AS LEVEL
BIOLOGY

7401/1

Report on the Examination

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General comments

The paper produced a range of marks from 0 to 67 and correct responses were seen in all parts of all questions.

Students scored well on questions testing recall and understanding (Assessment Objective 1). They struggled more, however, with questions testing AO2 and AO3. There was some confusion over command words, such as 'contrast', and often the command word was not obeyed. For example, many students 'described' when asked to 'explain' and vice-versa. Students found the comprehension question incredibly challenging.

Responses showed that some students do not appear to have moved on much from GCSE level. Answers were simplistic, and lacked the correct level of detail and terminology required at this level. Maths skills were also of a low standard, and there was a clear lack of understanding of the statistical tests. With the latter, there was evidence of students being taught alternative statistical tests to those stated on the specification.

Question 1

Students found questions 01.1 and 01.2 accessible, with the majority scoring the marks.

Answering question 01.3 should have involved only simple recall, however only 28% of students scored two marks. When describing the role of DNA helicase, many used very simple language, such as 'unwinds' or 'unzips'. Such terms were not accepted at GCE level. When describing the role of DNA polymerase, the most common mistake was stating that it forms hydrogen bonds between bases. There was also confusion with protein synthesis; many students stated that DNA polymerase forms pre-mRNA.

For question 01.4, 25% of students failed to score any marks, usually because they did not follow the command word and thus failed to give a contrasting statement; for example, 'ATP has ribose, DNA has deoxyribose.' Many thought adenosine is a base.

Question 2

For question 02.1, only 7.6% of students scored two marks. Most students were able to explain the purpose of boiling the agar, though the most common error was to copy the stem and state "so it could be poured". Explaining the purpose of transferring the same volume of liquid culture onto each agar plate was beyond most students. Some did not understand the term 'culture', thinking it just meant food. There were many generic answers, such as "to make it a fair test", "to control variables", and "so only the independent variable affects the dependent variable". The words valid, reliable, accurate and precise were also thrown at the answer.

Question 02.2 was not a difficult maths question; it simply involved multiplying three numbers together. Despite this, only 15.6% of students scored two marks.

For question 02.3, over half of the students were able to access the first marking point, but very few scored the second. There were not any real mistakes with mark point two; it was just omitted.

Question 3

There were no problems with question 03.1; it was well answered.

Question 03.2 asked for the advantages of lipid droplet **and** micelle formation. Students seemed to group both together ('they' or 'it') and give the same advantages. Many students failed to use the diagram to help them. For mark point two, there were lots of answers referring to making digestion easier; easier digestion does not equate to faster digestion. Only 3.7% of students scored all three marks.

As with 03.2, students did not use the diagram to help them answer question 03.3. Most answers just referred to lipids rather than to triglycerides. There were also a lot of generic answers of "packages and processes proteins"; failing to acknowledge that the question is about triglycerides, not proteins. There were several answers stating that the Golgi apparatus produces proteins from lipids or mistaking lysosomes for vesicles. Only 2.9% scored four marks, with over 70% scoring 1 or 2 marks.

Question 4

Figure 3 was a deviation from the pressure change graph that has appeared previously on AQA exam papers. This seemed to cause the majority of students some difficulty; 55% failed to score any marks on question 04.1.

Question 04.2 clearly represents the level of maths expected of AS Biology students, and clearly showed that many students are not capable of this, with 56% scoring zero marks. There seemed to be little comprehension of what to do, with seemingly any numbers being added, subtracted, multiplied or divided.

Question 04.3 tested simple recall of knowledge but 74% of students scored zero marks. The language used by students was very poor, with most simply repeating the stem, i.e. "the heart pumps forcing out tissue fluid". Very few students were able to limit themselves to 'water', incorrectly indicating that 'tissue fluid', 'fluid', 'plasma', or even 'blood' left the capillaries. The mark scheme represents the standard expected.

The answers to question 04.4 showed a lack of understanding of what the lymphatic system does in terms of draining excess tissue fluid; 73% of students scored zero marks. Many students saw the word 'blockage' and wrote about blood clots and atheroma. Its frequency in answers seems to suggest that atheroma is being taught despite not being in the specification.

Question 5

Other than with spelling, there were no issues with question 05.1; 76% of students answered correctly.

Question 05.2 proved to be harder than expected; again, this tested simple understanding but only 55% of students answered correctly.

68% of students scored the mark on question 05.3, which was fewer than expected for simple recall.

Question 05.4 showed that AS students lack an understanding of when to use each of the three statistical tests stated in the specification. Many thought that "a value for P of 0.04" meant that the

difference between them was only 0.04. There was also a large number of students referring to the 'sign test'; this is not in the AQA specification. 50% of students scored zero marks and only 4.6% scored three marks.

Question 6

59% of students failed to score the mark on question 06.1, suggesting a lack of understanding of the terms haploid and diploid.

Answered showed a lack of understanding of the concept behind question 06.2. Most students seem to think that it is the second meiotic division that halves the chromosome number; hence most answers referred to that, or referred to mitosis. Only 11% of students scored two marks.

62% of students scored the mark for question 06.3; again, a lack of understanding of the term haploid seemed to have been the main issue for the rest.

There was a severe lack of correct terminology and lots of confused terminology seen in the answers to question 06.4. There were responses discussing the idea of new combinations of genes, creation of new alleles, sister chromatids swapping, and swapping of genetic information between any two chromosomes. There were also many students discussing tension being created in chiasmata leading to snapping off sections; this appears to be a misinterpretation of the mechanism of crossing over. Only 5.3% of students scored all four marks, with just under a third scoring zero.

Question 7

Responses to question 07.1 were mostly good, students having clearly learnt this technique. 82% of students scored two or three marks, with only 5% failing to score. For mark point one there were some simplistic responses such as 'crush a leaf'.

Question 07.2 tested simple recall of organelle structures and scored well.

Question 07.3 tested recall of the function of a mitochondrion, and 73% of students scored the mark. Incorrect responses included "the powerhouse of a cell", "storage of ATP", "production of energy" and "energy **for** respiration".

In answers to question 07.4, most students ignored the standard deviations on the graph, and so did not score mark point one. Many students seemed to think that, as the number decreased slightly, mitochondria are used up during exercise, and that an increase in area of their inner membranes made mitochondria larger overall. Some who did factor in the standard deviations simply stated for mark point two that there was a significant difference, but did not state what that difference was, i.e. an increase in the number of mitochondria. 16% of students scored two marks, and 15% failed to score on this straightforward question.

Question 8

Considering question 08.1 tested recall from the specification, the answers were not strong. Only 32% of students scored all three marks. Some did not seem to consider **properties** of water, so stated 'condensation' and 'hydrolysis'. Some of the properties were confused, for example 'high latent heat capacity', and some were incomplete, for example just 'latent heat of vaporisation' and 'heat capacity' but neither stated as high.

Question 08.2 scored surprisingly badly with only 28% of students gaining the mark. Most answers simply stated dilution. Some odd methods were suggested including "Benedict's test", "colorimetry" and "heating gently".

The main issue with question 08.3 was not being able to calculate the ratios, despite being told how to do so in the question. Examiners saw many scripts in which axes had been drawn, but no data points plotted. 81% of students scored at least one mark, but only 22% scored all three marks.

The majority of answers given for question 08.4 were at GCSE level and only 41% of students scored two marks. The most common error was a failure to use the term water potential.

Question 9

In answering question 09.1, the majority of students were able to define a species, but simpler answers just stated "can make offspring", rather than **fertile** offspring. Far fewer were able to define species richness. Some gave the definition of the index of diversity, and many stated the number of species in a population.

Two-thirds of students answered question 09.2 correctly; those who failed to score did not understand what the mode is.

Question 09.3 was far more challenging for students, with 62% failing to score any marks. Students failed to understand what had been asked and what the data showed, for example stating "68% from one sample is not fair; all sample sizes should be the same". Many students also stated that sample A could have been **all** of the same species, which was not possible. Once again students were trying to apply generic ideas about experimental design without comprehending what had been asked. Commonly seen answers included "only one area", "no repeats", "no statistical tests", "not representative", "not a fair test", "correlation does not mean causation". Students failed to understand what species richness is, stating that "the number of different species is not given". Only 0.2% of students scored all three marks.

Question 10

The whole of question 10 proved to be very challenging for students. This question is a test of comprehension: students must use the passage to be able to answer the questions. Some clearly tried to respond without reading the passage and scored poorly. The mean score on each question part was less than one.

In answers to question 10.1, there was a clear lack of understanding of the mechanism of HIV infection. Common mistakes included stating that HIV is a bacterium, stating HIV is killed, stating there is no cure for HIV, stating HIV binds to reverse transcriptase, only discussing the action of enzyme inhibition, or simply repeating phrases from the passage. Only 1.4% of students scored four marks, with 45% scoring zero marks.

In answers to question 10.2 the lack of understanding of the mode of infection and of how the immune system responds was evident. Common mistakes included stating the body or virus becomes immune to AZT, that HIV becomes AIDS, that HAART prevents HIV becoming resistant to AZT and that there would be no need for new antibiotics. Students also tried to include the idea that lower doses of AZT could be taken to prevent muscle wastage, but the passage already stated that AZT is taken in low doses because it causes muscle wasting. Only 0.2% of students scored four marks, with 49% scoring zero marks.

10.3 was a simpler question, especially mark point one, but students mostly failed to address the question. Common mistakes included stating less energy is **produced**, less energy **for** respiration, **no** respiration and **no** ATP. Some thought oxygen is released during respiration; there was confusion with protein synthesis, and reverse transcriptase and some simply stated the role of mitochondria. As a result, only 9% of students scored two marks, and 58% scored zero marks.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

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