has either one or two of the recessive alleles. Candidates failed to gain marks, however, for a number of reasons: some incorrectly stated that the condition was inherited solely from Bob. Many ignored the information given in the question and assumed or stated that the cystic fibrosis allele is dominant. Expressions used to describe the idea of dominant or recessive alleles were, therefore, often misguided, for example Bob has the stronger gene and this overpowers Carol's or two recessive genes make a dominant. Other problems arose from the concept of probability. Many answers simply said that Alice drew the short straw without any explanation as to why. Some implied that she had more chance of getting the disorder because her father had two recessive alleles. Others said that her chances had been higher because she was a first-born child.

Incorrect responses to part (b)(ii) often followed the errors made in part (b)(i), however, others showed additional misconceptions in that if Alice had the condition, it would be Ted's turn not to have it. A number of candidates referred to strange ideas about sex-linkage for the cystic fibrosis gene, suggesting that it swapped from male to female in alternate generations! It is difficult to understand how they could have arrived at this idea, from the revision they might have done. Some wished to contradict the information given, suggesting that Bob is not the real father, or worse.

In part (c) a significant minority of candidates swapped their answers between the two subsections, indicating that they realised they had answered part (c)(ii) in the space for part (c)(i), only when they read the question for part (c)(ii). However, it was good to see that many candidates had clearly discussed the matter of embryo screening and had well-balanced views as a result. Where marks were not obtained, the reason was usually because the responses were too vague.

This was particularly the case in part (c)(ii) where candidates implied that screening simply went against nature, was playing God or was unethical. Candidates should be encouraged to expand on these ideas in answers. Some incorrectly believed that screening could rectify the condition. There was also occasional misunderstanding of the term screening, linking it either with genetic counselling or with stem cell research whilst others thought that radiation from the screening would harm the embryo.

Question 3 (Standard Demand)

A majority of candidates arrived at the correct answer in part (a), often without showing any working. Candidates should be encouraged to show their working because if they make an error in pressing calculator keys they will not notice, and then get no marks. An appreciation of number is helpful here, as a few gave answers such as 1200%. Few candidates were unable to arrive at an answer of some kind, with the most common poor manipulation of the figures leading them to answers such as 12% or 5.88%.

In part (b) most attempted three suggestions with a large proportion getting at least two marks. Where marks were lost, it was often due to candidates giving two examples of one way in which energy is lost, such as faeces and urine, knowledge of the particular way in which chickens lose waste was not expected. Examiners report that some candidates continue to believe, mistakenly, that energy is used for respiration.

Most candidates used their answers in part (b) to explain their answers in part (c), correctly suggesting that less movement by battery chickens would result in more energy being available for egg production. However, some missed the point and suggested that the proximity of battery chickens would mean that they were more likely to mate and lay eggs, or that there were more or bigger battery chickens so they would inevitably lay more eggs.

In part (d), many misconceptions surfaced. Although many candidates recognised that carnivores were at a higher trophic level than herbivores and that this would lead to more opportunities for energy losses, others thought that a herbivore would contain more energy than a carnivore or that carnivore flesh would be tougher to eat. The idea that herbivores eat a healthier diet may indicate some appreciation of the need for a good diet but shows a lack of biological understanding.

Question 4 (High Demand)

Part (a) required straightforward knowledge from the specification. Although this is at a high level the examiners were surprised at some of the weak responses offered. Many candidates got no further than suggesting that the code is used to control the appearance of the cell or organism, to decide whether someone has blue eyes or brown hair or even that it tells the cell the answers to all the great questions of life. Those who showed some appreciation of its significance commonly referred to protein synthesis, with reference to amino acids being less frequent. Some incorrectly suggested that the code makes amino acids or that it is made of amino acids. Only rarely was there reference to the particular sequence of amino acids.

It was evident that a significant number of candidates had not familiarised themselves with DNA fingerprints, in their revision. Those who had, commonly achieved at least two marks in part (b)(i). For the others, a good deal of thought was clearly provoked, along with much crossing out, sometimes of perfectly good answers replaced by much weaker ones. Candidates who failed to appreciate the concepts often tried to manipulate the numbered key to the bars. An example of this was calculating the mean of the mother's numbers and each of the possible father's bars or simply stating that the child's numbers follow on from Man B's, so he must be the father, whilst others attempted to compare the thickness of bars, rather than their positions. Candidates commonly failed to gain marks through imprecise statements, such as Man A hardly has any bars in common with the child, rather than having no bars in common, or failed to identify the source of the bars, from mother's and father's DNA. A few, particularly weak, candidates appeared to believe that the bars were photographs of real fingerprints.

There was a number of excellent answers in part (b)(ii), with correct references to haploid, diploid, zygote and even genome. However, many achieved only the one, straightforward, mark by stating that a child gets half its DNA from each parent, omitting to explain how this was achieved, via meiosis or gametes.

Question 5 (High Demand)

Part (a) may have been seen as something of a giveaway to those candidates who did not understand the difference between production and monitoring. However others might have thought it was a trick question and offered any organ other than the pancreas; with liver being the most common incorrect answer.

As with question 1(a), a wide variety of phonetic spellings was accepted for the enzyme, in part (b); even so, there were many suggestions, including all kinds of real or imaginary chemicals.

Some candidates gave a clear and complete answer to part (c)(i), whereas others only got half way there, by suggesting that enzymes are made in other parts of the body. A wide variety of strange suggestions were also given, almost imbuing dogs with mystical powers, dogs don't need a pancreas or dogs can grow a new duct, being two.

In part (c)(ii) the majority of candidates described the effects of injecting excess or insufficient insulin; unfortunately many appeared to be confused as to what insulin actually does, suggesting that it raises blood sugar, whilst others were confused about hypoglycaemia and hyperglycaemia. Insulin, or the lack of it, was also credited with a wide range of medical conditions, including anaphylactic shock, raised or lowered blood pressure, high cholesterol and blood clots.

Part (d) required candidates to offer a conclusion to their evaluation. A significant number of candidates appeared to be unprepared for this and gave both pros and cons without attempting to offer their own opinion, thus forfeiting one mark. Those candidates who gave either only pros or only cons were more able to gain the mark for a conclusion; however those who gave a mixture, needed then to explain their decision more carefully. Weaker candidates merely summarised Banting and Best's experiments and rarely gained marks. However many candidates could offer at least two pros and/or cons of the use of dogs, although it was often difficult for examiners to untangle poorly constructed answers from candidates with weak language skills. Candidates who laid out their response in a logical format usually gained all three marks. It would certainly be helpful to candidates if they were given more experience in constructing answers to this type of question.

Question 6 (High Demand)

Part (a) discriminated between those candidates who carefully read the question and information and those who did not. Weaker candidates often compared the growth, in general terms, as shown by all four curves and were able to gain few marks, or failed to read the instruction to describe and explain. Other candidates lost marks by not quoting values, between 7 and 8 units of light, from the graph where the curve levelled off. Many candidates were aware that limiting factors were involved, but understanding was insufficiently secure to gain marks for suggesting which factors might be limiting at each stage of the curve. Even the weakest candidates usually managed to refer to photosynthesis somewhere in their answer.

Part (b) was well answered by most candidates who recognised that the gardener would need to pay for the extra light etc. However some failed to pick up the second mark due to their answer being too vague in relation to the effect of this treatment on the profit. The cost of nutrients was a popular response which gained a lot of candidates a mark. Very few candidates were able to use relevant data accurately from the graph as part of their argument.

It was hoped that the majority of candidates taking the Higher Tier paper would have scored all four marks in part (c), where straightforward recall was required. It was very clear to examiners which candidates had learnt this, quoting verbatim from the specification in their answer and consequently scoring full marks. Where candidates fell down was when their knowledge was not secure and they decided to hedge their bets and combine symptoms, often quoting yellow leaves and stunted growth as deficiency symptoms for both ions or by completely reversing the function and deficiency symptoms of the two ions.

Mark Ranges and Award of Grades

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