AQA
Questions matter

AS
Biology
7401/1 Paper 1

Report on the Examination

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General comments

The paper was more accessible than in previous years. There was a wide range of marks awarded across the whole ability range with all questions being attempted. The mathematical and practical-based questions were answered slightly better than in previous years.

Question 1

01.1 Students should be reminded to give specific answers. The second mark was for external intercostal muscle. Many students just named intercostal muscle.

01.2 A straightforward question for many. Most students got the first two options, F and D, by interpreting the diagram correctly.

01.3 "Alveoli have thin walls" was a common answer. This marking point was only awarded for reference to the epithelium or the cells that make up the alveoli. It is the cells that are thin. The second marking point was much more accessible.

Question 2

02.1 Although a straightforward AO1 question, some students struggled to recall biological molecules correctly.

02.2 References to heating the biuret solution negated marking point 1. It is not necessary to heat biuret solution, unlike Benedict's solution. Students need to learn the colours of the reagents in the specification and be able to recall these in examinations.

02.3 Many students appreciated that enzymes are proteins. Fewer students made it clear that the enzymes were still present at the end of the reaction as they hadn't been used up.

02.4 Students should be reminded to present their final answer following the instructions given in the question. Most students did give their answer to 3 significant figures and achieved two marks.

Question 3

03.1 Although this question was about general virus replication, many students referred to replication of HIV. However, this still allowed them to score full marks. General statements included the 'virus replicates' rather than the 'viral nucleic acid is replicated'. Students should again be reminded about terminology; 'genetic information' was ignored but 'genetic material' was accepted. Furthermore, a 'new virus is produced' rather than 'viral proteins are produced' was another example of a more generalised answer.

03.2 This question confused some students. The question was about a virus killing the bacteria and so forming the clear zones. This appeared to be a new context for many. More general answers stated that the clear zones are where the bacteria had been killed but did not go on to say by the viruses. It was

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common for students to discuss antiseptics or antibiotics which had nothing to do with the material in this question.

03.3 This question was well answered; nearly 70% of students scored the mark.

03.4 It was pleasing that many students could correctly identify the correct stage of the cell cycle shown in the image as either cytokinesis or telophase. Vague answers like mitosis were ignored. The explanation proved more challenging. The question did state "do **not** refer to organelles in your answer", so discussions of the nucleus were ignored. The cytoplasm splitting was correct, but the cell-surface membrane splitting was not correct. Students need to think more carefully about how the cell-surface membrane pinches in or how a new cell-surface membrane forms rather than a cell-surface membrane splitting down the middle. Few students mentioned the chromosomes.

Question 4

04.1 The most common error for this question seemed to be about circular DNA. Some students did not know that chloroplasts contain circular DNA.

04.2 Many students could successfully derive 20% as the correct calculation if they read the figures correctly from the graph. The most common way to explain the incorrect step for marking point 3 was to write this out as a calculation to show how 25% was derived. Other students did explain this in other ways, with many explaining how it was divided by 0.72 rather than 0.9.

04.3 This multiple-choice question was answered correctly by nearly 60% of students.

Question 5

05.1 This question tested practical skills. Although the use of a grid and random number generator was common to assign random plots, some students still gave randomly throwing a quadrat into a field as a valid method. Students should be reminded to give full answers when describing how to calculate a mean. Many students did give a word equation, but full answers should relate to the plant height rather than just measurements.

05.2 Drawing a table is an important skill in biology. Column headings should include units and a full description, so just height in the first column was insufficient. There were many different ways to lay out the figures for marking point 2; common ones are shown in the mark scheme. It was important that the class intervals did not overlap: a common error was to give 60-70, 70-80, 80-90, etc. The use of either the ≤ or ≥ symbol was well used and pleasing to see. Some students require a little more practice in drawing results tables.

05.3 This question was well answered, with three-quarters of students scoring at least 1 mark.

05.4 This question proved a challenge. It was the high plant biodiversity idea in the wildflower field that was important for marking point 1. This could be linked to more nectar or pollen as food for the bees in marking point 2.

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Question 6

06.1 All marking points were seen in answers to this question. Students commonly identified DNA and ATP as containing phosphate ions.

06.2 It wasn't uncommon for students to mix up the effects of increasing hydrogen ion concentration, stating increasing pH rather than decreasing pH. However, many students went on to describe how increasing hydrogen ion concentration denatures proteins or alters the active site of enzymes.

06.3 This question stipulated that students should describe two patterns in the total concentrations of ions; **total** was emboldened in the question. Many students went on to describe patterns in sodium ions or other positively charged ions rather than the total or compared the positive and negative ions between the cytoplasm and tissue fluid. Students did understand that as the total positive and negative ions are equal there would be no overall charge. Students should be reminded to read the labels of the axes of a graph carefully and use this in their answers. So, "there is a higher total inorganic ion concentration in the cytoplasm than tissue fluid" is a better answer than "more ions in the cytoplasm", which did not gain credit.

06.4 The command "suggest and explain" was very important for this question. Each marking point included the correct transport mechanism and the reason. Few students gave both aspects and so failed to gain any credit. "Simple diffusion" and "co-transport" were commonly suggested answers for marking point 1. Some students also seemed to think that diffusion occurs to maintain a concentration gradient or to balance out concentrations. Students are expected to understand that diffusion occurs down a concentration gradient.

Question 7

07.1 A huge variety of drawings was observed by examiners in answers to this question. A basic Y-shape was not sufficient, as an attempt to draw heavy and light chains was important. Most students attached the drug to one arm of the variable region, which was not correct. The drug has to be anywhere in the constant region, at the bottom or to the side of the Y shape. Many labels were allowed on the mark scheme. Common incorrect answers included an active site, or a receptor being labelled on the antibody.

07.2 Many students had a really good attempt at answering this question. Some (just under 10%) gained the maximum of 4 marks. Students must use the given data in their answers. Deriving that 28 patients were unaccounted for was fundamental for marking point 3. Very general answers did not gain credit. Side-effects and all the characteristics of the patients were commonly mentioned. Only a minority of students analysed the method itself and recognised the need for a control group and/or larger sample size. Very few observed that the effect of ADC on tumours after 3 months is unknown, with a number incorrectly stating that ADC 'only' worked for 3 months, so was only a short-term/temporary treatment.

Question 8

08.1 This question was a straightforward test of AO1 skills. Students demonstrated they understood how non-competitive inhibitors work. References to binding at the allosteric site were common. Errors

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included the inhibitor binding to the enzyme without stating where, or the enzyme changing shape without mentioning its active site.

08.2 Identifying independent and dependent variables is a commonly tested skill. Many students clearly knew the definitions of the two variables but found identifying the independent variable difficult from the information given. Many incorrectly suggested protease/enzyme concentrations as the independent variable rather than time. Correctly identifying casein concentration as the dependent variable was much more commonly seen.

08.3 To work out the rate of a reaction from a tangent line is an expected skill for AS biology. Those who attempted it were able to score full marks. Common answers were around 23.5. Credit was given for calculating 17.5 as some students divided 35 by 2 instead of drawing a tangent line.

08.4 Estimating and then drawing a curve on a graph is another expected skill for AS level. It was expected that students realise that a higher temperature towards the optimum would increase the rate and so the curve should be steeper and to the left of the other curve and would end earlier. A wide range of curves was seen. As always, graphical work proved to be a challenge for many students.

Question 9

09.1 Students must take note of the instructions in the question. 'Do **not** refer to guanine in your answer' was a very clear instruction. Yet, some students did. Some students clearly knew a lot of information about the structure of DNA nucleotides including that cytosine and uracil are pyrimidines/single-ringed bases. Most students stated that cytosine and uracil both form hydrogen bonds with guanine.

09.2 Most students were very confident in using standard form in calculations and found this question very accessible.

09.3 This question was accessible, and many students were capable of getting some marks. Some students referred to introns and splicing, others did not but still were able to gain full marks. Most students correctly realised that a substitution was involved. As ever, students must express their ideas clearly. It is the genetic code that is degenerate or the DNA code that is degenerate rather than just DNA that is degenerate. Furthermore, it is a triplet or codon that is changed rather than just the DNA that changes.

09.4 In the passage, information was given about enzyme X. It stated that AT is caused by a lack of enzyme X. Students had to explain what would happen without this enzyme. Just lifting from the passage what enzyme X does was not sufficient to answer the question. The passage stated that enzyme X slows the cell cycle, so the answer is that no enzyme X would result in more/faster cell cycles. Few students appreciated that mutations occur during DNA replication.

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Mark Ranges and Award of Grades

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