

GCSE (9–1)

Examiners' report

**GATEWAY
SCIENCE
BIOLOGY A**

J247

For first teaching in 2016

J247/04 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 4 series overview

This is the third examination of the GCSE Gateway Specification A. The J247/04 component includes a multiple choice question section and a short answer question section that also includes one Level of Response type question. The Level of Response question assesses the quality of communication as well as knowledge and understanding. Throughout the paper there are some questions that are designed to assess candidates' knowledge and understanding of practical skills used in the specification. These questions demand responses that identify a candidate's awareness of the skills required to successfully complete practical activities and investigations.

There was no evidence that any time constraints had led to a candidates underperforming.

<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"> • Performed standard calculations following the required rubric (e.g. clear working, units, significant figures, rounding) relating to calculating percentage decrease: Question 18 (e)(i) and calculating volume: Question 19 (b)(ii) and recognition of the standard form: Question 19 (b)(iii). They were confident in calculating the number of amino acids: Question 21 (d). • Applied knowledge and understanding of natural selection to a given context: Question 17 (b)(iii). • Applied knowledge and understanding to questions set in a novel context. 	<ul style="list-style-type: none"> • As was the case in the previous seasons' papers, found it difficult to apply what they had learnt to unfamiliar situations. • Demonstrated clear misconceptions in understanding the antibody-antigen complex in Question 20 (a). • Produced narrow responses for the Level of Response question, where candidates concentrated their whole response interpreting the effects of lack of LDL receptor protein, but did not go on to identify the underpinning scientific knowledge to explain the effect or apply it in the context of the question stem: Question 21 (e). • Demonstrated low awareness of the skills involved in practical activities and investigations in questions designed to assess candidates' practical abilities and therefore found these challenging.

Section A overview

Candidates coped well with selecting choices. There was very little evidence of hesitation in their process of selecting, as relatively few responses had letters crossed out in the boxes for a replacement response to be made.

Section B overview

Candidates coped well with interpreting data to plot points accurately and draw lines of best fit. There were a variety of scales used but in the main these were appropriate. However, there was evidence that some candidates still chose scales that covered less than 50% of the available space. Occasionally, it was unclear as to which line was which and the easiest way to identify them is using a key. The most common mistake was to plot the incorrect variables on x and y axes. As evident from previous examinations, candidates should further develop their ability in applying their knowledge and understanding of practical skills in questions set in the context of practical activities and investigations.

Themes in candidate responses

A common theme in candidate responses was seen in questions that asked for descriptions of practical activities. These were frequently disjointed and involved incorrect sequencing of methods.


In the investigation of antibiotic pollution and bacterial resistance to antibiotics Question 16 (c), candidates were unclear as to the order different aspects of the method should occur. Some thought the bacterial lawn should be grown first and then the antibiotic disk put in. As the marking point was looking for the use of the sterile pipette to add the water to the agar, often the marking point would be gained for correctly mentioning the use of this equipment, but it exemplified the disjointed approach of candidates to sequencing a practical activity.

Further evidence of this was seen in candidates' descriptions of genetically engineering bacteria to produce many copies of a specific antibody in Question 20 (c)(i). Here they frequently mixed up the sequence of events for when to use restriction enzymes and on what structure. They also seemed uncertain of where and when the plasmid would be needed.

Comments on responses by question type


Multiple choice questions


Candidates in general completed all multiple choice responses, however, there was some evidence that a small minority of candidates had made some annotations with the intention to return to the question to enter a letter but then did not do so. It is important for candidates to make sure they have not left any multiple choice question unanswered.

	AfL	<p>It was also noted that there was evidence that candidates were annotating the question with decision-making markings to indicate whether they thought something was a distractor or not before selecting their letter choice. This practice demonstrates sound AfL and should be encouraged.</p> <p>When candidates have the opportunity to do final checks before completing the exam, it would be helpful that they check that all multiple choice questions have got a 'letter' response in the box.</p>
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Level of Response questions

Candidates in general did not manage to produce balanced arguments in their responses to the Level of Response question. There was evidence of candidates focusing on just one aspect of the question with respect to the reasons for increased levels of cholesterol. As a result, little evidence was seen of candidates identifying the impact of the increased levels within the coronary artery as identified in the stem. Candidates did not identify the significance of a reduced blood supply to heart **muscle** and often generalised in describing blood flow around the whole body. Even more rare to see was an understanding of how reduced blood flow impacted on supply of oxygen to heart muscle and the subsequent effect on aerobic respiration. As a consequence, most candidates were very limited in their overall response and Level 1 was common.

	AfL	Candidates should be encouraged to read and highlight key parts of questions which provide much of the relevant information, and to not be tempted into answering the question until all the rubric and stem has been read. Recognise that if they focus their response on one limited area or idea they are unlikely to cover the range of assessment objectives that the question covers.
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	OCR support	This ' How to answer 6 mark level of response questions ' set of activities will be useful to share with candidates. It will allow them to practice identifying key parts of questions, as well as familiarise themselves with different levels of answer.
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Other

Candidates again demonstrated a sound understanding of the application of practical techniques in completing a genetic cross, with Punnett squares proving a well understood technique to support probability calculations. The usual error for completing the Punnett square was to use incorrect gametes for the woman. There were, however, some instances where candidates found it challenging to respond to questions that targeted other practical skills. A notable example of this was how a minority of candidates were able to identify a need to specifically incubate bacterial cultures; often candidates just referenced having to leave them for a couple of days with no indication that incubation was needed.

Common misconceptions

There was some confusion when trying to describe what happened at the antigen binding site with some candidates thinking this was something on the antigen rather than antibody.

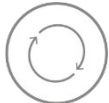
When calculating the number of amino acids in a protein, candidates were comfortable in dividing the number of nucleotides in an allele by 3. A significant number of candidates, however, did not apply knowledge to the specific question and did not subtract the four extra nucleotides in the faulty allele, as the question asked for the number in an **unaffected** allele and so scored just 1 mark.

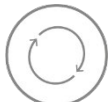
	Misconception	Candidates often inappropriately referenced 'lock and key' hypothesis when describing the antibody-antigen complex.
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Key teaching and learning points – comments on improving performance

Diagrams provided in a question offer a support to candidates to target key aspects that require them to use and apply their knowledge. These diagrams should be considered in depth by the candidate before structuring their response. This is the case in all questions but particularly the case for the extended writing Level of Response type questions.

Correct sequencing of events in practical activities needs to be emphasised as confused or inappropriate sequencing can often mean candidates fail to score some marking points for these type of questions. Encouragement for a step-by-step approach to their description of methodology would help improve performance in such questions.

	AfL	For graphing skills candidates should be encouraged to draft a suitable checklist to apply when preparing and completing their graphs. This could avoid them omitting key assessment features being assessed in graphing skills.
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	AfL	In questions that involve description of methods or experimental procedures a bullet point approach can often help with candidates thought processes and help sequence events and avoid repetition.
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Guidance on using this paper as a mock

This paper could be used as a mock and would provide a useful vehicle to identify how successful candidates are at three key areas of assessment:

1. Graphing skills.
2. Describing practical methodology in a logically sequenced manner.
3. Extended writing in Level of Response questions that require candidates to fully use the source information in the stem to identify appropriate knowledge and understanding. This should then be applied to a given context and then any effects interpreted.

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