OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL AS LEVEL BIOLOGY

(9610) BL02 Biological systems and disease

Report on the examination

June 2023

REPORT ON EXAMINATION: INTERNATIONAL AS LEVEL BIOLOGY 9610 BL02 JUNE 2023

Many students produced excellent responses to this paper while others found it challenging. There was no evidence that students were unable to complete the whole script within the time allowed.

The students found some command verbs easier to deal with than others. In general, the command verbs give, name and state resulted in correct answers. The more unusual command verb, predict (03.1) was also answered well. Many students scored well in questions using the command verb describe when it applied to a familiar context such as atheroma formation (03.6). However, when describe was used in the context of an unfamiliar application (04.3) or in relation to trends in data (03.3) students handled it less well. As expected, students found questions using explain (02.3) and evaluate (06.3) more difficult. Interestingly, students found questions asking them to give advantages and disadvantages more accessible than those asking them to evaluate, despite testing a similar skill.

Some students found it difficult to identify the appropriate data in tables (01.4) or graphs (06.3), in some cases not using the data at all (01.4). However, in other questions they discussed far more than was needed (06.3).

Maths questions were generally handled well, with most students able to correctly calculate radius (04.2). However, a surprising number were unable to calculate percentage change correctly (06.6)

Questions on the required practicals produced variable responses. Students were very familiar with possible errors in the set-up of a potometer (05.4) and the reasons for selecting a large sample size (06.1). However, fewer were confident on assigning subjects to study groups at random (06.2).

BL02 ends with two questions requiring continuous prose. In general, students described binary fission very clearly (07.1). In question 07.2 the students were asked to relate the structure of an antibody to its function. Whilst there was clear evidence that the students knew the structure of an antibody, they found it difficult to make the link between structure and function.

QUESTION 01

This question considered the digestion of starch in different parts of the digestive system. It included some straightforward starter questions and progressed to some more challenging parts.

01.1 A straightforward opening question with most students correctly naming maltose. The most common incorrect answer was glucose, given by about 20% of students.

01.2 Most students scored this mark. Few students gave an incorrect answer, although when they did it was often from reading the y-axis (8.3).

01.3 Again, the vast majority of students scored this mark. Most favoured temperature, although concentration of enzyme and concentration of substrate were both seen frequently. Many of the students that did not score were penalised for using the vague term ‘amount’ rather than the correct term concentration (or volume).

01.4 As expected, this question proved more challenging than the previous three parts. However, most students (around 90%) scored at least 1 mark with around 30% scoring 2 or 3 marks. All the marking points were seen but the idea that the time in the mouth was too short for complete digestion was twice as common as the other three. There were some relatively common misconceptions including that amylase is secreted in/into the stomach and that the enzyme itself has a pH. Some students simply copied or rephrased data from the table with no attempt to explain, whilst others ignored the table and discussed surface area for digestion.

01.5 Around 80% of students scored 1 or both marks. However, many were unable to give the precise location of maltase. Again, a number of students suggested that maltase is secreted in the stomach.

01.6 This question asked for the advantage of the low pH in the stomach. Some students suggested that denaturing amylase was an advantage. However around 75% of students scored one or two marks, with

twice as many knowing that the acid kills pathogens as those including the idea of the optimum pH for protease.

QUESTION 02

The structure of HIV and the drugs used to inhibit viral enzymes was considered in this question.

02.1 Students scored well on the structure of HIV. The majority correctly identified RNA..

02.2 Again, this question was well answered. The majority of students identified reverse transcriptase. If they did make a mistake, it was most likely to be about protease. The enzyme integrase was often misspelt as intergrase.

02.3 The students found this question challenging with less than 5% scoring all three marks. Many did not use the clues in the stem of the question, so did not talk about mutation and how this could change the shape of the active site. Some did not appreciate the idea that inhibiting one enzyme would prevent HIV from replicating.

02.4 Many students incorrectly cited herd immunity as a reason for developing a vaccine for HIV. All marking points were seen, however the idea of preventing infection was by far the most common.

QUESTION 03

This question presented data concerning CHD.

03.1 Students handled the use of the more unusual command verb 'predict' quite well. Some did try to explain but the 1-mark tariff should have alerted them to this being an unlikely requirement.

03.2 A surprising number of students struggled with this question. Some suggested that 100,000 indicated a large sample despite the original sample starting at 86,000. The majority of those who scored the mark did so for the idea of allowing comparison rather than the idea that group sizes could vary.

03.3 Disappointingly few students scored this one mark. In most cases this was because they simply stated an increase, rather than using the data to notice an increase in all three groups.

03.4 The students found this question accessible, with the vast majority getting both marks, usually for the idea of a large sample and the use of only women. All other marking points were seen although around 10 times less. A small number of students did state that the sample size was too small at 86,000 which suggests that they did not look carefully at the data.

03.5 More than half of students failed to score on this question. In many cases they referred to fat rather than saturated fat or cholesterol. Despite being contrary to the graph in Figure 4, a number of students stated that servings of high fat dairy decreased whilst the servings of red meat increased.

03.6 Overall, this question was well answered with around 90% scoring at least one mark. The vast majority knew that atheroma involved fatty deposits. Many also knew this led to a blockage in the coronary artery. However, fewer were able to correctly identify where the fatty deposits formed. Even fewer gained the mark for the idea that reduced oxygen to the heart muscle is a problem.

QUESTION 04

This question focused on plant viruses.

04.1 Students scored well on this question. The vast majority stated a vector or indeed named aphids.

04.2 Again, most students scored well on this maths question. A common mistake involved stating radius rather than diameter for which the students gained two out of the three marks.

04.3 Despite this question being set in the context of TMV movement many students saw the phrase symplastic pathway and described the movement of water. Students that scored were equally likely to gain each marking point. It was pleasing to see students using the correct term plasmodesmata, despite this not being stated in the specification.

04.4 Students did very well with this question about curled leaves and the effect on growth, with most scoring two or three marks. Almost all identified the decrease in photosynthesis. The students that scored two marks generally missed out the idea that there would be less production of sugar/protein/starch/biomass. Very few students considered stomata.

QUESTION 05

Centred on required practical 6 about transpiration.

05.1 This question proved difficult for a surprising number of students. Some answers were vague, suggesting the plastic bag would prevent water loss without identifying where from, showing a lack of understanding about what the balance would measure.

05.2 Many students correctly identified that the two methods would produce values with different units. Far fewer were able to give a second reason. The idea that the potometer only gives an estimate of transpiration rate was frequently quoted.

05.3 Most students were able to identify that the rate of transpiration is proportional to the rate of water uptake. Some thought that the symbol meant equal to whilst others tried to explain.

05.4 Around a third of students scored one mark on this question with another third scoring 2 marks. The most common marking point was the idea of poor setup of the potometer with several students giving two ways in which the potometer was set up badly (so only scoring 1 mark). This suggests that they were relying on learned response rather than looking at the experiment in the question. Those that did score 2 marks usually mentioned the leafy shoot and whole plant were different sizes.

05.5 Most students were able to identify that an increase in light intensity would result in an increase in transpiration. Fewer were able to identify the increased stomatal opening or increased rate of photosynthesis. A few students suggested that transpiration rate increased because the water was needed for photosynthesis. Very few put forward the idea of opening the stomata to let more CO_2 in. Students should be reminded to look carefully at the position of the letters on the graph, as point B is clearly before the line reaches a plateau.

5.6 Around a quarter of students understood the idea that once all the stomata were open, the rate of water uptake would plateau and so gained this mark. Many incorrect answers quoted the idea of limiting factors or that all the water in the potometer had been used up.

QUESTION 06

This basis of this question was required practical 5, the effect of a variable in heart rate.

06.1 The majority of students scored one mark, generally for the idea of a large sample being representative. The other marking points were seen much less often. Common mistakes included not qualifying the mean or the idea that anomalous data can simply be ignored.

06.2 This was generally well answered with most students opting for the idea of randomly assigning people to groups. A smaller number of students described the idea of matching. A few students felt that the old people in the study would not be able to cope with high intensity training and so should be put in the low intensity group.

06.3 Some students struggled with this question. However, around 2/3 scored one or two marks. A very small number scored all three as the idea that heart rate is not the only measure of fitness proved elusive. Most

students identified the idea of overlapping error bars. However, a number went on to lose this marking point because they stated that this meant the data was not significant.

Others simply looked at the numbers and decided as the difference was not a large number, it must not be significant. Further work on graphs and statistics might be beneficial. Many students wrote the phrase 'correlation is not causation' even though it is not relevant here. Some students missed the first marking point because they only looked at the data at rest or during exercise but not both. Quite a few students attached additional pages, invariably because they compared both high and low intensity training with each other and with before training (which was more than the question asked them to do).

06.4 Most students correctly quoted the equation CO = SV x HR. However, only around a third were able to explain that to keep cardiac output constant when heart rate decreases stroke volume must increase. Some students did not get this marking point because they did not look at Figure 11 and so described heart rate increasing. Surprisingly, a number of students correctly quoted the equation then stated that SV must stay constant to keep CO constant - suggesting that they do not understand the relationship.

06.5 Just under half the students scored one or two marks on this question. Common omissions included no mention of muscles or lacking the idea that more oxygen would be available. Some answers seemed to suggest that respiration did not occur at all until exercise. There were also some suggestions that sudden exercise would bring on a heart attack.

06.6 A surprising number of students were unable to calculate the percentage change in the student's heart rate. Errors resulting in one mark were usually for misreading values from the graph.

06.7 This question was answered well with around a third of students scoring each of 1, 2 or 3 marks. The most common correct answers were the idea of heart rate increased (in support) and only one subject (against). Again, generic answers of 'correlation is not causation' and the study was too short appeared, even though they are not relevant to the question.

QUESTION 07

The final question consisted of 2 extended answers. One about binary fission and one about the structure and function of antibodies.

07.1 The question about binary fission was generally well answered despite a small number of students mistakenly describing mitosis. A surprising number of students described both binary fission and conjugation. The most common marking point was to identify binary fission. Next most popular was DNA replication however the number scoring this would have been markedly reduced had the idea of circular DNA been needed. There does seem to be some confusion between the bacterial chromosome and plasmids. Few students mentioned the idea of an increase in the volume of cytoplasm. There was also some confusion about the cell membrane invaginating.

07.2 Although the full range of scores was seen, this question was less well answered than 07.1. All marking points were seen, however the ideas antibodies being complementary to one antigen and having two binding sites were by far the most common. The idea of the binding site having a specific shape and this being due to different amino acid sequences was only seen in around 20% of answers. Several students described heavy and light chains in some detail. Some students provided diagrams, but these were largely unlabelled or incorrectly labelled, so few added to their score this way. Pleasingly only a small number mistakenly identified the binding site as an active site.

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