OCR
RECOGNISING ACHIEVEMENT

GCSE

Biology A

Twenty First Century Science Suite

General Certificate of Secondary Education **J633**

Examiners' Reports

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Oxford Cambridge and RSA Examinations

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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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Chief Examiner's Report

Most candidates taking the Biology papers in this session performed extremely well. The papers were constructed to allow candidates to feel that they had every opportunity to demonstrate their knowledge and understanding, while at the same time discriminating between candidates of differing abilities. It was intended that candidates should feel that they had a positive experience in taking the examinations.

Most candidates found the papers accessible and demonstrated sound knowledge and understanding of the course content. Most candidates had been well prepared by their centres and due to the fact that questions towards the end of the papers were answered equally as well as questions at the beginning of the paper, there was no evidence that candidates ran out of time.

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

Some questions required candidates to provide extended written answers. As these types of questions will have more value and significance on the papers written for the new specification starting in 2012, it is vital that candidates are well practiced in the skill of answering such questions.

All papers are now marked using an on-line method of marking. This means that papers are scanned before being fed electronically to examiners. Candidates who decide to write outside the designated area, for example adding extra text at the bottom of their scripts, are in danger of this work being missed by the examiner. Candidates should therefore restrict their answers to the space that has been made available.

Candidates are well advised to read questions carefully. Each year a number of candidates lose marks unnecessarily because in their haste to complete the paper before they run out of time, they fail to read the question carefully. It cannot be stressed too strongly that reading and re-reading the question is time well spent. Candidates would also be advised to pay similar attention to their answers. Answers should always be re-read to ensure that they do indeed answer the question.

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 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.

Using chemical equations, such as respiration and photosynthesis, is another area where candidates can lose marks. When candidates are asked for a word equation, it is surprising the number of candidates who write down the chemical equation. This is a risky strategy as to score the marks the chemical equation must be given correctly. Candidates would be well advised to give word equations when they are asked for them in a 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 increase the degree of difficulty with these questions on higher tier papers, 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. 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.

Areas of the specification that caused most problems for this session's candidates were hormonal control, the body's response to infection, the role of ADH and the link between DNA and protein synthesis.

The individual examiner reports provide more detail on how candidates performed on specific questions, highlighting areas of concern and applauding improvements from previous years. All reports are available on line at www.ocr.org.uk

A221/01 Twenty First Century Science Biology A (B1, B2, B3) Foundation Tier

General Comments

Candidates generally performed as well as in other series. However there were signs of some still having some still having a way to go to be able to respond to free response questions as well as they are able to respond to the more objective style questions.

Some areas of the specification which have been problematic in the past have continued to prove challenging this time around. There was again confusion over the distinctions between nervous and hormonal control, and over the responses of the human body to infection. More detailed comments on these questions are given below, but it might be of benefit to ensure that such topics are reinforced as future candidates prepare for the Examination.

Comments on Individual Questions

Q1 asked candidates about inheritance. Part a was generally well answered, with nearly all candidates scoring for "alleles" to complete the third sentence. Part b was less well answered, the majority scoring one of the two marks. It was very common for the marking point relating to half the alleles coming from each parent to be missed. This was frequently a result of vague language, which did not make it clear that the candidate understood it is *half* from each parent.

Q2ai further tested understanding of the concept of an allele, this time looking for a correct distinction between cystic fibrosis and inheritance of eye colour. Again a number of responses which might have indicated this understanding were hampered by vague language, especially with the idea that cystic fibrosis has only 1 or 2 genes or alleles. 2aii asked about symptoms of cystic fibrosis, and 2b about the implications of genetic testing. These are important areas of the B1 specification, and pleasure at the number of correct responses was a little tempered by the surprising number of candidates who did not offer a response to one or both of these sections. It will be well worth ensuring future candidates are better prepared to meet this type of demand. 2ci looked for Mandy as the correct response, which came just a little more often than the correct response of Dan to 2cii. Most candidates scored at least one of these two marks.

Q3ai and aii asked candidates to first identify statements 3 and 5 as being incorrect, and then to redraft them in correct form in part ii. It was again disappointing that an appreciable minority offered no answer to part ii, highlighting the need for preparation for this style of question. 3b was much better answered, with the great majority of candidates scoring at least some of the marks.

Q4 tested understanding of antibiotics and went on to wider ideas about science. 4a was well answered, but it was really gratifying to see the widespread understanding of bacterial resistance reflected in the very good performance on 4b. In 4c the options called for were C, E, and A in that order. A good number of candidates did score at least 1 mark for getting the correct options. In 4d many candidates showed a good understanding of the need for peer review and for the results to have to be repeated by other scientists. Centres have clearly done much good work on this important idea about science.

Q5a needed candidates to correctly identify the key features of arteries and veins, and then to link the features to the correct functions. This part of the question was poorly answered, and perhaps candidates might benefit from strong emphasis on following the instructions given in the question. Parts b and ci were much better answered, but the point in 5cii that this was just an individual case was seldom appreciated. The idea about science that lots of results would be needed is possibly one to stress to future candidates.

Q6 tested knowledge of evolution and the origins of life. This was an area candidates were strong in, with most scoring at least 1 mark in 6a, most often for completing the third sentence with "simple". In 6b it was evident, as in some previous sessions, that candidates were a little uncertain of the point that if conditions on Earth were slightly different then there would be different outcomes to evolution.

Q7 tested appreciation of the different roles and actions of the nervous and hormonal systems. Again, as in previous sessions, this was an area of weakness to be improved upon. The key ideas of nerves passing impulses and giving fast responses while hormones give a slower longer lasting response are well worth emphasising for future reference.

A221/02 Twenty First Century Science Biology A (B1, B2, B3) Higher Tier

General Comments

Most candidates performed well on this paper and there was clear evidence that they were well prepared for the examination. There was no evidence that any of the candidates ran out of time. Candidates should be aware that this question paper contains a number of multi-choice style questions and that with questions of this type, candidates are well advised to at least make an attempt to answer them. They should at least try to eliminate incorrect responses and then take a guess at the correct answer.

The paper is marked by electronic marking after first being scanned and then fed electronically to examiners. It is now more important than ever that candidates use legible writing and restrict their responses to the boxes, spaces and lines that have been provided rather than writing in margins and other areas that may not be visible to examiners in the electronic copy.

Candidates should also be aware that some multiple choice responses require more than one response and the number of responses required does not always match the number of marks available. This was demonstrated in questions 4a, b and c, all of which required extra responses to gain the allocated marks.

The paper discriminated well with a mean mark of approximately 21 and candidates distributed across almost the whole range of marks available.

Comments on Individual Questions

1 Part (a) discriminated well with the most able candidates scoring all three of the marks. Weaker candidates usually scored at least one of the marks, this most often being the last of the three regarding maternal and paternal genes.
Part (b) also discriminated well. The easier of the two marks was given for some idea of structural proteins. Many candidates stated an example such as skin or more generally, growth. Both answers were credited for the first mark. More able candidates were able to go on and say that enzymes were also examples of proteins, and gained the second mark.

2 In part (ai) most candidates managed to score the first mark for stating that cystic fibrosis was controlled by just one gene or a pair of alleles. However fewer candidates went on to say that eye colour is controlled by many genes and thus failed to be awarded the second mark.
Part (aii) was well answered with most candidates giving two different symptoms. The most common error was when candidates gave symptoms for Huntington's disease rather than cystic fibrosis.
Part (b) was well answered provided the candidate had read and understood that the question was asking for implications. Too many candidates gave answers such as how to test for the condition, rather than an implication of testing for the condition. Good answers referred to making decisions about abortion and whether to have children, or other implications such as the difficulty of getting life insurance or mortgages.
Part (c) was very well answered with most candidates correctly identifying Mandy and Dan as the two correct examples.

3 In part (ai) both errors needed to be identified in order to score one mark. Just over 50% of candidates managed to do this. The candidates were then asked to correct the errors in part (ii). As only two errors existed, it was not possible to carry the error forward when

marking part (ii). Most candidates managed to score at least one of the marks for correcting the errors and many managed to identify the fact the sentences should have referred to antibodies and that they will only be effective against a specific flu virus.
Part (b) was well answered with almost all candidates scoring either two or three marks.

Part (c) was not answered well. This was an A* question and was marked as such. Too many candidates gave vague answers such as "to stop it spreading" and did not go into the detail required by an A* candidate. Good answers were rare and referred to the fact that the more people were vaccinated, the less chance there was of coming into contact with someone having the disease; or that the more infectious the disease was, the more people would need to be vaccinated to stop an epidemic.

4 This question was made harder by the fact that candidates were not given any clue as to how many boxes to put a tick in. In part (a) three correct responses were required for just one mark. Only the most able candidates managed to score the mark on this A* question.
Part (b) was aimed at grade B candidates and did in fact prove to be a little easier. However three correct responses were required for two marks and only the most able had the confidence to place a tick in third correct box. Approximately one third of candidates scored at least one mark with only ten percent gaining the second mark.
Part (c) was another tricky question that required three correct responses for two marks. Most candidates managed to score at least one of these two marks.

5 Part (a) was a more straightforward multi-choice question and most candidates scored both of the marks for identifying the second and fourth statements as being correct.
Part (b) was not answered well. The whole of the question was about heart disease, but all too often candidates failed to realise this and gave examples that were totally unrelated to the question. The vagueness of their response meant that they did not score. Good answers gave an example of a correlation such as the more you smoke, the more likely you are to have heart disease, or that the more you exercise, the less likely you are to have heart disease. They then went on to explain how the cause was explained and linked to the correlation. Answers that included factors with unproven links to heart disease were also credited.

6 Part (a) was a sequencing exercise with a twist. Candidates were given one of the correct responses and had to realise that response B was needed twice. Those candidates that read the question were clued into this fact by the penultimate sentence in the question. "Each letter can be used once, more than once, or not at all." The question performed well and discriminated across the ability range. Credit was given for placing both Bs in the correct squares and putting C before A on the left hand side, and D before E on the right hand side.
Part (b) was a straightforward multi-choice question and the majority of candidates scored at least one of the two marks.

7 Part (a) required candidates to make seven decisions to gain three marks. Because of the variety of choices available, almost half the candidates failed to score on this question. However the question discriminated well with more able candidates with over ten percent of candidates scoring all three marks.
Part (b) was well answered even though candidates were not told how many boxes to tick for the two marks. Very few candidates failed to score on this question with over half the candidates scoring both marks. The question proved to be a nice easy tailpiece for the paper.

A222/01 Twenty First Century Science Biology A (B4, B5, B6) Foundation Tier

General Comments

Most candidates performed quite well on this paper and there was clear evidence that they were well prepared for the examination. There was no evidence that any of the candidates ran out of time.

Candidates should be aware that this question paper contains a number of multi-choice style of questions and that with questions of this type, candidates are well advised to at least make an attempt to answer them. They should at least try to eliminate incorrect responses and then take a guess at the correct answer.

The paper is marked by electronic marking after first being scanned and then fed electronically to examiners. It is now more important than ever that candidates use legible writing and restrict their responses to the boxes, spaces and lines that have been provided rather than writing in margins and other areas that may not be visible to examiners in the electronic copy.
The paper discriminated well with a mean mark of approximately 18 and candidates distributed across almost the whole range of marks available.

Comments on Individual Questions

1 Part (a) proved to be a difficult start to the paper with approximately two thirds of candidates failing to score. Good candidates realised that all the sugar was reabsorbed but only some of the salt and water. Common errors included the kidneys not absorbing any salt or sugar at all.
Part (b) however was well answered with most candidates scoring at least one or both of the marks available. Correct answers included the amount of salt in the blood or drinking fluids.

2 Part (a) was about the process of diffusion. Most candidates failed to score and only the most able scored both of the marks. Credit was given for referring to molecules or particles and for stating that they moved from an area of high concentration to an area of low concentration. Common errors included reference to the movement of substances or chemicals and confusion with osmosis.
Part (b) was also surprisingly not answered very well. Many candidates failed to understand that dissolved food and oxygen must diffuse into a cell and that carbon dioxide must diffuse out. This should have been a straight forward question but because all three correct responses were required for the mark, only the most able scored the mark.
In part (c) once again candidates found the question difficult. Perhaps this is one area of the syllabus that would repay dividends for extra study. Over half the candidates failed to score with only the most able getting all four responses in the correct order.

3 Part (a) was answered correctly by almost all candidates. Recalling definitions has not always been done so well and it is pleasing to see that centres are rehearsing definitions to enable even less able candidates to score some marks.
Part (b) discriminated well with almost half the candidates scoring both marks and approximately a quarter of candidates failing to score any marks at all. Credit was given for getting all three lines on the left hand side correct and then all three lines on the right hand side correct.
Part (ci) was not answered well by most candidates. Many candidates failed to understand what was required by the question and gave answers that referred to controlling body

temperature. Only the most able realised that this question was about molecules moving faster, and having more energy and successful collisions between the molecules. Even the first easy mark of the rate of reaction increasing, was only gained by less then 20% of candidates.
Part (cii) however was answered well. Almost all candidates realised that water was being lost from the body by sweating.

4 Part (a) discriminated well. Most candidates scored at least one mark with the more able scoring both of them. Common misconceptions were that DNA is kept in the cytoplasm and that proteins are made in the nucleus.
In part (b) many candidates failed to read the question and failed to notice that only one line was required. Very many candidates attempted to draw three lines and forfeited the mark. Candidates cannot be reminded too often that they should read each and every question most carefully. This common error resulted in only a quarter of candidates scoring this relatively easy mark.
Part (ci) proved to be challenging for other reasons. Most candidates failed to score either of the two marks. More able candidates realised that the DNA first separates and then copies itself. This simple answer scored both of the marks.
Part (cii) also proved to be challenging with only one third of candidates scoring. Even though the example provided was not familiar to the candidates they should have realised that meiosis would half 22 chromosomes to a total of 11. In the past candidates have scored well when human examples have been used. Candidates clearly have a problem transferring skills from a familiar to a new situation.

5 Part (a) was well answered with most candidates correctly identifying the brain and the spinal cord as the correct answers.
Part (b) proved to be slightly more difficult, but most candidates scored at least one of the three marks. Approximately ten percent of candidates correctly identified all three responses and put them in the correct order.
Most candidates failed to score on part (d). At least two correct responses were required for one mark and for many candidates this proved to be too difficult. Common errors included mixing up effectors and receptors and thinking that the spinal cord was in fact the brain.

6 In part (a) most candidates correctly identified one person, but only approximately ten percent of candidates correct identified both George and Charley as the correct people.
Part (bi) was rarely answered well and credit was given for phonetically correct responses, such as "merry stems" instead of meristems.
Part (bii) also proved to be difficult. Although most candidates could correctly name a plant organ, such as a stem or a leaf, far fewer could name a plant tissue such as xylem or phloem. All too often candidates gave examples form the animal kingdom and failed to score.

7 Part (a) was correctly answered by most candidates giving the answer of electrical stimulation.
Part (bi) was also correctly answered by most candidates showing that once again, remembering a definition, in this case that, memory is the storage and retrieval of information, can repay dividends.
Part (bii) produced a mixed bag of responses. Almost 40% of candidates failed to score and many others gave answers, that although were credited, were not good answers. More able candidates gave responses such as intelligence, language or consciousness.

8 Many candidates found part (a) quite challenging with "voluntary" given as a common incorrect response. Approximately one third of candidates gave the correct response of "simple".
Part (b) proved to be surprisingly difficult. The most common misconception was that learning causes impulses to be transmitted more quickly or more strongly. Very few candidates gave the last response as the correct answer.
Part (c) was an easy end to the paper with the vast majority scoring both of the marks available by naming Mike and Hannah.

A222/02 Twenty First Century Science Biology A (B4, B5, B6) Higher Tier

General Comments

The paper was accessible to the majority of candidates. The free-response items have continued to be challenging for many candidates. The most able candidates provided clear response, presented in a logical order. The number of candidates using the space below the dotted lines provided for answers appeared to be less than previously observed. This is encouraging. In general, candidates showed a sound knowledge and understanding of homeostasis, the cell cycle and phototropism. Candidates did, however, show the least confidence in the areas of ADH release and subsequent activity, the definition of osmosis and the link between DNA and protein synthesis.

The majority of items did not appear to generate errors due to the misinterpretation of instructions or rubric. The candidate scores ranged from 5 to 41 out of a maximum of 42 marks, demonstrating a wide range of performance according to knowledge and understanding of candidates. 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 was generally clear and did not prevent candidates from obtaining marks. 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 generally understood the nature of homeostasis.
1(b) Most candidates showed a sound knowledge of receptors, effectors etc. and the overlap with artificial control systems.
1(c) Although many realised that the rate of reaction increased, relatively few candidates appreciated that the molecules move faster, leading to an increased frequency or energy of collisions.
1(d) Some candidates struggled with the calculation but not clear pattern emerged with regards to alternative answers.

2(a) It is unfortunate that a number of candidates failed to refer to water molecules when describing the movement from a high concentration (of water) to a lower concentration (of water). A number of candidates provided a definition without a reference to the membrane.
2(b) Many did well with this item. No pattern was observed in relation to other responses.
2(c) The stem of the item referred clearly to the three solutions but a number of candidates gave good responses without any reference to the solutions. This often prevented them from obtaining full marks, although it appeared that they understood the biological processes taking place.

3(a) Most candidates were aware that the pituitary gland is the site of 'release' of ADH into the blood.
3(b) Although some candidates were able to recall the features of alcohol impact on ADH production/urine formed, many struggled with the effect of Ecstasy.
3(c) This item was answered well by very able candidates. The link between ADH production and the concentration of blood/the body was not generally appreciated. This prevented some from explaining the negative feedback concept.

4(a) This item was generally answered without any difficulty. Very few candidates seemed to struggle with the link between number of base types and the pairing in DNA.
4(b) Good descriptions of DNA unzipping and duplication were provided. However, some candidates linked this to stages of mitosis.
4(c) The concept of base sequence and amino acid sequence in protein synthesis was generally poorly understood. Some did, at least, appreciate that DNA bases were involved.
4(d) This item was quite challenging but a number of candidates were able to respond without any apparent difficulty. This is an encouraging start to understanding the effect of mutations on DNA and protein structure.

5(a) Although many were able to work out the sentence completion without any problems, some did confuse the final reference to 'sugars' with 'minerals'.
5(b) Some candidates did not realise that they had to tick two boxes. This was, clear in the stem of the item.
5(c) Many candidates showed a good understanding of auxin migration during phototropism.

6(a) Relatively few candidates failed to obtain at least one mark for this item. Most realised the two correct responses in this 'talking heads' item.
6(b) Many candidates realised that the meristem was the structure described.

7(a) The repeated use of one of the options in the 'sentence completion' item did not challenge candidates. However, many selected incorrect options but without a clear pattern of alternative responses.
7(b) The most able candidates were able to cope well with this item. Many others struggled to recognise the first option, 'only the sensory neurone release...'.
7(c) Many candidates made the correct link between Ecstasy and serotonin removal/ concentration at the synapse.

8(a) Although some candidates struggled to explain memory, some were able to recall the precise definition. A number of candidates recalled the storage aspect but then moved on to describe 'remembering things', rather than recall or retrieval of information.
8(b) This item was generally well-answered without a clear pattern of alternative responses provided.

9(a) Again, this item was well-answered by many candidates.
9(b) Many responses were fully correct but some candidates realised that the brain was involved and confused 'motor' with 'sensory' neurons.

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