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General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Report on the Examination

2012 examination – June series

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Biology
Foundation Tier BLY3F

General

Particular problems which occurred quite frequently included:

The inability to express ideas clearly and unambiguously.
Paying insufficient attention to information provided in the stem of a question in order to guide a reasoned response.
Careless reading of the question resulting in an inappropriate answer, or not giving a comparative answer to a comparative question.
A failure to distinguish between the instructions *describe* and *explain* and thus including irrelevant material in the answer.
Evidence from diagrams or graphs not always being cited carefully and attempting to give descriptions of patterns in graphs without including numerical values – which are needed if full marks are to be gained.
Misuse of certain technical terms – for example *filtration* and *reabsorption* or *absorption* in relation to kidney function and confusion of terminology relating to data, such as *accuracy*, *reliability*, *precision* and validity.
Mathematical weakness in calculations and sometimes failing to include working as instructed
Limited ability to apply what has been learned to a novel situation. Poor understanding of certain topics, such as aerobic and anaerobic respiration and kidney function.

Question 1 *(Low Demand)*

(a) Just under a half of the students were able to identify the correct function for each of the structures alveoli, veins, villi and ribs.

(b) Just over a half correctly selected the term *diffusion* as the process by which oxygen enters the blood from the air in the lungs. 'Respiration' was a very attractive distractor.

Question 2 *(Low Demand)*

(a) Three-quarters of the students identified the term *transpiration* as the process by which a plant's leaves lose water.

(b) Only half of the students could give a complete description of the effect of temperature on water loss from a plant, as shown in the graph. Some described only part of the graph. To gain full marks, it was essential to quote figures from the graph – for example, a description of how the rate of water loss increased up to 37°C but decreased at higher temperatures.

(c) (i) Two-thirds of students were able to explain that closure of stomata would reduce water loss from the plant. Some suggested, incorrectly, that the stomata stored water.

(c) (ii) Just under half of the students correctly chose the highest temperature range (40 – 45°C) as being most likely to cause stomatal closure.

Question 3 *(Low Demand)*

(a) Nearly all students could correctly select the name of at least one of the structures, *nucleus* or *cell wall*, in the diagram of a yeast cell. Less than half correctly identified both.

(b) (i) Almost three-quarters of students correctly chose *carbon dioxide* as the gas produced by the yeast.

(b) (ii) A very high proportion realised that the bubble counter attached to the apparatus would overcome human counting errors and were similarly successful, in (b)(iii) by identifying from the table that bubble production stopped after 30 hours. Inevitably, they were less successful.

(b) (iv) In suggesting a reason why bubble production stopped after this time: only a quarter were able to make a sensible suggestion such as running out of food or there having been too much toxic alcohol produced. Incorrect answers included running out of yeast or of oxygen (gas bubble production being, of course, due to *anaerobic* respiration).

(c) Nearly all students could suggest at least one factor that should have been held constant when comparing fermentation in two species of yeast, such as the amount of yeast, or of glucose, or the temperature. Three-quarters of students were able to suggest two factors.

Question 4 *(Low Demand)*

(a) Only half of the students were able to perform the simple calculation, 100 – 2.5 – 2.6 = 94.9, to find the percentage of water in the urine sample. The most common error was to subtract from 10 rather than from 100. However, around two-thirds understood that protein was not found in urine because protein molecules in the plasma cannot pass through the filter in the kidney, and so were able to tick this option.

(b) Students were much more successful in choosing the term *partially permeable* to describe the membranes in a dialysis machine than they were, in **(b)(ii)**, at choosing the option stating that, at the end of dialysis, the concentrations of substances in the blood and in the dialysis fluid would be the same.

(c) Over three-quarters were able to give one disadvantage of a kidney transplant, the most common relating to the phenomenon of rejection.

Question 5 *(Low Demand)*

(a) Less than half the students could explain that each colony of bacteria on the agar jelly in the Petri dish was formed by multiplication from an original bacterium. 'Growth' was a common answer which, unless suitably qualified, gained no credit.

(b) While most students were able to count the 18 colonies shown in the diagram of a Petri dish, only just over half of them were able to multiply this figure successfully by 1000 (rather than dividing by 1000) to find the concentration of bacteria in the undiluted culture.

(c) The purpose of sterilising culture media and apparatus before using them is to kill microorganisms so that they cannot multiply and form colonies. While most students were able to give the first of these points, only around one-third could give both.

(d) The reason for growing bacteria at temperatures not higher than 25^{o}C is to make it less likely that pathogens will grow. Many students appear to believe that microorganisms *become* pathogenic at higher temperatures. Less than one-quarter gave the correct answer.

(e) It was disappointing that only just over a half of students knew that repetition of an investigation improves reliability, or checks that the first results were not anomalous. Many students spoilt their answers by adding a variety of other terms they had learned, such as *accuracy, precision, fairness* or *validity*, each of which was inappropriate.

Question 6 *(Standard Demand)*

This was the first of two standard demand questions which were common to the Foundation and Higher Tier papers.

(a) (i) The six peaks in heart rate in the graph, which corresponded with the six running sessions, were obvious to only around two-thirds of students.

(a) (ii) The five squares on the graph which followed the final run indicated a 2½-minute rest period, not a 5-minute period as many thought. Only one-third of students read the scale correctly.

(b) This question differentiated very well between students of different ability, although only about one-twentieth of Foundation Tier students scored full marks. The most common point made was that extra blood flowed to the muscles during exercise in order to supply more oxygen. Better students then related this to the extra energy needed during exercise and also stated that the extra blood flow would supply more glucose and take away more waste, such as carbon dioxide or lactic acid, or even heat. The point most often missed was the increased supply of glucose. One misconception, expressed by many, was that the blood supplied 'energy' *per se*, rather than in the form of glucose. Some students forfeited one mark by not making their answers comparative in order to relate to the *increased* blood flow given in the question.

Question 7 *(Standard Demand)*

This was the second of the two common, standard demand questions.

(a) Very few (around one-twentieth) of Foundation Tier students made the point that using a sealed container in which the air was replaced with pure nitrogen was because biogas was made by *anaerobic respiration*. Some gained a mark for realising that oxygen would have been removed, but many others had the misconception that the bacteria in the cattle manure would be able to make use of the nitrogen gas. Some also thought that the purpose of sealing the jars was to keep out microorganisms.

(b) (i) Two-thirds of students knew that, in addition to methane, carbon dioxide was the other major component of biogas. 'Oxygen' was a common error.

(b) (ii) Less than half of the Foundation Tier students correctly calculated from the data in the table that the proportion of methane in the biogas, when 2.5% fish fat was added, was 0.62.

(b) (iii) Around two-thirds of Foundation Tier students noticed that the addition of fish fat increased the amount of biogas, or of methane, produced. Some did not pay sufficient attention to the column headings in the table and confused the *yield* of methane and the *proportion* of methane in the biogas. Very few were able to make it clear that the proportion of methane barely changed, or increased only slightly, or did not increase above the value obtained with 5% fish fat. A number of students insisted on trying to *explain* the patterns they had described. However, since the question only required a *description*, no marks were available for *explanations*. Students should read the question carefully.

(b) (iv) Only one-fifth of students appreciated that the transport of fish fat over a distance of 110 kilometres was probably not economically viable, or that the environmental gain from the recycling of the organic matter would be counteracted by the environmental harm done by burning fossil fuels during transportation.

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA website

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