OCR
Oxford Cambridge and RSA

GCE

Biology B (Advancing Biology)

Advanced Subsidiary GCE **AS H022**

OCR Report to Centres June 2017

About this Examiner Report to Centres

This report on the 2017 Summer assessments aims to highlight:

- areas where students were more successful
- main areas where students may need additional support and some reflection
- points of advice 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.

The report also includes:

- An invitation to get involved in Cambridge Assessment's research into **how current reforms are affecting schools and colleges**
- Links to important documents such as **grade boundaries**
- A reminder of our **post-results services** including Enquiries About Results
- **Further support that you can expect from OCR**, such as our Active Results service and CPD programme
- A link to our handy Teacher Guide on **Supporting the move to linear assessment** to support you with the ongoing transition.

Understanding how current reforms are affecting schools and colleges
Researchers at Cambridge Assessment[1] are undertaking a research study to better understand how the current reforms to AS and A levels are affecting schools and colleges.
If you are a Head of Department (including deputy and acting Heads), then we would be very grateful if you would take part in this research by completing their survey. If you have already completed the survey this spring/summer then you do not need to complete it again.
The questionnaire will take approximately 15 minutes and all responses will be anonymous.
To take part, please click on this link: https://www.surveymonkey.co.uk/r/KP96LWB

Grade boundaries
Grade boundaries for this, and all other assessments, can be found on Interchange. For more information on the publication of grade boundaries please see the OCR website.

Enquiry About Results
If any of your students' results are not as expected, you may wish to consider one of our Enquiry About Results services. For full information about the options available visit the OCR website. If university places are reliant on the results you are making an enquiry about you may wish to consider the priority 2 service which has an earlier deadline to ensure your enquires are processed in time for university applications.

Supporting the move to linear assessment
This was the first year that students were assessed in a linear structure. To help you navigate the changes and to support you with areas of difficulty, download our helpful Teacher guide: http://www.ocr.org.uk/Images/345911-moving-from-modular-to-linear-science-qualifications-teachers-guide.pdf

Further support from OCR

activeresults

Active Results offers a unique perspective on results data and greater opportunities to understand students' performance.
It allows you to:

- Review reports on the **performance of individual candidates**, cohorts of students and whole centres
- **Analyse results** at question and/or topic level
- **Compare your centre** with OCR national averages or similar OCR centres.
- Identify areas of the curriculum where students excel or struggle and help **pinpoint strengths and weaknesses** of students and teaching departments.

http://www.ocr.org.uk/administration/support-and-tools/active-results/

CPD Hub
Your route to OCR's teacher training

Attend one of our popular CPD courses to hear exam feedback or drop in to an online Q&A session.
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[1] Cambridge Assessment is a not-for-profit non-teaching department of the University of Cambridge, and the parent organisation of OCR, Cambridge International Examinations and Cambridge English Language Assessment.

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Advanced Subsidiary GCE Biology B (Advancing Biology (H022))

OCR REPORT TO CENTRES

H022/01 Foundations of biology

General Comments:

AS level Biology B (Advancing Biology) offers a context-based approach to learning with a range of topics assessed across two papers. For H022/01 candidates need to demonstrate 'breadth' of learning across the whole AS specification. Mathematical and practical skills were embedded within both the multiple choice questions in section **A** and the longer responses required in section **B**. This question paper appeared to be accessible to candidates across the ability range with no evidence to suggest that candidates struggled for time towards the end of the paper. This could be a reflection of the fact that centres had prepared candidates and coached them in allocating their time appropriately across the two sections of the paper.

Overall, candidates demonstrated a wide range of ability with stronger candidates applying their knowledge to new situations to gain higher level marking points and lower achieving candidates displaying their ability to learn and recall facts.

Centres are encouraged to explain to candidates the need to write legibly as in some instances, responses proved difficult to read.

Comments on Individual Questions:

Section A

This section of the paper consisted of 20 multiple choice questions covering a range of topics across the breadth of the AS Biology B specification. It is therefore important that candidates are fully prepared and ensure thorough revision of the whole AS specification for this examination. Some of the questions were straightforward recall whilst others required the use of mathematical and/or analytical skills; some questions needed more time than others.

It was pleasing to see that these questions were attempted by all candidates with only Q13 receiving an omission. Candidates had been advised to spend no longer than 25 minutes on this section and, since the question paper was completed by the majority of candidates, it appears that candidates managed their time effectively.

If candidates change their mind about an answer, they should clearly cross out the letter and write the intended answer clearly in or beside the answer box. If letters are altered then the resulting 'hybrid' could be deemed to be ambiguous and so not credited.

Section **A** achieved a good spread of marks with stronger candidates able to demonstrate knowledge of the subject content without being distracted by the alternative options offered alongside the correct response.

Question 1

A straightforward recall question to start the paper was accessible to all candidates across the ability range.

Question 2

The link between the kinetic energy of water molecules and transpiration factors was assessed here which was answered correctly by a high proportion of candidates.

Question 3

Candidates were required to correctly identify a blood pressure measurement which would show hypotension. The most common incorrect response was **C** which showed a hypertensive measurement.

Question 4
This question was straightforward recall and the majority of candidates chose the correct response.

Question 5
The majority of candidates offered the correct option here for a double-blind clinical trial and there were few incorrect responses.

Question 6
This should have been fairly straightforward for candidates who could recall the enzyme-controlled reactions of blood clotting. However, many candidates incorrectly suggested option **A**, possibly failing to spot that, whilst the conversion of fibrinogen to fibrin was the correct reaction, the enzyme thromboplastin, in this distractor, was incorrect.

Question 7
Candidates did have to process some information from a table in this question and choose appropriate values to perform a percentage prevalence calculation. Whilst candidates often struggle with such calculations in section **B**, this posed little problem for 80% of candidates who identified the correct response.

Question 8
The majority of candidates chose the correct option for this question.

Question 9
This question proved challenging for some and required careful reading to choose the most appropriate response regarding the *HER-2/neu* gene.

Question 10
It was pleasing to see many candidates able to correctly apply their knowledge of antigens and antibodies to blood groups. It should be noted that some candidates put the number “1” in the answer box rather than the correct response i.e. the letter, **A**. As there was no ambiguity, candidates were given the benefit of the doubt in this case. However candidates need to be aware that, in multiple choice questions, the options for each question are **A** to **D** and that it may not always be possible for examiners to apply benefit of the doubt.

Question 11
This question tested knowledge of the relatively new concept of flow cytometry. Candidates were required to interpret a diagram and process information to formulate their response which did prove challenging for many candidates.

Question 12
It was pleasing to see candidates able to process information rather than simply recalling visual traces for ECGs with many offering option **B** as the correct response.

Question 13
This required a straightforward calculation of area and if candidates recalled their knowledge of inhibition zones in Kirby-Bauer tests they would only have had to perform one calculation to achieve the correct response, option **D**.

Question 14
The majority of candidates chose the correct option for this question.

Question 15
There were many correct responses for the type of stem cell being described.

Question 16
In this question candidates had to process both textual and diagrammatic information about cell / nuclear division. Candidates who noticed and understood the reference to the diploid number of the cell being four were then able to apply this knowledge to analysing the diagram and choosing **C** as the correct option.

Question 17
This was a straightforward recall question, although some candidates still confuse Down's, Klinefelter's and Turner's syndromes.

Question 18
This was a tough mathematical challenge towards the end of this section and, whilst there were no omissions, only the higher attaining candidates were able to process the information and correctly calculate the number of stomata.

Question 19
This biochemistry-based question proved challenging. Candidates were required to use their knowledge of pentose and hexose structures to choose the correct diagram for a given molecular formula. The only pentose i.e. C5 monosaccharides were found in options **C** and **D**. Counting the atoms within the molecules would have given candidates the only possible option for the ratio of hydrogen to oxygen as option **D**.

Question 20
The majority of candidates chose the correct option for this question.

Section B

Question 21
This question addressed both **AO1** and **AO2** with a biochemical theme around nucleic acids and the genetic code aimed at assessing the ability of candidates to apply knowledge in context.

Q21(a)(i) Two responses were required here for 1 mark and few candidates gave both **Q** and **R** needed to gain credit. However, over half of the candidates gave correct responses for parts **(a)(ii)** and **(iii).**

The most common correct response in **Q21(b)** was the **ALLOW** in additional guidance with reference to ribose and deoxyribose, rather than the absence of the O atom on the part of the molecule labelled **Q**.

In **Q21(c)**, high attaining candidates gained maximum marks demonstrating good understanding of the degenerate and non-overlapping nature of the genetic code. Some candidates, however, described the molecular structure of DNA or lacked detail of the genetic code, whereby marks could not be awarded.
Candidates achieved marks to **Q21(d)(i)** by describing the double helix and there were few references to phosphodiester bonds, or the sugar-phosphate 'backbone'.

Q21(d)(ii) proved challenging. Stronger candidates understood the idea that breaking down mRNA would prevent unnecessary production of proteins so would save energy and resources within the cell. References to mutations in mRNA or recycling did not gain credit.

Question 22
All three assessment objectives were addressed in this question which had a practical theme involving beetroot plants and betalain pigments.

In **Q22(a)** the majority of candidates were able to correctly state the membrane surrounding the plant cell vacuole as the *tonoplast*.

Q22(b)(i) required candidates to demonstrate their understanding of controlling experimental variables and references to temperature and size of beetroot discs were the most commonly seen creditworthy responses. However, some candidates stated length of time or volume of the solution which could not be credited as these possible variables had already been given in the question stem. There were also several responses in which the candidates had named variables but then failed to explain how they would be controlled.
Many candidates were able to correctly describe the trend in **Q22(b)(ii)** but few were able to go on to offer detailed explanation of the effect of low pH, i.e. high level of H+ ions on the structure of cell membranes with regards to protein channels and the permeability to betalain. Centres are encouraged to continue to impress on candidates the importance of using scientific theory in their explanations.

For **Q22(c)** many candidates were able to gain one mark, usually for reference to the phospholipid bilayer but examiners saw a few excellent, detailed responses from higher attaining candidates.

The most commonly seen correct responses for **Q22(d)(i)** involved references to vasodilation and increased blood flow, with few candidates referring to mast cells releasing histamine or increased permeability of the capillary walls. Some good responses that included betalain binding to receptor sites or to cytokines were seen in **Q22(d)(ii)** but some suggestions linked to enzyme inhibition were too vague to gain credit.

Question 23
This question also addressed aspects across the assessment objectives **AO1**, **AO2** and **AO3.** The candidates' knowledge of the concepts surrounding fetal growth and meiosis were examined in the context of twin fetuses.

Q23(a)(i) The majority of candidates correctly identified and described ultrasound as the technique used but few went on to describe how it could be used to measure BPD for the final mark point. Some candidates mistakenly described how it could be used to measure crown-rump length which was not credited.
In **Q23(a)(ii)**, whilst the majority of candidates were able to perform the calculation, some did not then give their response to 2 significant figures as requested thereby only gaining one mark. This was followed by a straight-forward reading from the growth chart for **Q23(a)(iii)** and as ECF was applied from the previous question, it was pleasing for examiners to see that most candidates were credited.
Q23(a)(iv) proved more challenging than expected and there were many responses referring to the lack of accuracy of the ultrasound or equipment problems which were not credited. Responses regarding maternal lifestyle were the most commonly seen correct answers.

The gap fill in **Q23(b)** enabled the majority of candidates to show their knowledge about meiosis and many gained at least three out of the five marks available. *'Chiasma/chiasmata'* provided the main challenge here.

Question 24
This question addressed mainly **AO1** and **AO2**. Candidates were required to demonstrate their mathematical skills by performing a calculation in the context of respiratory parameters such as PEFR and FEV_1.

Q24(a) These standard definitions often prove challenging for candidates and few correct responses were seen for both.

In **Q24(b)** over half of the candidates correctly calculated the FEV_1 value for two marks**.** In cases where candidates had not given their response to one decimal place one mark was awarded for the correct calculation. Unfortunately, few candidates offered a creditworthy conclusion for the final mark of this question.

Good responses to part **Q24(c)** commented on the fact that it was not necessary to tilt a child's head back as far during expired air resuscitation (EAR) or that it was important to only give small breaths. It is important that candidates read questions carefully as many candidates described differences when giving CPR or repeated that you should cover both the mouth and nose which was in the question stem. All such responses could not be credited.

Question 25

In this question **AO2** and **AO3** were being tested and candidates were required to draw on their knowledge of vaccines and apply this to clinical trials in the context of the Ebola virus.

In **Q25(a)** stronger candidates made a good attempt at completing the table to achieve all three marking points but some candidates struggled to correctly list a feature or an advantage to gain any credit. Some candidates could name the type of vaccine as 'live /attenuated' but few consolidated their response with an advantage of this vaccine. Both were needed for one mark.

Q25(b)(i) good responses showed an understanding that the other group in the trial was used as a comparison or a control. There were some misconceptions with a few candidates thinking that it was to see if the patients already had the virus.

In **Q25(b)(ii)** many candidates gained one mark, usually for reference to group 2 having to wait ten days for the vaccination and some went on to gain both marking points with excellent ideas relating to the vaccine being untested or for comments such *as 'the long term effects of the vaccine are unknown'*.

At the end of the paper, **Q25(b)(iii)** proved challenging. Candidates were required to evaluate the data provided in the trial and there were vague responses which referred to the vaccine as being 'fairly' effective or 'quite' effective which were not credited. Examiners were looking for the idea that the vaccine was totally or 100% effective if given immediately as shown by the data for group 1.

H022/02 Biology in depth

General Comments:

A few very good responses were seen by examiners, particularly in answer to Question 3 about classification and evidence for evolution.

As has been seen previously, the questions that included calculations proved challenging for many candidates.

The purpose of the different steps involved in slide preparation and converting between the different units of measurement should be covered thoroughly when teaching this unit.

Comments on Individual Questions:

Question 1
Candidates were first tested on their knowledge of cell ultrastructure and the function of organelles. The rest of the question focused on the role of carcinogens in the development of cancer, the diagnosis and treatment of cancer and a data question including a calculation using a graph about the incidence of cancer in the population.

Some candidates mixed up RER and Golgi in **Q1(a)**.

The mutation mark was often awarded for **Q1(b)** but very few made the link to proto-oncogenes or tumour suppressor genes.

Q1(c)(i) was usually well answered with age and gender being the most common given.
Many candidates calculated 110/340 instead of (340-110)/110 for **Q1(c)(ii)**.

In **Q1(d)(i)** 'more accurate' was often given. Very few candidates made the link between ultrasound and ribs.
It was common in **Q1(d)(ii)** to see 'vital organ' and an explanation of the importance of the role of the lungs in respiration and therefore to life. Some candidates got 'hard to treat' but very few got the idea that it is rarely diagnosed early.

In **Q1(e)** candidates often stated 'specific' but rarely made the link to antigens.

Candidates generally had the right idea about rapidly dividing cells for **Q1(f)** but a few candidates were unable to achieve the mark for referring to rapidly 'growing' cells.

Question 2
Candidates were asked to consider an ECG trace in this question and use it to calculate heart rate and describe the trace of a patient with SVT. They were then asked to describe the first aid procedure used for a heart attack and cardiac arrest.

In **Q2(a)** candidates often answered with 0.8 x 60 instead of 60/0.8. This resulted in a very low heart rate. Candidates should be encouraged to consider whether the answers they give are reasonable and then if not, perhaps try again.

Descriptions of the p-wave in **Q2(b)** were often given but fewer mentioned the frequency increasing. A lot of vague answers referred to a random change.

Candidates often lost potential marks for **Q2(c)** by not making it clear whether their answers referred to heart attack or cardiac arrest; they often then only scored the first mark point about calling the emergency services.

Question 3
Candidates were asked about classification and the different types of evidence for evolution. There was a level of response question in which the candidates had to discuss the usefulness of different types of evidence.

Candidates generally knew the taxonomic sequence in **Q3(a)**.

In the level of response question, **Q3(b)**, candidates often described every method they could think of without considering whether it would be useful. For example, DNA is useful but rarely found in fossils. Candidates need a lot more practice in this type of question. They need to read the question carefully and think about what is being asked. These questions are not just about using their knowledge but constructing a logical and relevant answer that usually has more than one part or angle to consider. Very few candidates described why certain types of evidence would not be useful.

Candidates often gave a description of the tool in **Q3(c)**, achieving one mark, but they less often made the link to greater cognitive, or dextral, ability.

Data was often not quoted in **Q3(d)** and very few made the link to the fact that there would be less time available to hunt. Very few stated that Australopithecus probably didn't vocalise. Most candidates simply described the data.

Question 4
The candidates were asked about the transmission and treatment of TB.

There was another level of response marked question, **Q4(a)**, in which the candidates were asked about the ways to limit the transmission of TB and the prevention of opportunistic infections. The same issues came up here as in the level of response question previously. A basic knowledge of TB was shown by candidates but antibiotics or DOTs were rarely mentioned and very few candidates explained what opportunistic means. Higher marks are more easily gained on this sort of question by attempting to answer the whole question rather than giving a lot of detail about one aspect of the question.

Many candidates mentioned lack of cell wall in and cell lysing **Q4(b)(i)** but very few explained why they lysed.
There were a lot of vague answers to **Q4(b)(ii)** with many candidates describing why bacterial cells are different from human cells without mentioning the cell wall.

Question 5
This question tested the candidates on the method of using a haemocytometer to count blood cells and then to analyse some test results.

Candidates did not answer **Q5(a)(i)** well with very few candidates seeming to know the northwest rule or how to calculate an accurate count.
In **Q5(a)(ii)** very few candidates mentioned degreasing the microscope slide. Some candidates just repeated the question for parts two and three. Many simply stated 'to identify different cells' for part four without saying how (nucleus visible) or which (leucocyte).

Many candidates were unable to convert the units between the technician's notes and the table of normal values in **Q5(b)** and therefore came up with an incorrect analysis of the results. Those that did it correctly scored highly.

Question 6
In this question, candidates were asked about the method used in an investigation into the water potential of onion cells and then had to analyse the results obtained.

Many candidates suggested that the differential stain made the cells easier to see for **Q6(a)(i)** without any mention of plasmolysed or unplasmolysed (or tonoplast). Candidates should be taught that very vague answers like this rarely score marks.
The common mistake in **Q6(a)(ii)** was to simply state that water potential decreases without saying inside the cell, another type of answer that is much too vague.
Candidates often suggested an improvement as the error in part **Q6(a)(iii)**.

Candidates often missed the units in **Q6(b)(i)**. There were not many plotting errors but a few unusual non-linear scales on the axis. The line of best fit often extended beyond the plots. Candidates should be reminded that they should not automatically extrapolate beyond the point on a graph.
Candidates often accurately stated the answer to **Q6(b)(ii)** but did not include the units.

In **Q6(c)** the apoplastic pathway was often incorrectly drawn by candidates and water often shown to pass through the Casparian strip.

Candidates usually scored well for **Q6(d)** however plasmodesmata were often given, incorrectly, as the last point.

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