

AS LEVEL

Examiners' report

BIOLOGY A

H020

For first teaching in 2015

H020/02 Autumn 2020 series

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 2 series overview

A small self-selected cohort took this paper to improve their calculated grades produced during the Covid-19 pandemic in summer 2020. Candidates knowledge of cell biology, immunology and gas exchange exceeded their understanding of biochemistry and practical laboratory experiments. Some candidates coped well with a diverse selection of maths problems while others struggled with following through in a step-wise approach, with rounding and with dealing with very large numbers.

<i>Candidates who did well on this paper generally did the following:</i>	<i>Candidates who did less well on this paper generally did the following:</i>
<ul style="list-style-type: none">• Used subject-specific terminology correctly• Listed relevant facts• Showed mathematical problem-solving ability• Focused answers on the question asked• Covered the full range of ideas required in the level of response questions	<ul style="list-style-type: none">• Misapplied specialist vocabulary• Wrote vague or ambiguous descriptions• Showed lack of familiarity with basic mathematical conventions like rounding up or down• Did not tailor their answers to the question wording

Themes in candidate responses

The theme of mathematical skills ran through this paper (**Questions 1(c)(ii), 2(b)(i), 2(d)(i) and 3(b)(i)**). Candidates maximised their chances of gaining marks by showing their working stages in a logical step-wise fashion.

	OCR support	<p>The OCR website has an extensive range of worksheets to help candidates develop their mathematical skills:</p> <p>https://www.ocr.org.uk/subjects/science/maths-for-biology/index.aspx?id=biology-a-h020-h420-from-2015</p> <p><u>In addition there is the</u> Biology mathematical skills handbook which provides support with <u>teaching</u> mathematical skills and is available here:</p> <p>https://www.ocr.org.uk/Images/294471-biology-mathematical-skills-handbook.pdf.</p>
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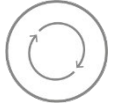
Comments on responses by question type


Level of response questions

The wording of the level of response questions required candidates to show a breadth of knowledge and the ability to organise their knowledge to address all the points required by the question. Level 3 answers require that the full extent of the question is addressed in detail.

In **Question 1(c)(iii)** candidates needed to relate structure to function (both aspects) in four types of cells. Partial answers achieved a lower level and mark, as did those that tried to address all of the required areas but made errors. The commonest errors were confusing erythrocytes and neutrophils, cilia and microvilli, and ciliated cells with goblet cells.

In **Question 6(b)** candidates needed to refer to structures shown on the insert figures for both fish and insect and relate these to both gas exchange and to ventilation. Again, partial answers achieved a lower level and mark as did those that contained factual errors. The commonest errors were omitting mention of ventilation mechanisms in fish and confusing the roles of tracheae, tracheoles and spiracles in insects. Candidates should be taught that air (not oxygen) enters spiracles and diffuses along tracheae and that in small resting insects, diffusion alone delivers a sufficient supply of oxygen to tissues.

	AfL	<p>Candidates need to spend some time analysing the demands of a level of response question. A level of response question is likely to require them to address multiple aspects and may require a higher order skill such as linking or comparing of ideas. Careful analysis before starting to write an answer can identify how many areas need to be addressed, and how these areas should be linked.</p> <p>For example, Question 1(c)(iii) required that eight areas should be addressed, while Question 6(b) required six (structures on the insert identified with comment relevant to gas exchange and to ventilation for fish and again for insects). Candidates may benefit from drawing a table to show the number of areas required as empty boxes, which they can tick off when they have addressed each one.</p>
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	Misconception	Many candidates misapplied the terms gas exchange and ventilation. Gas exchange covers the diffusion of oxygen and carbon dioxide at an exchange surface. Ventilation refers to muscular movements that result in the delivery of a fresh supply of air or water to an exchange surface. Ventilation may be tidal (as in mammals) or throughflow (as in fish).
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Other

On structured questions candidates can judge how much and what to write by looking at the mark allocation. If the question requires reference to a figure or table, answers need to show evidence of having used the figure or table.

Question 4(a) provided a challenge as candidates needed to integrate two graphs and evaluate their findings in the light of a student statement that included a contradiction. A general exam technique tip is to use all the classes of data in the answer. In this question that would mean commenting on results from rest homes, schools, hospitals and other. A teaching tip is to show candidates examples of positive (direct) and negative (indirect) correlations on scattergraphs. Dose response curves illustrate that effective medical interventions produce a negative correlation when drug dose is plotted against disease incidence or prevalence or against mortality.


Common misconceptions

On **Question 1(c)** many candidates assumed that ciliated cells make mucus, despite the focus on separate goblet cells in **Question 2**.

On **Question 6(a)** some candidates calculated the volume and surface area of the cubes shown but expressed the ratio back to front, e.g. saying the surface area to volume ratio was 1 to 3 rather than 3 to 1.

Key teaching and learning points – comments on improving performance

On **Question 1** candidates varied in their knowledge of the features of a good biological drawing, but the main guidelines (title, scale, no shading, do not overlap label lines) are easily taught.

	OCR support	The Biology Drawing skills handbook provides support with this: https://www.ocr.org.uk/Images/251799-biology-drawing-skills-handbook.pdf
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On **Question 2** few candidates could draw a peptide bond and some candidates confused autoimmune disease with immune deficiency.

On **Question 3** few candidates knew the kingdoms to which the pathogens belonged and many seemed unfamiliar with the term agglutinin.

On **Question 4** the year's news coverage of the pandemic meant that most candidates introduced the term 'herd immunity' into their answer and used it correctly. Many also referred to the R number or R_0 .

Numbers with decimal places below .5 should be rounded down (where necessary) and numbers with decimal places of .5 and above should be rounded up (where necessary). In the interests of accuracy intermediate stages of decimal working should not be rounded until the final answer stage.

Candidates should not be shy of using words in their working to explain the logic of each step, for example in **Question 2(d)(i)** headings could be 'finding 1.11% of the 2018 population', finding the 2019 population total', 'finding the number of lupus sufferers' and 'finding the proportion of sufferers that is photosensitive'.

Another good tip for candidates is to consider whether their final answer is bigger or smaller than they could reasonably expect. Taking this common sense view should help a candidate with a final answer to **Question 2(d)(i)** that exceeds the total population size to see that they must have made an error.

Guidance on using this paper as a mock

This paper provides excellent practice in solving maths problems and working out how to plan a full answer to a level of response question. The questions on microscopy (**Questions 1(a)** and **1(b)**) and experimental design (**Question 3(b)(ii)** and **Question 5**) also provide a model for testing transferable skills. Doing the paper and going through the mark scheme could be followed up by applying the same questions and skills to new microscope drawings and descriptions of experiments.

Supporting you

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