

Examiners' Report
January 2013

GCE Biology 6BI07 01

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Introduction

The overall feeling of the examiners is that the candidates are better prepared than ever for this paper.

Question 1 took its context from tissue culture in plants but, as always, was really about experimental design, implementation, analysis and evaluation. It is a credit to both candidates and their teachers that these matters are increasingly well understood. Such issues as the nature of variables, graph plotting and measures of reliability are now routinely well dealt with by students.

On the other hand work is still needed on methods for controlling variables and suggesting sensible values and the manipulation rather than just quoting of data.

In Question 2, teachers are reminded again that the skills being tested are those detailed in the specification on Page 80.

Question 1 (a) (i)

Most candidates were able to suggest either one or other of the two possibilities here. The most common mistake was to suggest a DV that simply could not be measured, although it was mentioning the right thing, for example "growth of callus".

(a) (i) Name **one** of the dependent variables in this investigation.

(1)

growth of calluses



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Examiner Comments

This suggestion is in the right area but simply could not be measured as stated.



ResultsPlus
Examiner Tip

Make sure that whenever you are thinking about a dependent variable it is something that could actually be measured.

(a) (i) Name **one** of the dependent variables in this investigation.

(1)

Concentrations of glucose



ResultsPlus
Examiner Comments

It was quite common for candidates to suggest the IV in answer to this question.



ResultsPlus
Examiner Tip

Make sure that you understand about the different kinds of variables in an experiment

(a) (i) Name **one** of the dependent variables in this investigation.

(1)

Percentage of explants



ResultsPlus
Examiner Comments

Partial answers such as this one were quite common.

(a) (i) Name **one** of the dependent variables in this investigation.

(1)

~~Length of calluses~~ — dry mass of callus — Concentration of glucose



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Examiner Comments

This candidate is trying to hedge their bets with two answers. One is right and one very wrong (it is the IV). This is a tactic which should be avoided at all costs.



ResultsPlus

Examiner Tip

When a question asks for a number of answers never exceed that number.

Question 1 (a) (ii)

This question was almost universally well answered.

Question 1 (a) (iii)

In this paper it is frequent that candidates try to answer with material which has been rote learnt. Since the rationale of the paper is to test knowledge and understanding of skills in novel situations, this is rarely likely to gain marks.

(iii) Give **one** growth condition that should be controlled in this investigation and explain how you would control it.

(3)

Growth condition *Species of the ~~same~~ cell.*

How this growth condition can be controlled *Taking the tissue ~~cell~~ from the same plant eg: pea plant and also it can be done by taking several tissue from the same part of the plant eg: stem.*



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Examiner Comments

Year after year it is clear that some candidates do not read the material they are given. There were quite a lot of answers which made the stock suggestion of "make sure the species was the same", as in this example. Since the whole experiment was performed on cotton, this would not be a markworthy answer. In addition, this is not a growth condition.



ResultsPlus

Examiner Tip

Make sure you read all the information given, and the questions, very carefully.

(iii) Give **one** growth condition that should be controlled in this investigation and explain how you would control it.

(3)

Growth condition *temperature*

How this growth condition can be controlled *place the explants in a water bath of same temperature but different glucose concentration.*



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Examiner Comments

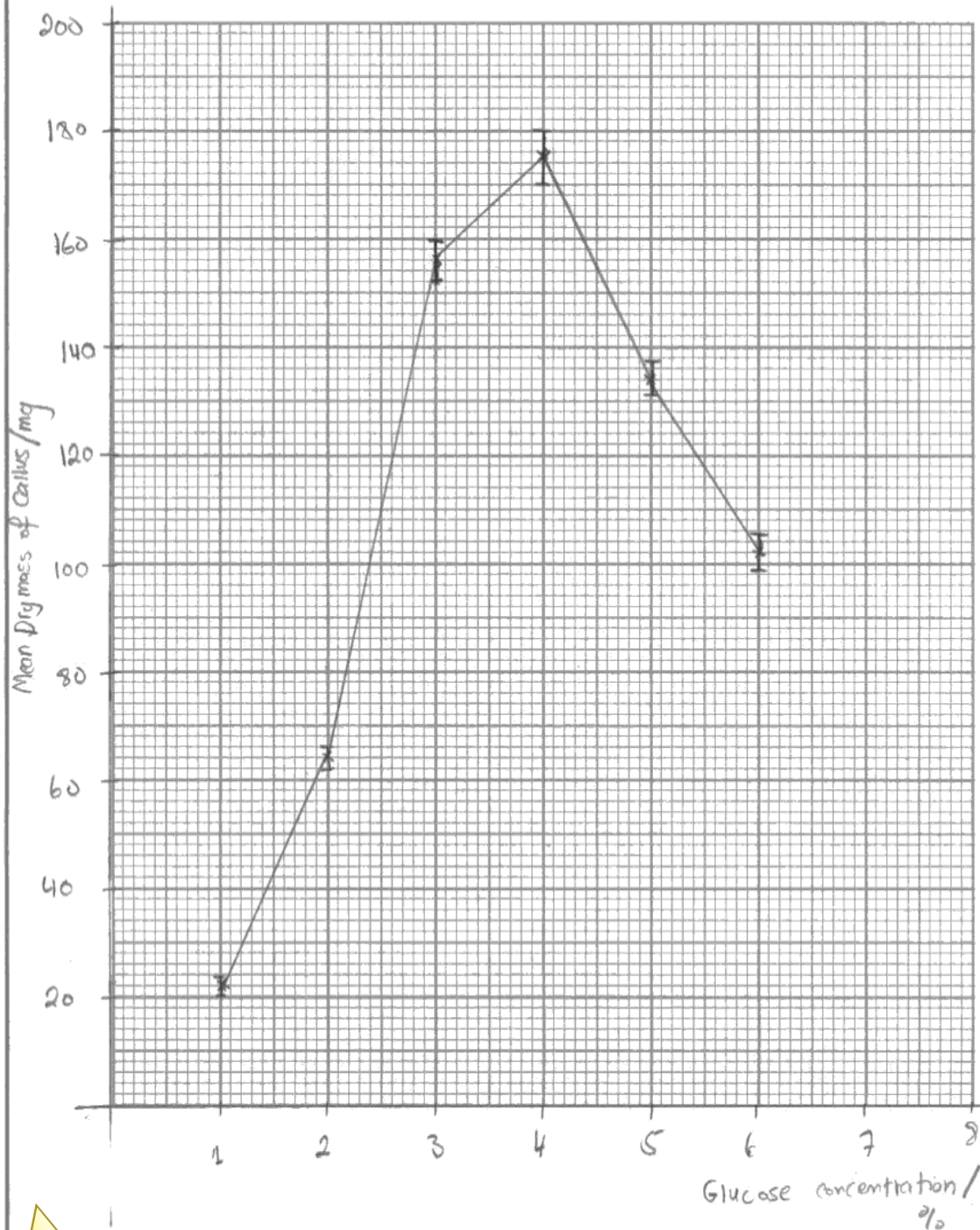
This would have been a 3 mark answer had it suggested a sensible temperature.

Question 1 (b) (i)

Although this question proved relatively accessible for most, there is still evidence of rather thoughtless answers which at the least wastes candidate's time and can lose them marks. An example which was very common on this paper was candidates plotting the SD, although they were not asked to do so.

(i) Plot the glucose concentration and the mean dry mass of callus, in a suitable graphical form.

(5)

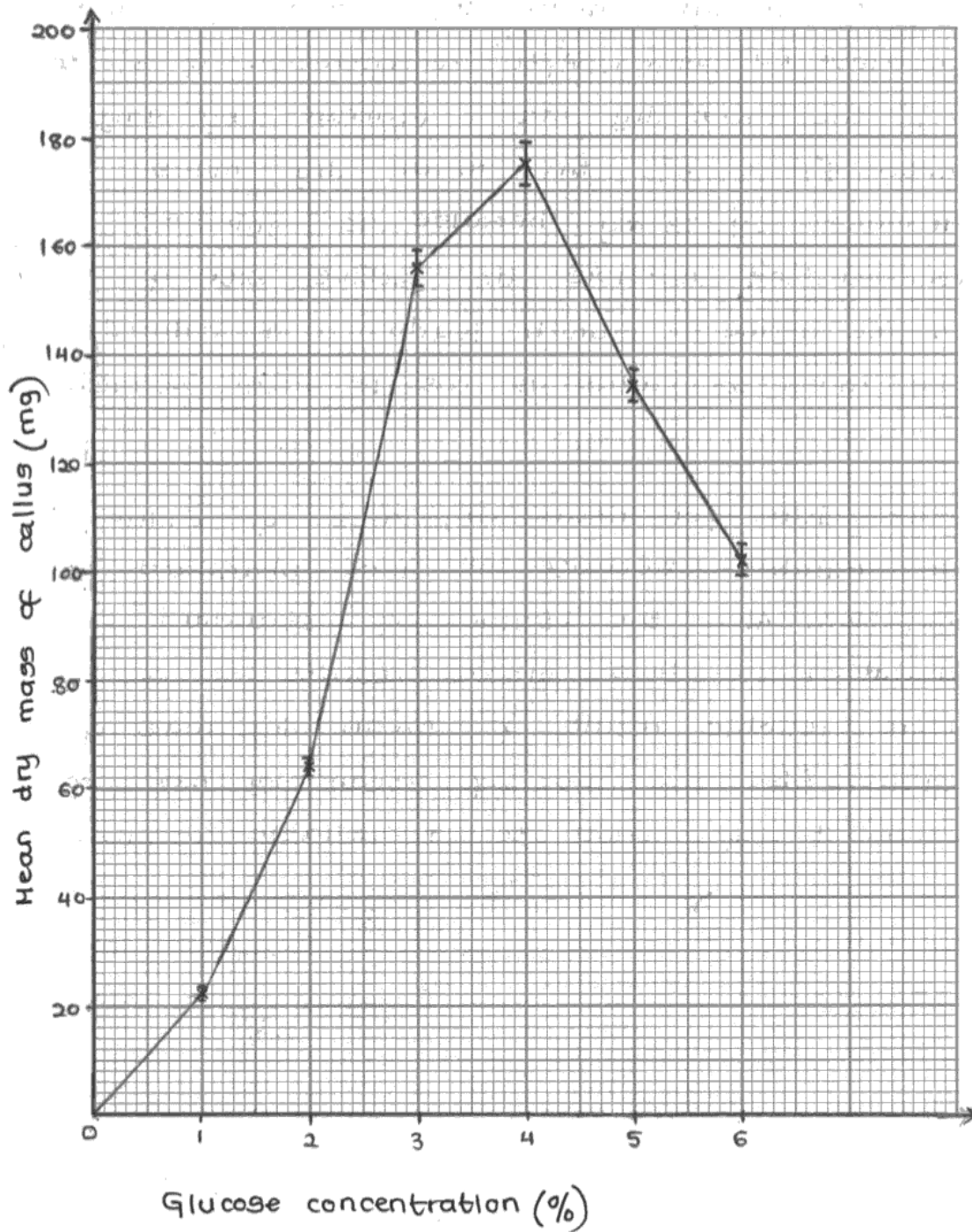


ResultsPlus
Examiner Comments

Many candidates plotted the standard deviation figures, which were not asked for on this occasion. However credit was not lost for this and the answer here gained a full 5 marks.

(i) Plot the glucose concentration and the mean dry mass of callus, in a suitable graphical form.

(5)



ResultsPlus
Examiner Comments

On this occasion there were 2 marks available for the plot. The most common way in which one of these marks was lost was to assume a point at 0,0.



ResultsPlus
Examiner Tip

Do not extrapolate beyond the data actually given. The only occasion when this rule may not be followed is if you are asked to do so in the question.

Question 1 (b) (ii)

Every year there is likely to be at least one question with a requirement to manipulate data and every year there are a good number of candidates who do not do so. It is often the case that such candidates have done nearly all the work for the mark, that is reading the necessary data from a graph or table correctly. The problem is that they then fail to do anything with these numbers.

(ii) Describe the effect of glucose concentration on the mean dry mass of callus.

(3)

As the concentration increased, mean dry mass ~~was~~ of callus ~~was~~ increased. When the concentration reached to 4% the highest value of mean dry mass was obtained which is 175 mg. After that as the the concentration increased, the mean dry mass of callus decreased.



ResultsPlus
Examiner Comments

There were many answers like this one which gained 2/3 for simply forgetting to manipulate the data.

(ii) Describe the effect of glucose concentration on the mean dry mass of callus.

(3)

- As the glucose concentration increased from 1% to 4% the mean dry mass of callus increased from 22 - 75 mg
- The greatest increase was from 64 to 156 mg when the concentration ~~was~~ increased from 2 to 3
- There was a decrease in ~~concentration~~ dry mass when the concentration further increased from 4 to 6% ~~from~~, it decreased from 175 to 102 mg



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Examiner Comments

As is so often the case in questions at this type, the candidate has done nearly all the work necessary to obtain a mark. That is, they have read off all the relevant figures from the graph but then simply quoted them rather than doing something with them.



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Examiner Tip

Ensure that you think about the possibility of manipulating data to illustrate points that you are making about trends or patterns in it.

Question 1 (b) (iii)

The answers most candidates gave to this question were very encouraging indeed. Unlike previous years, the majority homed in on the standard deviation values they had been given as what they should be looking at. This was usually worth 1 mark and was often followed by something which showed that the candidate knew that a low standard deviation indicates high reliability and vice versa. The 3rd mark alluded quite a lot of candidates who did not have the confidence to say that the data was reliable. Very few candidates talked about the lack of replication, anomalies or aspects of experimental design which might improve reliability. Such discussions have been common in previous years so a definite improvement is seen here.

(iii) Comment on the reliability of the data for the mean dry mass of callus.

(3)

The data obtained is not very reliable as there not any replicates made and anomalous data was not omitted at each particular concentration of glucose. Also, a large number of variables were uncontrolled, such as light intensity, temperature, humidity, etc. and these could have had significant effect on the data obtained that would now wrongly be attributed to change in glucose concentration.



ResultsPlus Examiner Comments

It has been common in the past to be faced with answers like this one, addressing a question about how reliability might be improved. What is required is, in fact, what most candidates this time did which is to comment on the standard deviation values and what they tell us about reliability.

(iii) Comment on the reliability of the data for the mean dry mass of callus.

(3)

The data is reliable because standard deviation for each reading of mean dry mass of callus is included. However, the standard deviation for certain results are very high. The standard deviation for result 5 and 6, where glucose concentration is 5% and 6% is constant, improving the reliability.



ResultsPlus Examiner Comments

This is a one mark answer because standard deviation has been mentioned. The rest of the answer, however, indicates that the candidate does not really understand what the standard deviation value means.



ResultsPlus Examiner Tip

Try to understand the difference between measuring reliability and ensuring it.

Question 1 (b) (iv)

(iv) Using the data in the table, describe the effect of glucose concentration on the mean percentage of explants forming a callus.

(2)

Shows a correlation b/w glucose concentration and mean percentage till 4%. Highest percentage reached 95% after that there is a drop in the mean percentage. Same relation as in mean dry mass of callus.



ResultsPlus
Examiner Comments

A significant number of candidates suggested that the relationship between glucose concentration and percentage of explants forming calluses was the same as the relationship between glucose concentration and the growth of calluses. The data show that this is clearly not the case, with callus growth reaching an estimated maximum at 4% glucose concentration but callus formation reaching an estimated maximum at 3%. A failure to realise this may have had consequences in question Q01bv.

(iv) Using the data in the table, describe the effect of glucose concentration on the mean percentage of explants forming a callus.

(2)

The concentration of glucose is directly proportional to the amount of callus produced but only for a ~~cer~~ certain range of concentrations



ResultsPlus
Examiner Comments

Imprecise answers such as this will rarely get marks.

Question 1 (b) (v)

In this question candidates were asked about a practical application of the results that they had been considering. The wide mark scheme, allowing candidates to explain any decision from using 3.5% for both, using 3% for explant formation and 4% for growth or using either 3% or 4%. As long as the choice was sensibly justified marks were gained.

- (v) Using the results of this investigation, suggest the optimum glucose concentration for both the formation and growth of calluses from explants. Explain your answer.

(2)

Optimum glucose concentration for both the formation and growth of calluses from explants is ~~3.5%~~ 3%. because at this concentration there is the highest mean percentage of explants forming a callus, that is 99.1%.



ResultsPlus Examiner Comments

This answer gains only one of the two marks because no comment has been made on the suitability of 3% for callus growth.

- (v) Using the results of this investigation, suggest the optimum glucose concentration for both the formation and growth of calluses from explants. Explain your answer.

(2)

Between 3% and 4% of glucose, because maximum mean dry mass was at 4%, and maximum formation of callus was at 3% of glucose, and increasing glucose concentration to 4% decreases formation of callus, hence 3.5% glucose could be a suitable ~~best~~ concentration to ~~obtain~~ obtain optimum results. more data should be ^{obtained} about concentrations between 3% and 4% to verify the best answer.



ResultsPlus Examiner Comments

A well reasoned answer which comments on most callus growth and explant formation and comes to sensible compromise solution.

Question 2 (a) (i)

- (a) The student's tutor said that he needed to add some visuals to his report, as well as some data.
- (i) He found the picture shown below in a magazine. He decided to add some information to this picture and use it in his report on GM crops.



Using the information in the extract, complete the boxes below to show the advantages and disadvantages of growing GM crops.

(4)

Advantages

- 1) GM crops have more potential to increase its productivity.
- 2) It also allows to transfer of genes across unrelated species, between animals or plants or any microbes.
- 3) The other way is using the vectorless transmission which is simpler and useful.
- 4) GM crop technology is widely used in the world as it's ^{also} having major impacts.

Disadvantages

- 1) GM crops also reduces the use of agro chemicals. So less of products produced at times.
- 2) If there is a transfer of these genes there must be side effects in which, we can get loss in productivity.
- 3) There is a vector transmission which carries virus from one species to another.
- 4) In the other side, there is malnutrition which accounts half of the 12 million deaths around the world.



ResultsPlus Examiner Comments

In general this question was well answered by most candidates. A few such as this one seemed not to understand what was required. The main problem being that little of what the candidate says has been extracted from the passage.



ResultsPlus Examiner Tip

Always consider using the information given in question to answer it and definitely do if so instructed.

- (a) The student's tutor said that he needed to add some visuals to his report, as well as some data.
- (i) He found the picture shown below in a magazine.
He decided to add some information to this picture and use it in his report on GM crops.



Using the information in the extract, complete the boxes below to show the advantages and disadvantages of growing GM crops.

(4)

Advantages	Disadvantages
<ul style="list-style-type: none"> - Fewer agro-chemicals are needed to grow the crops. - Economic and social stability of many less economically developed countries (LEDCs) will improve - Deaths related to malnutrition due to the lack of food can be reduced - Reduces water and wind erosion and thus the risk of desertification is reduced. 	<ul style="list-style-type: none"> - Genetically modified genes may escape through cross pollination leading to hybridisation between GM and non-GM plants. - Possible loss of beneficial insects like lacewings and ladybirds, leading to a reduced population of native birds - May damage habitats in farmlands



ResultsPlus
Examiner Comments

A very good answer typical of many seen.

Question 2 (a) (ii)

Very few had problems with this question

Question 2 (a) (iii)

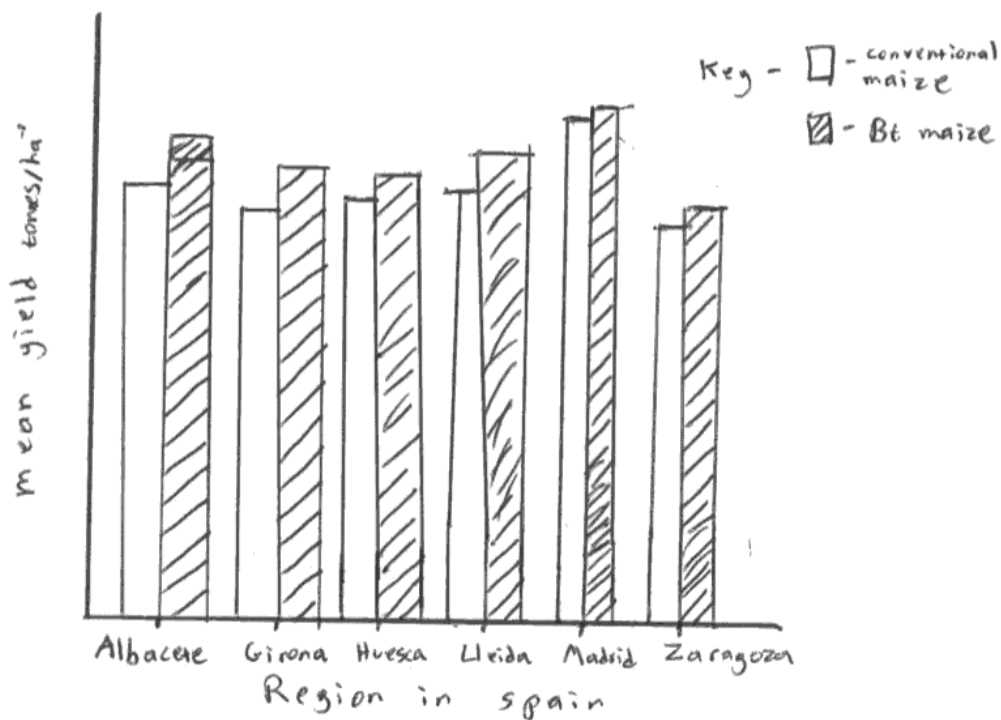
Most candidates tackled the calculation without any problems.

Question 2 (a) (iv)

(iv) The student decided to draw a graph to compare the data for the two types of maize grown in the six regions of Spain. Make a sketch to show the appearance of this graph and suggest a title.

(4)

Title Mean maize yield in Spain



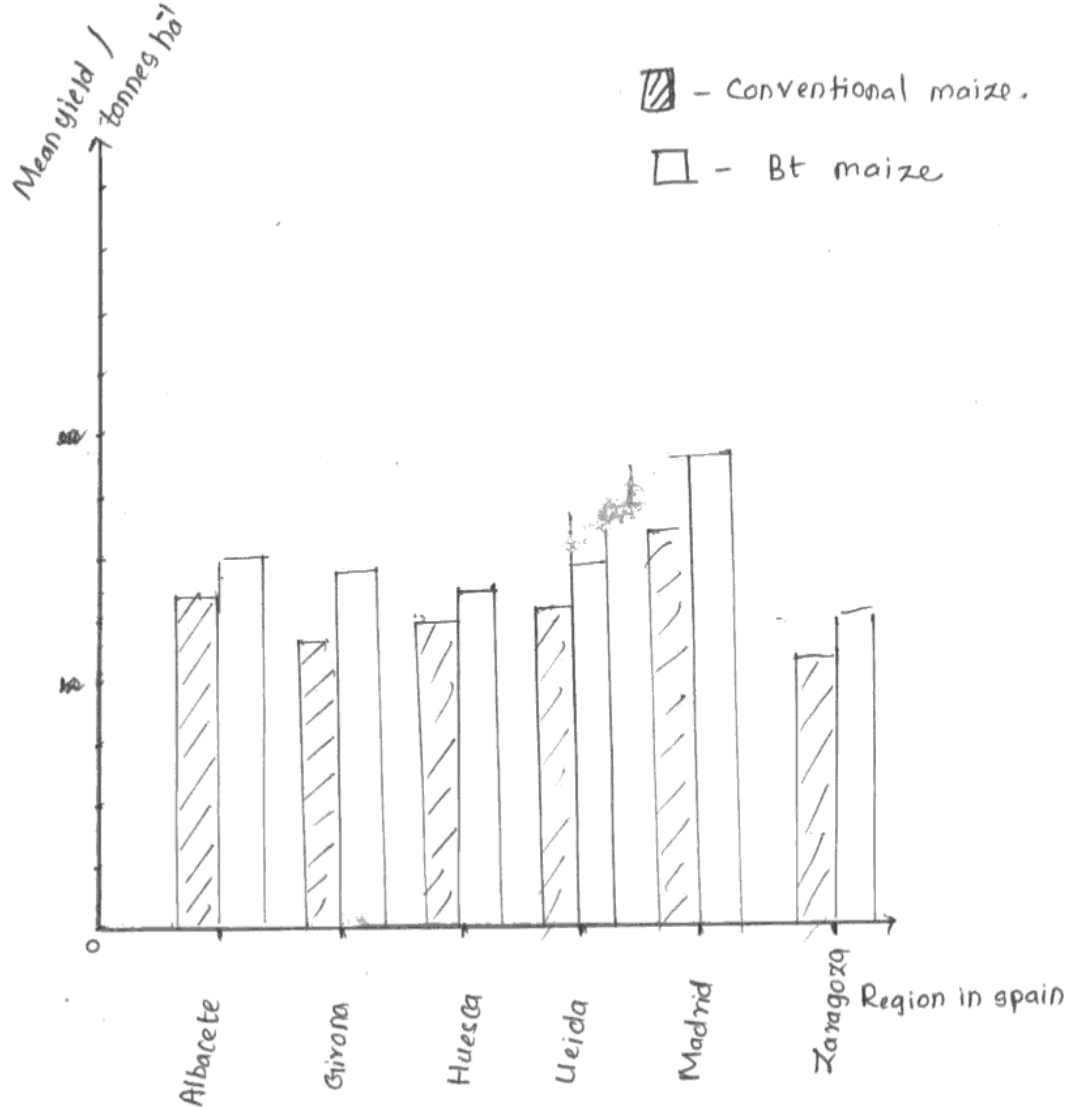
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Examiner Comments

This question proved accessible for most. The most common error was to write an inadequate title, as here where the 2 types of maize have been omitted.

(iv) The student decided to draw a graph to compare the data for the two types of maize grown in the six regions of Spain.
 Make a sketch to show the appearance of this graph and suggest a title. (4)

Title Mean yield of conventional maize and Bt maize in of
different regions of Spain.



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Examiner Comments

This is a good response gaining all four marks for a suitable title, choice of a bar graph, bars sketched which are identifiable in terms of both maize type and region and finally proper labelling of axes.

Question 2 (b)

(b) A report is expected to address the implications of the applied biology involved.

Explain **two** environmental implications from this extract.

(4)

1. GM crops ~~technical~~ technology ~~may cause weeds to~~
~~inherit tolerance to herbicides~~ reduce water and wind
erosion and thus the risk of desertification. Due to resistance
in GM crops, soil clearing can be done ~~late~~ later. As a result,
more soil can be conserved for flora and fauna.
2. GM crop ~~technical~~ ~~technique~~ technology causes loss in
species. Toxins in the crops ~~are~~ are consumed by the
predators along the food chain, causing a reduction ~~in~~ ~~the~~
in populations of native birds. This will disrupt the food
chain.



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Examiner Comments

This question proved to be very discriminating. Some candidates, such as the one shown here, were able to find two environmental implications in the passage and write some explanation. Others simply found 2 issues that they thought were environmental but wrote no explanation. Such answers gained no marks.

(b) A report is expected to address the implications of the applied biology involved.

Explain **two** environmental implications from this extract.

(4)

1 In paragraph 8, it talks about that ^{using} agro-chemicals can damage and give serious impacts on the environment.

2 In paragraph 10, it talks about the soil erosion, water erosion, wind erosion, and also desertification. These are related to the environment.



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Examiner Comments

This response is typical of quite a few which simply quote places where the environment is alluded to and make no explanation of what is going on.



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Examiner Tip

It is very important to take note of command words (such as explain) in a question.

Question 2 (c) (i)

Paragraph number 4.

This would be because physical methods are generally mentioned in this area e.g. supplying electric current and using a gene gun. These require more role of the experimenter.



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Examiner Comments

This question was generally well done. The most common reason for loss of mark was to not mention that genes are being transferred but to only talk about methods of doing it, as in this example.

Question 2 (c) (ii)

The production of correctly written references still seems to be an area which needs work. On this occasion an example was given which only had to be mirrored but still very few candidates were able to gain full marks.

(ii) Reference number 3 is complete and written in a suitable format.

Rewrite reference number 1 in a suitable format.

(2)

Roger Straughan, Michael Reiss, Cambridge University Press
Ethics, Morality and crop biotechnology, Cambridge university
press, Cambridge, 1996



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Examiner Comments

This is one in which all the information is present without any additions or omissions but the order is wrong so gets mp 1.

(ii) Reference number 3 is complete and written in a suitable format.

Rewrite reference number 1 in a suitable format.

(2)

1. Straughan, R and Reiss M. (1996) Ethics,
Morality, and Crop Biotechnology. Cambridge
University Press.



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Examiner Comments

A rare example of an answer gaining both marks. The most common reason for loss of one of the marks was to include the author's forenames.



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Examiner Tip

Make sure you know how to write a reference to a journal article or book properly.

Paper Summary

Advice on how to improve marks remains much the same as ever, but it must be noted that an improvement in all areas was seen.

- Read all the information given in the questions very carefully, it is there for a purpose.
- Always manipulate data in questions asking you to describe a trend from a graph, table etc.
- Do not just quote figures. Make sure any manipulation is mathematically correct and with units, if appropriate.
- Thoroughly review *all* core practicals. Be clear about all the details and implications of each.
- Question 1 will *always* be based on one of these.
- Review your understanding of basic experimental design. Be clear about the different types of variables (IV, DV etc.).
- Make sure you understand how to write references properly.
- Be very clear that you understand what we mean by economic, environmental, social and ethical implications of biology.

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