

Principal Examiner's Feedback

October 2016

Pearson Edexcel International
Advanced Level
in Biology (WBI03) Paper 01

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WBI03/01

GQ October 2016

Paper Introduction

There were some difficult questions on this paper on which some candidates struggled to score many marks. This was notably the case for 1aii, 2ai and 2cii. Detailed comments on these are made in this report. .

As ever, advice is to make sure that candidates are thoroughly familiar with all of the nine core practicals. This means the basic practical, as carried out or seen, together with all of the background theory and data analysis. WBI03 is a skills-based paper but knowledge is still needed in these areas. For Q2, it is very important, again as always, to make sure candidates are familiar with the requirements of the domestic visit/issue report on page 80 of the specification (Issue 6). This is currently still available on the Pearson website.

WBI03_01_Q01ai

Question Introduction

A relatively easy starter question, but both independent variables were needed for the mark. This is one of the main reasons why half of all candidates did not achieve this mark.

Examiner Comment

Very often, as here, candidates choose generic variables which bear no relation to the question being asked. No thought has really been given to the idea of independent variable in this answer.

Examiner Tip

Make a real effort to learn the meaning of the different kinds of variable; dependent, independent and other variables, which should be controlled or monitored.

(a) (i) State the **two** independent variables in this investigation.

(1)

1. Temperature

2. light intensity.

WBI03_01_Q01aii

Question Introduction

Very few of the candidates gained three marks on this question. Most had a good idea about how to obtain dry mass, but were unable to suggest a way of doing this accurately.

Examiner Comment

When such terms as 'accurate', 'reliable' and 'valid' are asked about, candidates will often, as seen in this example, come up with generic suggestions about repeating aspects and keeping all sorts of things constant. Sometimes such suggestions, as long as they are specific to the scenario of the question, may gain some marks. However, again as seen here, they do not address what the question is actually asking about.

Examiner Tip

Try to learn how to make measurements accurate or data reliable and valid. They do not all involve the same thing.

(ii) Describe how the dry mass of a callus could be determined accurately.

(3)

- ⇒ By obtaining ~~same number~~ equal number of wheat grasses.
- ⇒ By obtaining ~~same~~ equal concentration of auxin, mineral salts, cytokinin and Sacrose.
- ⇒ By repeating the experiment.
- ⇒ By taking same amount of ~~ex plant~~ explants.

Examiner Comment

This is one of the better answers, which attempts to address all parts of the question. Obtaining dry mass is addressed well, with a suitable drying method described and the idea of a constant mass being achieved. However, although it attempts to make a suggestion about accuracy, this is not detailed enough to gain the mark.

(ii) Describe how the dry mass of a callus could be determined accurately.

(3)

After the experiment, calluses are taken, dried between filter papers and then ^{dried} further ~~and~~ in an oven ~~until~~ at a fixed temperature ^(at 100°C for 24 hours) until a constant mass is obtained. Then, by using a digital balance, the mass of calluses are found, and recorded.

WBI03_01_Q01aiii**Question Introduction**

This question was designed to be accessible for most candidates, however due to a poor understanding of the question, over half of candidates gained no marks.

Examiner Comment

This is a good example, gaining both marks available.

(iii) Describe how the student could ensure that the culture media contained the same concentration of sucrose. (2)

In each culture media, measure equal masses of sucrose and add it to known volume of medium, 20cm³.

DO NOT WRITE

WBI03_01_Q01bi**Question Introduction**

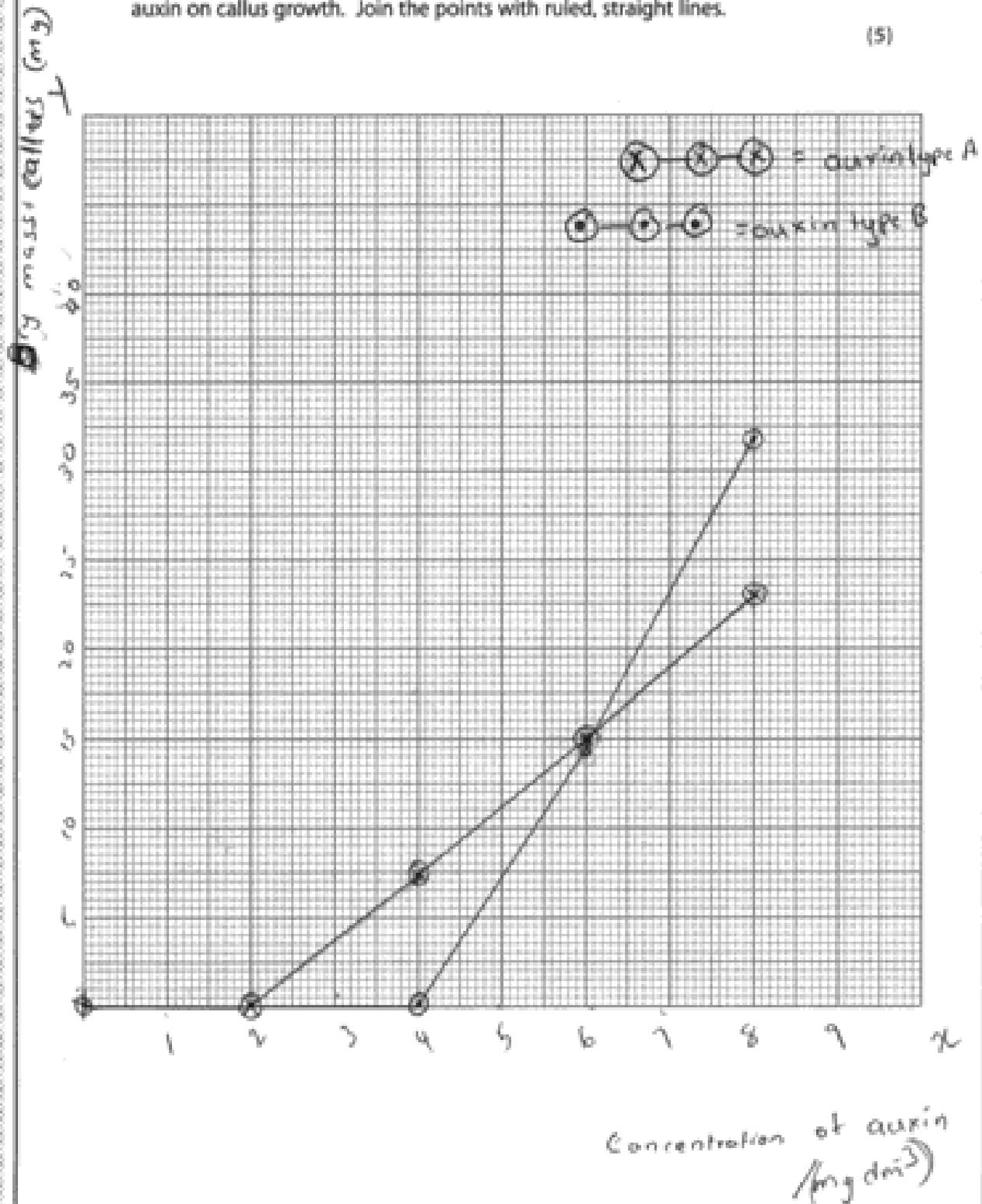
As has become common the graph proved very accessible, with most candidates scoring well. The most common reasons for candidates losing marks was units not being put on the axes labels and inaccurate plotting.

Examiner Comment

Most candidates are capable of getting full marks on the graph plotting exercise.

- (i) Using a line graph, plot the data to compare the effects of the two types of auxin on callus growth. Join the points with ruled, straight lines.

(5)



WBI03_01_Q01bii

Question Introduction

This question was quite well done with about half gaining all three marks. Where marks were lost this was mainly in relation to a failure to make a manipulation but to simply quote data.

Examiner Comment

A clear three mark answer.

(ii) Compare the effects of these two types of auxin on callus growth in this plant.

(3)

Increasing concentration increases dry mass. There was no dry mass at 0 and 2 concentrations for either A or B. However, at 4 mg dm^{-3} A had a 7.2 mg increase while B still remained nil. At 6 mg dm^{-3} both A and B had a slight difference of 0.3 mg - A: 15 / B: 14.7 mg . On the other hand, at 8 mg dm^{-3} , B had an increase of 8.7 mg more than A: A: 23 / B: 31.7 mg .

DO NOT WRITE IN THIS AREA

Examiner Comment

This answer suffers from a lack of attention to the data but simply makes some qualitative comments.

(ii) Compare the effects of these two types of auxin on callus growth in this plant.

(3)

In auxin type A 0 to 2 mg dm^{-3} concentration dry mass was 0 and from 2 to 8 mg dm^{-3} the concentration, dry mass increased upto 23 mg. In auxin type B, 0 to 4 mg dm^{-3} concentration there was dry mass was 0 and from 4 to 8 dry mass of callus increased rapidly upto 31.7. The growth of callus in auxin type B is more compared to auxin type A. But callus starts to grow in low concentration in type A than in type B.

DO NOT WRITE IN THIS AREA

WBI03_01_Q01biii

Question Introduction

Questions about the significance of a difference and simple statistics are usually quite well answered. In this case, however, only the best candidates were able to gain three marks.

Examiner Comment

This answer achieves mp3 only as the rest of the answer is not clearly related to the data.

(iii) Suggest what further information is needed in order to be more confident that any differences are significant.

(3)

- ~~know~~ The plants. The explants can be grown in ^a the same medium after-wards. The difference in length, number of leaves can be recorded to provide further differences.
- A different plant can be used to extract the explant from, the ~~ab~~ mentioned procedure can be followed to provide differences.

Examiner Comment

This answer addresses all three marking points.

rise⁻ is observed for auxin type B between 6 and 8 concentration (17mg difference)

(iii) Suggest what further information is needed in order to be more confident that any differences are significant.

(3)

Information about
 a Standard deviations and the number of replications at each concentration. Standard deviation ~~must~~ is needed in order to make sure there is no overlapping, ~~etc~~ If so (overlapped) there would be no significant difference. Also, ~~need to more~~ need to use a larger sample to repeat ~~the~~ and calculate the mean which is more reliable.

Examiner Comment

This answer, although brief, gains one mark for its mention of standard deviation and is close to gaining another mark when it mentions the mean, but fails to gain the mark as it does not mention replication.

(iii) Suggest what further information is needed in order to be more confident that any differences are significant

(3)

Standard deviations.

Repeated and the mean masses.

Control value.

WBI03_01_Q01c

Question Introduction

Three marks were gained only by the top 20% of the candidates. Too many candidates were vague about how they expressed themselves and did not quote concentrations in the case of either auxin B or zeatin. Some candidates merely suggested that simply auxin or cytokinin is needed, evidently having not read the question carefully.

Examiner Comment

A clear full mark answer.

Using all the information in this question, describe the contents of a culture medium that could be used for the maximum growth of a callus from crested wheatgrass.

(3)

- Zeatin type of cytokinin at concentration of 3 AU as it give growth of ^{ground} 20.45g mass of callus.
- Auxin type B, as it give ~~g~~ at concentration of 8 mg dm³, as it give mass of callus 31.7 mg.
- In addition use mineral salts and sucrose for maximum growth of callus from crested wheatgrass.

Examiner Comment

Although there is nothing fundamentally wrong with this answer, it gains only one mark because its reference to auxin is unsupported by either the type or the concentration and the reference to zeatin does not give the best concentration of auxin used. The question has not been clearly read as it requires use of information and also asks for the requirements for maximum growth.

Using all the information in this question, describe the contents of a culture medium that could be used for the maximum growth of a callus from crested wheatgrass.

(3)

for a maximum growth of a callus from crested wheatgrass auxin, mineral salts, sucrose and most importantly cytokinin is can be used. The contents will increase or maximise the growth of plant.

Examiner Comment

This answer has not used any of the data in the question into account and as a result gained no marks.

Using all the information in this question, describe the contents of a culture medium that could be used for the maximum growth of a callus from crested wheatgrass.

(3)

A culture medium containing all mineral ions needed for plant growth such as glucose Nitrate, Magnesium, Phosphate, Calcium.

WBI03_01_Q02ai

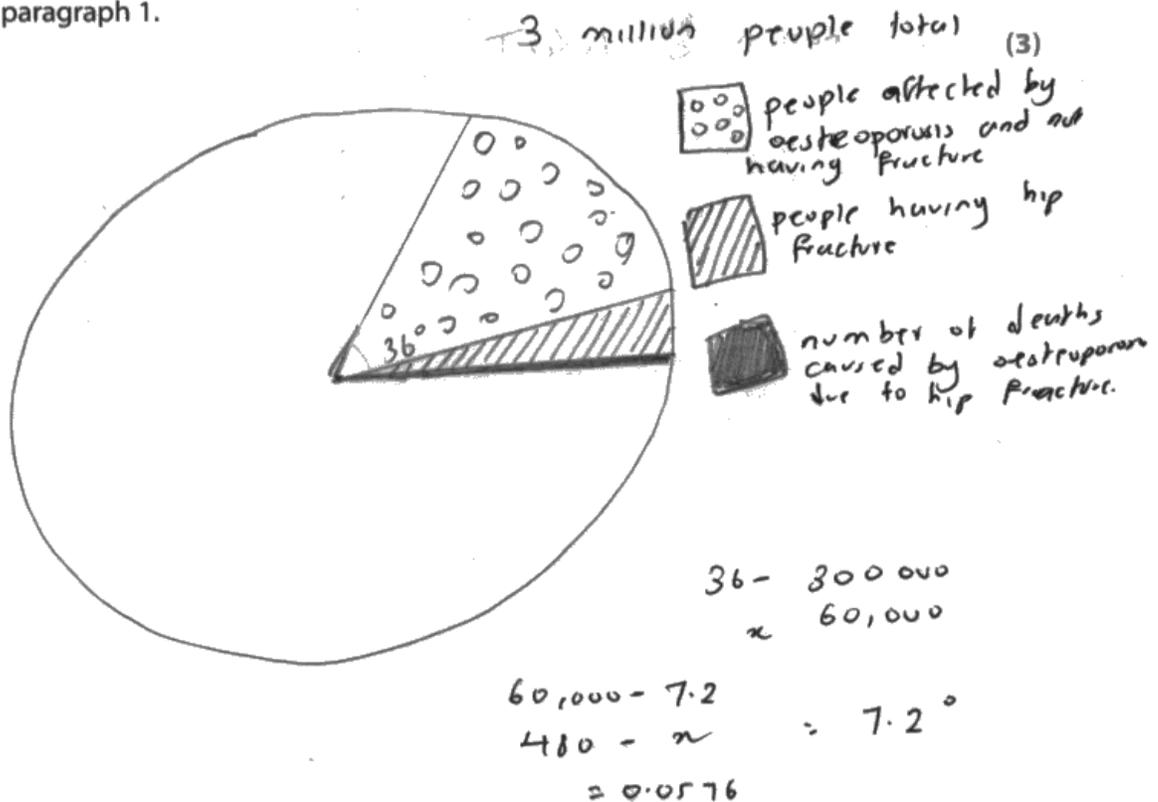
Question Introduction

This question was also only well answered by the top 20% of candidates, with many candidates not understanding what is meant by 'a visual.' Reference to the Visit/ Issue requirements in the syllabus would help here.

Examiner Comment

This question proved to be quite difficult for many but a good number were able to give a three mark answer as seen here.

- (a) (i) The report lacks visual material to illustrate some of the points made. Sketch a visual to illustrate the numerical information given about osteoporosis in paragraph 1.



WBI03_01_Q02aii

Question Introduction

This question was poorly answered by most candidates with only a small minority gaining the mark.

WBI03_01_Q02aiii

Question Introduction

This question was well answered with some excellent summaries of the information provided.

Examiner Comment

This answer scored full marks. This is a typical response which scored three marks.

(iii) Write a paragraph to summarise the information in this diagram. ^{three (hip, spine, femoral neck)}
 Both Teriparatide and Bisphosphonate results in increased BMD for all ~~the~~ (3) ^{three (hip, spine, femoral neck)}
 Teriparatide ~~is more effective~~ results in a higher increase in bone mineral density, ie is more effective, than Bisphosphonate for all three (spine, hip and femoral neck). The difference in % change in BMD from baseline between Teriparatide and Bisphosphonate ~~for the~~ at the spine, hip and femoral neck is 5.7% ^{in % change in BMD from baseline}, 2.5% and 2.9% respectively. The largest difference between Teriparatide and Bisphosphonate is at the spine and the smallest difference in % change in BMD from baseline between Teriparatide and Bisphosphonate is at the hip.

WBI03_01_Q02b

Question Introduction

This question was generally very well answered with the most common errors being those made by candidates who made suggestions, which although possibly true, were not in the report.

Examiner Comment

A pleasing number were able to extract the necessary information from the report to gain 4 marks.

(b) Explain **two** economic implications of osteoporosis identified in this report.

(4)

1. Once the Teriparatide microchips is lost in the muscle, it ~~increa~~ the cost for the fixing treatment is the damage is high. Likewise when the newly micro chips are invented the cost will become high more rapidly.
2. However, some ~~sen~~ money is saved from the treatment of fractures as the hip fractures cost £ 2bn a year. However, th microchips reduces the cost of ~~is~~ daily injection so the money will be saved.

Examiner Comment

Although point 1 in this answer may be true it is not confirmed by the report and thus gained no marks

and produces a higher BMD...

(b) Explain **two** economic implications of osteoporosis identified in this report. (4)

1. ~~Elderly~~ Implantation of a microchip with Teriparatide costs a lot as it is a relatively new technology used against osteoporosis.
2. Microchips reduce the cost of daily injections of teriparatide, thus people will have more money to spend on other things like food.

WBI03_01_Q02ci

Question Introduction

Although a reference writing question is often set, some candidates still continue to struggle with it. Here only the top 20% of candidates achieved three marks, the lowest scoring 20% of candidates gained no marks in this question. Attention to detail is the key to answering this kind of question well.

Examiner Comment

A lack of precision often loses candidates marks in questions such as these. Here the inclusion of the month in the reference limits the mark to a maximum of two marks.

(c) Information about the small study referred to in paragraph 5 is shown below.

First-in-Human Testing of a Wirelessly Controlled Drug Delivery Microchip
Robert Farra, Norman F. Sheppard, Laura McCabe, Robert M. Neer, James M.
Anderson, John T. Santini, Michael J. Cima and Robert Langer
Published in Science Translational Medicine February 16 2012
Sci Transl Med 22 February 2012:
Vol. 4, Issue 122, p. 122

(i) Using the information write a full reference to this paper as it should have been presented in the report.

Anderson, J.M.,
 -> Cima, J.M., Farra, R., Langer, R., McCabe, L., Neer, M.R., Shep
 Sheppard, F.N and Santini, T.J. (February 16 2012).
 First-in-Human Testing of wirelessly Controlled Drug Delivery
 Microchip. Science Translational Medicine, 4(122)122.

Examiner Comment

In this case, a mark is lost because author abbreviation is incorrect. The inclusion of 'p.' before 122 (the page number) is ignored.

(c) Information about the small study referred to in paragraph 5 is shown below.

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Robert Farra, Norman F. Sheppard, Laura McCabe,
 Robert M. Neer, James M. Anderson, John T. Santini,
 Michael J. Cima, Robert Langer (2012)
 First-in-Human Testing of a Wirelessly Controlled
 Drug Delivery Microchip Science Translational Medicine,
 4, (122), p.122

Examiner Comment

They key with any reference question is to follow the rules precisely. Many were able to do this but some, although including much of the required information, did not and gained few marks, if any. In this case, the authors have not been correctly abbreviated, additional information (such as the word vol.) is included and the order of the parts is not accurate.

(c) Information about the small study referred to in paragraph 5 is shown below.

First-in-Human Testing of a Wirelessly Controlled Drug Delivery Microchip
 Robert Farra, Norman F. Sheppard, Laura McCabe, Robert M. Neer, James M.
 Anderson, John T. Santini, Michael J. Cima and Robert Langer
 Published in Science Translational Medicine February 16 2012
 Sci Transl Med 22 February 2012:
 Vol. 4, Issue 122, p. 122

(i) Using the information write a full reference to this paper as it should have been presented in the report.

(3)

Ra ~~Farra~~ Robert F, Norman F ETAL (February
 16 2012) Science Translational medicine, Controlled
 drug delivery microchip, Vol. 4 issue 122 page p 122

WBI03_01_Q02cii

Question Introduction

This question was answered very poorly. An overwhelming number of candidates appear to think that the names of peer reviewers would be included in the authorship.

Examiner Comment

This answer is one of the few seen which gained two marks.

(ii) Suggest why this research paper has so many authors.

(2)

This paper has so many researchers and the test that they are writing is on human so lot of professions on their professions needed to not make a mistake for example microbiology expert, music profession, drug producer, doctors.

Examiner Comment

A minimal answer for one mark, but still one of the few seen which gained anything on this question.

(ii) Suggest why this research paper has so many authors.

(2)

Because it's ~~over~~ information was gathered from many different fields of science.

Examiner Comment

A very common answer in terms of peer reviewers being in the author list.

(ii) Suggest why this research paper has so many authors.

(2)

It is a peer reviewed ^{paper} journal where each and everyone of them research. and analyse the experiment to check for the reliability of the result.

WBI03_01_Q02d

Question Introduction

This was well answered, which is often the case when candidates are required for gather information from the report in order to answer the question.

Examiner Comment

A clear, concise four mark answer.

(d) Complete the table below by giving **one** benefit and **one** risk of each drug.

(4)

Drug	Benefit	Risk
bisphosphonates	slow or stop the natural process that dissolves bone tissue	Leads to oesophageal cancer
Teriparatide	increases bone density and strength	Kidney stones

Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Read all of the information given in the questions very carefully: it is there in order to guide candidates and should be utilised.
- Thoroughly review all core practicals. Be clear about all of the details and the skills that each helps to teach you. The first question of this paper will always be based on one of these practicals.
- Review your understanding of basic experimental design. Be clear about the different types of variables (independent, dependent and control variables).
- Make sure that you understand how to write references properly, this includes journal articles, books and websites.

