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Examiners' Report

Summer 2013

GCE Biology (6BI02) Paper 01R
DEV, PLANTS & ENVIRONMENT

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Grade Boundaries

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General

Overall, the students' responses for this paper demonstrated a relatively good standard of biological knowledge; particularly where answers were more straightforward. The standard of communication, however, sometimes let students down. Where students exhibited poor communication skills it was not always clear exactly what the students were referring to. Poor spelling often led to marks being lost especially in distinguishing between singular and plurals. Failure to read questions carefully and use the specific information presented on the question paper were evident. Students should be aware that if, say, two marks are available, it is a good idea to try to write down two clear and separate ideas or facts. In some questions this had not been done.

A significant minority had writing which was difficult to read – those students would have benefited from the use of a scribe or the opportunity to word process their responses.

Question 1(a)

This was very well answered by the vast majority of students. The most common error was either 'ribosomes' or 'plant'.

Question 1(b)

Most students got the first two mark points correct but errors were often made on the '1,6-glycosidic bonds' or 'magnesium atoms' points.

Question 2(a)

Despite the guidance in the question asking for the procedures **before** testing on patients, a significant number of students described the testing of procedures on patients. They missed the direction in bold in the question by not having read the question properly.
The question was, however, generally well answered when read properly. Almost all responses referred to animal testing or to tissue culture. Very few mentioned toxicity specifically. Many linked animal testing to side effects instead of to volunteers. Many stopped after animal testing, incorrectly suggesting next stage relates to patients. Some students referred to healthy patients and lost a mark.

Question 2(b)

This question was an example of where the responses demonstrated a good standard of biological knowledge. The majority of responses gained 4 marks. The marks for placebo and 'neither patients nor testers knowing' were most frequently seen, followed by reference to 'bias'. Other reasons such as a comparison, discussion of the placebo effect and drug effectiveness were not often seen. Emphasis needs to be placed on difference between a description of the trial and the reasons for each step when an explanation is required. Some students gave extended descriptions

of what a placebo was and then failed to finish the explanation behind the stages of a double blind trial.

Question 3(a)(i) and **Question 3(b)**
Both were very well answered by the vast majority of students.

Question 3(a)(ii)
Good clear answers by most students.

Question 3(c)QWC
The majority of responses clearly had the right idea and knew the appropriate stages, although many answers were too vague to award many marks. Although spelling of required terms was usually good, common misspellings included 'telephase' and 'cytokenesis'; grammar was frequently poor as marks were also lost by incorrect use of plural terms.
Nucleus/nuclei and nucleolus/nucleoli were often used interchangeably and it was apparent that many students either did not know which was plural or singular, or used them incorrectly. Students' lack of exactitude in use of terminology lost them marks.
Common good responses seen were reference to telophase, description of chromosomes decondensing, nuclear membranes and nucleoli reforming and cytokinesis.
In a minority of answers, students described anaphase, or gave details of cytokinesis rather than telophase.

Question 4(a)(i)
Awarding of 2 marks for this question was rare. The mark most frequently awarded was for linking temperature to pollen tube growth and/or enzymes. Many responses gained the same marking point several times over, but did not gain any other mark. Where validity was mentioned it was frequently in relation to the results rather than to the investigation.

Question 4(a)(ii)
Most students were able to describe the effect in broad terms but were often not specific or detailed enough. Students lost marks because the ends of ranges were not clearly stated. For example, a response might use one figure but not two when describing a trend eg increase up to 10, but not from 0/1 (mp 1). Few stated where decrease ended. The majority of students were able to correctly manipulate data but often did not state clearly where this change occurred on the graph.

Question 4(a)(iii)
This proved to be a question which tested the understanding of the process which was occurring and the more able students rose to the challenge admirably.

Question 4(b)QWC

The majority of responses showed that students clearly had the right idea and knew the logical sequence, but answers were often vague and lacked the required detail and scientific rigour when using terminology. Many did not use the correct terms, so instead of 'diploid zygote', answers referred to 'diploid embryos', zygotes with no mention of them being diploid, or diploid cells with no mention of the zygote; and again many triploid cells rather than triploid endosperm. Sometimes there was reference to fertilisation of two eggs, or fertilisation by the pollen tube nucleus, or fertilisation by sperm cells. Although references to 'female cell/ovum/egg cell' were all common, fusion with the 'egg nucleus' was rarely seen. It was also common to see reference to 'polar bodies' instead of 'polar nuclei'.

Question 4(c)

Some named **both** crossing over and independent assortment and gained 1 mark. Very few gave good explanations of either process and therefore only gained 1 mark.

Again when an **explanation** is required a **reason** must be given.

Question 5(a)

Good clear answers were provided by most students. All 3 points were seen. The most frequently seen correct answers referred to contamination by pathogenic bacteria. Some mentioned humidity but this was not common. Many students appeared to be quoting a previous mark scheme and not answering the specific requirement of this question.

Question 5(b)

This was well answered, the majority gained at least one mark for reference to only one parent and many gained either of the other two marking points.

Question 5(c)(i)

This was generally well answered with most students gaining a mark for describing the general relationship shown by the data. Most students attempted to manipulate the data with some correctly describing the small change of 4%. There were also many descriptions of each section of graph instead of describing the overall trend.

Question 5(c)(ii)

This proved to be a very testing question which allowed the more able students to demonstrate an understanding of the term validity as well as the complexity of the data provided. The most common mark awarded was for the idea that **both** lines follow the same trend. A few mentioned that the smallest difference was 3% or that 12% was greatest difference. Very few commented on the variability or the conflict in the evidence. Some stated that the conflict in the evidence meant that the conclusion was invalid.

Question 5(d)
Generally well answered with the majority of students gaining the mark for 'totipotency'.

Question 6(a)
This was generally well answered. Full marks were frequently awarded, although many responses clearly had the right idea but were poorly worded or had details missing, eg, 'increased mass increased distance' with no mention of 'up to 150g'. Many responses frequently described the shape of the graph rather than the effect of mass on distance. Some students referring to the **graph** levelling off or plateauing rather than stating that the distance did not change. Many students correctly identified the linear relationship and quoted correct figures.

Question 6(b)
Many students gave two different variables without stating that the second fibre had less tensile strength. Few students gained both marks because they failed to suggest **and** explain as the question instructed. Many students use the term 'different' instead of describing the difference eg 'less' or 'greater than' or 'smaller'. Many incorrectly stated that the second fibre had greater tensile strength.

Question 6(c)
There was considerable variation in the marks awarded for this question. The majority of responses had the correct idea and sequence, but not necessarily enough detail, eg reference to addition of masses without mentioning the size of masses. Many students considered the use of repeats but did not link this to the calculation of a mean/average. Reference to safety procedures was rare.
There were, however, a sizeable number of students who mistakenly thought that nylon fibres were taken from plants.

Question 7(a)
Most students answered this question correctly showing a knowledge of the three domains named by Woese.

Question 7(b)(i)
A significant number of students only considered general communication rather than to the target audience of scientists as specified in the question. Those who interpreted the question correctly did well. Some students stated that Woese made good use of the internet and he also seems to have kept a journal but gave no evidence of publishing it or where it should be published.

Question 7(b)(ii)
Many students had the correct idea and could describe peer review in some way, although often with vague, lengthy descriptions which were often contradictory and so lost marks. Fewer students had the idea of repeating the experiments and even fewer provided the correct reason for the repetition of these experiments. Some students used the term 'peer pressure' instead of 'peer review'.

Question 7(c)
Many students found this question very difficult to answer; there were many examples that suggested students knew the answer but struggled to express it clearly using correct terminology. Many focused on separating organisms into the taxonomic hierarchy. Quite a few just listed out the order of the different taxonomic groups from kingdom to species and some explained how species and genus names are assigned to an organism.
The most common correct idea in the answers was that molecular phylogeny used DNA or proteins. It was rare to see a clear explanation that phylogeny is the evolutionary relationships of an organism.
Some students gained just one mark for the detail of how a characteristic would be judged, because they had restated the stem of the question – 'they can be classified into groups by...' followed by an explanation. Others lost this as they just described similarities and differences without then putting organisms into groups.
The key to this question is the command word 'explain' that has been used rather than 'describe' - those who did well showed an awareness of the difference in these instructions.

Question 8(a)
This was typically well answered with the majority of students gaining the mark by correctly identifying the correct definition of an endemic species.

Question 8(b)
There was evidence that some students read the phrase 'breeding programme' and then described this rather than answering the specific question which was about the development of this programme **with the 4 squirrels**. Again those who read the question carefully gained high marks. These answers described a small gene pool and low genetic diversity **because** there were only 4 squirrels. This then led on to references to inbreeding, although many wrongly referred to 'interbreeding' instead. Very few mentioned the capability of these squirrels to breed successfully, although large number of students attempted this by suggesting that the squirrels might choose not to mate with each other, which is too vague to be creditworthy.

Question 8(c)(i)
The vast majority of answers had the correct calculation. However, **few** answers gave **direction** of change ie a decrease. Most students showed their working, but in a substantial minority it was not made clear what the

process was, as only numbers were shown without it being clear what was being done with these. Care must also be taken when rounding figures as this was not always done correctly.

Question 8(c)(ii)

The majority of responses gained full marks for this question. The main problem students found arose from failing to read the labelling on the y axis of the graph, which showed ‘number of middens’ and not ‘population size’. Hence ‘population’ and ‘middens’ were mixed up in some students’ answers. However, the majority of students were able to gain marks for noting that the number of middens fell and therefore the population must have dropped. Some described ‘fluctuations’ rather than one slight increase in 2004.

Question 8(d)

This question was well answered by the majority of students. The ideas of a programme needed to increase numbers, to prevent extinction and for reintroduction to the wild were commonly seen. Most students clearly understand the concept of captive breeding and reintroduction.
The concept of endemism was less well understood, and descriptions of breeding programmes to increase genetic diversity had to be ignored when given in the context of this being an endemic species which would not have the potential for outbreeding. The reference to endemism had to refer to the fact that this species is not found elsewhere and is therefore in danger of extinction.

Paper Summary

In order to improve their performance students should:-

- Read all of the details in the questions carefully and double check the context of the question, do not 'skim read' - make sure to read every word and not fill in the gaps from practice papers that have been attempted. Questions may appear similar, but there are often subtle differences. Answer the question asked, not the ones that have been practised.

- Develop a familiarity with the terminology encountered at this level and learn how to define key phrases accurately.

- Try for shorter, more precise sentences - it helps students to focus. When sentences start to ramble on it becomes difficult to determine where one point ends and another starts.

- When underlining key words in a question, try to refer to them when writing the response.

- Review all of the recommended core practicals with particular reference to laboratory procedures.

- Gain practice at interpreting information presented graphically and in tables.

- Practice simple mathematical calculations – subtractions, and % differences.

- Practice hand writing responses to questions to develop better skills at expressing themselves.

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