Examiners' Report
Principal Examiner's Feedback

January 2022

Pearson Edexcel International Advanced Level
In Biology (WBI15) Paper 01
Respiration, Internal Environment,
Coordination and Gene Technology

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The paper was the third cycle of the new specification and tested respiration, internal environment, coordination, and gene technology.

The scope of the questions provided a good opportunity for candidates to demonstrate their knowledge and understanding of these topics. The questions on this paper yielded a very wide range of responses with some excellent answers given. This resulted in an excellent spread of marks, across the full range.

There were some parts of questions that were left blank but there was no evidence that candidates had insufficient time to complete the paper. Many candidates made an attempt at questions on the article which was the final question. However, there were more blank questions for the article possibly indicating the lack of time for detailed analysis and preparation of the article due to constraints caused by the pandemic.

There were some straightforward questions demanding recall that yielded high marks across the cohort and some more demanding questions that discriminated well. Multi choice questions were well answered and proved to be a good source of marks. There were many responses which were well articulated showing excellent use of biological technology in context.

However, it is still evident that some candidates do not pay sufficient attention to the command word used in the question. This is particularly true of compare and contrast questions where descriptions failed to gain the marks. Graphs relating to novel situations continue to be problematic for candidates. Many candidates did not refer to the data provided in the graphs and often failed to appreciate the units for axes of the graphs. Responses needing calculations were very varied. However there does seem to be an area that is improving as candidates become more aware of the nature and demands of this type of question. Clearly this has been a focus of both teaching and practice. It was pleasing to see that most candidates could change the subject of an equation and calculate gradients using $y = mx + C$. Questions which demanded analysis, explanation, and application of knowledge to unfamiliar contexts were seen to be more challenging to candidates.

A large number of centres are clearly using our mark schemes and examiner reports to prepare candidates. This is particularly evident where similar mark points have appeared on previous papers. eg. the AAT gene question. However, care must be taken not to just use the points from previous mark schemes without relating it to the context of the current question.

QUESTION 1

In part a, most candidates were able to calculate the width of the mitochondrion. The most common error was the conversion of mm to nm.

In part b, candidates scored highly when they did what had been asked, 'to describe' how ATP is synthesised by oxidative phosphorylation. A few candidates did little more than an iGCSE response which gained little credit.

In part c most candidates gained both marks by fully explaining how energy is used to supply energy for biological reactions. Several candidates still relate **to the 'production of energy'.**

QUESTION 2

In part ai, aii and bi, the multichoice questions the majority of candidates were able to discriminate between the correct answer and the distractors. The muti choice questions proved to be a good source of marks.

In part b(i), there were a range of responses. Many went into detail about the properties of fast twitch muscles rather than explaining why the sprinter's muscles contain a high percentage of fast twitch muscle fibres. The majority missed the idea that sprinting demanded fast speed over a short distance / in a short time.

In part c, most candidates correctly identified the relationship between heart rate and lactate concentration with increasing speed. Few got the idea that lactate increases more at higher speed. Only the most able candidates made correct comparison between the relative change in lactate and heart rate.

QUESTION 3

The MCQ in ai did not present a problem to candidates. However, the MCQ in aii was only correctly answered by half of candidates. Spinal reflex should be a focus for teaching.

In part bi, many candidates made comments about the heart rate when the whale was at the surface. This did not gain any marks as the question was about when the whale was diving. Candidates were able to make appropriate comment on heart rate and length of dive.

In part bii, most candidates were able to explain how the heart rate changes were controlled immediately on return to the surface. They described appropriate physiological changes and how they were monitored. However,

a significant number of candidates implies that there were increased frequency of impulses from the medulla to the SAN without actually stating the fact. That being said the majority candidates attained full marks here.

QUESTION 4

Part a was surprisingly left blank by many candidates failing to identify the location of Bowman's capsule on a kidney diagram. In part aii and aiii, the multichoice questions, the majority of candidates were able to discriminate between the correct answer and the distractors. The muti choice questions proved to be a good source of marks.

In part b, most candidates were able to explain the movement of water correctly but found explaining the countercurrent mechanism more of a challenge. Details were often too vague and contradictory to gain credit. This topic needs to be a focus of teaching. In part c the descriptions were often too vague to achieve full

marks. However, some candidates did achieve full marks here and many were able to describe how aquaporins were inserted into the membranes. few candidates completed the story after more water being absorbed bringing the water potentila of the blood back to the normal range.

QUESTION 5

The MCQ in part ai was well done. Practically 100% of candidates identified the correct structure where rod cells are located. In aii the answers were a complete dichotomy – either very good achieving full marks or very muddled and inaccurate achieving no marks. Many candidates stated that the opsin blocked the sodium channels which is not correct.

In part c the level-based question many candidates were able to discuss the experiments in the diagrams. Often the diagrams were described without relating the experiment or outcome to the effect caused by IAA. It was pleasing to see that many candidates could attain level 3 through detailed comments on the experiments and knowledge and understanding of the effect of auxins at a molecular level.

QUESTION 6

The MCQ in part a was done well. In part b, many candidates could identify that sodium channels opened but did not refer to the change in membrane potential initiated by the stimulus or made correct reference to the threshold potential.

In part ci candidates had to change the subject of the equation $y = mx + c$ and calculate the gradient of the myelinated neurone graph. Many did this well but incorrectly calculated the percentage increase in the gradient between the myelinated and non-myelinated neurones. Part cii was generally done well. A common error was not to refer to myelin acting as an insulator. Most were aware of the term 'saltatory' conduction and could accurately explain it.

Part d was not done very well by the majority of candidates. Many misinterpreted the command words and compare the PET images before and after taking cocaine. The question demanded knowledge of how the PET scan is used and the processes involved. It has not been examined before in this specification with previous questions referring to fMRI and CT scans.

QUESTION 7

The calculation in part a was done well with majority of candidates coming up with the expected answer. A few did not give the answer to two significant figures.

In part bi, it was clear that many could not name the stage of the cardiac cycle at T on the ECG. In part bii most candidates could correctly calculate the mean heart rate. In part biii the command words command and contrast again presented a challenge to candidates. Too often the trace of the patient was described and in a

later paragraph the trace of the normal ECG was described. This gains no credit. Comparisons need to be linked – ideally in the same sentence.

In part c, most candidates showed a good understanding of genetic engineering and could correctly describe the process to produce adenovirus that contains the AAT gene. Many however missed the idea of the first mark point 'to identify / isolate the AAT gene, and the last point where the functional AAT protein could be produced.

QUESTION 8

The responses to this question varied greatly. Some candidates had clearly studied the article in detail. The majority however seemed to have little detailed knowledge of the contents of the article. However, there were more blank questions for the article possibly indicating the lack of time for detailed analysis and preparation of the article due to constraints caused by the pandemic.

In part a most candidates responded about lack of dopamine. However, their starting point was in the brain rather than in the gut and explaining how the toxicant got from the gut into the brain.

In part b, it was pleasing to see that most candidates now have an understanding of microarrays and bioinformatics. Many candidates achieved full marks here.

In part c there were some good responses making references to either DNA profiling or the use of PCR. Hardly any candidates referred to the product of the genes and comparing the functions.

In part d proved to be a challenge to most candidates. Many just copied sections from the article. Transcription factors and mode of action needs to be a focus.

In part e most candidates recognised that mutations could be caused by ES damaging mtDNA. Few candidates referred to phosphodiester and hydrogen bonds being broken.

The MTT assay in part f again prove to be challenging. Few suggested using living or viable cells in the assay. Many got the result of toxicity on the colour change the wrong way round.

There were few correct responses to part g. A few got the idea of no ethical issue but did not explain why.

SUMMARY

A few suggestions for improving candidate performance are given below.

· Candidates need to have time study the article.

· Candidates need to refer to the command word used in the question and focus their answer in an appropriate manner. Appendix 7 in the specification lists all the command words and their meaning. This is particularly true for explain, describe and comment on command words.

· In graphs candidates need to check the labelling of the axes and scales.

· In level-based questions the diagrams needs to be used as well as relevant knowledge and understanding.

· In calculations it is better to show the workings as well as an answer as if the answer is incorrect candidates may gain some credit for correct working. Care needs to be taken in the interconversion of units – eg cm3 to dm3.