

OCR Report to Centres

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This report on the examination provides information on the performance of candidates which it is hoped will be useful to teachers in their preparation of candidates for future examinations. It is intended to be constructive and informative and to promote better understanding of the specification content, of the operation of the scheme of assessment and of the application of assessment criteria.

Reports should be read in conjunction with the published question papers and mark schemes for the examination.

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**General Certificate of Secondary Education
Biology A (Twenty First Century Science) (J243)**

OCR REPORT TO CENTRES

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Overview

The paper assessed this session was A161.

This was the first of the new style question papers as required by OFQUAL. The paper was intended to be more rigorous overall and contained three six mark questions that require much longer extended answers. Examiners were worried that candidates would find this new style of question very difficult and that the number of no-responses would increase. However it soon became clear that centres had prepared their candidates well. The vast majority of candidates made valiant attempts at these questions writing down extended answers. Many candidates were able to demonstrate both knowledge and understanding and were able to score high marks on these questions. Centres are to be applauded on the preparation of their candidates for these new style papers.

Most candidates were entered for the appropriate tier. Centres need to be aware that weaker candidates that are entered for higher tier papers do not have a pleasant experience and are usually unable to demonstrate what they know and understand. This clearly has an adverse effect on the grade that they will receive. Schools are well advised to enter weaker candidates for the foundation tier where they are more able to demonstrate their knowledge and understanding and complete the examination feeling that they have had a positive rather than a negative experience.

Most candidates this session performed well, with the longer free response questions proving to be the most challenging. It is important that papers discriminate between candidates of differing abilities and it was felt that these papers achieved that aim.

There was no evidence that candidates had run out of time, or that questions towards the end of the paper had gone unanswered. Neither was there any evidence that any group of candidates had been disadvantaged by language, cultural or ethnicity issues. It was pleasing to see that the majority of candidates had attempted all of the questions with few no-responses.

As always, there are lessons to be learned and specific points relating to each paper are picked up in the individual reports from each Principle Examiner. Some issues however occurred across the suit of papers and these are detailed below.

Although there were few no-response answers, it is still important to stress to candidates that leaving questions blank will guarantee that they get no marks for the question. At least attempting the questions opens up the opportunity of them scoring some of the available marks. Candidates should be encouraged to at least make an attempt with every question. Sometimes candidates leave a question blank with the intention of returning to it later. This can easily be forgotten by the time they reach the end of the paper. Teaching candidates to quickly review their answers before the end of the examination avoids this mistake being made.

As previously mentioned, this was the first of the new style papers that contain the extended three, six mark questions. In the past, extended questions have always proved to be more challenging to candidates. Candidates can be helped to answer these questions by being taught a few simple rules. All too often candidates answer the question by re-writing it before starting their answer. This not only wastes time but also uses up the available space for their answer. Candidates need to read each question carefully, decide how they are going to structure their answer, and only then begin to write it down. Simply rushing to get their answer down on paper, often results in lost marks and reduced grades. Another implication of this approach is that candidates are then forced to write outside of the area allocated for their answer. Examination papers are now scanned and marked online. Candidates who write outside of designated areas are at risk of their answers not being fully marked. Candidates would be well advised to ensure

that they use the appropriate answer lines and spaces in which to write their responses. This is often exacerbated by candidates crossing out initial incorrect responses, and then cramming the answer into a much smaller space. This is another good reason why candidates should think carefully before beginning to write their answer to the question. Centres then need to teach candidates to read through their answers and ensure that the answer does in fact answer the question that has been asked. All too often candidates can become side tracked when writing down their answer and it is only by re-reading what they have written that this can be avoided. Re-reading answers also helps to avoid vague or imprecise answers. The use of the words “they” and “it” often do not clearly identify what the candidates are writing about. Re-reading highlights these issues to the candidates who can then correct them.

When answering questions that include numerical calculations, candidates are always asked to show their working. It is vital that they do this. Candidates are very good at answering calculation questions intuitively or performing simple mental arithmetic and then writing down the answer. Providing the answer is correct, this is not a problem as they will gain full marks. However it is a very risky strategy. A simple mistake in their mental calculations will lose them all of the marks. If they had written down their working, the chances are that they would have salvaged at least one of the marks available for the question.

Centres will be well aware that many of the questions in these papers consist of “Put ticks (✓) in the boxes next to the correct answers.” In order to ramp up the degree of difficulty of higher tier questions, candidates are not always told how many correct responses are required. The more astute candidate may well look to see how many marks the question is worth and then assume that the number of marks available for the question, must match the number of correct responses required. On the higher tier, this is not necessarily the case. Some questions will award one mark for two correct responses. Some may award two marks for three correct responses. Candidates must be advised to answer each of these questions on their merit and place ticks next to those answers that they think are correct.

The following reports provide more detail on how candidates performed on specific papers, highlighting areas of concern and applauding improvements from previous years. Please ensure that your staff are encouraged to read these reports. They are available on line at www.ocr.org.uk

A161/01 Twenty First Century Science Biology A (B1, B2, B3) Foundation Tier

General Comments

This new specification paper was accessible to the majority of candidates. The free-response items were challenging for many candidates and some appeared to struggle to understand the response needed for the 6-mark items. However, the most able candidates provided clear responses, presented in a logical order. Most candidates limited their responses to the spaces provided but some tended to extend their writing into other spaces on the paper. In general, candidates showed a sound knowledge and understanding of genes and the inheritance of gender but were less confident about genetic testing, the explanation of high blood pressure and issues relating to sustainability.

The majority of items did not appear to generate errors due to the misinterpretation of instructions or rubric. The candidate scores ranged from 4 to 45 out of a maximum of 60 marks, demonstrating an anticipated wide range of performance according to knowledge and understanding. Many candidates appear to have been well-prepared for this paper and completed all items. Some candidates changed their responses by crossing out initial attempts. This tended to happen in those items requiring calculations. Candidates did not seem to run out of time and the number of 'nil responses' was limited.

Comments on Individual Questions

- 1
 - (a) Candidates coped well with this item and presented some very interesting and appropriate suggestions. A small number of candidates provided unqualified responses such as eyes, nose and size.
 - (b) Most candidates obtained 1 mark for this item. There was a tendency to select the incorrect response, 'genes are made up of chromosomes'.
 - (c) This item did present a problem to most candidates. However, some failed to identify female or male in the outer boxes.
- 2
 - (a) This item was successfully completed by many candidates. An alternative pattern of responses could not be identified.
 - (b) Many candidates understood that cystic fibrosis was based on a recessive allele/gene but a few candidates only referred to the carrier feature or the need for double recessive.
 - (c) Some candidates identified appropriate uses for genetic testing, such as testing the inheritance of a disease/disorder, but many failed to do this. Many candidates provided numerous examples of implications and this was encouraging.
 - (d) This item presented problems for a number of candidates. Although many referred to unnatural or 'playing God', most struggled to identify the reasons for the testing procedure.
- 3
 - (a) Although some realised that microorganisms produce toxins, this response was rarely seen. Candidates also failed to understand that microorganisms often cause disease by killing or invading cells.

- (b) (i)** It was surprising to see that candidates often realised that six sets of doubling were required, they did not obtain the correct value to complete the item.
 - (ii)** The idea of bacteria causing food poisoning or making people ill was well-understood but this was not often linked to the high reproductive rate of bacteria or to the concept of increase risk over time.
 - (c) (i)** Very few candidates identified the correct response. An alternative pattern of responses could not be identified.
 - (ii)** Candidates struggled to work through this item. Some considered, incorrectly, that the stages did support the conclusion.
 - (iii)** The concept of repeating the test was generally understood. Some candidates were also able to consider the evaluation or review of Koch's original results.
- 4 (a)** Many candidates did not appreciate the difference between systolic and diastolic phases of the cardiac cycle. They struggled and often included references to exercise.
- (b)** Many candidates coped well with this item. The majority were able to locate Paul and Peter in the table but often confused the location of Dave and Ranjit, putting them in the 'low' category.
- (c)** It was unfortunate that many candidates failed to refer correctly to the explanations of high blood pressure, causing heart disease/heart attack. This had an impact on their overall score for the item because it was a crucial feature to the acceptable response. Many clearly understand the various actions needed to reduce high blood pressure. Such actions were often described in some detail.
- 5 (a) (i)** Very few candidates identified the correct response. An alternative pattern of responses could not be identified.
- (ii)** Those candidates who chose to disagree with the overall conclusions of the insecticide investigation struggled to identify supporting evidence. This restricted their score for this item. Using the data fully was credited fully and many students were able to achieve an acceptable level of response, supported by clear references to the values provided in the data tables.
- (b) (i)(ii)** Few candidates realised that phytoplankton/algae are prime living indicators in the sea. Likewise, few appreciated the useful role of lichens as an indicator in the air.
- (c)** Some candidates appeared to be selecting their responses at random. They were not making an informed judgement. It was unfortunate that some selected 'levels of nitrogen' rather than 'levels of nitrate'.
- 6 (a)** Many candidates did well with this item and obtained both marks. A number correctly identified the protection of rain forests but failed to select the reduction of large scale monoculture. Such candidates may not have appreciated the term 'monoculture'.
- (b)** Many candidates identified the correct response. No other pattern of alternative responses could be identified.

- (c) (i)** Some candidates realised that land fill or litter would be reduced and that pollution or the release of CO₂ would take place. However, very few appreciated the impact on the use of raw materials/oil and even fewer referred to the lowering of energy used.
- (ii)** The correct response most commonly used related to the slow decomposition. Many candidates did struggle with this item.

A161/02 Twenty First Century Science Biology A (B1, B2, B3) Higher Tier

General Comments

This was the first of the new series of examination papers that included longer six mark questions. Most candidates seemed to be well prepared for these questions and made a very good attempt at answering them. This resulted in almost all candidates scoring some marks on these questions with a significant number managing to score full marks. Candidates would be well advised however to ensure that their writing is legible and contained within the space provided. Due to the fact that these scripts are marked electronically, examiners do not see the whole page by default and unless there is some indication that the candidate has written outside the allocated window, it is possible that the examiner will fail to spot additional text and the candidate could lose marks.

The paper was suitably challenging and discriminated well between candidates. Very few sections were unanswered suggesting that the paper was accessible to most candidates. The length of the paper has been increased to sixty marks but there was no evidence that any of the candidates ran out of time. It was also pleasing to see a decrease in the number of no-responses.

Comments on Individual Questions:

Question 1

Part (a) was an easy introduction to the paper with most candidates scoring the single mark. The most common incorrect answer was “genes”.

Part (b) was also answered well. This tended to be a two or nothing question where candidates either scored zero or both of the marks.

Part (c) proved to be more testing and even when candidates scored correctly on part (i) they often failed to score on part (ii). To get part (ii) correct, candidates had to realise that recessive conditions require both of the recessive alleles to be present in the genotype.

Question 2

More able candidates scored both of the marks for part (a). It was clear that some candidates were guessing the answers and usually failed to score either of the marks.

Part (b) was the first of the new six mark questions and was answered well by the majority of candidates. Candidates who scored well, described a test on either an adult, child or embryo and then went on to explain several implications for the individual and society as a whole. Good answers included testing for genetic disorders and the implications for themselves, their family and their future prospects such as insurance and employment implications. It was pleasing to see the good quality answers from a large proportion of the candidates. However, some candidates expanded at length on uses rather than implications.

Part (c) partly overlapped with part (b) and those candidates who used arguments in part (b) and then repeated them again here were credited. Vague arguments about cost or saving lives were, not credited, but arguments such as being able to plan ahead, having the correct treatment, false results and risks of miscarriage, were credited.

Question 3

Part (a)(i) was surprisingly not well done. The question presented the data in an unfamiliar way and most candidates assumed that the answer must be 1 and that it had simply doubled several times. Only those candidates where 'the penny dropped' realised that 8 bacteria must have originally been present on the Petri dish. Even some of the more able candidates failed to realise this.

In part (a)(ii) only the more able candidates were able to complete the calculation and score both of the marks. Most candidates tried various unsuccessful ways of performing the calculation to no avail. Those who realised that to get the correct number, the total had to be halved 12 times scored at least 1 mark even if their calculated total was incorrect.

Part (a)(iii) was well answered with most candidates scoring both marks for shortage of food and reduced temperature.

Part (b)(i) was answered reasonably well but approximately half the candidates only gave the immediate response that the numbers dropped and did not go on to gain the second mark by stating that after some time the numbers began to rise again. Candidates rarely understood the word 'describe' and consequently went on to explain the changes in great detail for no credit.

Just over half the students managed to score on (b)(ii) but only the most able scored both of the marks. This question required students to be able to analyse complex graphs and only the most able succeeded.

Part (b)(iii) was not answered well. This was clearly a difficult question targeted at the most able candidates. When candidates did score, they were given credit for stating that the student was incorrect because not all the bacteria were killed and it is not possible to know if all non-resistant bacteria were killed. Very few stated that it is possible that a bigger dose or the same dose over a longer period of time would have killed them.

Question 4

Part (a)(i) was another of the new six mark questions and discriminated well. Almost all candidates were able to show some knowledge and understanding to score some marks. The more able went to give a detailed account of how the immune system works with memory cells and realised that the antigens on cowpox and smallpox must be very similar.

In part (a)(ii) more than half the candidates failed to score when all that was required was that people who had cowpox did not catch smallpox. Some candidates described a totally different correlation that was not related to the question, and failed to score.

Part (a)(iii) proved to be a very difficult question with very few candidates scoring both marks. The first easy mark was for the idea that a dangerous experiment had been carried out on a small boy, and the second harder mark was for the idea that a small boy was not able or old enough to give consent.

Part (a)(iv) should have been an easy question but most candidates failed to score by giving vague answers. Answers worthy of credit referred to the fact that one person's life had been put at risk so that many lives could be saved.

Part (v) was better answered with candidates giving examples such as testing on animals or human cells.

Part (b) was not well answered. This type of question has been asked before and previous reports have commented on how candidates can do well when answering this question. To score, candidates had to make it clear that when more people are vaccinated, the chances of a non-vaccinated actually coming into contact with an ill person are reduced. This idea of contact is essential to access this question.

Part (c) however was well answered with credit being given for side effects, allergic responses, and that people are genetically different and will react differently to vaccines.

Question 5

The calculation in (a)(i) was answered well by almost all candidates with both marks being awarded. Candidates who wrote down the correct method but made a mistake in the calculation were awarded one mark.

Part (a)(ii) however was not answered well. This was a simple percentage calculation and it is clear that centres would be well advised to ensure that their candidates can carry out simple percentage calculations.

Part (b) was also poorly answered by almost all candidates. Many clearly did not understand the question and said meat eating was more sustainable as meat is a more concentrated form of energy. They did not appreciate the questions reference to 'food chains'. Credit was given for less steps in the food chain, therefore less energy would be lost, leading on to the idea that growing vegetables would be able to feed a larger number of people.

Question 6

This was the last of the six mark questions and without doubt the hardest for candidates to do. This was not because the content was hard but because it was new to the specification. To facilitate candidates answering the question, space was provided for a diagram of the nitrogen cycle allowing candidates to score in one of two ways ie diagram or written text. Surprisingly candidates seemed to perform better with the quality of their writing and not with their diagram. It is clear that candidates would be well advised to learn the diagram of the nitrogen cycle. Some candidates had obviously not been taught this section of the specification and gave answers that related to the greenhouse effect or photosynthesis and respiration.

Question 7

Overall, question 7 proved to be difficult for all apart from the most able candidates. Part (a) should have a simple recall question of a definition but all too often answers were vague and confused. Good answers made reference to variety both between and within species. Credit was also given for examples in a named habitat.

Part (b) proved equally as difficult. The question was a straight lift from the specification and required answers such as resources eg food and medicines or making sure the ecosystem was more stable and could survive natural disasters. Only a small number of candidates were able to score both marks.

Part (c) should also have been straightforward. However over half the candidates failed to score any marks at all. This question is an excellent example of why candidates would be well advised to learn simple definitions as a way of boosting their score.

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