



Examiners' Report Principal Examiner Feedback

Summer 2019

Pearson Edexcel Advanced Level
In Biology (WBI02) Paper 01 Development, Plants
and the Environment

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Introduction

Many students demonstrated a sound grasp of the factual content of the course, such as the role of sclerenchyma and xylem, the structure of centrioles, the structure of sperm and how sperm are adapted to their function. Questions requiring application of knowledge proved more challenging, particularly for those who relied on learning mark schemes from previous examinations.

There was clear evidence that students often failed to read a question thoroughly enough and ignored directions in the stem to use a map or photographs that were included with the question. Some points in the mark scheme would only have been gained if these resources had been used.

In questions that require a comparison to be made it is essential to set out both sides of the comparison in order to gain credit. It was disappointing that so many students made statements about only one side of a comparison. Examiners were not expected to interpret the other half of the answer on behalf of the candidate.

The quality of answers to questions involving data handling was very variable. Marks for describing the data will only be awarded if the data has been manipulated: merely copying the data from the graph or table isn't enough. It is always a good idea for students to look at their numerical answers and check that the answer is realistic – if the answer is not feasible, they can then look for an error in their working.

Individual questions

Q1(a) The majority of students gave a correct description of a difference between the function of sclerenchyma fibres and xylem vessels. The most typical approach was to focus on the role of xylem in transporting water. A few, however, gave a difference in structure which was not relevant to this question.

Q2(a) The most common correct answer was a reference to the cell as “the structural unit of a living organism”. Describing it as a unit of life was too vague to be given credit.

Q2(b)(i) Students were expected to relate their knowledge to the specific situation given in the question. Those that simply referred to synthesis of proteins rather than synthesis of pepsinogen were not awarded a mark.

Q2(b)(ii) Here it was evident that some were confusing the Golgi apparatus with the rough endoplasmic reticulum.

Q2(c) A comparison of the two types of cell was expected. It is important for students to be aware that when a comparison is required it is important to state both sides of the comparison. For example merely stating that gastric stem cells can divide indefinitely is insufficient and a comment about the chief cells is also needed. This type of omission was commonly seen by examiners.

Q3(a) The calculation proved straightforward for the majority of students although some incorrectly rounded down the answer.

Q3(b) The structure of centrioles was well understood although a number of answers referred to tubules rather than microtubules.

Q3(c)(ii) The majority of students gained both marks but there were some that seemed unaware of the term as they offered answers such as "prokaryotes do not reproduce" or "prokaryotes carry out meiosis".

Q3(d) There were many good descriptions of late telophase and cytokinesis in plant cells. Although details of the formation of a cell plate were not expected as it is not a requirement of the specification it was pleasing to read a number of accounts that gave accurate descriptions of this process.

Q3(e) Most failed to state that the number of mitochondria will have been halved when the G₁ stage of the cell cycle is reached. This meant that they also did not refer to the need to restore the original number. The majority of students, however, did link the production of ATP in the mitochondria to a use of this energy source.

Q4(a)(ii) A disappointing number of students incorrectly drew a straight line graph.

Q4(b)(i) Examiners were pleased to see many answers that were constructed in a logical sequence arriving at the conclusion of stunted growth and yellow leaves as a result of the wheat plant having a lack of magnesium ions.

Q4b(ii) A common reason for students losing marks was that they described the test group of plants having no magnesium ions but failed to state what would be in the solution. Others gave vague statements that conditions would need to be the same whereas better answers named at least two factors that would need to be controlled and indicated how this would be done for at least one of them. A weakness in responses to this question was omitting details of how the dependent variable would be measured.

Q5(a) Although many gave a definition of the term niche there were a number who confused it with habitat. Others failed to use the sloth as an example so were unable to gain the second mark.

Q5(b) The calculation was successfully completed by most students. It is important that they consider how many decimal places or significant figures are appropriate.

Q5(c)(i) The weakest answers were in suggesting an advantage to the sloth. Although some did suggest the idea of providing camouflage it was more common to see answers that suggested that the algae offered protection against microorganisms. More students gained a mark for suggesting an advantage to the algae although some failed to link sunlight to photosynthesis. It was much more common to be able to award a mark for the final part that required an advantage to the moth with many suggesting the idea of the sloth fur providing warmth for the eggs of the moth.

Q5(c)(ii) Very few indicated that all the organisms would need to be removed from the sloth. Lots of answers referred to sampling methods such as the use of pitfall traps and quadrats which was a clear indication of failing to relate the answer to the context of the question.

Q6(a) Unfortunately many students ignored the timescale and offered answers about speciation.

Q6(b)(i) A significant number of candidates recalled practical work they had done using electrophoresis and gave answers about DNA profiling. They need to read the question carefully as illustrated here as the context is clearly molecular phylogeny.

Q6(b)(ii) The phrase "breeding experiment" in the stem of the question seemed to cause a significant number of students to offer answers about captive breeding programmes. Others simply referred to the need to "check if offspring are fertile" whereas what was required was a statement of how this would be achieved.

Q6(c)(i) Students should be encouraged to check that the results of calculations they have carried out are plausible. A disappointingly large number of calculations were inverted resulting in an answer of 94 leopards km⁻² at which point it should be evident that this is not realistic.

Q6(c)(ii) The stem of the question clearly states that students should use the information in the photographs yet very few used the photographs at all.

Q6(c)(iii) Although the stem of the question directs students to use the information in the map and their own knowledge to answer the question, the vast majority just relied on their own knowledge to write about captive breeding programmes and did not refer to the map at all. Therefore very few gained access to the marks allocated for answers concerning habitat fragmentation.

Q7(a)(i) The standard of drawings was very variable with some showing sperm without a midpiece and others showing the flagellum as a structure no longer than the head and midpiece. Others indicated that the mitochondria would be in the head of the sperm.

Q7(a)(ii) Adaptations of the sperm for its function were usually described clearly with most concentrating on the flagellum, acrosome and mitochondria. Fewer referred to the streamlined shape of the sperm.

Q7(b)(i) Most students only referred to the fact that lycopene increases sperm production and did not go on to distinguish between its effect on the control rats with its effect on the rats exposed to PCBs. Others just quoted values from the graph without actually manipulating the data to calculate increases.

Q7(b)(ii) It was evident that a significant number of students did not take enough care to read the question carefully. This is best illustrated by the fact that many referred to the need to use rats of the same age, species and gender and so clearly failed to realise in this investigation all of the rats had to be male. Others did not indicate that all of the rats needed to be treated with PCBs. Another problem was that poor expression meant that examiners often found it difficult to know exactly what each group of rats had been fed.

Q8(c) Many students were able to link sexual reproduction to increased genetic variety and to link asexual reproduction to the production of genetically identical offspring. Weaker answers linked asexual reproduction to mitosis and then went on to describe the role of mitosis in growth or replacement of cells. Poorly constructed answers meant it was often not possible for examiners to know which type of reproduction was being described.

Q8(d)(i) The trend that increasing the the initial number of polyps leads to a lower population density was stated in most answers but few looked more deeply into the data to identify the non-linear nature of the relationship.

Q8(d)(ii) The majority of candidates realised this question was about competition. Better answers were offered by students that had used the information to indicate there would be competition for attachment sites and then gave an example of a resource that jellyfish might compete for such as food. Weaker answers were seen in which it was merely stated that there would be competition, or that there would be competition for resources without naming them.

Summary

In order to improve their performance candidates should:

- understand that when asked to give examples as part of the answer, marks will be lost if none are included
- when describing practical procedures, remember to include a description of how the dependent variable will be measured
- not try to make the question fit an answer they have learnt from the mark scheme for a previous examination
- check their final answer is realistic after they have answered a question involving a calculation
- set out both sides of a comparison when questions ask for similarities or differences