OXFORD
INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL BIOLOGY

(9610) BL02

Report on the examination

June 2019

REPORT ON EXAMINATION: INTERNATIONAL A-LEVEL BIOLOGY BL02 UNIT 2 JUNE 2019

There were a number of detailed responses across the paper, but students demonstrated particularly good understanding in question four, which linked to required practical 6 – investigating the rate of water uptake using a simple potometer. Other areas in which students performed well included the action of endopeptidases, how mutations prevent the production of functional enzymes and the structure of HIV.

Areas that students found more challenging were: applying knowledge to some of the novel contexts, and in particular questions where students were asked to evaluate statements relating to the results of an investigation. Many students struggled with the questions which tested mathematical skills. There was little evidence of students' understanding of statistics, and many did not demonstrate knowledge at an appropriate level.

Question 1

This question was about the digestion of proteins. **1.1** was answered well, with 65% of responses gaining both marking points. Despite this, only 20% followed this up in question **1.2** by describing how endopeptidases increase the action of exopeptidases. For **1.3**, students had to state the number of peptide bonds present in a polypeptide containing 145 amino acids and only 57% correctly stated 144. There were a number of common mistakes observed, but by far the most frequent was where the total number of amino acids had been halved. A higher proportion achieved the one mark in **1.4**, and this was largely down to the error carried forward from **1.3**. In **1.4**, students had to simply find 25% of their answer from the previous question. Question **1.5** was designed to see if students understood the equation for calculating the DH value. If a protein molecule has been completely hydrolysed, then all the peptides originally present would have been hydrolysed and so a DH value of 100 would be obtained. In this part, 79% of responses gained the one mark.

Question 2

This question was about the movement of organic substances through a plant. In **2.1**, nearly all students were able to identify sucrose as the carbohydrate transported in the plant stem. Around two-thirds of students gained the one mark available in **2.2** for describing the high pressure that would exist in the phloem as a reason for the sap

continuing to flow out from the stylets. Where students didn't achieve this mark, it was usually for referring to a concentration gradient. Only 18% of responses were awarded the two marks in **2.3** and this was because few realised that it took 1.15 h for the sap to travel from the previous aphid position (i.e. from aphid 2 to aphid 3 = 2.40 – 1.25). So 20 cm ÷ 1.15 h = 17.4 cm h^{-1}. Most responses calculated the rate incorrectly as 16.7 cm h^{-1} (40 cm ÷ 2.40 h). The error carried forward meant that a further 45% of students gained the second marking point for the calculation of the mean. **2.4** showed a good spread of marks and a large number of excellent answers. 81% of students achieved at least one mark, with 64% achieving a minimum of two marks. Where marking points were not gained, it was usually for missing any one of the following details: active transport (MP1), the idea of mass transport (MP3) and / or the idea of sugars being removed from the phloem in the sink areas.

Question 3

The first parts of this question were about mutations and the effect on protein structure. In **3.1**, only around half the responses included a reference to base sequence and were therefore awarded the one mark. Students performed well in **3.2**, with over two-thirds of responses gaining at least two marks. In many responses, students didn't quite gain MP4 as they didn't include reference to the shape of the active site changing. The following parts of this question were application, based on the context of a disorder called PKU and its possible treatment using a drug called Kuvan. In **3.3**, most students correctly interpreted the given information and stated that there wouldn't be an accumulation of phenylalanine. Students did less well in **3.4**, with only around 40% of responses gaining the mark. Over half the responses gained at least one mark in **3.5**. There was an even higher number of good answers that did not gain certain points by missing keywords such as active site or complementary. In **3.6**, students had to evaluate the conclusion made by the scientist. It was impressive that the vast majority of students gained at least one mark and this was usually for MP2. Many students went one stage further by pointing out a weakness in the investigation, e.g. that side effects were unknown or that the drug didn't bring the concentration of phenylalanine below 600 units for all patients. The better responses often had a clear division between points that were in support and those that were against the conclusion.

Question 4

This question was about a student investigating transpiration and most parts were answered very well. Many students were able to correctly explain why the joint in the apparatus needed to be sealed (**4.1**) and were able to give at least one reason why the rate of water uptake may not be the same as the rate of transpiration (**4.2**). In **4.2**, many responses had MP1 – 3 but there were very few references to water being used, e.g. in hydrolysis reactions (MP4). Most students correctly suggested the function of the reservoir in returning the air bubble back to the start of the ruler (**4.3**) and the reason for the student taking repeat measurements (**4.4**). Question **4.5** proved to be more problematic for many students. There were various mistakes observed, but most commonly they were for not calculating the area of the circle correctly (e.g. not using the radius) or for not realising that the results in table 2 were for a 20-minute period. Nearly two-thirds of the responses gained both marks in **4.6**. When students did not gain marks for this question it was largely because they just described the results, rather than explaining them. Two-thirds of responses gained one mark in **4.7** for naming environmental conditions that would be different to those in the laboratory. Only a small proportion gained the second mark for providing a brief explanation as to how the named conditions would have affected water uptake.

Question 5

This question was about HIV and drugs used to treat the virus. In **5.1**, nearly two-thirds of students correctly labelled both A and B. **5.2** proved to be problematic for many students, with only a third of responses gaining both marks. Problems occurred when calculating volume or converting between units. Some responses gained one mark for the correct answer not in standard form or in the incorrect order of magnitude. Around 70% of responses gained at least one mark in **5.3**, with all the marking points covered. Unfortunately, for some students, they made the correct point that viruses replicate inside cells but failed to add that the antibiotic would therefore be unable to reach them. In **5.4**, most students grasped the concept that these drugs would work to inhibit or prevent replication of HIV. Despite this, far fewer students were able to apply their knowledge of the HIV enzymes integrase and protease and gain the two other marking points.

Question 6

This question was about the effect of caffeine on human heart rate. Nearly two-thirds of students were able to calculate the difference in mean cardiac output in **6.1**. Some

students misinterpreted the question and either worked out a % increase for the test group or compared the cardiac output between the two groups. For questions **6.2** and **6.3**, many responses only gained one mark. In **6.2**, most responses didn't give much more than state that caffeine would be the only variable. In the responses that gained one mark in **6.3**, it was usually for the idea that body mass or size varies. In **6.4** just over half the responses gained the mark for correctly describing why a control group was used. In **6.5**, relatively few students could name standard error or t-test and suggest why either of these would be an appropriate statistical test for comparing two mean values. In **6.6**, students were presented with a P value of 0.03 and although very few responses stated there is a significant difference in the means, a good number understood that it was below P=0.05. Many students picked up on the small sample size or that the control group showed very little change. For MP6, many responses stated that there could be other factors, but didn't give any examples of named factors such as age or BMI. A good number of responses just described the data in table 3 without linking it to the conclusion. As mentioned in question 3, the better responses gave a clear divide in the points supporting and opposing the conclusion.

Question 7

This question was about investigating cell division in the root tip of a plant. In **7.1**, students had to describe how to make a temporary mount of root tissue in order to observe cells at different stages of the cell cycle. There were some very detailed responses to this question and two-thirds of students gained at least two marks. Marking points 2 and 5 were the most often missed and several responses did not gain MP4 as they incorrectly referred to iodine as the stain. In **7.2**, nearly two-thirds of responses gained the one mark for correctly identifying the start and end of one S-phase. Just under half the responses gained the two marks in **7.3**. Where students did not gain marks, this was usually for incorrect rounding or incorrect use of data from table 4.

Question 8

This question was about vaccinations and the use of ORS to treat cholera. **8.1** elicited some excellent responses which showed detailed recall of the immune response. It was pleasing that over half the responses gained at least 4 marks. Where marks were missed, it was usually for failing to refer to the role of antibodies, e.g. in bringing about agglutination of pathogens or for the idea of herd effect. In **8.2**, many responses focused solely on what an ORS solution contains and did not go on to explain how it would treat

diarrhoea. A slightly higher proportion included the idea of water being absorbed from the lumen by osmosis. Only the very best answers included detailed of co-transport and water potential (MP 2 and 3).

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OXFORD INTERNATIONAL AQA EXAMINATIONS
GREAT CLARENDON STREET, OXFORD, OX2 6DP
UNITED KINGDOM

enquiries@oxfordaqaexams.org.uk
oxfordaqaexams.org.uk