AQA

AS LEVEL
BIOLOGY

7401/2 Paper 2
Report on the Examination

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GENERAL

This paper produced a wide range of marks with students displaying good AO1 knowledge of a variety of the specification content. As always, students struggled with the more applied aspects of the questions.

Question 1 was about protein synthesis and revealed some confusion about which molecules are coded for by genes.

Question 2 required students to apply their knowledge of enzymes and membranes, and scored lower than expected.

Question 3 required students to apply their knowledge of carbohydrate structure to a novel polymer. This created some issues, with students clearly not reading the provided information carefully enough.

Question 4 was about the heart and the effects of exercise, and was generally well answered, although some students struggled to interpret the graph.

Question 5 was about cell division and the causes of variation. Although this question was generally well answered, students should be encouraged to think about the organisation of their answer when they are asked to explain similarities and differences.

Question 6 was about fat digestion and students generally displayed sound AO1 knowledge for the first part but struggled to apply their knowledge of natural selection for the second part.

Question 7 was about the cell cycle and students struggled to interpret the graph provided, although the AO1 aspects and the calculation were better answered.

Question 8 was practical-based and students should be aware that they may be required to perform dilution calculations; this aspect was poorly answered. Marks were also missed for inaccuracies when taking readings from a graph.

Question 9 was about sampling and was generally well answered.

Question 10 proved to be an excellent discriminator. Well prepared students displayed excellent AO1 knowledge of the structure of DNA and RNA and the differences between chloroplasts and mitochondria.

Question 1

01.1
The vast majority of students selected the correct answer for this question.

01.2
Students struggled with this question, with only a small minority able to identify molecules other than proteins that can be coded for by a gene.

01.3
This question was better answered, with over half the entry gaining at least 2 out of the 3 marks. A pleasing number of students were able to link the lower percentage of phospholipids in the rough endoplasmic reticulum to the presence of ribosomes and were able to clearly explain the roles of the rough endoplasmic reticulum and the smooth endoplasmic reticulum.

Question 2

02.1
Most students performed well on this question, although there was some confusion between quaternary and tertiary protein structure and the release of water in condensation reactions.

02.2
This question was not well answered with only about 25% of the cohort achieving 2 or more of the 4 marks. There were too many vague references to 'enzymes being complementary to substrates' with no reference to the active site. Students should also be reminded that 'E-S' is not acceptable as an abbreviation for enzyme-substrate complexes.

Question 3

03.1
Over two-thirds of the students were able to score at least 1 of the 2 marks. Marks were missed because of vague references to polymers and monomers without referring specifically to GOS.

03.2
Higher scoring students were able to provide two differences between the structures of GOS and lactose but there was much confusion about the structures of lactose and GOS, despite being told that GOS is a polymer of galactose.

03.3
Again, marks were missed due to too many vague references to 'amylase not being complementary to GOS'. 'Same shape' and 'binding sites' were still being seen and gained no credit.

03.4
This question was particularly poorly answered, with only a third of students achieving at least 1 of the 3 marks. Many students simply repeated the stem of the question by writing about GOS increasing healthy bacterial populations without any explanation of how this worked. A minority of students understood that GOS could act as a resource for these bacteria by providing galactose for respiration and binary fission.

Question 4

04.1
Almost half of the cohort scored full marks for this question, which was a little disappointing as it tested basic GCSE knowledge of the cardiac cycle.

04.2
Well prepared students understood the link between stroke volume and cardiac output and were, therefore, able to explain the increase in cardiac output for the two types of exercise. A number of students wrote about increased respiration requiring more oxygen, which was irrelevant.

04.3
This question was poorly answered, with only a minority of students able to achieve all 3 marks. A number of students wrote about constricting the lumen to increase pressure or about diverting blood flow to other parts of the body.

Question 5

05.1
Students should be encouraged to read the information provided more carefully, as many clearly missed the sentence explaining that the diagram showed the chromosome content after the first meiotic division. As a result, only a quarter of students were able to score both marks.

05.2
Better prepared students read the question instructions carefully and clearly organised their answer into similarities and differences between the causes of genetic variation in the two rice populations. Approximately 40% of students were able to achieve 2 out of 3 marks by mentioning standard causes of variation, such as independent assortment and random fertilisation of gametes.

Question 6

06.1
This was generally well answered with a majority of students understanding that hydrolysis reactions involve the addition of water. There were, however, references made to the breaking of hydrogen bonds and even glycosidic bonds rather than ester bonds.

06.2
Almost a third of students were able to achieve 2 marks for this AO1 question. There was, however, some confusion around the idea of bile salts digesting fats or emulsifying them into fatty acids and glycerol.

06.3
This question was poorly answered with only around 20% of students able to achieve 3 out of the 4 marks. Marks were missed by referring to ‘gene’ rather than ‘allele’. Too many students simply repeated the stem of the question by writing about natural selection favouring those individuals with the gene mutation. There were very few references to directional selection, but there did seem to be an improved understanding regarding the increase in allele frequency over time.

Question 7

07.1
Students struggled to interpret the information provided in the graph. There were many references to the mass of DNA increasing and decreasing rather than to the number of cells. There were many random descriptions of mitosis, with students attributing the increase and decrease in mass of DNA to the different phases of mitosis. A minority of students who understood the graph were able to make meaningful comments about cells with a DNA mass of 1 being in interphase, and relating that to the high number of cells with this mass of DNA.

07.2
Almost three-quarters of students were able to achieve 1 out of 2 marks for the standard reference to ‘uncontrolled cell division’ in tumour cells.

07.3
Just over 50% of students achieved full marks for this question. This was slightly surprising given the simple AO1 nature of the question. There were some references to homologous pairs of chromosomes, which again indicated that students were not reading the question carefully, since mitosis was clearly stated.

07.4
Almost three-quarters of the cohort were able to achieve at least 1 mark for this relatively simple calculation.

Question 8

08.1
Only a quarter of students achieved maximum marks for this relatively simply dilution calculation. Teachers should be reminded that students should have the opportunity to calculate dilutions during their practical activities.

08.2
Many students were able to use the data and the graph provided to work out the density of the protein solution.

08.3
Marks were missed for inaccurate reading of graph scales and too many students simply left this question blank.

08.4
Only around 10% of students achieved the maximum mark for this question. Again, students need to be reminded to read the information provided very carefully. Marks were missed due to a lack of understanding of the consequences of the errors in the tests. A number of students were writing about not having enough blood in the test or having copper sulfate solutions that were too dense or not dense enough, despite the fact that the question clearly asked for the consequences of the error, not for the cause.

Question 9

09.1
Despite the simple nature of this question, only around 10% of students were able to achieve maximum marks by stating that the data should be from a large sample size and randomly collected. Too many students focused on an explanation of how to calculate a mean.

09.2
Just over two-thirds of students were able to gain at least 1 out of the 2 marks for this relatively straightforward calculation.

09.3
Having identified the correct species, most students were able to achieve at least 1 mark for linking the increased surface area of the gills to increased oxygen uptake.

09.4
Approximately 50% of students gained full marks for this straightforward AO1 question.

Question 10

10.1
There were many excellent answers to this question, with over 20% of students achieving the maximum of 6 marks. The differences in the structures of DNA and RNA seem to be well known. Marks were not awarded for using the letters A, C, T, G and U rather than the full names of the bases. More able students organised their answers clearly and contrasted the structure of DNA and RNA in clear, paired statements.

10.2

This question was not answered as well as the previous question, with lots of confusion about cytoplasm and cell walls. The question asked about differences between the structures of chloroplasts and mitochondria, so references to location and function were irrelevant and gained no credit. There were many references to animal and plant cells and to the relative size of the two organelles, many of which incorrectly stated that mitochondria were larger. As with the previous question, students should be encouraged to organise their answers carefully, especially when they are being asked to outline similarities and differences.

Mark Ranges and Award of Grades

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