



**General Certificate of Secondary Education**

**Biology 4411**

**BLY3H Unit Biology 3**

**Report on the Examination**

*2009 Examination – January Series*

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# Biology

## Higher Tier BLY3H

### General

There were a number of particular problems which occurred quite frequently which included the following. A lack of understanding of certain topics and paying insufficient attention to information provided in the stem of a question in order to guide a reasoned response

Careful reading of the question to ensure this was the question actually answered eg if certain topics are specifically excluded as in question 1(b) then no marks are available for inclusion of these topics; and if the precise opposite of the actual question is construed then the answer will inevitably be incorrect, as in question 6(a).

There was mathematical weakness, both in calculations and in reading information accurately from a graph.

Lack of appropriate terminology eg organisms like bacteria may be killed at high temperatures rather than being denatured while enzymes and other proteins are denatured rather than being killed; or something being affected by an experimental procedure gives no indication whether an increase or a decrease is intended; terms such as filtration and reabsorption have specific meanings with respect to kidney functioning and cannot be used interchangeably

### Question 1 (*Standard Demand*)

Nearly all candidates in part (a)(i) were able to complete the calculation of the cardiac output successfully.

In part (a)(ii), most knew that oxygen was needed by the muscles for respiration and/or energy release. Some concentrated, quite reasonably, on the prevention of anaerobic respiration and the build up of lactic acid.

Part (b) asked for changes other than those already encountered in earlier sections. Nevertheless, many candidates insisted on mentioning the increase in heart rate or blood supply to the muscles which were the subject of part (a). More appropriate answers related to increased depth and/or rate of breathing. A few mentioned dilation of arteries or diversion of blood from elsewhere. However, only about a quarter of candidates scored the full two marks.

### Question 2 (*Standard Demand*)

Over three quarters of candidates correctly named the process by which plant leaves lose water as either transpiration, evaporation or diffusion in part (a)

In part (b) the large majority of candidates successfully interpreted the data which showed that condition D, warm and windy, resulted in the most rapid loss of water from the plant. However, explanations of this observation were much less successful: most of these related to the wind blowing the water (vapour) away, perhaps also stating that evaporation was faster due to the higher temperature. There was very little reference to enhancement of concentration gradient due to the wind, nor to the higher temperature providing the water molecules with more energy.

### Question 3 (*Standard Demand*)

Over half of the candidates knew that a high temperature would have killed the bacteria or denatured their enzymes and hence cooling was needed before adding any bacteria. Some did not read the question carefully and answered in terms of the benefits of heating to 80°C in order to kill microorganisms.

Many candidates were confused in part (b)(i) about the nature of the pH scale and were not sure that a fall in pH implied more acidic conditions. Some candidates thought the bacteria

were acidic. Other candidates knew that it meant an acidic substance was being produced and the more informed candidates knew that, in the case of yoghurt production, this was lactic acid. There were candidates who knew that the acid was the product of anaerobic respiration. However, less than half of the candidates scored any marks in this section.

The usefulness of the fall in pH in yoghurt production was also a mystery to many in part (b)(ii). The correct references to improved flavour and to preservation of the yoghurt were accepted.

There was more success with the concept of refrigeration in part (c) as most realised this would help to preserve the yoghurt.

#### **Question 4 (High Demand)**

In part (a) sealing the apparatus was the most common precaution that examiners rewarded as being equivalent to preventing the entry of other microorganisms, although various methods of sterilising apparatus and media were also frequently described. Nearly all of the candidates were able to make at least one sensible suggestion.

A surprising number of candidates in part (b) suggested that pH, the independent variable, should be held constant, but most were to suggest at least one appropriate control variable eg temperature, concentrations of various named substances, volumes of media and the amount of bacteria added.

Reading of the optimum pH from the graph, in part (c)(i), was sometimes imprecise. Examiners accepted values in the range 7.4 to 7.6.

In part (c)(ii), only a quarter of candidates could suggest that the way to improve the accuracy of the answer to part (c)(i) was to use several more pH values at smaller intervals around pH 7.5. Some lost the mark through imprecise communication, for example: do the experiment at pH 3, pH 3.5 and pH 4 does not imply it should also be done at pH 7.5. Many thought that mere repetition of the original experiment would improve its accuracy reliability, perhaps, but not accuracy.

#### **Question 5 (High Demand)**

In part (a)(i), three quarters of candidates correctly selected glucose and galactose as the sugars absorbed by active transport.

Even if the incorrect sugars had been selected in part (a)(i), some general points about active transport could still be made in part (a)(ii) eg that active transport required energy and that less energy would be available if the rate of respiration were reduced by cyanide. Full marks were only available for those who had correctly selected glucose and galactose and who stated that the rate of absorption of these sugars was reduced in the presence of cyanide. Affected by cyanide was not accepted as an adequate description. Only about 1 in 8 candidates was able to give a completely correct answer.

Although in part (b) it was evident to most candidates that all four sugars could still be absorbed even in the presence of cyanide, only a tenth could relate this to the fact that diffusion of these sugars would not need an energy supply.

#### **Question 6 (High Demand)**

In part (a) many candidates, who thought that lowering the proportion of methane would make biogas a better fuel, clearly had little understanding of this topic. Alternatively, they had not read the questions with sufficient care an inevitable recipe for disaster.

More than half of the candidates made no headway at all with part (b). It was evident that many did not understand that methane was only produced by anaerobic respiration. Thus, they argued that if methane production had proceeded to a certain level without oxygen, then having

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oxygen present could only make production better! Many candidates were unduly fascinated by the production of water, the presence of which was regarded by examiners as being due more to mere evaporation than to any process relevant to this question.

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

In part (a)(i) a majority of candidates knew that proteins are large molecules and thus correctly selected substance A from the list of five differently-sized molecules.

About two thirds were able to state something sensible in part (a)(ii) about why protein was therefore not found in urine, but only two thirds of these could explain fully and unambiguously that proteins were too large to pass through the kidney's filter. Others had proteins being filtered out in contexts that did not make it clear whether this meant they did or did not pass through the filter.

Some, quite correctly, argued in part (b) that substance B was glucose which would pass through the filter and then be completely reabsorbed, such identification of substance B went beyond what was actually required but was, nevertheless, commendable. Others used the terms filtered and absorbed interchangeably and it was difficult for examiners to award marks when the candidate's intentions remained unclear. Many gave an incomplete account although they thought substance B was reabsorbed, it was not described as having been able to pass through the filter in the first place, or it was not suggested that it was reabsorbed completely.

Only a tenth of candidates in part (c) were able to argue, from the information provided, that haemoglobin was not normally found in urine as it was contained inside red blood cells which were too large to pass through the kidney's filter whereas, in haemolytic anaemia, the haemoglobin released from the burst red cells was small enough to be filtered out of the blood. About a third of candidates were unable to make any sensible observations in this section.

### **Question 8 (High Demand)**

The passage given for analysis in this question included a great deal of factual information about the use of petrol and of gasohol, together with some debatable issues. Not all of the information had to be used to score full marks, but candidates were expected to use information selectively to present a balanced argument before deciding in favour of one side or the other. Few were completely successful, but a third were able to score at least three out of the five marks available.

It was evident that many found it difficult to synthesise information from the passage with knowledge acquired elsewhere into a coherent argument. For example, very few registered that if gasohol contained smaller amounts of nitrogen and sulphur compounds then there would be a reduction in emissions of NO<sub>x</sub> and SO<sub>2</sub> and hence less acid rain in tune with the air quality monitoring mentioned in the passage but at odds with the claims of some opponents of the use of ethanol in motor fuel.

The question differentiated well amongst candidates of varying ability. However, it also discriminated against those who were unable to extract appropriate information from the passage or communicate their thoughts unambiguously.

### **Mark ranges and award of grades**

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