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ASSESSMENT and QUALIFICATIONS ALLIANCE

## General Certificate of Secondary Education

# Biology 4411

## BLY3H Unit Biology 3

# Report on the Examination

*2008 Examination – January Series*

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# Biology
# Higher Tier BLY3H

### General

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. 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.

There were particular problems which occurred quite frequently. There was a lack of understanding of certain topics – e.g. kidney function, biogenesis, energy release (rather than its 'production'). There was an inability to express ideas clearly and unambiguously, such as patterns shown in data.

Excessive verbosity rather than making specific points succinctly and precisely – this merely wastes time as no marks are available for re-stating the question nor for making the same point more than once.

Candidates paid insufficient attention to information provided in the stem of a question in order to guide a reasoned response. Candidates needed to read the questions carefully to ensure this was the question actually answered – e.g. when asked just for a *description* of patterns in data, an explanation was *not* required.

The mathematical ability of candidates was often weak.

### Question 1 *(Standard Demand)*

Errors in part (a) included misreading the scale on the vertical axis of the graph (e.g. reading 2.2 as '2.1') and failure to divide by 10 to obtain an average rate of increase per hour over this 10-hour period. As would be expected, Higher Tier candidates were more successful than those at Foundation Tier and 40% scored full marks in this section.

In part (b) many candidates failed to point out that the presence of oxygen permitted *aerobic* respiration (rather than just 'respiration') and only about a quarter went on to explain that *more* energy was available in the presence of oxygen.

### Question 2 *(Standard Demand)*

In parts (a)(i) and (a)(ii), there were many answers relating to 'fair testing' rather than to the purpose of each procedure – it appeared that the phrase 'each flask…' in the question triggered this unthinking response. However, over three quarters of candidates realised that heating the flasks over a Bunsen burner would kill bacteria and nearly half that cooling would provide a suitable temperature for bacterial growth. In part (a)(iii), opinions were equally divided between those who thought the purpose of the flask's 'swan' neck was to keep oxygen out and those who understood its true purpose of preventing the entry of microorganisms.

In part (b) just under ½ of candidates fully understood how Pasteur's experiment supported the theory of biogenesis. For most of the remainder it related to growth of organisms with or without oxygen.

### Question 3 *(Standard Demand)*

In part (a) around three quarters of candidates knew that the fuel gas in biogas was methane (although 'ethanol' was quite a common incorrect answer). Slightly fewer knew that biogas was produced by anaerobic respiration, or by fermentation, common inadequate answers being 'decay' or 'decomposition'.

In part (b) candidates were largely successful at extracting appropriate information from the passage in order to describe the benefits to a farmer in Sri Lanka of making biogas in a back-yard fermenter. Although, even here, many answers lacked precision, for example, stating that the farmer obtained free biogas but not explaining for what purpose this might have been used, or describing crops grown in soil to which spent organic matter from the biogas generator had been applied as 'organic' but not pointing out that, as such, they commanded a higher selling price. In part (b)(ii), although just over half the candidates correctly pointed out that temperatures were cooler in the UK than in Sri Lanka, fewer explained that this would slow down gas production in a simple biogas generator; many included anecdotal answers relating to a lack of sufficient cattle to supply enough biogas to provide for the energy demands of the UK population or the possibility of unpleasant odours near human dwellings.

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

While most candidates sensibly described the graph following the time sequence from 0 to 14 minutes in part (a), many of the descriptions given lacked essential detail. Thus the heart rate rose steeply for the first 2 minutes of exercise, then *the rate of increase* became less (this latter point often being expressed ambiguously). Many quoted values for pulse rates – especially for the maximum of 126 at 5 minutes. Similarly, better candidates pointed out that recovery was rapid between 5 and 7 minutes and then more gradual, finally reaching the original pulse rate at 11 minutes. Many candidates included irrelevant explanations with regard to oxygen supplies, avoiding oxygen debt, and breathing and respiration. More careful reading of the question would have avoided this. Just over half of the candidates scored full marks for what should have been a relatively simple exercise.

In part (b) descriptions of vasodilation were often ambiguous – thus an artery becoming 'larger' does not necessarily mean its diameter is increasing. Only a third of candidates gave adequate answers.

In part (c) explanations centred around oxygen supplies, possibly for respiration – although not necessarily a *greater* supply of oxygen for an *increased* rate of respiration. Better candidates remembered that more glucose would also be required during exercise and some went on to explain that this provided for a greater expenditure of energy. Although lactic acid production and breakdown were often mentioned, relatively few appreciated that this, together with extra carbon dioxide and heat, would need to be transported away from the working muscles by the blood. Around three quarters of candidates scored 2 marks or less, out of the 4 available, in this section.

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

As ever, imprecise understanding of the working of the kidney proved to be a stumbling block for many candidates, with almost half scoring no marks in part (a) and 80% scoring zero in part (b)(i).

Omission of the term *filtration*, or *filtered*, cost many candidates a mark in part (a). For some, the terms *filtration* and *absorption / reabsorption* were freely interchangeable, often with 'diffusion' being applied to each. Some had little idea of the relative sizes of molecules – thus glucose was often considered 'too large' to enter the nephron. Better candidates did understand that glucose, being relatively *small*, would be filtered out of the blood and would then be completely reabsorbed by active transport. Only 7.5% of candidates could tell the complete story.

In part (b)(i) answers from many candidates implied that it was normal for protein to be filtered out of the blood and thus the disease must have affected the ability to reabsorb it back again. Only better candidates understood that the disease did, in fact, operate at the level of filtration, it being exceptional that protein should pass from the blood into the nephron. In part (b)(ii) the advantages of a kidney transplant over dialysis generally revolved around convenience and cost and most candidates knew about these. Hardly any candidates gave any biological benefits

regarding avoidance of the build-up of toxins in the blood, or increased blood pressure, between dialysis sessions, or the possibility of infection or blood clots due to the blood leaving the body and entering the dialysis machine. Most also knew of the problem of rejection of a transplanted kidney and the need to use immunosuppressant drugs – although only better candidates went on to explain that the latter could result in reduced resistance to infection. A few candidates stated that a transplant operation could in itself be dangerous.

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

In part (a) most knew that active transport could operate against a concentration gradient and many added that this would require an energy supply. Relatively few mentioned specific protein carriers in the cell membrane.

Similarly, the vast majority knew that microvilli increased the surface area of the villus and that mitochondria released the necessary energy in part (b). Those who thought that energy was 'made' by the mitochondria were not credited.

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

Many answers in part (a)(i) got no further than the information given in the question – i.e. the stirrer mixed the contents of the fermenter. Better candidates suggested that better access of the fungus to the reactants, or to oxygen, or prevention of sedimentation of the fungus, or maintenance of an even temperature, might result from such mixing. Only a third of candidates managed this. Similarly in part (a)(ii), weaker candidates got no further than the idea of a jacket of cold water 'cooling' the fermenter. Better candidates gave two sensible reasons why such cooling was desirable – e.g. to maintain an optimum temperature and to prevent death of the fungus or denaturation of its enzymes. Some also explained correctly why the fermenter might warm up in the first place due to the release of heat energy from the fungus. Less than a fifth of candidates could give two such sensible ideas.

In part (b)(i) only a quarter of candidates were able to read the correct time period from the graph. Many did not confine themselves to a 6-hour period, as specified in the question, and thus condemned themselves to scoring no marks. Others misinterpreted the graph by either reading values from the wrong curve or by choosing a time period when the antibiotic concentration was at a maximum rather than when it was increasing at its maximum rate. In part (b)(ii) while many (55%) of candidates recognised from the graph that glucose was used before sucrose, many others failed even to mention sucrose (despite its inclusion in the actual question) and attempted to relate the fall in glucose to the rise in the amount of either the fungus or the antibiotic. In part (b)(iii) many candidates became very confused in this final description and interpretation of the patterns shown in the graph with respect to the amounts of glucose, the fungus and the antibiotic. Some clearly did not read the question carefully and also included descriptions of the changing sucrose concentration. Other descriptions were very imprecise and many confused the terms *Cephalosporium* (= the fungus) and *Cephalosporin C* (the antibiotic). Explanations of the relationships were often weak and only better candidates suggested that glucose might be used, say, as an energy source for the fungus: weaker candidates merely suggested glucose was used for 'growth'. Relatively few pointed out that the rise in antibiotic concentration occurred after the rise in the amount of the fungus which, of course, needed to be present before any antibiotic could be made. A mere 0.5% of candidates scored full marks in this section, with 55% scoring no marks at all.

**Mark Ranges and Award of Grades**

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