



# **GCE EXAMINERS' REPORTS**

**BIOLOGY/HUMAN BIOLOGY (NEW)  
AS/Advanced**

**SUMMER 2009**

## **Introduction**

Summer 2009 is the first award of the new AS. For all specifications there have been changes to the content of the units, and in many new marking criteria have been introduced and unit weightings altered. Also in some subjects there has been the withdrawal of internal assessment. However, the biggest change in most subjects has been the reduction from a three to a two unit assessment.

In moving to the new specification awarding bodies have sought to maintain the overall United Kingdom standard for AS, as measured by the proportion of candidates achieving grade A and by the proportion achieving a pass grade in each subject. Comparability between 'old' and 'new' specifications is measured in terms of the overall subject outcome and not in terms of unit outcomes. Many of the units in the new specifications will bear little relation to those in the old specifications. Even where they are very similar, it is quite likely that outcomes will be different. The expectation is that the number of grade As at unit level will decrease in a specification where the number of units is reduced, whilst the number of passes will increase. The overall cash-in outcome, however, will be maintained. These same principles will apply to the new A level where a six unit assessment is reduced to a four unit assessment.

## **Statistical Information**

This booklet contains summary details for each unit: number entered; maximum mark available; mean mark achieved; grade ranges. *N.B. These refer to 'raw marks' used in the initial assessment, rather than to the uniform marks reported when results are issued.*

## ***Annual Statistical Report***

The annual *Statistical Report* (issued in the second half of the Autumn Term) gives overall outcomes of all examinations administered by WJEC.

## BIOLOGY

### General Certificate of Education 2009

#### Advanced Subsidiary/Advanced

*Principal Examiner:* Mr. B. Hughes, B.Sc.

#### Unit Statistics

The following statistics include all candidates entered for the unit, whether or not they 'cashed in' for an award. The attention of centres is drawn to the fact that the statistics listed should be viewed strictly within the context of this unit and that differences will undoubtedly occur between one year and the next and also between subjects in the same year.

<b>Unit</b>	<b>Entry</b>	<b>Max Mark</b>	<b>Mean Mark</b>
BY1	2741	70	39.3

#### Grade Ranges

A	54
B	48
C	42
D	36
E	31

*N.B. The marks given above are raw marks and not uniform marks.*

## BY1

### General comments

The paper allowed all candidates to access marks. Each question contained some marks which almost all candidates were awarded and some which only the best prepared candidates attained.

The quality of written communication was again an issue for some candidates. They were reminded of the necessity for good English and orderly presentation on the front of the examination paper, but a significant number lost marks because examiners could not make sense of what had been written.

### SECTION A

- Q.1 Most candidates were awarded both marks for 'animal cell' in part (a); some gave centrioles in plant cells and/or omitted mitochondria. In part (b) (i) there were some poor drawings and careless labelling including, 'cell membrane' and even 'cell wall', some candidates did not label the drawing. The majority of candidates knew the function in (ii), but some did not specify aerobic respiration. Most were able to name a cell with many mitochondria in (iii), but the explanations in part (iv) were often vague, general, or not related to the cell they had chosen in (iii).
- Q.2 Parts (a) was straight forward but some candidates gave '*prophase*' for A or B and some even gave '*prophase*' for both A and B. Candidates who had prepared properly and practised genetics problems should have attained full marks and many did. Some poor drawings in part (b) many candidates made no attempt to draw the correct number of chromosomes or to show that in anaphase chromosomes are v or u shaped with centromeres towards centrioles. In part (c) many candidates described processes that occur during prophase. A small number of candidates offered no answer for any part of question 2.
- Q.3 Again some very poor drawings in part (a) (i) some candidates made no effort to show the shape of the pentose and were very careless about where the other components are attached. There was some confusion with the  $\alpha$ -helix in part (b), so that '*protein*' or '*amino acids*' were relatively common in (b) (i) as was '*peptide bonds*' in (b) (iii).
- Q.4 Most candidates were able to name the fluid mosaic model in (a) (i). A small number of candidates lost the mark for (a) (ii) by labelling hydrophilic and hydrophobic on separate phospholipid molecules. The difference between secondary and tertiary was generally well understood in (b) though some candidates did not show that the bonds in tertiary structure are between the amino acid side chains. The quality of written communication was an issue for a number of candidates in (b), and was the main issue in (c). In (c) (i) many candidates failed to refer to the hydrophobic and hydrophilic parts of phospholipids and gave vague descriptions like '*inside*' or '*outside*'. There was much confusion about what constitutes an extrinsic protein in (c) (ii).

Q.5 Most candidates were able to label the diagram in part (a) with the notable exception of the plasmodesma. There was confusion with plant transport in (b) with candidates giving '*apoplast*' and/or '*sympplast*'. In (c) some candidates gave changes that would not be visible under the microscope or thought that cells would absorb water. Part (d) (i) was surprisingly poorly answered, in a very small number of centres candidates gave a definition that correctly referred to comparing the free energy of water molecules in a system with the free energy of water molecules in pure water. Almost all candidates got (d) (ii) though there were some careless errors made in the calculations in (d) (iii).  
A small number of candidates offered no answer for any part of question 5.

Q.6 Most candidates scored at least 1 mark for part (a) (i), though relatively few scored all 3. Some confused organic and inorganic in parts (a) (ii) and (iii). Most correctly named condensation in (a) (iv). Part (b) (i) was not well answered. Candidates frequently failed to explain that identical molecules are involved in the reaction; some confined their answers to joining monosaccharides to make polysaccharides. The graph was done well in (b) (ii) though some candidates did not label the axes properly. Some careless calculations in parts (b) (iii) and (iv), some candidates were clearly unable to calculate a percentage change. Most candidates were able to describe competitive inhibition in (v) though the quality of written communication was an issue for a number of candidates. Some bizarre suggestions for application in (b) (iv).

Q.7 Option 7(a) was the more popular choice. Again the quality of drawing was frequently poor. Some candidates confused eukaryotic and prokaryotic, or drew something that had features of both, the mark scheme penalised this but did allow candidates to score some of the marks.

Option 7(b) was attempted by fewer candidates but most of those who did attempt it gave a good answer. There was some confusion about the use of immobilised enzymes in biosensors.

As always, in both free response questions the quality of written communication was an issue for a number of candidates.

## BIOLOGY

### General Certificate of Education 2009

#### Advanced Subsidiary/Advanced

*Principal Examiner:* Mr. C. Blake, B.Sc., Ph.D

#### Unit Statistics

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<b>Unit</b>	<b>Entry</b>	<b>Max Mark</b>	<b>Mean Mark</b>
BY2	3976	70	36.9

#### Grade Ranges

A	51
B	45
C	40
D	35
E	30

*N.B. The marks given above are raw marks and not uniform marks.*

## BY2

### General comments

Candidates had been well prepared by centres for the new specification and it was considered by the examiners that all questions were accessible. There was concern from one centre that candidates would not be familiar with the principles of Darwinian evolution and natural selection and in response the emphasis in the marking scheme was changed slightly to give more weight to adaptive radiation and the Galapagos finches. Candidates appeared to have sufficient time to complete the paper and in the scripts which I saw there were very few gaps in responses.

- Q.1 Very few candidates achieved full marks, even the locust caused problems with considerable numbers considering that it was a vertebrate and even more that the field mushroom was a plant. In the main the genus of the desert locust was correctively given.
- Q.2 (a) The majority of candidates realised that a haemoglobin molecule carries 4 molecules of oxygen and correctly read from the graph stating that 4% of the binding sites on haemoglobin were empty in the lung capillaries.
- (b) Very few candidates appreciated that the steeper the dissociation curve is the more oxygen will be released with a small drop in partial pressure. Candidates seem to be obsessed with oxygen loading and do not appreciate the implications of the dissociation curve to unloading and supply of oxygen to tissues for respiration.
- (c) Most candidates stated that the partial pressure of carbon dioxide would be high in a respiring muscle but some weaker candidates stated lungs and veins.
- Strong candidates concisely and accurately stated that high carbon dioxide levels would lead to increased dissociation of oxygen but with others there remains much confusion.
- (d) The implications of fetal haemoglobin having a dissociation curve to the left of the maternal was well explained and centres are to be complimented on teaching this so well.
- Responses to the question on lugworm haemoglobin were also logically developed.
- Q.3 (a) Responses to this question were disappointing. Identification of cells was asked for, not tissues, and many candidates reversed the functions of the xylem and phloem. The function of the companion cell was commonly correctly given.
- (b) Very few candidates appreciated that lignin gives structural support and prevents the xylem vessels collapsing when water is sucked along them. Most referred to its role in waterproofing the cells.
- (c) Very good responses, a good knowledge and understanding of terms were shown.

- Q.4 (a) Most candidates were able to give two properties of respiratory surfaces but the third caused problems with some, these sometimes stating large surface area (ignoring the word **other** in the question) and many others stating that all respiratory surfaces have a rich blood supply (trachea do not).
- (b) Many candidates do not know that gas exchange takes place at the respiratory surface assuming that it is involved with taking gases into the body. Two advantages of the tracheal system were usually accurately given and a pleasing number of candidates successfully calculated the percentage volume change in the tracheal system during inspiration.
- (c) Candidates were able to clearly state the process of inspiration in a mammal, some weaker candidates, however, described diffusion of gases across the alveoli and binding with haemoglobin.
- (d) An alarming number of candidates stated that it was difficult for aquatic organisms to get oxygen from water because it was combined with hydrogen and clearly did not realise that it was dissolved oxygen which was being used.

There was an excellent understanding of parallel and counter current flow over the gills, although some considered that it was the movement of the fish which was important and not the flow direction of the blood in the gills.

- Q.5 (a) Most candidates stated that sexual reproduction would lead to variation and qualified this by giving an advantage of variation. Some candidates did access the other points on the marking scheme, resistant stage in life cycle and role in aiding dispersal.
- The disadvantages did cause some problems with large numbers referring to the energy involved!
- (b) Only the better candidates were able to give two reasons why terrestrial animals rely on internal fertilisation and yes I did see it - 'to stop them getting wet!'
- (c) Commonly good reasons were given to explain why the flowering plants have been so successful in the colonisation of the land.
- Q.6 (a) Theory of evolution - The least popular of the two essays but all the points on the marking scheme were observed. Candidates wrote about the Galapagos finches (or were they parrots, budgies, canaries or seagulls) in great detail, but made no obvious connection to the role of natural selection and variation. Adaptive radiation which is mentioned in the specification was rarely discussed.
- (b) Very full and detailed accurate accounts of the differences in dentition between a carnivore and grazing herbivore were given together with excellent accounts of the adaptations of the gut in a ruminant but the statement that 'cows have four stomachs' needs to be qualified please!

## BIOLOGY

### General Certificate of Education 2009

#### Advanced Subsidiary/Advanced

*Principal Examiner:* Mr. G. Rowlands, M.Sc., B.Ed.

#### Unit Statistics

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<b>Unit</b>	<b>Entry</b>	<b>Max Mark</b>	<b>Mean Mark</b>
HB2	870	70	31.4

#### Grade Ranges

A	45
B	40
C	35
D	30
E	25

*N.B. The marks given above are raw marks and not uniform marks.*

## HB2

The first examination of the new specification produced a varied range of responses. Many candidates were poorly prepared for the examination with scripts containing vague answers below the standard expected at this level. However, there were also many excellent scripts reflecting the enthusiasm for the applied parts of the specification. This was particularly true of the extended writing questions where there were excellent detailed responses. Once again, there were examples of candidates failing to read the stem of the question. For example in Q.1 responses were given which could not be seen in the diagrams despite the latter being in bold. Also, in essay (a) many described the pathway of gases through the lungs rather than the mechanism of inspiration. In essay (b) candidates tended to describe the flow of blood through the heart, rather than describing the flow of blood after it leaves the heart.

- Q.1 Generally well answered.
- Q.2 Parts (a), (b) and (c) were well answered but in part (d) there was a lack of understanding about the cause and treatment of a peptic ulcer. Responses tended to be centre-based particularly with reference to *H.pylori*.
- Q.3 Generally well answered although the definition of a parasite was often vague and candidates should avoid phrases such as "an organism living off another organism". The explanations as to why *Taenia* is not destroyed by the secretions of the host also tended to be vague with few mentioning the thick cuticle. References to the parasite producing inhibitory substances to prevent digestion by the host's enzymes, and the fact that the coating protected it from the host's immune responses tended to be centre-based.
- Q.4 The graph part was well answered, however, correct concise definitions are essential at this level. In part (c) (i) it was surprising to find that many candidates thought that Rubella is a sexually transmitted disease!
- Q.5 Part (a) was well answered. In part (b) the majority failed to appreciate that albumen is a protein and therefore made up of amino acids and that evolutionary relationships can be deduced from differences in DNA and the base sequence in different organisms.
- Q.6 It was apparent that some candidates were unfamiliar with ECG traces. Evidently, some centres had not covered this section of the specification adequately, if at all. The better prepared candidates were able to interpret normal ECG traces. However, there was considerable confusion over the abnormal traces.

Q.7 The majority of candidates answered question (a) on lungs and smoking with many gaining full marks. However, it was surprising how many candidates described the pathway of airflow through the lungs in great detail rather than the mechanism of inspiration involving intercostal muscles and diaphragm. There were some really excellent responses to the second part of the question on smoking, with detailed descriptions of the effects of tar, nicotine and carbon dioxide on the respiratory system. However, there were a considerable number of candidates who had little more than a layman's knowledge of the topic with vague statements such as 'smoking causes lung cancer' and 'smoking causes tar to build up in the lungs'. Such responses, of course, gained no marks.

The few responses to essay (b) were very weak and many described the flow of blood through the heart rather than the flow of blood from the heart as required by the question. The second part of the question on hypertension was very poorly understood by the majority. It was rare to find a reference to blood pressure measurements. Most thought that cholesterol lines the arteries rather than fatty deposits being built up from cholesterol in the blood. There was little understanding of the effect of the reduced lumen size on blood pressure.

It was therefore disappointing to find that despite increased awareness among the public regarding health issues such as heart disease, hypertension, the effects of smoking, cancer, exercise and diet etc. a number of AS candidates had little more than a layman's knowledge of these issues.

## BIOLOGY

### General Certificate of Education 2009

#### Advanced Subsidiary/Advanced

*Principal Examiner:* Mr. J. Dean, B.Sc.

#### Unit Statistics

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<b>Unit</b>	<b>Entry</b>	<b>Max Mark</b>	<b>Mean Mark</b>
BY3	4771	44	29.0

#### Grade Ranges

A	33
B	29
C	25
D	22
E	19

*N.B. The marks given above are raw marks and not uniform marks.*

## BY3

I wish to start my examiner's report by saying that the vast majority of centres followed the procedures and guidelines set out by the WJEC and achieved a high standard. I therefore do not want my report to seem to be negative about centres and their interpretation of the marking points. My comments are to clarify some of the issues that this year's marking raised. The main problems seem to have been caused by centres giving candidates too much information, such as the two variables or prescriptive procedures to follow. The use of a past full BI 3 paper is not appropriate as it does not cover all the criteria for the new specification and the prediction and experiment are not linked.

### Q.1 Aims/ Predictions

This can be either a quantitative or qualitative prediction, but not all practicals can be quantitative so we can not mark in such a way that one type is of a greater value than another. Therefore the marking scheme awards a mark for correct identification of the two variables and then the additional mark is for linking the two variables with a direction. (as with the old scheme).

### Q.2 Experimental design

A few centres gave one or more of the variables including the units in the background information to candidates. Clearly we cannot therefore award these marks as it would not have been fair to other candidates.

Most candidates were able identify a suitable range and could suggest how to control other variables.

It was surprising how few candidates knew that boiling an enzyme would be a suitable control for an enzyme practical.

Again most candidates could identify the main risks.

### Q.3 Results

Most candidates managed to construct a suitable table with sufficient repeats. Candidates demonstrated that they could take readings accurately and calculate rate or mean appropriately.

The axes of graphs were labelled correctly with linear scales and most used the space available. Plotting of points was good and on the whole the points were joined appropriately. However a few candidates still extrapolate the line beyond the results they have.

#### Q.4 Analysis

Trends and patterns in their results were discussed well by many candidates however a few talked about what they expected to happen and did not match this with their actual results.

Candidates have improved their understanding of reliability of data and accuracy of measuring. They were also able to suggest improvements that would improve reliability or accuracy.

A few candidates struggled to relate their conclusion using their data to support it.

The potential range of practicals now possible causes complications in deciding for each practical what were the key expected concepts and how many were needed for each mark descriptor. So it was decided to use a banded mark scheme to aid the process.

Majority of relevant principles showing coherence/understanding	5 Marks
Most principles, no coherence	4 Marks
Some major principles missing	3 Marks
Some major principles given but some misunderstanding	2 Marks
Little relevant information given	1 Mark
No relevant information, information misunderstood	0 mark

There was no need for any comment by pupils relating their data with the Teacher's data, a simple mark or comment from the teacher on the coversheet was sufficient.

#### Q.5 Further work

On the whole this was done well. Candidates could plan and identify the variables to extend the practical in such way that they would gain more information about the concept they were investigating. It was not sufficient just to do something that would give them no additional knowledge, e.g. take more readings at 15, 25, 35, 45, so that they were filling in the gaps between 10, 20, 30, 40, 50.

#### Microscopy

This area was really disappointing, having seen the fantastic work done by candidates under examination conditions improve year upon year, I was shocked by what was presented this year. Candidates' best work should have been submitted from a range of slides, and if this was the case then standards have slipped badly. Very few candidates achieved full marks and those centres that submitted all of a candidates work were being unfair to the examiners as it is not our responsibility to select the best piece. Many candidates in those cases showed little or no improvement in the quality of their drawings. There were also some inappropriate specimens used as they did not allow the candidate to demonstrate their ability.



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