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Examiners' report

BIOLOGY A

H020

For first teaching in 2015

H020/01 Autumn 2020 series

Version 1

ocr.org.uk/science

Introduction

Our examiners' reports are produced to offer constructive feedback on candidates' performance in the examinations. They provide useful guidance for future candidates.

	Reports for the Autumn 2020 series will provide a broad commentary about candidate performance, with the aim for them to be useful future teaching tools. As an exception for this series they will not contain any questions from the question paper nor examples of candidate answers.

The reports will include a general commentary on candidates' performance, identify technical aspects examined in the questions and highlight good performance and where performance could be improved. The reports will also explain aspects which caused difficulty and why the difficulties arose, whether through a lack of knowledge, poor examination technique, or any other identifiable and explainable reason.

A full copy of the question paper and the mark scheme can be downloaded from OCR.

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Paper 1 series overview

As Paper 1 is Breadth in Biology this paper tested a wide range of topics in the specification. Few topics were tested to a great depth of knowledge and understanding.

Most candidates attempted all the questions and there was no evidence that many had difficulty finishing in time.

Candidates who did well on this paper generally did the following:	***Candidates who did less well on this paper generally did the following:***
• Read the question carefully. • Paid attention to the command word such as 'explain'. Good candidates gave full explanations while others simply made statements or gave descriptions. Questions containing the command word 'suggest' were also good discriminators as a high-attaining candidate can often think of a sensible idea. • Ensured that their response contained relevant points that answered the question. • Attempted all parts of the question paper.	• Left some questions not attempted (No Response) in section B. The mathematical questions and some of the chromatography questions were missed by a number of candidates. • Wrote down what they had learned whether it answered the question or not. • Did not show clear working for mathematics questions. • Were unable to describe or explain the role of bonds within and between molecules. The understanding of bonds and forces within and between molecules goes a long way to explain how and why molecules behave the way they do. • Were not able to identify limitations or suggest improvements to a given method or describe a method to use apparatus with which they should be familiar. 15% of the assessment are for questions based on practical work and candidates who have achieved their practical endorsement should be well prepared for this sort of question.

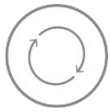
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Section overview

Section 1 was multiple choice and section 2 contained short answer questions. The attainment in section 1 was often a good guide as to what to expect in section 2.

Themes in candidate responses

Candidates often did not make full use of the information provided in the stem of questions. Many candidates seemed to struggle when faced with extracting information from a graph. For example in Question 24(b) the small difference between the means and the huge overlap of the error bars was ignored. Information in tables was also not used to its full potential. For example in question 22(c)(ii) many candidates did not use the table provided to accurately identify the amino acids for which they had calculated the Rf values.

	**AfL**	Try providing students with a graph they have not previously seen. Ask them to describe the graph – this can be done as a description exercise in which one student has sight of the graph and another has to draw it from the description given. Students can then be asked to interpret the information provided in the graph and explain the shape of the curve.

Comments on responses by question type

Multiple choice questions

The multiple choice questions proved to be very discriminating and there was a very wide range of attainment observed.

Only the highest attaining candidates were able to interpret the information in the graph for question 3 to state that curve A most closely reflected the effect of ethanol on cell membrane permeability.

Only the highest performing candidates were able to calculate the value of Q_{10} in question 14 and calculate the proportion of oxygen released in question 17. . In question 13 it seemed that many candidates were guessing and only some candidates knew that the best method of sampling in this case would be systematic sampling.

Questions involving Practical work

Questions involving detailed knowledge of practical work were not well answered.

There was mixed performance in section 1 in questions 3, 12, 13, 14, & 17 which all relied on good experience in practical work as they involve the correct interpretation of data from practical work or data from secondary sources.

Question 22(b) also relied on practical experience in describing how to carry out chromatography and 22(c) required candidates to have experienced calculating Rf values. These questions were not well answered by many candidates.

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In question 24(a) candidate's understanding of what constitutes a problem (or limitation) in the procedure was unclear, as were their suggestions for modifications. Many candidates suggested a new completely different procedure rather than modifying the one given to reduce the limitations. When writing an alternative method, candidates could follow the lead given in the PAGs and write numbered steps rather than full prose.

	**OCR support**	The Practical skills handbook provides support with practice exam questions relating to limitations in practical skills. It can be found at https://www.ocr.org.uk/Images/294468-biology-practical-skills-handbook.pdf

Questions involving Mathematics

Mathematical calculations were not well completed. Even simple calculations such as calculating Rf values in question 22(c)(i) were often incorrect.

Where more complex calculations were required, such as in question 25(b)(i), the working of these calculations was often confused and difficult to follow. Candidates needed to calculate how many enzyme complexes were required to replicate the human genome in a set time. However, responses were often incomplete or there were bits of working arranged haphazardly around the page.

	**OCR support**	The Biology mathematical skills handbook provides support with teaching mathematical skills and is available here: https://www.ocr.org.uk/Images/294471-biology-mathematical-skills-handbook.pdf.

Common misconceptions

In question 24(b) almost all candidates did not correctly interpret the relevance of error bars that were very large and had a large overlap between two sets of data. Large error bars suggest data that is variable (and perhaps not easily repeatable). While it is not a significance test in itself, the degree of overlap between error bars can be a good indicator that two sets of data are not significantly different.

	**Misconception**	Where two sets of data appear to be only slightly different a statistical significance test can help to determine whether the difference is significant. Statistical data such as the standard deviation can also help to indicate the significance of a small difference between sets of data.

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	OCR support	The Biology mathematical skills handbook provides support with teaching mathematical skills and is available here: https://www.ocr.org.uk/Images/294471-biology-mathematical-skills-handbook.pdf. Support specifically with statistical analysis can be found in the Mathematical skills statistics booklet: https://www.ocr.org.uk/Images/338621-mathematical-skills-statistics-booklet.doc

Another common misconception surrounded the bonding in biological molecules – most notably in proteins. Candidates did not have a strong understanding of the types of intramolecular and intermolecular bonds involved in creating molecules with particular properties. This meant that they were unable to apply this understanding in questions 2, 16, 18, 19, 22(a) and 25(a).

Key teaching and learning points – comments on improving performance

Carrying out practical work, such as chromatography and using a potometer, is an essential part of studying Biology. The practical skills tested as part of this AS examination are covered in the PAG (Practical Activity Group) practicals. These include extension questions designed to help candidates to answer the questions in the written examination.

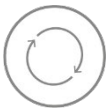
	OCR support	The PAGs can be found here: https://www.ocr.org.uk/qualifications/as-and-a-level/biology-a-h020-h420-from-2015/planning-and-teaching/#a-level-practical-activities. The answers to the Extension question are available securely on Interchange here: https://interchange.ocr.org.uk/Modules/ControlledMaterials/ControlledMaterialsGCEFrom2015.aspx. General support on practical skills can be found in the Practical skills handbook here: https://www.ocr.org.uk/Images/294468-biology-practical-skills-handbook.pdf. Specific support on adapting the PAGs as well as revising the Module 1.1 Practical skills can be found in the Practical activities support guide available at: https://www.ocr.org.uk/Images/597719-practical-activities-support-guide.pdf.

The examinations carry a number of marks for demonstrating mathematical skills. This is an area of weakness for many Biology candidates. Candidates should understand what specific statistical tests are used for and should be able to carry out each test. Above all they should be able to interpret the results of statistical tests.

	AfL	Give students plenty of practice with mathematical questions. Make sure that they include all their working in the response – and that the working is clear. This is important as if the calculation is incomplete or the final result is incorrect it is often possible to award marks for parts of the calculation.

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Teaching about molecular shapes and the bonds or forces that create these shapes can be difficult. Visualising forces and the effects they have can be much easier if students have the opportunity to make models.

	**AfL**	Make best use of a range of different learning techniques. Give students plenty of opportunities to make models or create animations of biological molecules so students can visualise them effectively.

Guidance on using this paper as a mock

This examination paper has a good range of question types which test a range of skills. It makes a good mock paper as it can highlight areas of weakness in a number of the key areas which candidates often find difficult – these include practical skills, mathematical skills, interpreting graphs and interpreting statistical data.

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