# GCE AS EXAMINERS' REPORTS

## BIOLOGY
## AS

## SUMMER 2022

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# BIOLOGY

## GCE AS

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## COMPONENT 1: BASIC BIOCHEMISTRY AND CELL ORGANISAION

### General Comments

The overall standard of the candidates was very good with some excellent responses seen. Most questions were accessible to all candidates and the number of questions not attempted was extremely low. The facility factor for most questions was high, but the rigour of the paper was deemed to be similar to those set previously.

### Comments on individual questions/sections

Q.1 This question required candidates to demonstrate a knowledge and understanding of the biochemistry of amino acid structure and enzyme inhibitors.

(a) (b) These were easy opening, straight recall questions and most candidates were able to correctly identify the functional groups and the element found in some amino acids as sulfur

(c) This question was well answered on the whole with most candidates able to predict that the concentration of threonine would increase due to end-product inhibition of threonine deaminase

(d) Many candidates gave detailed and accurate descriptions and explanations in this part and gained all three marks available. However, some candidates lost marks for not linking the variables when describing the trend in the results. Also, it was quite common for candidates to state that the rate was decreasing when the line levelled off rather than that the rate became constant. In part (ii) candidates were typically able to access all the marks available, if they realised that isoleucine was acting as a competitive inhibitor. I was very pleased with the detailed responses given by many candidates.

Q.2 This question examined the candidates' knowledge and understanding of osmosis and was a practical-based question.

(a) The majority of candidates were able to correctly calculate the % change in mass for the potato cylinder in the 0.8 mol $dm^{-3}$ NaCl solution and were able to explain the need to calculate a percentage change in this investigation. In part (iii), the graph was generally well constructed by most candidates but some marks were lost for misplaced plots or for inappropriate scales, usually on the y-axis. Ample grid space was provided on the paper but some candidates chose to compress their scales making it difficult to identify the exact coordinates for some of the plots. Lines were generally well drawn with most candidates opting for either lines of best fit or joining the plots, both of which were appropriate in this case. Candidates gave clear and accurate descriptions of the relationship between the concentration of the bathing NaCl solution and the percentage change in mass in part (iv) and many gained all four marks available. Part (v) proved more challenging but many candidates correctly stated that the solute potential of the bathing solution would be required in order to determine the water potential of the potato tissue. In parts (vi) and (vii) a number of candidates confused reliability and accuracy; however, the majority were able to give logical suggestions in both parts.

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(b) This part of the question was very well answered, and it was pleasing that most candidates were able to access the marks and gave clear explanations for their choice of potato variety.

Q.3 This question tested the candidates' knowledge and understanding of the structure and function of cell organelles and how organelles work together to carry out cellular activities.

(a) Many candidates gave detailed and logical accounts of the functioning of the organelles in the diagram with many gaining the full five marks available.

(b) This was well answered with candidates clearly having benefitted from exposure to past examples of this type of question in their preparation for the exam. Many candidates were able to correctly identify the organelles as mitochondria despite the atypical appearance in the images suggesting that candidates had been able to view a wide range of images during their studies.

Q.4 This question required candidates to demonstrate a knowledge and understanding of cell division.

(a) Most candidates were able to identify the correct stage of meiosis and to give valid reasons for their choice. Good, clear explanations of how meiosis contributes to genetic variation were given by many candidates in part (a) (ii). Most were able to identify a structure in a flower where meiosis occurs although some did suggest the root tip. One can only assume that they did not read the question carefully enough.

(b) This was also well answered by many candidates with several gaining all six marks available across the three sections.

Q.5 This question required candidates to demonstrate a knowledge and understanding of DNA structure and the replication of viruses. This question had the lowest facility factor of all the questions on this paper.

(a) Generally, well answered although several candidates gave answers that did not directly address the question. For example, some candidates referred to host DNA being in a nucleus whereas viral DNA is not. This is not a difference in the DNA but in its location. All the relevant characteristics of the viral DNA are essentially given in the stem of the question and the diagram so this part of the question was testing the candidates' knowledge of the host DNA.

(b) This focussed on viral DNA replication and many very good responses were seen. The commonest error in this part was when candidates seemed to confuse DNA replication and transcription with references to RNA polymerase commonly seen. This may have been due to candidates having been taught RNA virus replication whereas the question was clearly on a DNA virus.

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Q.6 This question assessed the quality of extended response (QER). The best answers fully addressed the three aspects covered in the question. Most candidates managed at least a superficial description of the levels of protein structure and better candidates were able to give very detailed comparisons covering most or all of the indicative content. Better candidates gave highly detailed descriptions of the levels of protein structure. The very best candidates wrote accounts that covered all points of the indicative content thereby accessing the top band of marks. The least well answered part of the QER question was the second section where candidates had to explain how the levels of protein structure are maintained. Here, candidates tended to list the bonds that occur in each level without mentioning the relevant functional groups involved in bonding at that particular level of the structure. The third section (induced fit enzyme action) was particularly well answered and it was clear that candidates had been well prepared on this section of the specification.

**Summary of key points**

Candidates should take care to use scientific vocabulary in their responses and ensure that their answers are detailed enough to access all the mark points available.

When describing relationships between variables on a graph, candidates should ensure they refer to both variables in their answer.

Candidates should take care to use information given in the stem of a question in their answers, if a specific figure or image is referenced in a question, the marks will be directly related to it.

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## COMPONENT 2: BIODIVERSITY AND PHYSIOLOGY OF BODY SYSTEMS

### General Comments

There were many well prepared candidates who demonstrated a secure knowledge and understanding of the material. Some scripts showed candidates had prepared thoroughly and had a strong understanding of the AS material. Responses were clear and used scientific terminology correctly.

### Comments on individual questions/sections

Q.1 Most candidates were well able to define holozoic and saprotrophic. Autotrophs however, proved more difficult. In part c) expression of the answer was not always clear enough to award the mark. Candidates needed to explain that stain would allow more contrast between structures. Calculation of magnification was carried out well in most cases. In part (c)(v) a clear link was needed between the consistency of the food and the strength of muscle contraction linked to the thickness of the gut wall.

Q.2 Most candidates correctly identified the diagram type in (a). However, less were able to explain how it showed relatedness, i.e. the idea of branching and more recent branching, illustrating increased relatedness. In (b) many good answers for binomial naming were seen but less gained full marks as they did not answer the question of why use this instead of the common name. Many responses included 'international language' but what was needed was the idea that the common name could cause confusion or be different in different languages.

In (c) candidates sometimes confused the DNA sequence with the amino acid sequence. Part d) proved difficult for many candidates. Most correct answers gained marking point 1, the number of alleles for a gene. Part (e) was answered well.

Q.3 In (a)(i), the calculation did not prove problematic for most. Where errors were made, candidate had not used the stomatal number given in the question. In (a)(ii), almost all candidates gave excellent accounts of stomatal opening with many gaining full marks. Mostly good answers were seen in (b)(i). However, many could not say why sunken stomata reduced transpiration. An understanding of the air movement not moving the water molecules was needed to gain this mark. Parts (b)(ii) and (iii) were very well answered.

Q.4 Most candidates realised that a dissection requires the use of a knife or scalpel in (a). However, the hazard is that it is sharp which was omitted in several responses. Part (a)(ii) showed that candidates are familiar with the adaptations of the gill filaments. However, few stated that the epithelium was one cell thick or linked it to a short diffusion path. In (b)(ii) some candidates missed out completing the graphs. Reading all parts of the question paper is essential. In (c) candidates needed to clearly explain that increased ventilation would move more water over the gills to get the same volume of oxygen into the blood. Only the better candidates were able to do this.

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Q.5 Some candidates failed to gain the two available marks in (a), as they could not state the independent variable as the distance of the lamp from the plant, and the dependent variable as the distance the water level moved. A few candidates stated the independent variable was the light intensity and that the dependent was the amount of transpiration or the water uptake by the roots. Nearly all candidates could calculate the mean in (b)(i). However in (b)(ii) there were a variety of answers. Some candidates used 300 or 30 as the value of h, instead of 3. Another error in the calculation was that their answer was not divided by 60 to give the rate per minute. To gain credit in (b)(iii) which required candidates to modify the method used, a range of 5 measures of the independent variable were needed, so stating five different wind speeds would suffice.

Q.6 Many strong answers were seen which gave the detail of the electrical control of the cardiac cycle and linked to the ECG trace. Candidates were fluent and thorough in this area. Comparisons of the two traces were often well done, but sometimes direct comparisons were missing. Some candidates tried to link their comparisons to the reasons for the difference, this was not always a successful strategy as the accounts could become confusing. The third area of the QER showed that some candidates really understood the trace and cycle. Many stated that the atria were not functioning correctly and many said atrial fibrillation. The best responses linked the ECG to poor filling and emptying of the atria and ventricles.

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