



General Certificate of Secondary Education

Biology 4411

BLY3F Unit Biology 3

Report on the Examination

2011 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
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 from a graph
Mathematical weakness in calculations
Limited ability to apply what has been learned to a novel situation
Poor understanding of certain topics, such as gaseous exchange, kidney function, absorption from the intestine, diffusion and active transport.

Question 1 (Low Demand)

This question was well answered by most candidates.

- a) Although most knew that carbon dioxide was the gas that made bread rise, 'oxygen' was a common incorrect answer in part (i). Similarly, most knew that fermentation was the process that produced the gas.
- b) It was surprising that the highest figure, at 25°C, was not always selected as the fastest rate in this section. The two extremes, and 30°C, were common incorrect responses.

Question 2 (Low Demand)

- a) Most recognised that the structure labelled on the diagram of a villus was a capillary. However, many thought that the villi absorbed food by 'osmosis' rather than by diffusion.
- b) The villi were attributed to various organs on the diagram of the digestive system, the liver and pancreas proving to be strong distracters, although around three quarters of candidates correctly assigned them to the small intestine. Less than half of the candidates knew that the villi helped in the absorption of digested food or could suggest that they provided a large surface area.

Question 3 (Low Demand)

- a) Nearly all candidates successfully read the concentration of oxygen from the bar graph as being 18 units and around three quarters knew that the blood vessel carrying blood from the lungs to the heart would be the one with the highest concentration of oxygen.
- b) In this section it was evident that nearly all knew that oxygen was carried by the red blood cells and in combination with haemoglobin.

Question 4 (Low Demand)

- a) Nearly all candidates chose wind and temperature as the two variables which were changed in the investigation using the potometer, although 'weather' was a common answer which examiners considered to be too vague. Less than half of the candidates

appreciated that the same plant cutting should be used for each measurement as different cuttings would be of different sizes or have different numbers of leaves which would alter the rate of water uptake.

- b) In relating the 3 lines on the graph to the 3 experimental conditions, the most common error was to give the reverse answer – with just over half the candidates answering this section correctly.
- c) Less than two-thirds opted for transpiration as the process, by which water was lost from plant leaves, 'respiration' proving to be the stronger of the two distracters.

Question 5 (Low Demand)

- a) Relatively few candidates were able to relate the drinking of water to a decrease in mineral ion concentration in the urine, or the eating of salty food to their increase. It was evident that there was widespread misunderstanding of the role of the kidneys in maintaining the ion concentration of the body.
- b) There was more success in this section and the majority were able to select at least one piece of evidence from the table in support of treating elderly patients by giving them a kidney transplant.

Question 6 (Low Demand)

- a) Candidates were very successful in linking the three parts of the fermenter – air pump, filter and rotating paddles – to their correct functions.
- b) (i) While most appreciated from the bar graph that glucose enhanced the growth of the *Fusarium*, only a small proportion of candidates were able to make appropriate and accurate use of figures from the graph.
- b) (ii) relatively few could suggest that glucose might have had this effect since it was a source of energy (or could be used in respiration), or that it could act as a source of materials for growth.
- c) Candidates were fairly evenly divided between choosing either calcium or magnesium as the ion most important for the growth of the *Fusarium*. Careful reading of the question was required in order to select that omission of magnesium had resulted in least growth and hence this was the most important ion.
- d) Just over half the candidates knew that *Fusarium* was usually grown to make mycoprotein (rather than alcohol or biogas).

Question 7 (Standard Demand)

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

- a) While a very substantial majority of candidates were able to select the brain as the organ whose blood flow did not change with varying levels of exercise, rather fewer were able to work out that the skin had the greatest reduction in blood flow in heavy compared to light exercise. Less than a quarter of Foundation Tier candidates were able to calculate

that the heart muscle took 1/25 of the total blood flowing around the body during heavy exercise.

- b) Hardly any Foundation Tier candidates were able to suggest **two** ways in which the body increases the flow of blood through the skeletal muscles during exercise, although approximately one-third could think of **one** way. The methods suggested usually related to an increased heart rate and sometimes to a description of vasodilation – although the latter was often spoiled by imprecision, e.g. ‘widening of blood vessels’ or ‘dilation of capillaries’ were not credited by examiners. Many thought, incorrectly, that an increased breathing rate would help with blood flow.
- c) Candidates found this section very difficult at this level. Only a few knew that carbon dioxide was a by-product of respiration, and still fewer related the increase in carbon dioxide to an increased rate of respiration. Hardly any stated that the carbon dioxide would need to diffuse from the muscles into the blood. Many thought, incorrectly, that deeper breathing would draw extra carbon dioxide into the blood from the inhaled air.

Question 8 (Standard Demand)

This was the second of two common questions.

- a) Around two-thirds of candidates appreciated that boiling the milk before using it to make yoghurt would kill any microorganisms already in it. Some used terminology that was too imprecise – boiling does not ‘remove’ or ‘get rid of’ microorganisms.
- b) Only about one-fifth of candidates were able to calculate successfully the rate from the graph. Many were able to select the correct values of 6.0 and 4.5, and probably subtract them, giving ‘1.5’ as a very common answer, with very few dividing by the time taken which was 100 minutes. Hardly any Foundation Tier candidates could suggest a sensible reason for the slowing of the rate towards the end of the investigation – such a running out of ‘food’ or the denaturing of enzymes at the lower pH.
- c) There was a little more success in this section as a number of candidates knew that lactic acid was formed during the production of yoghurt.
- d) Less than half of candidates knew that, in school laboratories, bacteria should not be grown at temperatures above 25°C and the reasons given for incubation at lower temperatures often owed more to science fiction (the bacteria ‘taking over the school’) than to the scientific fact that pathogens would grow better at 35°C. A common misconception was that yoghurt-producing bacteria would *become* pathogenic, possibly due to a mutation induced by the higher temperatures.

Mark Ranges and Award of Grades

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