



GCE EXAMINERS' REPORTS

**BIOLOGY
AS/Advanced**

JANUARY 2011

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.

Unit	Page
BY1	1
BY2	4
HB2	7
BY4	11
HB4	14

BIOLOGY
General Certificate of Education
January 2011
Advanced Subsidiary/Advanced

Principal Examiner: Mr. P. Owen

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.

Unit	Entry	Max Mark	Mean Mark
BY1	5717	70	39.4

Grade Ranges

A	50
B	45
C	40
D	35
E	31

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

Biology BY1

Some parts of the paper proved to be very challenging for many candidates who were not able to apply knowledge to the situations posed. A positive development was that many candidates wrote detailed answers to the free response question and often scored maximum marks for the question. There was no evidence to suggest that candidates had insufficient time to complete the paper.

Q.1 Although this was the first question on the paper, more was expected from candidates than just one word answers to the parts. The use of magnesium, for example, needs a statement to the effect that it is a component of chlorophyll or a part of the structure of a chlorophyll molecule. 'Used in chlorophyll' is not really appropriate as an A/S answer. The same is true for the other parts and, in the case of calcium ions, reference to hardening rather than strengthening of bones was required.

Q.2 This was a well answered question with only the name of the chains causing any difficulty to some candidates who gave 'polypeptides' as a common answer.

Q.3 The question (a)(i) asked for answers to be in terms of water potential. Answers referring to water concentration were therefore, not acceptable, and the term should not be used. Many candidates made reference to the water potential of plasma rather than of the solution and a sizeable number had water leaving the red blood cells rather than entering. The answers to part (a)(ii) were poor with little understanding that the water potentials of the red blood cells would vary within the range.

The answers to part (b)(i) failed to take account of the word 'other' in the question. Reference to time was incorrect because time was measured as implied by rate of uptake. Many candidates appreciated in part (ii) that the uptake of the ions was by active transport and that ATP was required, which was dependent on oxygen uptake. However, in answer to part (c) very few candidates appreciated that diffusion was still occurring despite no ATP being produced and that the rate of diffusion was 7μ .

Q.4 Most candidates scored well on part (a) with statements 1 and 4 being the ones causing any problems. The diagrams in part (b) were often small and lacking detail of the centromere. Chromatid and chromosome were often confused. The answers to part (c) often lacked the terminology that should be encouraged at A/S. For example, far too many candidates referred to the chromatids as going to the 'ends' of the cells rather than the poles. Only a minority of candidates mentioned the splitting of the centromere and, in many cases, candidates gave the impression of the chromatids meandering apart, rather than being pulled to the poles.

Q.5 Although candidates could name the products in part (a)(i) they often failed to describe accurately, the process of hydrolysis in part (ii). A particular difficulty appears to be the concept of the water molecule being chemically inserted to break the ester bond.

Answers to part (b) often lacked detail. For example, 'waterproofing' was used as an answer. A reference to a waxy cuticle providing a waterproof layer on the leaf was required. Candidates should be encouraged at A/S to amplify their answers rather than just write down one or two words.

Q.6 Most candidates scored well, but far too many were still referring to the 'production of energy' in answer to (a)(ii). ATP production is clearly the answer. The answers to part (b) often failed to refer to the need for large amounts of ATP being required to support the high levels of metabolic activity.

Q.7 This proved to be the most challenging question. In part (a) many candidates did not remember that mRNA is found in both the nucleus and the cytoplasm. In part (b)(ii) less than half of the candidates mentioned complementary base pairing but gave much vaguer answers simply repeating the stem of the question in a different way.

Parts(ii) and (iii) caused great problems. In part (ii) some candidates mentioned mitosis but few mentioned DNA replication and many simply repeated the stem of the question. Candidates in answering part (iii) often referred to chromosomes and genetic material rather than answer the question in terms of DNA which was what the question was about.

Q.8 Both questions were equally popular. Answers to (a) were good but in some cases failed to use correct terminology. For example, many candidates referred to latent heat rather than the latent heat of vapourisation. Answers to (b) often scored full marks, only marking points G and K causing the most difficulty.

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Advanced Subsidiary/Advanced

Principal Examiner: Dr. J. B. Ford

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Unit	Entry	Max Mark	Mean Mark
BY2	1101	70	32.4

Grade Ranges

A	46
B	41
C	36
D	31
E	27

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

Biology BY2

Virtually all candidates were resitting this unit. Overall the performance was disappointing.

- Q.1 This proved to be relatively easy for most candidates, the majority scoring at least half marks.
- Q.2 This type of question has been used frequently in past papers, but even so, some candidates appeared to assume that only one tick could be placed on each line. As a result, these candidates inevitably sacrificed three of the nine marks on offer.
- Q.3 A minority of answers used the word 'segmented' in (a) but went on to define it as a division into head, thorax and abdomen. Even more difficulty was experienced with the advantage required in (b). Very few mentioned the necessity for a water proof integument in a terrestrial invertebrate. The most popular answer was 'protection from predators', ignoring the fact that the Arthropoda probably provide food sources for more animals than any other Phylum.
- Q.4 There was a widespread failure to read and comprehend part (b) of this question. The key words were 'the biological significance'. Most answers were simply extension of those given in part (a) and just gave further details on the diagram. For example, 'the curve has flattened out' is not an answer describing biological significance. The stem of the question referred candidates to the lungs and something like 'Haemoglobin will be fully saturated in the lungs (whereas the theoretical line would not)' was expected, but rarely given. Another surprisingly feature of answers to (b) was the fact that many candidates did not comprehend that the dissociation curve can be read from right to left as well as from left to right. Although (iii) referred to a change from 8kPa to 5kPa, many candidates could apparently only see the curve in terms of uptake and answers such as 'it takes up less at 5 than at 8' were commonplace.
- Q.5 Some of the poorer definitions of a parasite would have equally applied to a predator and 'feeding off another animal' is not adequate. The rest of the question was generally answered quite well. A choice of organ systems was allowed for in (c). In (d), markers frequently came across the statement that the worms are hermaphrodite and therefore reproduce asexually!
- Q.6 The majority coped with the simple calculation but a surprising number had very little understanding of the terms 'source' and 'sink'. In c (i) sugar or sucrose were acceptable answers, but it was unexpected to encounter so many candidates who think that carbon is a molecule. In (ii) there was confusion between translocation and transpiration.
- Q.7 Where problems arose with this question they were often due to the inability to provide a clear explanation rather than a lack of understanding. As in question 3, the answers to 7 (c) rarely mentioned the vital importance of protection against dehydration. Most of the essay answers on the leaf referred to the role of stomatal closure in a terrestrial plant, but few see the analogy with the spiracles of terrestrial arthropods.

Q.8 The two straightforward essay topics were roughly equally popular choices with candidates. In both cases the emphasis was on structure and although the word was printed in bold, it was often ignored. A well annotated diagram could provide a source of several marks. Where candidates relied on description alone, the text could often lack essential detail. For example, the blood circulation answers unsuccessfully left it to the marker to decide which blood vessels are attached to which chambers of the heart. Candidates who overlooked the specific requirement for structure alone, often wasted a great deal of time on the initiation and control of heart beat, with no gain in marks.

HUMAN BIOLOGY
General Certificate of Education
January 2011
Advanced Subsidiary/Advanced

Principal Examiner: Dr C Blake

Unit Statistics

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Unit	Entry	Max Mark	Mean Mark
HB2	294	70	36.5

Grade Ranges

A	48
B	43
C	38
D	33
E	28

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

Human Biology HB2

This unit had a small entry, almost all were resitting . It was rare to find a question not attempted.

- Q.1 (a) A simple start but it did cause a problem with large numbers of candidates not able to give examples. There were lots of viral diseases, bilharzias was common and a worrying number gave gangrene as an example of a fungal disease for which I could find no reference.
- (b) (i) Almost always correct but about 5 candidates put it in the wrong order.
(ii) Candidates found this very difficult and there were relatively few correct responses.
- (c) Pleasing numbers of correct responses but generally centre based so all the candidates got it or none did!
- Q.2 (a) Quite good responses but some spoilt by inaccurate statements such as: ref to villi and microvilli not cilia. Cilia catching bacteria, cilia swallowing bacteria etc.
- (b) (i) Many stated that cartilage prevented trachea closing / maintained its shape but very few linked this to inspiration or when there was low pressure in lungs.
(ii) Good candidates got this mark but weaker ones tried to link it, bizarrely, to movement of food down the trachea.
- (c) (i) Very good discriminator. Very few candidates could give a logical explanation here. There were few references to diffusion gradients and many to the CO₂ levels reducing the O₂ levels in the apparatus.
(ii) Almost all candidates stated that drugs increased the flow rate but very few stated that the drugs did not affect overall lung capacity. Candidates are getting better at quoting figures but a significant number did not access this simple mark.
(iii) Good but some ignored the word 'allergen' in the stem and discussed pollution, smoking etc.
(iv) Many correct responses.
(v) Good responses.

- Q.3 (a) Usually quite well done. We deducted 1 mk if incorrect symbols used eg. B, A A and B
- (b) (i) Much better than I had anticipated, candidates had been well drilled and I suspect were anticipating a question on blood groups.
- (ii) Universal donor and universal recipient almost always correct and in several cases even if not shown in (i)
- (c) I would have predicted this to be the most difficult question on the paper but it was answered well and showed detailed understanding.
- (d) Very few valid suggestions were given here. Many considered that white blood cells would not be antigenic because they are the same as RBC.
- Q.4 (a) Good but many did not know where amylase is produced or where bile salts are produced.
- (b) Function of lacteal and capillaries usually correct but function of smooth muscle cells in villi usually given as peristalsis.
- (c) Large numbers of candidates mentioned gluten but few linked this to an autoimmune condition and considered that the severe weight loss was linked to the inability of digesting it. Many stated, correctly, that there would be impaired absorption but few linked this to a reduced surface area and even less stated that digestion would be affected. Good discriminator.
- (d) All sorts of incorrect reasoning here, with references to the kidney, acute diarrhoea and thirst centres in brain not functioning after such surgery.
- Q.5 (a) Very few fully correct responses here, a very good discriminator.
- (b) A surprising number of candidates stated that the SAN was in the wall of the Left atrium.
- (c) Almost all realised that it prevented the wave of depolarisation passing from atria to ventricles but few could give the reason why.
- (d) Poorly answered. Many candidates (well over 50%) did not have a clue what the coronary arteries were and thought that the term referred to ALL blood vessels going to and from the heart. Candidates who did know what the coronary arteries actually did, made reference to supplying oxygen but very few mentioned CO₂, lactic acid, aerobic respiration, glucose or prevention of arrhythmia. Very disappointing.

- Q.6 (a) Probably attempted by 30% - 40% of candidates. Range of marks seen varied from 4 to 10 but rarely to Max. TB caused the biggest problem and marks lost were usually here.
- (b) The most popular but candidates struggled to get maximum marks. Examples of natural barriers were commonly not of AS standard with statements such as: 'skin', 'villi beating in lungs', 'slime', 'acid' and 'cilia catching germs'.

Descriptions of phagocytosis tended to be very simplistic but very detailed accounts of T lymphocytes were commonly given. Many candidates consider that antibodies are cells and that memory cells seem to store antibodies for future use. There were very few references to antibodies in milk or being absorbed across the placenta. The immune system continues to cause great problems, antibodies are seen to be the same as enzymes or even as cells. There is confusion between the terms *antigen* and *antibody* and very little understanding about memory cells. There is a scant knowledge about the natural barriers involved in defence and far too many references to bacteria living on the skin surface which kill potential pathogens and skin pH, presumably a fact gained from a TV advert.

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Unit Statistics

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Unit	Entry	Max Mark	Mean Mark
BY4	3074	80	51.3

Grade Ranges

A	61
B	55
C	49
D	44
E	39

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

Biology BY4

It is very pleasing to report that many well prepared candidates scored highly. Candidates and their teachers are to be commended for their efforts. There were very few 'nil responses' to the questions and all the points on the mark scheme were accessible. It is apparent that the majority of candidates have a good understanding of the requirements of the specification of this unit.

Q.1 Well answered.

Q.2 Well answered.

Q.3 Well answered apart from (c). It was apparent that candidates from some centres had not studied this addition to the new specification.

Q.4 Generally well answered although weaker candidates tended to refer to the function of pigments in absorbing 'light' rather than 'light energy' and vague statements such as 'chlorophyll not absorbing the colour green'. At this level it is essential to use the term 'wavelength'.

In (d) many candidates gave good definitions of absorption and action spectra but failed to answer the question and failed to describe the relationship between the two.

Q.5 The majority of candidates scored highly but weaker candidates were unsure about the fate of hexose sugars produced.

Q.6 There were some excellent responses to this question with candidates from a number of centres having a good grasp of biochemical details. It was particularly pleasing to see good responses to (d) although many failed to appreciate the importance of the term 'per turn of the cycle' in the stem of the question. In (d) (iii) very few knew that the electron carrier system involving NAD has three pumps whereas that involving FAD has two pumps.

Q.7 There were some excellent responses with better candidates achieving the maximum marks. However, the explanations of weaker candidates were vague. Terms such as 'ions leak or flood in' and sodium gates 'breaking down' and 'eddy currents' are unacceptable at this level. In (e)(iii) it is incorrect to state that 'impulses jump from node to node in myelinated axons.' Many candidates failed to understand the terms 'depolarisation' and 'action potential'.

Q.8 (a) Anaerobic respiration.

There were many excellent answers with many candidates achieving maximum marks. It was very pleasing to see that candidates not only learn the information but also have a good understanding of the biochemical reactions. However, many good candidates included only the breakdown of pyruvic acid and failed to describe the pathway of conversion of glucose to pyruvate and so failed to achieve the maximum marks.

(b) Fermenter.

Candidates from some centres produced excellent responses. However, there were also vague answers lacking the detail required at this level. Marks cannot be gained from merely naming parts of the fermenter. It is also necessary to detail the function of the component. For example, the function of the water jacket in removing heat produced during the metabolism of *Penicillium*.

Many candidates referred to *Penicillium* as a bacterium rather than a fungus. There was also some confusion between *Penicillium* and the penicillin it produces.

Although many responses included labelled diagrams of a fermenter these have little value unless well annotated.

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Unit	Entry	Max Mark	Mean Mark
HB4	124	80	47.8

Grade Ranges

A	61
B	55
C	49
D	44
E	39

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

Human Biology HB4

Well prepared candidates from a minority of centres scored highly. However, the general standard of the candidates was disappointing. Nevertheless candidates attempted all the questions and there were very few 'nil responses'. All the points on the mark scheme were accessible.

- Q.1** Well answered.
- Q.2** This was considered to be an easy question but it was apparent that many candidates were unfamiliar with this section of the specification with very little knowledge of the practical aspects of microbiology.
- Q.3** Part (a) was well answered by the majority of candidates but many were unaware of the adaptations of the cells of the proximal convoluted tubule. Part (c) was particularly poorly answered. Phrases such as 'cleaning the blood' and 'the dialysate contains the right amount of chemicals' should be avoided at this level. Use of the expected terms 'water potential' and concentration gradient' were rare.
- Q.4** Part (d) was poorly answered with the majority of candidates having little understanding of respiration energy budgets.
- Q.5** The majority of candidates scored highly but weaker candidates were unsure about the fate of hexose sugars produced.
- Q.6** There were some excellent responses with better candidates achieving the maximum marks. However, the explanations of weaker candidates were vague. Terms such as 'ions leak or flood in' and sodium gates 'breaking down' and 'eddy currents' are unacceptable at this level. However the function of acetylcholine at a synapse was well described.
- Q.7** Responses to the muscle myofibril were centre based with a number of candidates gaining maximum marks.
- Q.8** (a) Anaerobic respiration.

Before attempting an essay question it is advisable that candidates plan out their answers.

Many failed to do this and so did not appreciate the important points required by the question. Although there were some good responses many candidates described only the breakdown of pyruvic acid into lactic acid. In failing to describe the pathway of conversion of glucose to pyruvate they were unable to achieve the maximum marks. Many concentrated only on the removal of lactic acid.

- (b) Fermenter.

It was pleasing to see some really good, detailed answers to this question.



WJEC
245 Western Avenue
Cardiff CF5 2YX
Tel No 029 2026 5000
Fax 029 2057 5994
E-mail: exams@wjec.co.uk
website: www.wjec.co.uk