A-LEVEL
BIOLOGY

7402/1: Paper 1
Report on the Examination

7402
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General Introduction to the Autumn Series

This has been another unusual exam series in many ways. Entry patterns have been very different from those normally seen in the summer, and students had a very different experience in preparation for these exams. It is therefore more difficult to make meaningful comparisons between the range of student responses seen in this series and those seen in a normal summer series. The smaller entry also means that there is less evidence available for examiners to comment on.

In this report, senior examiners will summarise the performance of students in this series in a way that is as helpful as possible to teachers preparing future cohorts while taking into account the unusual circumstances and limited evidence available.

Overview of Entry

Just under 600 students took this examination.

Comments on Individual Questions

Question 1

Answers to question 01.1 demonstrated a sound level of knowledge about the induced-fit model of enzyme action. Few answers to question 01.3 successfully demonstrated an appreciation of what the graph in **Figure 1** showed; many students incorrectly explained that the reaction had stopped when the curve plateaued. Answers identifying ADP as the limiting factor in question 01.4 did not achieve a mark because, in testing the effect of Pi concentration on enzyme activity, all substrates would be in excess.

Question 2

Most answers to question 02.1 contained a clear description of the relationship between animal size and the surface area to volume ratio. However, only a few gave a valid reason for this relationship (marking point 2). In question 02.2, many successfully linked knowledge of oxygen availability in water to suggest a relevant advantage for model **A**, although some students who only recalled details of the counter current principle scored no marks. In question 02.3, the information given in **Figure 3** proved to be inaccessible to many, with marks rarely achieved in these answers. The mathematics question, 02.5, discriminated well, but many failed to gain a mark by using an inappropriate number of significant figures.

Question 3

Question 03.1 discriminated well, with answers containing plenty of relevant details in well-constructed accounts about the process of translation. Students commonly failed to gain MP1 because their answers did not state that specific amino acids are carried by tRNAs. Most answers achieved at least some success when asked to apply an understanding of the effect of a mutation on protein structure in question 03.2.

Question 4

Appropriate conventions used for making scientific diagrams were understood well by the vast majority of students. In addition, most students correctly identified the blood vessels shown in

Figure 4, although some commented on a lack of contrast in the image, making it difficult for them to identify these structures. In question 04.3, few students could adequately describe the safety precautions involved in clearing away after a dissection.

Question 5

In question 05.1, some students gave vague or incorrect descriptions of the preparation and ultracentrifugation of a chloroplast suspension. Their knowledge of chloroplast structure was also patchy in question 05.2 and the calculation of a ratio in 05.3 baffled many, so very few achieved marks here. Many successfully applied knowledge of chloroplast structure to explain the reduced growth rate of iron-deficient plants in question 05.4, but relatively few linked a lack of thylakoids either to the absence of chlorophyll or to limited light absorption.

Question 6

Most answers to question 06.1 demonstrated a successful application of appropriate graph-reading skills and students often went on to manipulate numbers using relevant calculations. In question 06.2, many students did not successfully match mitotic division stages to the information shown in **Figure 7**, but the majority of answers demonstrated secure knowledge of both chromosome behaviour and the role of spindle activity in mitosis.

Question 7

In question 07.1, many applied a sound understanding of phagocytosis to successfully explain the cancer treatment. However, those who chose not to use information given in **Figure 8** focused on irrelevant details, such as the acquired immune responses, which did not gain marks. In question 07.5, relevant suggestions for further investigations in testing cancer drugs rarely contained the required explanation of why the suggested investigation should be used.

Question 8

In question 08.1, most students successfully described the structure of a triglyceride, with some failing to gain MP2 by not stating that three water molecules are lost. Few students successfully answered question 08.3. In question 08.4, the successful application of an understanding of trends shown by the data in **Table 6** was achieved fully by only a few students. Many answers made comparisons within each population rather than between the populations, and scored few marks.

Question 9

Students demonstrated a good knowledge of biological molecules in question 09.1, but identifying the elements in RNA was badly done. Hardly any answers showed a correct use of the logarithmic scale in **Figure 11**, so very few answers to question 09.2 achieved 2 marks. Correct answers to question 09.4 were most commonly found in high-scoring scripts.

Question 10

In question 10.1, most students showed good knowledge of DNA structure. This was less true of their descriptions of transport processes across cell-surface membranes in question 10.2. Many students failed to include the relevant information about channel or carrier proteins in their descriptions and often referred incorrectly to movement from high gradient to low gradient. Detail about the co-transport process was not well-known. In question 10.3, a common misconception when considering prokaryote structure was to confuse a bacterial capsule and a viral capsid.

Concluding Remarks

Examiners noted a good range of correct responses to questions requiring extended descriptions of the induced-fit hypothesis, translation, mitosis, DNA structure, transport of substances and comparisons of cell structure. These questions proved to be good discriminators and allowed students to demonstrate what they knew and understood. It also suggested that students, on the whole, were suitably prepared in those topics which are usually delivered in the first year of the two year A-level course. On the other hand, questions testing the acquisition of evaluative skills, or requiring ideas to be linked between different parts of the specification, did not produce anything near the same level of success. Many of the questions testing mathematical skills proved to be difficult, with few students achieving success.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.