

**GCSE (9–1)**

**Examiners' report**

**GATEWAY  
SCIENCE  
BIOLOGY A**

**J247**

For first teaching in 2016

**J247/03 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 3 series overview

This paper tested a small cohort of candidates, following the cancellation of examinations in Summer 2020 and the subsequent award of grades based on schools' data.

J247/03 assesses content from specification topics B1-B3 and B7. Therefore, to perform well on this paper candidates need to have a sound knowledge of the theory covered in topics B1-B3 and be able to apply the skills and understanding that they have developed in the practical activities covered in topic B7. This paper is not synoptic and so does not contain any material covered by topics B4-6. There are a number of questions that involve the assessment of key mathematical requirements from Appendix 5e of the specification.

<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"> <li>• Correctly performed calculations in Question 16(a)(i), Question 17(a)(ii), Question 18(b)(i) and Question 19(b)(i).</li> <li>• Described the relationship shown in the graph in Fig17.1 and compared this with the graph shown in Fig17.2.</li> <li>• Explained the effect of temperature on enzyme action in terms of the kinetic theory in Question 18(b)(ii).</li> <li>• Gave a complete description of protein synthesis in Question 22(a).</li> </ul>	<ul style="list-style-type: none"> <li>• Confused the direction of flow in phloem tubes (Question 5) and the direction of a nerve impulse in motor neurones (Question 10).</li> <li>• Reversed the ratio calculated in Question16(a)(i).</li> <li>• Did not use the graph to calculate the concentration of urea in the urine in Question 17(a)(ii).</li> <li>• Confused the use of a potometer with a photosynthometer in Question 19.</li> <li>• Could not describe the action of selective weedkillers in Question 20(a)(i).</li> <li>• Could not identify monomers and polymers in Question 22(b)(i).</li> </ul>

## Section overview

Section A includes 15 multiple choice questions assessing topics across B1-B3. Comments on individual questions are shown below.

Section B also assesses topics from B1-B3 and contains a mixture of short answer, extended prose and level of response questions. Comments on these questions are shown below.

## Themes in candidate responses

Many candidates scored well on the mathematical questions in the paper but some did lose marks by not closely following the instructions given. The level of response question was not answered well by many candidates, however many of the descriptions of protein synthesis that were written were excellent. Recall of the structure of the nephron was generally sound but fewer candidates could recall a specific function of gibberellins in plants.

## Comments on responses by question type

### Multiple choice questions


Questions 1,2,6,7,8,9,11,13 were well answered by most candidates.

Question 3,4,5 and 15 proved more challenging. In Question 3 a significant number of candidates chose B as an incorrect answer, mixing up the roles of the left and right ventricles. In Question 4, A proved to be a common incorrect answer with candidates presumably linking cell division with the term mitosis in the question. In Question 5 most candidates chose answers involving phloem but some answered A, thinking that the main movement was upwards.

Questions 10,12 and 14 proved to be the most challenging questions. Many answers to Question 10 were B, with candidates reversing the impulse flow in the neurone. In Question 14, C was the most common incorrect answer.

### Level of response questions

Very few candidates wrote Level 3 answers to the level of response question (Question 21c). Many could compare the challenges faced by the two players but descriptions regarding the role of the nervous system and muscles were less clear. Often these answers focused on a generic description of the reflex arc rather than discussing the role of the eye, the cerebrum and the muscles controlling the arm and fingers.

	<b>OCR support</b>	This <a href="#">set of activities</a> are designed to show candidates how to tackle 6 mark level of response questions.
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## Other

The questions requiring mathematical skills were generally well answered.

Question 16(a)(i), involving calculating the surface area to volume ratio, was correctly answered by most candidates. In Question 17(a)(ii) again many answers were correct with some given in standard form. Common errors involved not using the graph and simply dividing 16 by 1000. In Question 18(b)(i) most candidates scored some marks by calculating the mean but some did not give their answer to one decimal place or did not convert to a volume per minute. Question 19(b)(i) was handled well by most, although some did not halve the diameter to find the radius of the tube.

In the longer answer prose questions, there were a mixture of responses.

Question 22(a) elicited some excellent descriptions of protein synthesis. Question 21(b) was designed to challenge the more able candidates and this proved to be the case. Only a fairly small number of candidates concentrated on the number of muscle fibres supplied by one motor neurone and then linked this to fine control that is needed in the fingers. In Question 20(a)(ii) some candidates did not make a clear choice of a herbicide but simply described the data in the table.

In the practical based questions, there were some good responses. In Question 18(a) many candidates could give an advantage of using a gas syringe and in (b)(ii) could use kinetic theory to explain the results. In Question 19(a)(ii), a significant number of candidates thought the air bubbles were produced by the leafy shoot and so lost a mark and the role of the heat sink in (a)(iii) was not well understood. In (b)(ii) the anomaly was identified by most and they explained how it should be dealt with in (b)(iv).

## Common misconceptions

As already stated, the multiple choice questions highlighted some common misconceptions. The direction of flow in phloem was not known by many, as was the direction of the nerve impulse in a motor neurone.

Some candidates also did not appreciate that in the lungs, it is the total surface area of all the air sacs that is important. Hence in Question 16(a)(iii), breaking down small air sacs to form a smaller number of large sacs would decrease the total surface area, even though the surface area of one air sac would increase.

In Question 16(c) there were good descriptions of the uptake of water into the cells but some candidates used the term 'turgid' incorrectly as these were animal cells.

Question 17(b) was well answered but a number of candidates reversed the position of the Loop of Henle and the second coiled tubule.


In Question 19, a significant number of candidates seemed to be confusing the potometer with a photosynthometer and therefore thought that it was measuring bubbles produced by the leafy shoot.

Although descriptions of protein synthesis in Question 22(a) were generally of a good standard, there were some misconceptions. The most common of these is that mRNA triggers the synthesis of specific amino acids, rather than their assembly into proteins.

## Key teaching and learning points – comments on improving performance

In mathematical questions, candidates need to be reminded of the need to check the instructions in the question carefully. They need to give their answer to the correct number of decimal places or significant figures, if requested. They also need to check in which units the answer should be expressed.

More experience on practical activities, either hands-on or via computer simulations, may eliminate some of the misconceptions seen in the potometer questions.

	<b>OCR support</b>	This <a href="#">suggested practical activity</a> contains questions you could practice with candidates about potometers, as well as the method which you could review with them. It also links to the SAPs website which has further support.
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## Guidance on using this paper as a mock

This paper showed good discrimination in the small cohort of candidates. The mark scheme was constructed in the same way as in all summer examinations and the questions tested a good range of topic areas. It is therefore very suitable for use as a mock paper.

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