

## **Biology A**

**Twenty First Century Science Suite**

**General Certificate of Secondary Education J633**

## **OCR Report to Centres**

---

**January 2012**

**1792197247**

**J633/R/12J**

OCR (Oxford Cambridge and RSA) is a leading UK awarding body, providing a wide range of qualifications to meet the needs of candidates of all ages and abilities. OCR qualifications include AS/A Levels, Diplomas, GCSEs, OCR Nationals, Functional Skills, Key Skills, Entry Level qualifications, NVQs and vocational qualifications in areas such as IT, business, languages, teaching/training, administration and secretarial skills.

It is also responsible for developing new specifications to meet national requirements and the needs of students and teachers. OCR is a not-for-profit organisation; any surplus made is invested back into the establishment to help towards the development of qualifications and support, which keep pace with the changing needs of today's society.

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.

OCR will not enter into any discussion or correspondence in connection with this report.

© OCR 2012

Any enquiries about publications should be addressed to:

OCR Publications  
PO Box 5050  
Annesley  
NOTTINGHAM  
NG15 0DL

Telephone: 0870 770 6622  
Facsimile: 01223 552610  
E-mail: [publications@ocr.org.uk](mailto:publications@ocr.org.uk)

## CONTENTS

**General Certificate of Secondary Education**  
**Biology A (Twenty First Century Science) (J633)**

### OCR REPORT TO CENTRES

<b>Content</b>	<b>Page</b>
Overview	1
A221/01 Twenty First Century Science Biology A (B1, B2, B3) Foundation Tier	3
A221/02 Twenty First Century Science Biology A (B1, B2, B3) Higher Tier	6
A222/01 Twenty First Century Science Biology A (B4, B5, B6) Foundation Tier	9
A222/02 Twenty First Century Science Biology A (B4, B5, B6) Higher Tier	11

## Overview

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.

Once again, candidates taking the Biology papers in 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 these papers achieved that aim. Most centres had prepared their candidates well for the examination. 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 as there were fewer no-responses than previous sessions.

As always, there are lessons to be learned and specific points relating to each paper are picked up in the individual reports for each paper. 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.

Centres will now be fully aware that question papers of this style are being replaced, as required by OFQUAL with a more rigorous style of paper that includes 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. It is vital that candidates use legible handwriting. 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 also 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.

OCR Report to Centres – January 2012

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, it is likely 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](http://www.ocr.org.uk)

# A221/01 Twenty First Century Science

## Biology A (B1, B2, B3) Foundation Tier

### General Comments

Many of the Candidates entered showed a wide range of knowledge and understanding of the areas of Biology covered by this paper. While most of the responses were appropriate, some questions were poorly answered eg 5b and 8. Where there were opportunities for candidates to express themselves in their own words, many of the responses suffered from either poor use of technical terms or from being poorly thought through. It is disappointing to see Candidates contradict themselves, and thus be unlikely to gain credit. Some responses were too superficial, and future Candidates might do well to practice writing an appropriate length of answer for the number of marks on offer.

### Comments on Individual Questions

- 1a asked Candidates to identify the nucleus as the site genes are found. Most, but by no means all, candidates were able to do so.
- 1b required two boxes to be ticked, one for “instructions for a cell” and the other for “code for making proteins”. Most candidates scored at least one of these marks, and there did not seem to be a particular bias towards which statement was correct in the one mark responses.
- 1c like 1b required two boxes to be ticked. It was pleasing to see that virtually all of the candidates followed these instructions.
- 2a was well answered with most candidates shading only the third box from the bottom on Anita’s chromosome.
- 2b seemed to be the hardest part of Question 2. The mark for alleles was scored more frequently than the one for saying Anita’s versions are recessive. Perhaps the concept of dominant vs. recessive was less well understood than the concept of alleles.
- 2c was very well answered, with candidates showing a good appreciation for the fact that alleles are inherited from both parents.
- 3a was looking for a response along the lines of the couple deciding whether or not to become pregnant. A number of responses were not credited because they talked about decisions relating to a pregnancy already underway.
- 3b was not generally well answered. Some of the responses which were not credited made a reference to “mucus” without any qualification, so perhaps candidates need to work as much on how to structure an effective answer, as recalling a little information. The best answers were very clear and talked about both respiratory and digestive difficulties.
- 3ci was very well answered.
- 3cii was not as well answered as part i, although many of the incorrect responses did include one of the two names (either Andy or Stella) required for the mark.

## OCR Report to Centres – January 2012

3ciii seldom gave candidates two marks, and the most common marking point scored was the idea that different individuals will have different life spans. Few candidates went on to give further detail such as the lifestyle factors listed in the mark scheme.

4a required recall that viruses cannot be killed by antibiotics, and was correctly answered by just over half of the candidates.

4b was less well answered but many candidates did manage to score one of the two marks by making only one error in the five true/false options. The most common mistake seemed to fall on the fourth question about stopping taking antibiotics once the patient feels better.

4c was the best answered part of Question 4 but many still failed to appreciate that a vaccine is a safe form of the disease-causing microorganism.

4d proved difficult for many candidates. The most common error was to simply repeat information given in the text of the question without adding any extra information. Successful answers discussed changes in the shape of the virus or its antigens. Many candidates showed confusion over the roles of vaccines and antibiotics in their responses to this part of the question.

5a showed a perhaps surprising number of responses opting for the first box, although there were relatively fewer opting for the other incorrect boxes. This may point up a clear area of misunderstanding – that heart muscle is supplied with oxygen from blood inside the heart.

5b was very poorly answered because many of candidates failed to follow the instructions and draw the correct number of lines either on the left or the right of the middle column of boxes. Where one mark was scored, it was most often for getting the features linked to the correct functions. As in previous series there was a general weakness in linking arteries and veins to appropriate features.

5c was better answered, but a common failing was for candidates to emphasise what the scientist should do rather than concentrating on processes involving the wider scientific community eg peer review. It would have been pleasing to see more references to publication of the data.

5d was particularly well answered. Responses showed widespread understanding of risk factors for heart disease.

5ei was often answered correctly. Where there were mistakes, it was mostly in indicating the deposits inside the wall of the artery.

5eii elicited some good responses, but many suffered from either confusion about where the restricted flow would be going (eg around the body) or from being overly categorical about shutting off blood supply rather than restricting flow.

6 more often saw one mark scored rather than two. There was no clear pattern as to which correct option was chosen in these responses. It was perhaps a little surprising that the statement that View 2 conflicts with View 1 was not chosen more often, and the issue here may have been one of vocabulary.

7 was very well answered. Many candidates scored all three marks, and nearly all scored one or two marks. There was a tendency among some candidates to use “hundred” or “thousand” instead of “million” in the first sentence, so perhaps there was some weakness in appreciating how long ago life began.

OCR Report to Centres – January 2012

8 was poorly answered. A lot of responses were muddled and self contradictory in ways that suggested that candidates began writing before finishing thinking through their answer. The most commonly scored marking point was for saying that human choice is important in artificial selection.

9 usually scored one if not both marks. The most common mistake was to ignore the correct ring including “introduction of a new predator”. Given the poor responses in 5b, it was pleasing to note most candidates at least offering four lines on the diagram in this question.

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

## General Comments

Since the new Unit 1 paper A161/02 was offered this year, the number of candidates entered for this paper was much lower than last year. The proportion of more able candidates seemed to be lower.

Most candidates seemed to be well prepared and made a very good attempt at answering the questions. However candidates would be well advised to ensure that their writing is legible and contained within the space provided. The paper was suitably challenging and discriminated well between candidates. Very few sections were unanswered suggesting that the paper was accessible to most candidates. There was no evidence that any of the candidates ran out of time.

## Comments on Individual Questions

### Question 1

Most candidates answered part (1a) well and placed the X directly on the nucleus. Errors were rare but no responses were more common. This was possibly due to candidate's haste and failure to read the question carefully and spot the instruction.

Part (1bi) was a harder question but still well answered with most candidates giving the correct answer of recessive.

Part (1bii) proved to be more challenging. Candidates were not told how many correct answers were expected and had to do quite a lot of working out to gain the three marks. One mark was awarded for each set of parents correctly identified and the third mark for the single parent on the right hand side of the family tree. Some candidates jeopardised their marks by failing to read the question carefully and identifying people in the second or fourth generations. Only about a sixth of candidates managed to score all three marks.

Question (1biii) proved to be almost as difficult for able candidates as it did for less able candidates and did not discriminate well. Although approximately half of all candidates gave the correct answer of 50%, it is also possible that more able candidates were seduced by the apparently correct answer of 33.3%.

Only the most able candidates realised the correct answer to part (1ci) was B. Weaker candidates failed to remember that Huntington's is a dominant disorder and they also failed to understand that Hh is not a carrier but in fact has the condition.

Approximately two fifths of candidates managed to gain both marks on part (1cii). "A" was the most commonly given correct answer with the more able candidates also correctly identifying "F".

### Question 2

Part (2a) proved to be a tricky question. The answer that was required, was that the couple must decide if they are going to have any children. However all too often candidates worded their answer in such a way that it was unclear to the examiners if the couple were thinking about whether to attempt to become pregnant or whether to terminate an existing pregnancy. It is most important, particularly with the introduction of the new style examination papers, that candidates can marshal their thoughts and answer in a clear and coherent manner.

## OCR Report to Centres – January 2012

Part (2b) required candidates to write down two symptoms of cystic fibrosis. The most common error was for candidates to write down two similar symptoms such as a cough and lung infections. Answers such as these were not credited as what was required were two distinct symptoms such as sticky mucus and cough or difficulty digesting food.

(2ci) proved to be a very easy question with almost all candidates scoring the single mark. Part (2cii) was also well answered with approximately four fifths of candidates correctly identifying both Andy and Stella.

Part (2ciii) discriminated well. Most candidates managed to score at least one of the marks available, usually for saying that everyone is different and therefore it is not possible to say when someone will die as the severity of cystic fibrosis varies from person to person. More able candidates also went on to say that some other factor could be involved in the person's death such as another illness, accident, or environmental factor such as lifestyle.

### Question 3

Approximately two thirds of candidates managed to score the mark in part (3a) for stating that vaccination was the causal link that was thought to increase autism.

Part (3b) was not answered well with almost half of the candidates failing to score. All too often candidates gave vague answers about peer review and failed to focus in on what the question was really asking. Good answers stated that if the results were similar when repeated by other scientists, the evidence was more reliable and would be likely to show up any errors in the original piece of research. Candidates would be well advised to read questions more carefully and answer what is actually being asked rather than write down a previously prepared answer. Part (3ci) was not answered well. Almost four fifths of candidates failed to understand what was meant by a positive correlation and interpret the graph correctly. Most answers involved a negative correlation and therefore did not score. Only the most able candidates gave the correct answer of 90 to 91.

Part (3cii) also proved to be a tricky question. Candidates had to realise that the graph does not support the theory and then go on to explain that as vaccination rates fall the levels of autism rise. The most common error was for candidates not to examine the graph carefully and mix up the two lines. Thus candidates who referred to vaccination rates rising as autism levels fell, did not score.

Part (3d) was a pleasant surprise as what was thought to be a challenging question gave candidates an easier opportunity and almost all managed to gain some of the three marks available with well over half scoring all three. It was pleasing to see that so many candidates could distinguish between technical limitations and values.

Part (3e) 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 non-vaccinated people actually coming into contact with ill people are reduced. This idea of contact is essential to access the marks for this question.

### Question 4

Question (4) proved quite challenging as the number of correct responses was not stated in the question. Although candidates could infer that as the question was worth three marks, three correct answers were required, this logic cannot always be relied upon as sometimes four responses may be required for three marks. Approximately half of candidates managed to score two marks with a fifth scoring all three.

### **Question 5**

Question (5) discriminated very well and only the most able realised that there were two correct responses for the hormonal system and three correct responses for the nervous system. As always with this type of question, candidates are well advised to think carefully before drawing their lines and then making them clear and direct from box to box. Crossed out lines, or lines that go via a circuitous route only increase the chances of an examiner failing to award the correct marks.

### **Question 6**

It is pleasing to see how much improvement there has been when candidates answer questions concerning Ideas about Science. Two or three years ago most candidates would have had considerable difficulty answering this type of question. However most candidates managed to score at least one of the marks and a significant number were able to gain both marks for this question. Both teachers and candidates are to be applauded.

### **Question 7**

This question proved to be very challenging. Candidates needed to think carefully how they were going to answer this question. Those who just wrote down what came into their heads often presented a disorganised response and missed out on the opportunity of scoring most of the marks. Good answers made clear comparisons, both in similarities and differences, and included reference to choice, characteristics, sexual reproduction, and that artificial selection produces quicker results that are less random.

### **Question 8**

Part (8a) was not answered well. Candidates needed to think carefully about the implications of a reduction of crabs on the population size of the larger fish. Candidates were well clued into what was required by being told that the large fish population remain unchanged. All too often answers only gave a part or one side of the story. The most common answer that only scored one of the three marks was that the smaller fish and shrimp population would rise thus increasing the food supply for the larger fish. However very few went on to say that the turtle population would be reduced thus forcing sharks to eat more large fish, to gain the second mark. The third mark was awarded for saying that the two effects balanced out thus explaining why the population of large fish remained unchanged.

Part (8b) was a nice easy end to the paper and allowed most candidates to score all three marks. Very few candidates failed to score at least one of the marks and it was pleasing to see that even those candidates who did not know the answer at least attempted to answer the question. There were very few no-responses.

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

## General Comments

This paper was quite accessible to the majority of candidates sitting this examination in January.

The candidates were well prepared for this paper although the free response questions did challenge the candidates. There was no evidence that candidates ran out of time and it was encouraging to see very few “no responses” in the scripts marked.

## Comments on Individual Questions

1 Part a) The majority of the candidates achieved this mark.

Part b) Many of the candidates scored one mark. This was usually for a correct 1<sup>st</sup> response linking receptors and skin. Many linked effectors with blood rather than the correct linking of receptors and blood for the 2<sup>nd</sup> response.

Part c) This was a 3 mark question which required the candidates to link cooling the body down to the mechanism that brings this about. In the majority of responses candidates gained one mark for cooling the body down.

2 Part a) Many candidates scored at least one mark for the correct response, food. Some named the process of respiration correctly, however breathing was often written rather than respiration.

Part b) This question was attempted by the majority of candidates with most gaining at least one mark for either the correct response of urine or salt.

3 Part a) This question on the process of osmosis proved difficult for most candidates. They need to make sure that they look at the number of marks allocated to a question and ensure that their answer is sufficiently detailed to reflect this.

Part b) Most candidates attempted to answer this question, usually gaining one mark for the correct response to row 2.

4 Part a) This question on the events that occur in the cell cycle and mitosis proved to be a difficult challenge for most of the candidates. Candidates tended to know that the cell divides during mitosis, however they had to have a clear indication of three correct responses to achieve one mark.

Part b) Many of the candidates gave the response of 6 to this question rather than the correct response of 18. It would be good advice to remind candidates to make sure that they have understood what the question is asking them to do before answering.

Part c) This was well answered by the majority of the candidates who knew that gametes are produced by meiosis.

Part d) This question proved to be a challenge for most candidates, only a few of them knew that after gametes fuse the zygote would contain the correct number of chromosomes.

OCR Report to Centres – January 2012

5 Part a) This question was well answered by the candidates and most had written Liam as one of their two responses with most correctly indicating both Liam and Arthur.

Part b) Most candidates knew that the genetic code was stored in the nucleus, although fewer knew that the cytoplasm was where proteins are made.

6 Part ai) This question was answered well. Most candidates demonstrated that they knew at least one of the correct statements about cell specialisation.

Part aii) Candidates needed two correct responses in this question for one mark. Half of the candidates achieved this mark with the majority of those who hadn't writing "specialised" rather than the correct response "unspecialised".

Part bi) Some candidates had written phototropism in response to the question, however many had written photosynthesis.

Part bii) This question needed candidates to address why the seedling was growing towards the light source and therefore needed to qualify their responses with an indication of receiving more light and the importance of this.

7 Part a) This question was particularly well answered and most candidates had only drawn one straight line from and to each box.

Part b) The majority of candidates did not achieve this mark; all four possible responses were indicated as possible correct responses.

Part ci) Most candidates knew description of structure of the axon.

Part cii) It was encouraging to note that some candidates knew that the fatty sheath was important in insulation, however only a few indicated that it increased the speed of transmission.

8 Part a) Here candidates needed to state one way of studying the cerebral cortex. Many candidates who failed to score this mark had given very general answers such as brain scan.

Part bi) It was encouraging to see that the majority of candidates knew that memory is the storage and retrieval of information.

Part bii) Candidates needed to give two correct responses here for one mark. Most candidates who failed to achieve this had given one correct response and need to be encouraged to check that they have given sufficient responses to gain the possible marks.

9 Part a) This question required candidates to write the correct response in the spaces provided. Just under half of the candidates scored at least one mark on this question, usually for the correct responses "brain" and "repetition".

Part b) The majority of candidates knew which actions could be learned and gained the final mark on this paper.

# A222/02 Twenty First Century Science

## Biology A (B4, B5, B6) Higher Tier

### General Comments

This paper appeared to be well-received by the vast majority of candidates who had been taught and prepared well for the examination. Most candidates completed all items and appeared to have sufficient time to complete the paper. Very few candidates wrote extensive responses beyond the space provided and most seem to be well-versed with the rubric of this objective and free-response paper. The responses were generally very clearly-written, with few candidates crossing-out earlier attempts.

### Comments on Individual Questions

- 1(a) Although many candidates realised that the movement of water takes place across a partially permeable membrane (or equivalent term), many failed to clarify the direction of movement, referring to high to low concentration without reference to water molecules.
- 1(b) This question was answered well by many candidates. No clear pattern of alternative responses was identified.
- 2(a) Most candidates were not challenged by this question. They used the scaffolding provided by the objective nature of the item.
- 2(b) Again, many candidates responded well to this question. No clear pattern of alternative responses was identified.
- 2(c) A number of candidates correctly linked this topic to the 'lock and key' hypothesis. Most realised that the molecule must fit into the enzyme but not all referred to the active site.
- 3(a) This item was generally well-answered by most candidates.
- 3(b)(i) Very few candidates appreciated the building up of urea in the dialysate fluid but some did understand that diffusion rates could stop or be limited if the dialysate was not constantly replaced.
- 3(b)(ii) Some candidates did very well and obtained full marks. A number were puzzled by the lack of protein exchange across the artificial kidney membranes.
- 4(a)(i) Many candidates scored well on this question.
- 4(a)(ii) This question did not pose a challenge to most candidates although a few confused 'unspecialised' with 'specialised' cells.
- 4(b)(i) Most candidates appreciated that the auxin collects on the side of the shoot in the shade.
- 4(b)(ii) It was unfortunate that many candidates failed to qualify the nature of more light, more photosynthesis and more or greater growth. It was reassuring to note that many identified this process as a way of increasing the chance of survival.
- 5(a) This question was answered well by many candidates. No clear pattern of alternative responses was identified.

OCR Report to Centres – January 2012

5(b) It seemed that some candidates were concerned about the correct response of '0'. Some candidates chose other numbers, without a clear pattern emerging.

5(c) Some candidates were reluctant to eliminate the central collection of bases. This led them to identify, incorrectly, amino acids 2, 4 and 2, rather than the correct combination of only amino acids 2 and 4.

6 Although many candidates provided responses in a relatively unstructured manner, they were able to gain almost full marks in relation to fundamental features of cell division. The reference to cloning was not appropriate for this question.

7(a) Many correctly identified all four responses. Some were able to recognise the 'brain' and 'repetition' areas but not the two central spaces. No clear pattern of alternative responses emerged.

7(b) This item was very straight forward and few candidates were challenged by the concepts involved.

8(a) The pattern of responses for the correct answer was 'E, D, A and F'. Many candidates completed this without any problem but some replaced F with C.

8(b) This item was well-understood by most candidates.

9(a) Most candidates gained the mark for this question.

9(b) It was very reassuring to see that a significant number of candidates obtained full marks for this question. No clear pattern of alternative responses was identified.

**OCR (Oxford Cambridge and RSA Examinations)**  
1 Hills Road  
Cambridge  
CB1 2EU

**OCR Customer Contact Centre**

**Education and Learning**

Telephone: 01223 553998  
Facsimile: 01223 552627  
Email: general.qualifications@ocr.org.uk

**www.ocr.org.uk**

For staff training purposes and as part of our quality assurance programme your call may be recorded or monitored

**Oxford Cambridge and RSA Examinations**  
is a Company Limited by Guarantee  
Registered in England  
Registered Office; 1 Hills Road, Cambridge, CB1 2EU  
Registered Company Number: 3484466  
OCR is an exempt Charity

**OCR (Oxford Cambridge and RSA Examinations)**  
Head office  
Telephone: 01223 552552  
Facsimile: 01223 552553

© OCR 2012

