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Examiners' report

BIOLOGY A

H420

For first teaching in 2015

H420/01 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

H420/01 is one of three components of the GCE A Level Biology A specification assessed during this examination session. For H420/01 candidates needed to demonstrate breadth and depth of knowledge across modules 1, 2, 3 and 5 with 15 multiple-choice and two Level of Response questions included in the 100 marks.

Mathematical and practical skills continue to be embedded within the multiple-choice questions in section **A** and the longer responses of section **B**. The question paper appeared to be accessible to candidates across the ability range, and there was no evidence to suggest that candidates were under any time constraints towards the end of the paper.

Candidates who did well on this paper generally did the following:	***Candidates who did less well on this paper generally did the following:***
• Attempted all questions in both sections **A** and **B** • Maintained focus in multiple-choice questions without being distracted by alternative options • Were able to apply knowledge to novel context • Read carefully the information provided in e.g. figures, tables, practical methodology and graphs to formulate an appropriate response • Demonstrated practical skills and knowledge acquired from PAGs • Demonstrated good mathematical skills, including the ability to analyse and evaluate data • Gave succinct responses	• Left some questions blank i.e. No response (including multiple-choice in section **A**) • Demonstrated recall of facts, but appeared unable to apply knowledge appropriately • Gave extended responses which did not answer the question being asked

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Section overview

As in previous years, Section **A** of the examination consisted of 15 multiple-choice questions covering a range of topics across the assessed modules for this component. Only **AO1** and **AO2** were assessed with a range of questions some involving recall; others requiring need to demonstrate mathematical, practical and/or analytical skills; some questions needed more time than others.

Mathematical and practical skills were embedded throughout the structured questions in Section **B**. Assessment objectives **AO1**, **AO2** and **AO3** were addressed throughout **Questions 16** to **21** with concepts from across the appropriate modules of the specification including the movement across membranes, respiration rates in yeast and chromatography of photosynthetic pigments.

Themes in candidate responses

Generally, if candidates were able to understand the command word and use the information provided in e.g. a data table, then they went on to provide good responses throughout the question.

In **Q18(a)** it was important for candidates to 'use the information' in the figure of FURA-2 provided. The presence of negative charge shown on the figure was the prompt for candidates to explain that the molecule was (negatively) charged so could not pass through the phospholipid bilayer of a cell membrane.

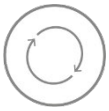
Furthermore, in **Q18(b)(ii),** candidates who were able to analyse the table and notice that strength of stimulation was proportional to intensity of fluorescence, could then make the appropriate link to Ca^{2+} ions to formulate a response that evaluated and explained the conclusion relating to these ions as required by the question.

There was some evidence that reading graphs as in **Questions 16(b)(i)** and **20(b((ii)** proved challenging particularly with understanding axes and recognising trends.

Comments on responses by question type

Multiple-choice questions

Most candidates attempted all 15 questions. Responses were seen where candidates had attempted to replace, e.g. B with D in the answer box which leads to ambiguity for examiners. In Question 14 letter J from the question stem was seen in the answer box. Also in Question 14 a common misconception became evident whereby candidates thought that vesicles themselves were released by exocytosis rather than the contents of the vesicles.

	**AfL**	Advise candidates what to do if they change their minds about an answer when completing the multiple-choice questions. They should make sure that they completely scrubbed out their original letter or put a line through the answer box and then clearly write their amended choice next to it. Advise candidates to check that they have only written an appropriate response i.e. **A**, **B**, **C** or **D** in the answer box and not a letter from the question, e.g. K/J or L from Question 14.
	**Misconception**	Animated video clips showing vesicles fusing with cell surface membranes to release chemicals, e.g. neurotransmitters help understanding and show that the 'whole' vesicle is not released from the cell.

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Level of response questions

There were two Level of Response questions, **Q20(b)(ii)** and **21(c)** both worth 6 marks. This style of questioning requires succinct responses.

Q20(b)(ii) required candidates to use graphical data to evaluate two conclusions about different sugars respired by yeast. Most candidates attempted to evaluate both conclusions, although few candidates could correctly identify supporting statements for the first conclusion about similar respiration rates or offer any mathematical evidence in support of their responses. The second conclusion about disaccharide hydrolysis was more successfully attempted with many candidates knowing that maltose and sucrose were disaccharides. A minority of candidates thought that glucose was also a disaccharide which confused their responses. It was clear that some candidates did not spot the data for lactose or did not correctly identify it as a disaccharide so did not use it in their response.

For **Q21(c)** some candidates did not read the question correctly and explained the spirometer trace rather than comparing the mechanisms of normal and full expiration. Good L3 responses demonstrated excellent knowledge and used correct terminology to describe the passive mechanism of expiration and compare it to full expiration as an active mechanism.

	AfL	In **Q20(b)(ii)** some candidates did not appear to understand the idea of evaluating statements. Centres could offer exemplars and advice to students on how to formulate responses to questions where they have to argue 'For and Against' with supporting evidence for their argument.

Questions that included requirement to demonstrate mathematical and/or practical skills

Question 16 highlighted the need for increased understanding and confidence in using the correct terminology associated with practical work, e.g. resolution and random error.

	OCR support	There is support with the language of measurement in the OCR Practical skills handbook (https://www.ocr.org.uk/Images/294468-biology-practical-skills-handbook.pdf) and in the Language of measurement in context – Biology (https://www.ocr.org.uk/Images/577369-language-of-measurement-in-context-biology.doc). *Campbell, P. (ed.) (2010) The Language of Measurement – Terminology used in school science investigations, Hatfield, The Association for Science Education*

	AfL	For further support with language of measurement, a useful resource referenced in the Practical skills handbook is: *Campbell, P. (ed.) (2010) The Language of Measurement – Terminology used in school science investigations, Hatfield, The Association for Science Education*

Question 17 required candidates to demonstrate both maths and practical skills in the context of chromatography of photosynthetic pigments. The R_f value for spot 3 was correctly calculated by candidates who understood the orientation of the chromatogram. The orientation of the chromatogram in Fig. 17.1 caused some confusion and error possibly due to candidates being used to seeing chromatograms running vertically or horizontally from left to right rather than right to left as in this case.

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The part questions that followed were about the procedure and appropriate responses showed evidence that candidates had completed a PAG regarding chromatography and could apply their knowledge. There were vague responses to **Question 17(b)(i)**which simply stated that results would be affected without further detail.

	OCR support	Support specifically around adapting practicals within the PAGs and revising the Module 1 Practical skills can be found in the Practical activities support guide (https://www.ocr.org.uk/Images/597719-practical-activities-support-guide.pdf).

Question 20(c)(iii) and **20(c)(iv)** assessed mathematical skills of calculating in standard form and using logarithms. **Question 20(c)(iii)** was generally answered well and most candidates understood that when dividing two numbers in standard form, one power of 10 should be subtracted from the other rather than divided. The most common mistake was not putting the answer in standard form or not realising $^{-}3$ **-** $^{-}11 = {}^{+}8$. For **Question 20(c)(iv)**, most candidates started the log graph correctly with 0, 7 plots but many went on to draw curves rather than straight lines. Some candidates showed evidence of actually calculating the $\log_{10}$ number of cells at each time interval to plot their line correctly.

	OCR support	Support with mathematical skills can be found in the Mathematical skills handbook (https://www.ocr.org.uk/Images/294471-biology-mathematical-skills-handbook.pdf).

Common misconceptions

As the student's statement in **Question 16(b)(i)** referred to two types of uptake, simple diffusion and active transport, candidates answers generally referred to these rather than facilitated diffusion (which was allowed in the mark scheme). Candidates found it challenging to identify that the type of uptake for substance A was simple diffusion and for substance B was active transport. Many candidates misinterpreted each graph and thought the reason why the rate of uptake kept increasing as concentration increased for substance A was because the substance was taken up against the concentration gradient. For substance B, many candidates thought the plateau in the rate of uptake was because the concentration inside and outside the cell was in equilibrium so stopped increasing. Few understood that the graph plateaued as increasing concentration would not increase rate of uptake further due to e.g. insufficient transport proteins.

	Misconception	Misinterpreting graphs associated with movement of substances by diffusion and active transport is a common misconception of the mechanisms of transport across cell membranes. See delivery guide for support: https://ocr.org.uk/Images/206567-biological-membranes.pdf

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Key teaching and learning points – comments on improving performance

It is advantageous to complete practical investigations in the classroom and to observe microscope slides or study photomicrographs.

For example, experience of completing or watching videos of practical work related to topics such as thin layer chromatography in **Q17**. Details on the use of e.g. negative controls in **Q20(a)(ii)** and serial dilution in **Q20(c)(i)** are useful skills to include to enable candidates to gain confidence in responding to such questions.

Observing photomicrographs of cellular components such as the mitochondrion in **Q19(a)** is a requirement of the specification. These components often look different depending on microscope and staining technique used. Again, to improve confidence, it would be useful for candidates to study a range of micrographs from both scanning and transmission electron microscopes as well as the usual light microscope.

	**OCR support**	To consolidate learning in the classroom you can use OCR delivery guides and support handbooks available here:https://ocr.org.uk/qualifications/as-and-a-level/biology-a-h020-h420-from-2015/planning-and-teaching/

Guidance on using this paper as a mock

This question paper has a variety of question styles and includes questions that can be accessed by candidates across the ability range. It can be used to identify gaps in knowledge of the appropriate modules, spot misconceptions and to assess weaknesses in practical and mathematical skills.

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