Version 1.0: 0108

ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Additional Science 4463 / Biology 4411

BLY2H Unit Biology 2

Report on the Examination

2008 Examination – January Series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334). Registered address: AQA, Devas Street, Manchester M15 6EX
Dr Michael Cresswell Director General.

Additional Science / Biology Higher Tier BLY2H

General

This was the first examination of the new specification and it was evident that some candidates had not prepared effectively or that they had been entered for the wrong tier as a significant minority of candidates achieved relatively low scores.

Candidates should be advised to write in black ink or black ball point pen only as the scanning process involved in on-line marking does not pick up pale colours well. Candidates should be asked to ensure that their writing is clearly legible. Candidates with poor writing may use scribes, with approval, as a means of ensuring their answers can be read by examiners. Furthermore candidates should be advised to ensure that if their answers extend beyond the printed lines or space then they should keep these extensions away from the edges of the page as they may be removed during scanning.

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.

The specification requires candidates to apply their knowledge and understanding to novel situations and, in the main, good attempts were made, in particular in questions 5(b) and 6(b), however where understanding of the development of scientific understanding and knowledge was required, such as in question 3(a), candidates were much less confident. Those questions which required understanding of the impact of science on society, such as 1(c) and 7(b), were also not generally well done, except by stronger candidates.

Question 1 ***(Standard Demand)***

Although the majority of candidates drew the pyramid in the conventional way, with the producer at the base, a variety of different presentations were accepted. However, some candidates drew what appeared to be pyramids of numbers, whilst others omitted one of the levels, most commonly parasitic worms.

In part (a)(ii), the failure to carefully read the information and question may well have cost candidates marks, as many discussed losses of mass/energy by the herring, rather than the tuna or suggested that the tuna did not eat all of the herring (which is excluded by the information in the question). Others, referring to energy, suggested that it is used up in the process of respiration, rather than being released.

Once more, in part (b)(i) careful reading of the question and information would have lead to more candidates securing both marks for the calculation. Many omitted to subtract the initial mass (50kg), while others failed to divide by 6.

In part (b)(ii), there was a wide variety of suggestions to a question which was targeted at the economic aspects of science. Although many did refer to the cost of providing the diets, there were also suggestions about pen size, the need to repeat or record masses for longer than 6 months, numbers of fish in the pen or their sale price; all of which the examiners felt did not address the issue. Although there were many references to concerns about the welfare of the tuna, cruelty, ethics, lack of space, flavour or quality, in part (c), many responses were considered to be too vague. These included ideas that the treatment was 'unfair' to the fish or that it was 'unnatural'. One or two, clearly struggling to make any suggestions, arrived at rather strange ideas, that 'the tuna will be too heavy to carry home' or that 'it won't fit in the tin' or even that 'people prefer fresh fish', perhaps believing that the young tuna were killed and then kept for 6 months as they put on weight.

Question 2 *(Standard Demand)*

In part (b)(i), the mark scheme ignored a wide range of substances passing in or out of the container. A majority of candidates included air or oxygen passing into the container in this list and were awarded the first mark, relatively few, though, went on to explain that this was for respiration. A few candidates appeared to believe that the waste vegetables would be photosynthesising and suggested that holes allowed carbon dioxide in and oxygen out.
Many candidates understood that decaying compost would provide minerals or nutrients, in part (b)(ii), some going on to give examples; a significant minority included other inappropriate substances, most commonly vitamins and proteins and as a result were not awarded the mark, here.

Question 3 *(High Demand)*

In part (a), candidates were expected to demonstrate their understanding of how science works. It was evident that some had not revised this topic carefully enough. Many candidates correctly referred to lack of knowledge of the existence of genes, DNA or chromosomes or these structures being first observed in the early 1900s to gain one mark but very few, including the best candidates, scored full marks on this part of the question. Candidates often suggested that the microscope was invented in the early 1900s, although this did not result in a penalty. Other candidates said the genetic engineering was not popular in the 1850s. Some candidates thought that there was 'no interest' in topics such as 'genetics', 'breeding', 'inheritance' or even 'peas' and 'science'.

A number of answers were based on the idea that the experiments took such a long time that the results did not become available until the 1900s or that Mendel had no data to back up his ideas.

References to God or religion were often made and almost always indicated that candidates thought the question was something to do with evolution and/or Darwin. Virtually all these answers suggested that Mendel's ideas were against God.

Of those candidates who understood the need for random selection, in part (b)(i) most were able to outline a reasonable method of achieving this.

Many of the incorrect responses indicated a misunderstanding of the question in that descriptions of various alternative additional crosses were given. Others explained that the seeds should be deliberately chosen to match the expected ratio – eg. 'take one green for every yellow'; 'make sure you have half of each'.

A few candidates who had the right idea lost the mark because the sample number quoted was inappropriately small. Others failed to appreciate that using all the seeds did not constitute a sample.

In part (b)(ii), the question demanded that candidates should give a ratio in their answer, and although most complied with this, many gave fractions or percentages, which the examiners ignored. Poor counting let many candidates down, whilst some gave unqualified ratios in terms of green : yellow, rather than yellow : green and lost the mark.

In part (b)(iii), students who used a punnett square were more likely to be successful than those who chose alternative means to show the cross. Many candidates appeared to believe that the cross was between heterozygous parents and arrived at offspring phenotype ratios that did not match their previous answers, although they seemed unconcerned about this, others failed to gain the mark for correctly identifying the phenotype of yellow or green peas.

Question 4 *(High Demand)*

Most candidates were able to correctly identify two enzymes, in part (a). Those who did not, sometimes renamed the same type of enzyme, such as 'carbohydrase and amylase' or gave an inappropriate example, most commonly 'pepsin'. There was evidence of some confusion between 'lipase' and 'lipid'.

In part (b)(i) the most common incorrect answer was 'tiredness'. Some candidates discussed 'low blood sugar' possibly because they were thinking about problems when diabetics have poor control of the condition with insulin. Marks could have been gained by some candidates if they had been more precise as references to 'sugar' which were unqualified failed to get credit and neither did 'going to the toilet'. In part (b)(ii) lack of precision, again, cost many candidates the mark, as they discussed the need to reduce carbohydrate intake. Those who had shown poor understanding of the symptoms of diabetes often suggested that diabetics should increase sugar intake, whilst some named almost any component of the diet that was newsworthy, including protein, fat and salt. Those candidates who knew the symptoms of diabetes and an appropriate change to the diet were commonly able to gain the mark in part (b)(iii). In part (b)(iv), lack of precision again let candidates down, with 'injections' being an all too frequent answer, omitting what the injection should contain.

Part (c) regularly drew the correct response, although between them, candidates gave almost every function of other organelles, particularly confusing ribosomes with mitochondria. Others reversed the role of ribosomes, suggesting that they made amino acids from proteins.

Question 5 *(High Demand)*

In part (a), most candidates identified the neutralising effect of bile, although precisely what was being neutralised or where that neutralisation was happening was not always clear. These candidates often went on to explain that this was important so that enzymes in the small intestine could work more effectively. Good candidates gave very full answers which also described the emulsification of lipids (which is not on the specification) and the advantage of this action. However many were confused as to what was being emulsified: food and lipase often being suggested, and also often misunderstood what happens during emulsification, with chemical digestion commonly losing the mark.

In part (b), as in others before, poor reading of the question lead to many strange answers. There were many who misread the term "faeces" as 'faces', in part (b)(i), and described how the skin of the face became pale. This often caused candidates to exchange answers between part (b)(i) and (b)(ii), when they realised their error. Some simply gave the same answer for part (b)(i) and (b)(ii). In this part, candidates were expected to use the information, along with their own knowledge, to arrive at reasonable suggestions. In part (b)(i), many did this, giving sensible, logical explanations which usually involved the bile or pigments not reaching the small intestine to colour the food/faeces; in which case two marks were awarded. In part (b)(ii), however, the question was more demanding and candidates often became confused trying to sort out the details provided, many believing that only in people with gallstones are red blood cells broken down, leading to them having less blood in circulation or the lack of digestion/ absorption causing them to be pale from lack of food. Good candidates recognised that if the bile pigments could not pass through the bile duct, then they would pass into the blood and be deposited in the skin. The question discriminated well at grade A, as it was intended to.

Question 6 *(High Demand)*

In part (a), candidates were asked to describe how the brain and the skin 'monitor' body temperature. Unfortunately a considerable number of candidates ignored or misunderstood the instruction and wrote lengthy, often carefully learned, details (some of which went well beyond the scope of the specification) about how the brain and the skin 'control' body temperature; all to no avail. Those who did read the question carefully enough frequently referred to the thermoregulatory centre, although the examiners did not accept the frequently referred to

'thermoregulatory system'. However, that this centre monitors the temperature of the blood passing through it was less well understood and not often referred to. It was more common to read how the centre controls body temperature. Similarly, in part (a)(ii), candidates often referred to sweating, hair erection and shivering. The examiners were lenient with descriptions of the means by which information is passed through the nervous system to the brain; even so, answers that addressed the question were not common.

In part (b), candidates were expected, once more, to apply their knowledge and understanding to a novel situation, as how these muscles work is not expected knowledge. Many candidates made good attempts, and the three marks could be gained by explanations which included incorrect suggestions, as long as the thread of the response made good biological sense. For some, the lines provided were not enough to write down all their thoughts and they continued well into the space below. References to the muscle 'constricting' and 'dilating' were not accepted, nor were suggestions that blood might flow 'nearer to the skin' (as the information indicates that the whole diagram is of the skin) or onto the skin, as a result of the muscle relaxing. A number of candidates correctly described at least some events in cold conditions but then added 'and vice versa in hot conditions' and gained no more marks. Had they restated their descriptions in reverse, marks would have been awarded. Weaker candidates suggested that more blood flows into the skin capillaries in cold conditions in order to keep the skin warm. The examiners were pleased to note that the idea of capillaries moving up and down in the skin was less frequently suggested than they feared.

Question 7 ***(High Demand)***

It was evident that in part (a)(i) candidates had struggled to make up their mind, as there were often numerous crossings out. Although there were a number of meaningless responses along with others not referred to in the information, such as 'carbon dioxide' and 'temperature', many arrived at the correct answer. Part (a)(ii) was quite tricky and proved to be a good discriminator at the highest grades. This required candidates to have a good understanding of the concept of limiting factors. (Perhaps it was this question which prompted many to cross out 'magnesium' in part (a)(i). It was evident that many candidates had not read the information in the question, regarding the specific light intensity and yield, carefully enough as it was common for responses to include information about increasing light intensity. Some came close and mentioned the *rate* of growth at both magnesium concentrations being similar rather than the yield.

In part (a)(iii) weak candidates merely restated that magnesium causes an increase in growth, although some used evidence from the graph to back this up whilst others referred to magnesium being important in the manufacture of proteins, in general. Slightly stronger candidates linked magnesium to chloroplasts, although the examiners did not think that this was sufficiently precise at this level, whilst many also referred to 'yellowing of leaves' if magnesium was deficient. Good candidates made secure links between chlorophyll production and photosynthesis and were rewarded for their knowledge.

In part (b), once more, many candidates did not appear to read the information or the question carefully enough. However, many realised that increasing magnesium concentration would lead to little or no greater yield. Unfortunately these did not always go on to explain that this would lead to a waste of fertiliser or money and it was not unusual to read of the dangers of putting excess magnesium in the soil; such as poisoning the plant or the consumer, causing pollution (without any qualification as to the form this would take), cause over-production of grain or even the potential risk of ignition!

Mark Ranges and Award of Grades

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