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General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Report on the Examination

2012 examination – January 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
- Poor quality handwriting, sometimes to the point of illegibility
- 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
- Not reading data accurately
- Mathematical weakness in calculations
- Limited ability to apply what has been learned to a novel situation
- Poor understanding of certain topics, such as kidney function, the relationship between glycogen and glucose.

Question 1 *(Low Demand)*

This question was well answered by most students.

(a) Part (i) proved to be the most challenging section of this question, with just over a half of students knowing that the blood vessel surrounding an alveolus was a capillary rather than an artery or a vein. However, nearly all knew that gases cross the wall of the alveolus by diffusion and that there was more oxygen in inhaled air than in exhaled and more carbon dioxide in the exhaled.

(b) Nearly all knew that oxygen was carried in the blood mainly in the red blood cells and nearly all recognised haemoglobin as the chemical with which the oxygen combined.

Question 2 *(Low Demand)*

(a) There was much confusion about whether breathing, gas exchange or respiration was responsible for heat production in an industrial fermenter, but the vast majority appreciated that temperatures in excess of 45 °C would have killed the *Penicillium* and that the rotating paddles mixed the *Penicillium* with the nutrients.

(b) Nearly three-quarters of students were able to read figures from the graph correctly and nearly all recognised that the steep, upward-rising part of the *Penicillium* growth curve was the region that represented the fastest rate of growth.

Question 3 *(Low Demand)*

(a) Most students were able to link the three given aseptic precautions to the correct reasons for their use.

(b) Only about a half correctly selected the most isolated, round colony on the Petri dish as the one most likely to contain just one species of bacterium and, as anticipated, fewer still could adequately explain their choice. An unexpected, incorrect response was that the colony selected was the same shape and size as the inoculating loop!

(c) It was disappointing that only a half of the students recognised that carbohydrate in the growth medium would be the main energy source for the bacteria. In part (ii), a similar proportion knew that lactose was the substance in milk fermented by the bacteria *and* that the product was acidic.

Question 4 *(Low Demand)*

(a) **(i)** Many students ignored the data and sought a *purpose* for not removing albumin from the blood during dialysis rather than the *cause* – its inability to pass through the pores in the dialysis membrane because it was too big. Many others stated *either* that the albumin was a big molecule *or* that it could not pass through the membrane – to include both of these was a rarity.

(a) **(ii)** Less than a quarter of students realised that *water* was the main substance removed from the blood by dialysis.

(a) **(iii)** Most recognised the term *partially permeable* as applicable to the dialysis membrane.

(b) The majority of students scored one mark rather than two because they made two points relating to just one aspect – rejection. In addition, some answers were rather vague.

Question 5 *(Low Demand)*

(a) Most students recognised the term *transpiration* as the process by which plants lose water vapour.

(b) **(i)** Just over one-third were successful in calculating the number of stomata per mm^2 of leaf surface.

(b) **(ii)** The answer in part (ii) was dependent on that already given in (i) – even if that had been incorrect. Just over half the students were successful here.

(b) **(iii)** Most students were able to make at least one valid point relating a low number of stomata to adaptation to living in hot, dry conditions; fewer were able to relate this to a reduction in the loss of water from the leaf.

Question 6 *(Standard Demand)*

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

(a) Although a majority of students knew that yeast produced carbon dioxide, a substantial minority suggested other gases, such as oxygen, methane or nitrogen. And, although two-thirds knew that either 'fermentation' (the favourite response) or respiration produced the gas, some students were obviously seeking the opportunity to use the term 'biogenesis' in one of their answers and this seemed as good a place as any!

(b) This was a high-scoring question with most students recognising that the highest gas production, which occurred at 30 °C, provided evidence that this was the best temperature.

(c) A large proportion of students understood that repetition was the thing to do in order to improve the reliability of the investigation, but far fewer were able to correlate this with the obtaining of similar results each time. Many were keen to calculate an average and also wrote about the detection or removal of anomalies rather than stressing that the *absence* of such anomalies would have been an indicator of reliability.

(d) Two-thirds of the students scored no marks in this section as they insisted on writing about how accurate results could have been obtained (e.g. with better instrumentation) rather than assessing whether the value stated for the best temperature was an accurate one. Some gave answers that were partially correct – suggesting the use of more temperature values – but better students stressed that these values should be clustered around 30 °C, and the best stated that temperatures separated by smaller intervals should have been used – e.g. just 1 or 2 degrees apart. Those who stated, 'Do it again at 28, 30 and 32 °C,' scored full marks for a succinct, precise answer.

Question 7 *(Standard Demand)*

This was the second of two common questions.

(a) This was a straightforward question asking for a comparison of heart rate patterns of two people displayed in the form of a graph. Inaccuracy of expression meant that many students did not score as well as they might have: for example, a description for one of the two people without a comparison with the other did not address the question. Thus, to state that the person with the muscle disease experienced a very high heart rate in the first few minutes of exercise was not mark-worthy whereas, to state that this was *higher* than the healthy person, was. The most successful students worked sequentially through the graph making comparative points. Some students felt they needed to *explain* the differences in heart rate despite the question asking only for a *description*. Students who quoted numerical values from the graph were often better able to make their points unambiguously.

(b) **(i)** Most students knew that, in addition to glucose, *oxygen* had to be transported to the muscles at a higher rate during exercise.

(b) **(ii)** Despite the difference between the two people being stated as in their ability to store glycogen in the muscles, many students insisted that there were differences in the ability to transport oxygen as well, with some even thinking that energy could be extracted from the oxygen if glycogen were unavailable. Only better students understood that glycogen was able to be interconverted with glucose and hence, in the absence of glycogen, there was greater dependency on glucose being supplied, via the blood, to enable the same amount of energy release to power the exercise. Many insisted, incorrectly, that there would have been a difference between the two people in the balance between aerobic and anaerobic respiration. Other errors included glycogen transport by the blood and irrelevant references to breathing, lactic acid production and oxygen debt.

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