OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL AS LEVEL BIOLOGY

(9610) BL02

Report on the examination

June 2022

REPORT ON EXAMINATION: INTERNATIONAL AS LEVEL BIOLOGY 9610 UNIT BL02 JUNE 2022

The paper produced a range of marks from 1 to 69 (out of 75), the highest mark being a few marks higher than in January 2022. Although correct responses were seen in all parts of all questions, many students struggled to express their ideas in clearly in a concise way including the correct scientific terms . This is reflected in that the mean score on this paper was less than half marks. Students are reminded to read the command words in questions carefully and follow what is required.

Topics in which students demonstrated good knowledge included the structure and function of the aorta, the mass flow hypothesis for the movement of sucrose in plants and horizontal gene transmission in bacteria. Knowledge was less secure on how HIV replicates after entering a human cell and in the formation of tissue fluid. There was a wide range of performance on the questions related to the assessment of practical skills. Overall, the performance on mathematically based questions was low. Many students failed to gain any marks; this was particularly evident in questions 01.4, 02.3, 05.2 and 05.3.

QUESTION 01

In 01.1 most students correctly referred to the replication of circular DNA and of plasmids. Despite this, only around a third of students went on to include more details about binary fission such as the division of the cytoplasm or the extension of the cell membrane inwards. Very few students referred to the resulting daughter cells receiving a single copy of the circular DNA and variable numbers of plasmids.

Question 01.2 was answered reasonably well with just over 60% of students gaining the one mark for mutation.

For question 01.3 many students correctly interpreted Figure 1 and described the transfer of a plasmid or gene for resistance by conjugation. Unfortunately, only around 30% of students realised that as the diagram shows transfer between two different species, it represents horizontal gene transmission.

Students did not score well on question 01.4 with less than 20% gaining the two marks. Although many students realised that there would be 9 divisions during the 3-hour period, they didn’t seem to understand what to do next in the calculation with a range of errors observed. Around 40% of responses correctly worked out that there would be 512 resistant bacteria for one species but didn’t realise that this figure must then be doubled to reach the final answer.

QUESTION 02

Question 02.1 was answered very well with over 85% of students gaining the two marks available. Many students interpreted the context correctly and stated factors such as light intensity and temperature. Some answers incorrectly stated wind speed which was the independent variable in this investigation.

Close to 75% of students gained at least one mark in question 02.2 Many students realised the need for the apparatus being airtight but only the better responses went beyond this point. The question asked for precautions that should have been taken when setting up a potometer. Despite this, weaker responses typically named factors that should be kept constant.

Question 02.3 proved to be more problematic for students with just over 20% of students gaining full marks for this calculation. Many students incorrectly used the diameter of the capillary tube, rather than

the radius. Others used the rate of water uptake per hour rather than dividing this figure by 12 to find the water uptake for 5 minutes. In addition, many students did not follow the instruction of giving the answer to 2 significant figures.

02.4 proved to be an excellent discriminator. Approximately two thirds of responses gained at least one mark but only around 20% of these gained all three marking points. Many students appreciated that having the fan positioned close to the plant shoot would result in a higher rate of transpiration. Weaker responses often did no more than describe the relationship between the distance between the plant shoot and the fan and rate of water uptake. Some students also had difficulty in applying their knowledge of transpiration to this unfamiliar context. They seemed to write all they knew about cohesion-tension, without linking this knowledge directly to the data in Table 1.

Just under 20% of students gained the one mark for question 02.5 and correctly stated that the total surface area of the leaves must be measured in order to compare results. There were many vague answers such as the size of the plant shoot, the number of leaves or the distance moved by the air bubble.

QUESTION 03

Just over half of all responses gained the one mark for correctly stating that the fluid would be blood plasma. Where students did not gain the mark, it was usually for not being specific enough eg, just stating ‘blood’ or for incorrectly naming components of blood such as red blood cells or large proteins.

As with the previous question, 03.2 was not answered well with only a third of students gaining at least one mark. Many students either made statements that were not comparative or showed a misunderstanding between the components of tissue fluid and blood plasma.

Question 03.3 was an excellent discriminator. Just under two thirds of students gained at least one mark and this was typically for describing that the pressure at the venous end of the capillary would be lower. Approximately 25% of responses gained three or four marks and within these there were many excellent explanations of how some tissue fluid returns to the circulatory system at the venous end of the capillary. A marking point that was commonly missed by students was the linking of the lower water potential to the presence of the large plasma proteins within the blood. As a general point, students failed to gain marks by using inaccurate language, such as ‘tissue fluid’ being returned to the capillary.

QUESTION 04

Question 04.1 was answered reasonably well with just over 50% of students gaining at least two marks. Most students identified the root tip as the region or area where mitosis was taking place. Some students described mitosis as being the cell cycle or stated that “most stages of the cell cycle occur at the tip” without appreciating that all the stages of the cell cycle would occur there. Another misunderstanding was observed in responses that stated that meiosis takes place in root cells. Not as many students seemed to understand the reason for adding a stain and often thought it was to stain the organelles, the nucleus or the cell. Only the better responses described the purpose of the stain to distinguish the chromosomes. For the final part of this question, many students had the correct idea of pressing downwards to produce a single layer of cells although a good number of responses fell short by not adding that light could pass through. Misconceptions observed included: to remove air bubbles or to break open the cells to release the contents.

04.2 was not answered well with less than a third of responses gaining one mark or more. Many students just seemed to repeat aspects of the previous question eg “ensure that the cells are stained

well enough". It also appeared that many students did not read the wording of this question carefully enough and gave answers either not specifically related to the counting of cells or instead gave points relating to general safety precautions when conducting the experiment. When marks were given, it was usually for describing the need to observe a large number of fields of view to gain a representative sample of cells.

Question 04.3 was the lowest scoring question on the paper with less than 10% of students gaining the one mark available. Most students just gave a description of anaphase but did not include any description of the appearance of the cell during this stage of mitosis.

The calculation in question 04.4 was answered reasonably well with over half of the responses gaining both marks. Some students gave the correct answer but in hours rather than minutes and therefore gained just one mark.

For question 04.5 just under two thirds of students gained one mark. In was not uncommon to see responses that simply repeated the stem of the question and stated that a different root tip had been used. Many other responses suggested the differences would be due to the size of the tip or the plant. Some responses blamed the students for miscounting or the poor quality of the microscope. Only the better responses gave suitable ideas about genetic variation, differing named environmental factors or the role of chance.

QUESTION 05

Question 05.1 was answered well with just over 80% of students gaining at least one mark. Many responses referred to a thick wall to withstand the high pressure or to prevent the aorta from bursting. There were also many good descriptions of elastic tissue in expanding and recoiling to maintain the pressure.

Considering that 05.2 is a standard question type it was not answered very well with only a third of responses gaining the one mark. Although many students correctly identified the length of a single cardiac cycle, they then had difficulties in converting this figure into a rate eg by erroneously multiplying the length of the cycle by 60. Students should remember to check their answers against their everyday experience. It is possible that by doing this some might recognise an unlikely figure as resulting from an error in their calculation.

Students found question 05.3 challenging with only a very small proportion of responses gaining the two marks. The question also had by far the highest number of unattempted responses. A wide range of errors were observed for this calculation but the most common was to just multiply the length of one ventricular contraction by 24 hours. Many students did not read the times correctly from Figure 4 but did show evidence of the correct method, so were awarded one mark. A number of students also did not follow the instruction of giving the answer to the nearest hour.

In question 05.4 students had to use the information from Figures 4 and 5 to explain what causes blood to leave the ventricle at the point shown. Many students just described the general passage of blood through the heart without providing any explanation. Just less than two thirds of responses gained one mark and this was usually for linking the contraction of the left ventricle to the high pressure. Only the better responses went a stage further and explained that the high pressure within the ventricle causes the closing of the atrioventricular valve and the opening of the semilunar valve.

Question 05.5 required students to understand that blood would flow from higher pressure (in the left ventricle) to lower pressure (in the right ventricle). Just over 50% of students understood this and those who were awarded this marking point usually referred to the mixing of oxygenated and deoxygenated

blood. Many students then went on to simply repeat the wording of the question, so could not be awarded the second marking point.

QUESTION 06

This question discriminated well but did prove to be challenging despite it testing recall (AO1) of topic 3.2.4, 'HIV as an example of a human disease caused by a virus'. Just under 50% of responses gained no marks. The mark scheme required students to show understanding of key points about HIV replication. Unfortunately, there were many responses that were too vague and lacking in specific details eg just stating that HIV replicates in cells and then spreads through the body. There were also many responses that either confused the roles of the HIV enzymes or did not include the names of the enzymes within the answer. It was very common for students to not mention the role of DNA polymerase and many described the viral RNA pairing with a single strand of DNA to become double-stranded DNA. Some responses showed significant errors in understanding eg referring to HIV dividing by mitosis or binary fission.

Question 06.2 also proved to be a good discriminator with just under 20% of students awarded all three marking points. Although many students picked up on the idea that the shape of the receptors would be different, few went on to explain in more detail the effect of the mutation on these receptor proteins.

QUESTION 07

Question 07.1 was answered reasonably well with just under 60% of students gaining one or two marks. Many of these responses explained that a tumour would result from uncontrolled cell division. Despite this, only the better responses included a statement about the effect a mutation would have on the function of a tumour suppressor gene. For some students there was a confusion between proto-oncogenes and tumour suppressor genes.

In 07.2 around 75% of students correctly identified the statement that was not true for malignant tumours.

Students answered question 07.3 very well with around 70% of responses gaining one mark for correctly describing how the number of males and females with lung cancer changed. A further 20% of students went on to describe the data in more detail and also used information from the graph to illustrate the answer.

Fewer students were able to correctly interpret the data in question 07.4 with only 15% of responses gaining all three marking points. Many students simply repeated the data in the table without any attempt to answer the question. Other responses made no reference to SE and just stated that the survival rate for females was significantly higher because the mean rate was higher than males for each of the years. Some students just compared the size of the SE values as a basis for judging whether differences were significant or not eg at 1 year there is no significant difference because the SE values are the same for both males and females.

QUESTION 08

Both questions 08.1 and 08.2 proved to be excellent discriminators.

In 08.1 many students gained at least one mark and almost 20% gained maximum marks, displaying impressive use of terminology and understanding of this topic. Although many students correctly described the action of amylase, it was common to see responses that simply described starch being broken down directly into glucose by amylase. It was good to see reference to hydrolysis in many responses, however, only a small proportion of students included the action of digestive enzymes on

glycosidic bonds. Some responses included irrelevant details such as the role of bile or described the digestion of proteins or lipids. The second part of this question, which involved describing the absorption of carbohydrate digestion, was usually done in less detail. A large number of students just described glucose moving into the blood but without any mention of the mechanisms involved. Fortunately, many students gained a mark for mentioning the role of carrier or channel proteins for taking glucose into epithelial cells. Where students included active transport of sodium ions into the blood (from epithelial cells) very few went on to describe the importance of this.

Question 08.2 was answered slightly better than 08.1 with almost 25% of students gaining the maximum marks. Again, there were some excellent responses which included detailed explanations. This was particularly evident in the parts on the loading of sucrose from the source into the phloem via companion cells. The better responses also went into some detail to explain how co-transport is involved in this process. Although many students correctly described how the pressure gradient between the source and the sink is established, fewer went on to refer to the mass flow of sucrose towards the sink. In a similar way, not many students described the unloading of sucrose at the sinks and what the sucrose may be used for. For responses that achieved lower marks a range of different errors were seen. Some described how sucrose is produced in the sinks, others described the transport of sucrose in the xylem and involving cohesion tension.

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