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Examiners' Report
June 2011

GCE Biology 6BI07 01

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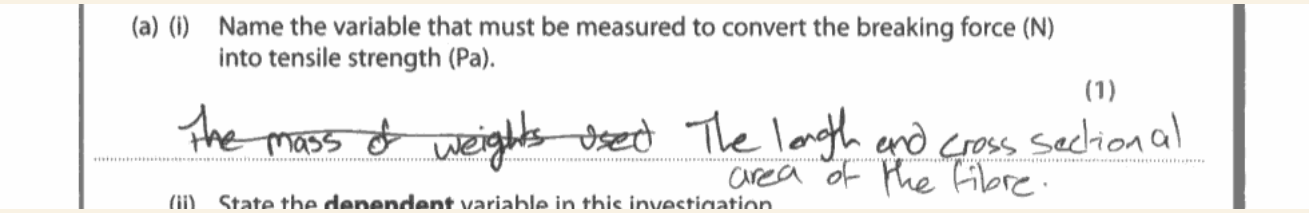
Introduction

There has been a distinct improvement in candidate performance this year. The main reason for this would seem to be the greater attention being paid to the How Science Works assessment requirement of the specification, and the unit 3 visit/issue criteria. The recognition by centres that this is a skills paper and that the skills examined are clearly indicated in the specification is probably also a factor for this improvement. It is hoped that this will be continued into the future.

Question 1 (a) (i)

One of the recurring themes in this report will be 'read the question (and all the information in it)'. Failing to do so caused many problems on this question.

It was made very clear in the preamble that tensile strength *per se* was not being measured, but breaking force (N). It was also clear, to those who read it carefully, that the conversion from N to tensile strength required a calculation involving cross sectional area of the fibre. It was disappointing, therefore, to see so many candidates simply guessing.



(a) (i) Name the variable that must be measured to convert the breaking force (N) into tensile strength (Pa).

(1)

~~the mass of weights used~~ The length and cross sectional area of the fibre.

(ii) State the **dependent** variable in this investigation

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Examiner Comments

This response shows evidence of considerable confusion. Three answers have been given. The last one is correct. The first one is discounted because it has been crossed out. However, the second attempt which is wrong, gains no mark.

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Examiner Tip

Carefully read the information in the preamble to questions.

(a) (i) Name the variable that must be measured to convert the breaking force (N) into tensile strength (Pa).

(1)

Volume of distilled water / and also crossection of fiber

(ii) State the **dependent** variable in this investigation

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Examiner Comments
Again, the candidate has given two answers and the first one is taken as the intended response even though the second is absolutely correct.

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Examiner Tip
Never give more answers than are asked for or implied. In this case 'the variable' means one so the first one is marked.

Question 1 (a) (ii)

This question was aimed at examining a very basic understanding of variables and it was disappointing to see so many candidates again apparently guessing the answer. Candidates are reminded that this unit is focussed on skills, and especially those on How Science Works (HSW). Applying any of the HSW criteria in novel context is also expected.

(ii) State the **dependent** variable in this investigation.

(1)

Concentration of NaOH .

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Examiner Comments
A very large number of candidates chose to quote the IV when asked for the DV, as this one.

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Examiner Tip
Check your understanding of what is the IV and what is the DV by making a pair of sentences, one will be correct and one will be incorrect. In this case the two would be 'the concentration of NaOH (may) depend on the tensile strength of sisal fibres' OR 'the tensile strength of sisal fibres (may) depend on the NaOH concentration'.

Question 1 (a) (iii)

Although this question was well answered by many, there was a significant number who found it beyond them. In the middle were those who could name a relevant variable or two but could not give a sensible and viable way to control either.

(iii) Give **two** variables to be controlled in this investigation. Describe how they could be controlled.

(4)

Variable 1 Temperature.

How it could be controlled The temperature of the surrounding should be constant, when both types of fibres ~~where~~ are soaked in the solution.

Variable 2 Size of Fibres.

How it could be controlled Fibres of hemp and sisal should be of equal size and length.

(b) (i) The results of an investigation using sisal fibres are shown in the table below (1 MPa = 1 million pascals).

Sodium hydroxide concentration (%)	Mean tensile strength / MPa
0.00	395
0.04	425
0.08	540
0.16	820
0.24	590
0.32	620

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Examiner Comments

This answer gained one mark for temperature, which was credited on its own, although better candidates would say 'temperature of NaOH solution' or 'temperature of room/ chamber where the tensile strength measurement was carried out'.
The method of control simply elaborates on the variable, a common mistake.
The second variable, size, is too vague; the word size is usually best avoided just as candidates should avoid amount. The candidate finally arrives at an answer which would have gained them a mark, had it not been a third attempt and written in the wrong place.

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Examiner Tip

Check through all nine core practicals and make a list for each one of the possible control variables and come up with ways of controlling them.

(iii) Give **two** variables to be controlled in this investigation. Describe how they could be controlled.

(4)

Variable 1 humidity ~~temp~~

How it could be controlled doing the experiment in the same lab. ~~and use water bath for temp~~

Variable 2 ~~length of fibre~~ temperature

How it could be controlled use water bath

(b) (i) The results of an investigation using sisal fibres are shown in the table below (1 MPa = 1 million pascals).

Sodium hydroxide concentration (%)	Mean tensile strength / MPa
0.00	395
0.04	425
0.08	540
0.16	820
0.24	590
0.32	620

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Examiner Comments

This is an example of a typical two mark answer for giving two correct variables. The suggestions for methods of control are too vague in both cases. A constant temperature water bath would have achieved the mark, as would an enclosed chamber with some humidity equalising arrangement, such as a bowl of water which would keep the atmosphere saturated whilst the experiment was carried out.

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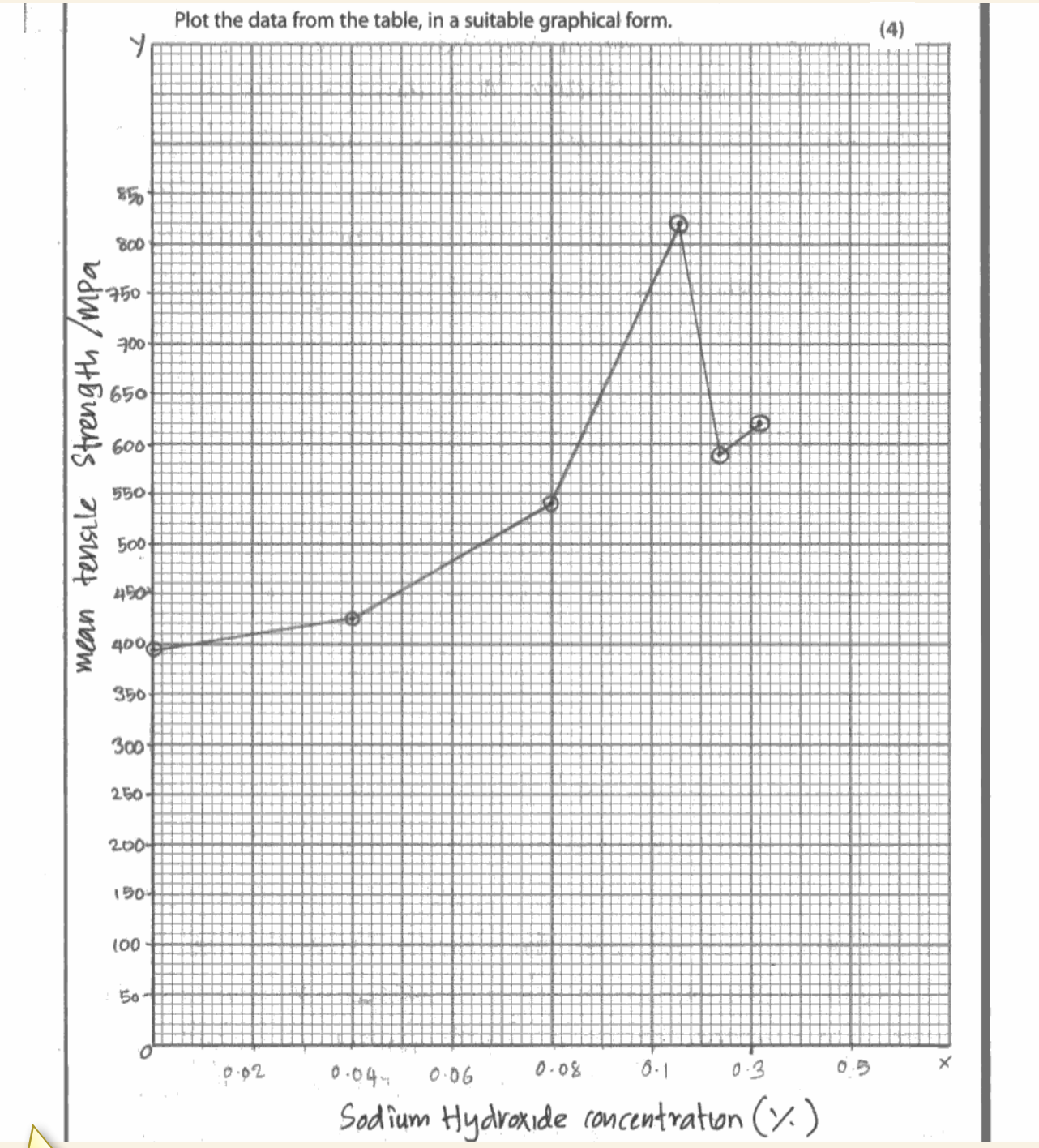
Examiner Tip

Again, look through each core practical and think about its possible use as a method to find something out by measurement. Then, think about the details of the conditions under which these measurements would need to be made to make the results valid. In this way you can be prepared for all sorts of possibilities in the examination.

Question 1 (b) (i)

The graphical display of data is a skill which most candidates can gain a good mark for. However, errors are still made, the most common are failure to properly label axes (usually due to the omission of units), the drawing of an inappropriate line and the adoption of inappropriate axes as shown in the examples.



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Examiner Comments

In this case the use of a non-linear x-axis has lost the candidate the plot (P) mark. The axes are correct (the A mark), properly labelled (L) and a ruler drawn line would gain S.

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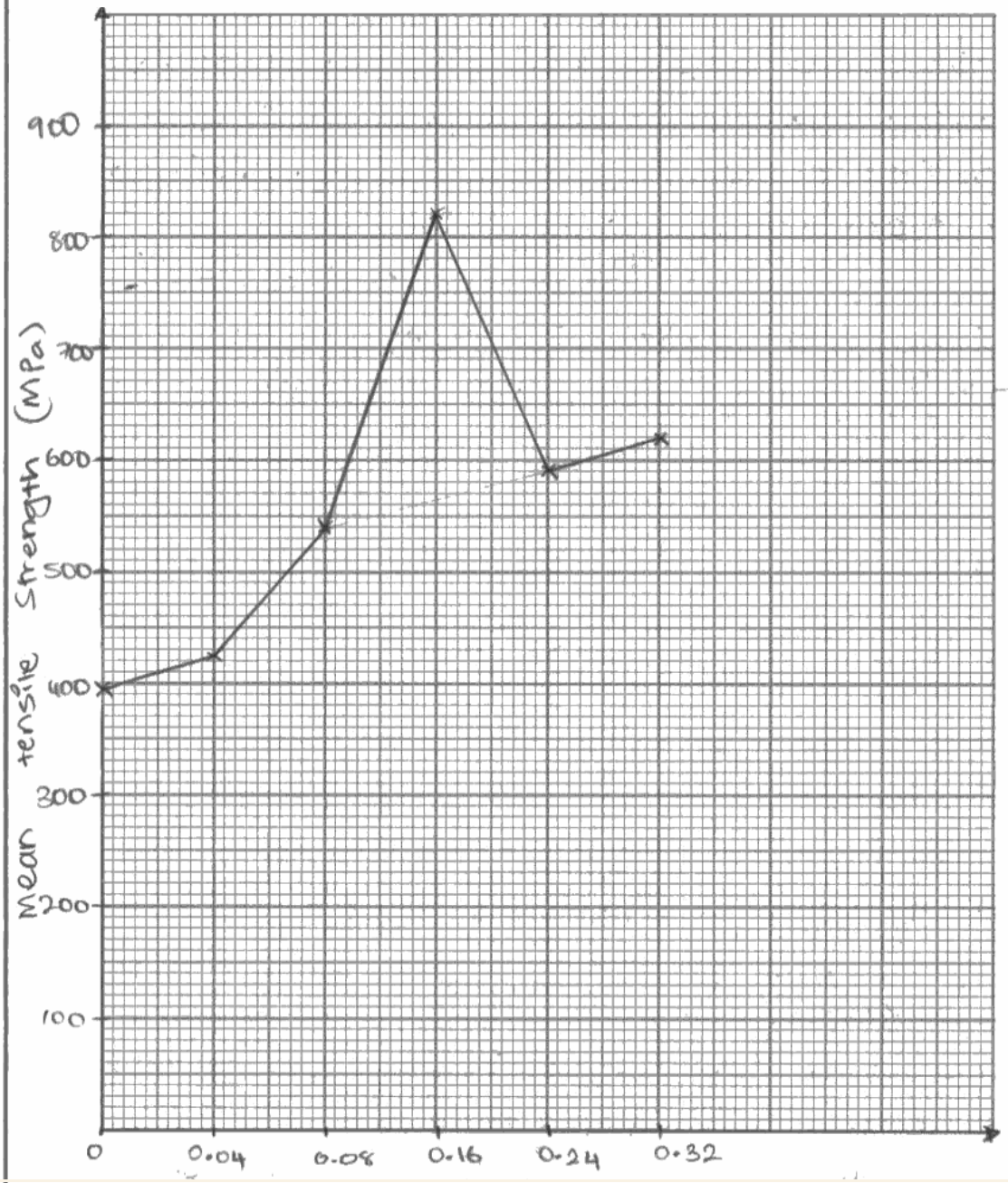
Examiner Tip

It is possible, but not very likely, that a non-linear axis (for either x or y) could be appropriate. Therefore, think very carefully before using one.

Plot the data from the table, in a suitable graphical form.

(4)



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Examiner Comments

This was much the most common mistake where the x-axis goes from 0.08% NaOH to 0.16% (0.08% difference) with a single large square, whereas from 0.04 to 0.08% is a difference of only 0.04% but is also given a large square.

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Examiner Tip

Look out for unequal intervals, particularly in IV values. This is often because it is simply not practical to take measurements of the DV at equal intervals of the IV.

Question 1 (b) (ii)

Some questions may ask for an explanation and a description, others may be just a description or just an explanation of the graph.

(ii) Describe the effects of sodium hydroxide concentration on the tensile strength of sisal fibres.

(3)

On general trend, the increase of sodium hydroxide concentration will increase the tensile strength of sisal fibres. This is because the middle lamella of the fibres will berome more stronger as the concentration of the alkali increased.

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Examiner Comments

This is a very brief answer which only gained the mark for noticing that there is some evidence that an increase in [NaOH] leads to an increase in tensile strength. Further marks were available for pointing out some of the further subtleties in the data.
In spite of its brevity, the answer does manage to stray from the command word *describe* into an attempt at an explanation. This is one of the commonest errors of interpretation made by candidates this series.

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Examiner Tip

Always read carefully describe and/or explain questions to understand which one you are being asked to do, in some cases it may be both. Describe is asking for what it is like, explain is asking for suggestions as to why it is like that.

(ii) Describe the effects of sodium hydroxide concentration on the tensile strength of sisal fibres.

(3)

The graph shows the tensile strength of sisal fibres increases with increasing concentrations of sodium hydroxide. At 0.00% of NaOH concentrations the tensile strength is 395 MPa, at 0.32% of NaOH concentration, the tensile strength is 620. This is because NaOH reinforced the cellulose fibre. The tensile strength of the sisal fibre is maximum at a NaOH concentrations of 0.16%, it was 820 MPa. At concentrations higher the tensile strength reduced because the NaOH disrupted the cellulose structure of the cellulose fibre hence weakening it

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Examiner Comments

This answer gained 2 marks out of 3, which was quite a common score. One way to obtain the third mark would have been to have manipulated the data rather than just quoting it, as this answer did. Another would have been to look for the more subtle aspects of the data, such as the differences in gradient between various values of [NaOH].

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Examiner Tip

In data description questions, always think about doing some manipulation such as calculating a difference or dividing one number by another to be able to state how much bigger/smaller they are than each other. If you do this, make sure you do it properly and do not use words such as about, nearly etc. in your answer; as in, *'the value at 11 is about double that at 10'.*

(ii) Describe the effects of sodium hydroxide concentration on the tensile strength of sisal fibres.

(3)

As the sodium hydroxide concentration increases from 0·00 to 0·16, the mean tensile strength of the sisal fibres also increases. The steepest increase is from the sodium hydroxide concentration of 0·08 to 0·16 with an increase of 280MPa. After the Sodium hydroxide concentration of 0·16 there is a steep decrease to 0·24 and after 0·24 there is an increase of 30MPa from the Sodium hydroxide concentration of 0·24 to 0·32

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Examiner Comments

This is an excellent answer which achieves 4 of the mark points with a maximum score of 3. They are; increased [NaOH] causes increased tensile strength, a steeper increase from 0.08% 0.16% [NaOH], illustrated with a manipulation and then the peak at 0.16%.

Question 1 (c) (i)

(i) State **one** similarity and **one** difference in the conclusions you could make about the effect of sodium hydroxide on the tensile strength of sisal and hemp fibres.

(2)

Similarity Sodium hydroxide increases tensile strength of both sisal and hemp fibres.

Difference At ~~same~~ equal concentration of sodium hydroxide, the mean tensile strength of hemp fibres is higher than sisal fibres

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Examiner Comments

This answer shows one of the common errors for this question, which was to say that both fibres show an increase in tensile strength with increased [NaOH]. This is, of course, only true up to a certain point and this needed to be indicated for the mark.

(i) State **one** similarity and **one** difference in the conclusions you could make about the effect of sodium hydroxide on the tensile strength of sisal and hemp fibres.

(2)

Similarity Both sisal fibres + hemp fibres show an ~~decrease~~ increase in tensile strength when using (adding) sodium hydroxide

Difference Hemp fibres have an overall higher tensile strength than sisal fibres.

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Examiner Comments

In addition to the error shown in the above example for the similarity, this response shows a common misconception in the difference. The candidate having missed, as many did, the stem which asks for a difference in the effect of [NaOH] on the two.

Question 1 (c) (ii)

This question was the most discriminating on the paper. The details of what is required are found in the How Science Works section of the specification.

(ii) Comment on the reliability of the data for **hemp** fibres and explain how this affects your confidence in any conclusions drawn. **(3)**

The reliability of the data for hemp fibres are higher compared to sisal fibres, Since the standard deviation is given for hemp fibres and not for sisal fibres. ~~Sisal Fibres has a less reliable.~~ Reliability of sisal Fibres are less. Using the standard deviation the data can be ~~compared~~ compared, described easily and can be concluded easily.

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Examiner Comments

This response displays quite a common misreading error. The candidate is attempting to compare reliability between hemp and sisal, which is not asked for.

(ii) Comment on the reliability of the data for **hemp** fibres and explain how this affects your confidence in any conclusions drawn. **(3)**

It does not say how many times the experiment was repeated. Therefore, the data is not that reliable. ~~However, in comparison to the other experiment, the same concentration of NaOH were used, hence meaning the data is somewhat more reliable.~~ There is not that much confidence in the conclusions, as the test was only taken once, then there could be systematic/random error

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Examiner Comments

This response displays a common and startling mistake. The candidate clearly states that 'it does not say how many times the experiment was repeated'. In the pre-amble it says 'Thirty fibres were soaked in distilled water and the breaking force of each fibre was measured in newtons'! Again, it needs emphasising that every bit of information given is potentially needed. However, the lack of understanding goes further in this case, as it did for many others. It is strongly implied in the response that, had the experiment been repeated, it would have been more reliable. This is not the case but still seems to be a widespread misconception, despite the fact that it is commented on year after year in the examiner reports.

(ii) Comment on the reliability of the data for **hemp** fibres and explain how this affects your confidence in any conclusions drawn.

(3)

The data is not very reliable as the standard deviations for most of the values are too large. & Also some results ~~for the 0.24% concentration~~ seem to overlap with those of ~~0.16% and 0.32%~~ others. (S.D for 0.24% is 185) 1074 will decrease to 889

Then, the maximum tensile strengths for sisal and hemp do not have a very significant difference.

The data for 0.04 and 0.08% concentrations of hemp are more reliable than the others.

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Examiner Comments

This is a quite rare full mark response to this question, but it does show it is quite possible for a candidate at this level to understand SDs and what they mean. Candidates should know that SD is a measure of variability and thus reliability and that a high SD shows reliability is low. Some comment on these lines was needed for marking point 1. This response gets this in the first sentence. The very best candidates would probably have done an estimate of the relative sizes of the SDs for each value of [NaOH] and realised that they are well over 10% of the mean in every case and in some cases up to nearly 20%. Such a manipulation would have gained marking point 2. It also might have lead on to a realisation of the fact that would have gained marking point 3, although a candidate who did this would not get 3/3 because of the maximum of 2 as on the mark scheme for marks derived from marking points 1-4. This is because the question asks for comments on reliability and an explanation of the effects of this on confidence in the conclusions. This aspect of the mark scheme reflects the 'and' in the question. This response does get a second mark when it points out the fact that means with SDs overlap in some cases and even goes on to use the word significant in a correct context. The candidate is clearly well on the way to understanding the inferential statistical tests they will meet and interpret at A2.The final mark awarded in this case is for the recognition in the last line that some means seem to be 'more reliable' than others (marking point 3), although it is also very close to marking point 6 on lines 4 and 5.

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Examiner Tip

Make a real effort to understand measures of variability such as range bars and standard deviations and what it means when they do and do not overlap.

Question 1 (c) (iii)

Nearly all candidates gained the first mark for stating hemp, but most did not go on to give an adequate explanation as to why. The first point to make is that the question says *'Plant fibres treated with sodium hydroxide* could be used to reinforce new materials' and the preamble says 'It is possible that adding alkali will increase the tensile strength of these fibres *so that they can be used in new materials*'. These two statements should have indicated to candidates that untreated fibres would *not* be suitable. So, the many who said that the reason they had chosen hemp was because it was stronger than sisal, *even when no NaOH was added* did not gain marking point 2.

(iii) Plant fibres treated with sodium hydroxide could be used to reinforce new materials.

Using the data given, suggest which of these two fibres is more suitable for reinforcing new materials. Give an explanation for your answer.

(2)

Hemp fibres would be more useful. This is because when it is treated with Sodium Hydroxide they have a higher maximum tensile strength when compared with sisal fibres. Hemp with 0.24% concentration has 254 MPa more tensile strength than sisal with 0.16% concentration

(Total for Question 1 = 20 marks)

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Examiner Comments

This is a good response which gained 2 marks, but in fact got all 3 marking points on the mark scheme.

(iii) Plant fibres treated with sodium hydroxide could be used to reinforce new materials.

Using the data given, suggest which of these two fibres is more suitable for reinforcing new materials. Give an explanation for your answer.

(2)

Hemp fibres are more suitable as they have a greater tensile strength than sisal fibers even without NaOH added. And when NaOH is added hemp has a greater ~~maximum~~ tensile strength of 1074 MPa when 0.24% NaOH was added. While sisal's maximum tensile strength is 820 MPa when 0.16% of NaOH was added.

(Total for Question 1 = 20 marks)

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Examiner Comments

This response, after a false start ('....even without NaOH added') got 2 because it goes on to gain marking point 2 when it talks about the comparative maxima for hemp and fibre. The statement about relative strengths in untreated fibres is ignored as it is not wrong, it is just not relevant to the question. Marking point 3 would not have been awarded because the data are not manipulated, they are simply quoted.

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Examiner Tip

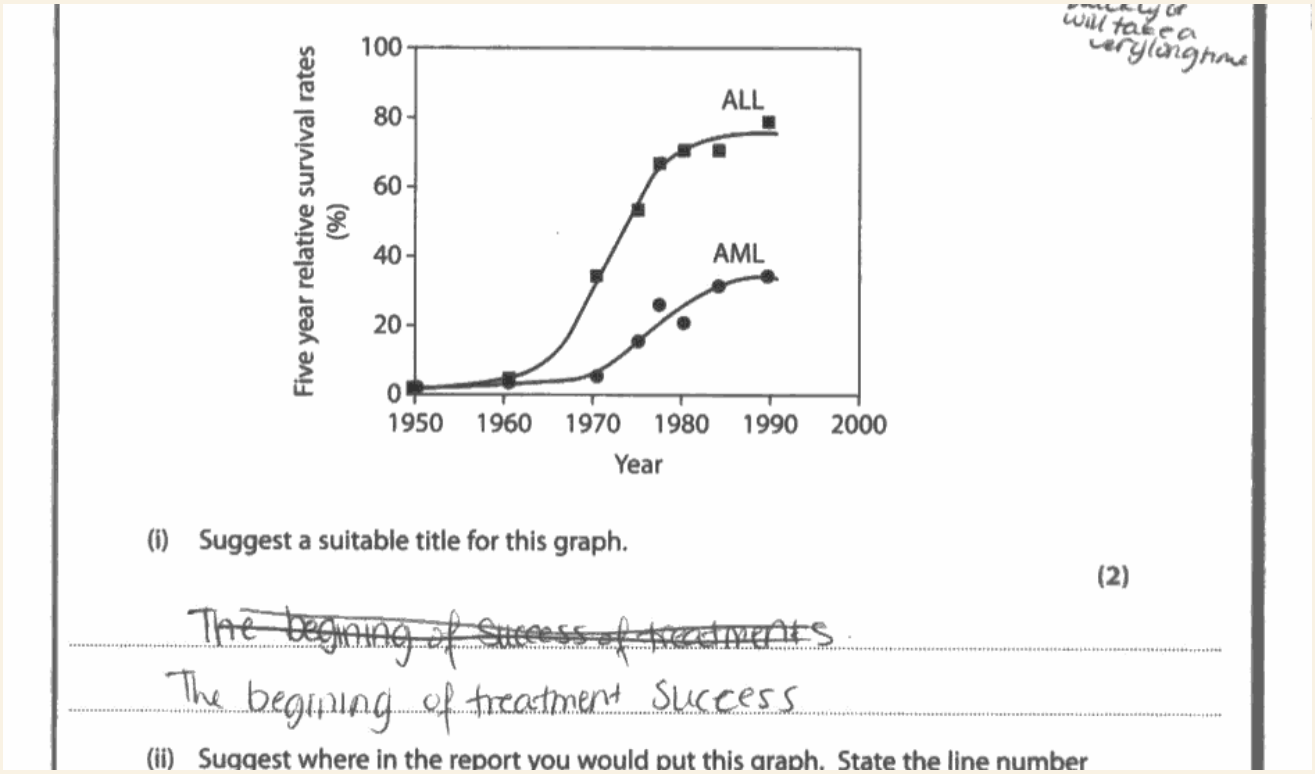
Make sure you read and re-read all the information given. This will be especially important in the very last part of the question, where you will very often be asked to refer back to something in the preamble, although you are unlikely to be told to do this, you must think to do it yourself.

Question 2 (a)

This question gave a good spread of answers, but did allow many who maybe struggled with some of the more demanding parts of the paper to gain significant credit. Weak candidates gave vague answers to marking point 2, such as weakened immune systems or body defences.

Question 2 (b) (i)

On the face of it this question looks easy, but in fact it gave a full spread of marks. Of those who did not get 2/2, the main reasons were either a lack of attention to detail or the idea that some sort of newspaper type headline was what was required. This latter problem has been apparent in the past and commented on in the reports previously.



(i) Suggest a suitable title for this graph.

(2)

~~The beginning of Success of treatments~~

The begining of treatment Success

(ii) Suggest where in the report you would put this graph. State the line number

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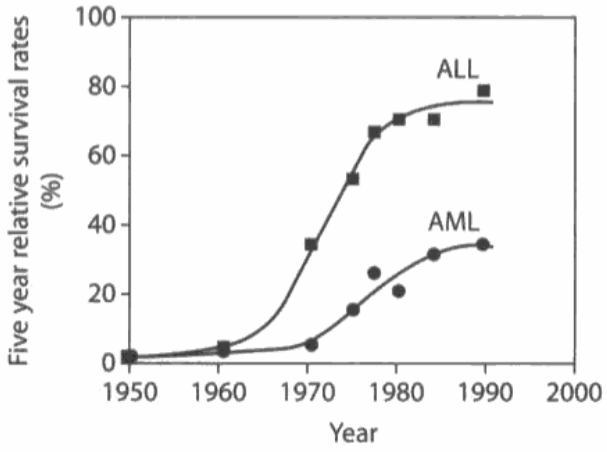
Examiner Comments

This is simply not the sort of title a *scientific* graph would have, although a newspaper or popular science magazine may use this approach



(i) Suggest a suitable title for this graph.

patients (2)

Comparison between survival rates of two types of leukaemia ~~of~~ over past few decades.

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Examiner Comments

By not stating which types of leukaemia or which decades, this answer gets zero.

Question 2 (b) (ii)

This question proved to be very accessible for all levels of ability.

Question 2 (c)

This question proved to be accessible to many with even the weakest generally scoring 2/4.

(c) A visit or issue report is expected to address two of the following implications: ethical, social, economic or environmental. Identify, using line numbers, **two** of these implications from this report. Explain why you have chosen each implication.

(4)

Implication 1 Economic

Line number 24.

Explanation It shows ~~tells about~~ us the economic state of the medicine worldwide. It says that ~~about~~ the sales were about $ 100 million worldwide which applies for economy. Also it says about the profit that they have gained by the medicine.

Implication 2 26.

Line number ~~Social~~ Ethical

Explanation It speaks about the rights of the society which produces the medicine or the source of medicine. ~~As a society~~ Ethically they have decided that collectors are expected to compensate source countries. The source country has its right to get the profit of what they produce.

Q2.

(a) Also it can be a great risk for the child if the child is affected by other diseases. ~~If children become infected~~

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Examiner Comments

This answer shows a typical full mark response to this question. The most commonly quoted response to economic was in terms of the money being earned for the use of periwinkle. Fewer discussed this as being an example of an ethical concern when the country of origin does not see any of this money.

(c) A visit or issue report is expected to address two of the following implications: ethical, social, economic or environmental. Identify, using line numbers, **two** of these implications from this report. Explain why you have chosen each implication.

(4)

Implication 1 Economic

Line number 24

Explanation Worldwide sales of the madgascan periwinkle is huge(at $100million), this is a problem for madagascar as it does not get any of that money even though the plant originates from there.

Implication 2 Environmental

Line number 32

Explanation By using a particular plant to cure a disease & selling it worldwide we are decreasing global biodiversity.

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Examiner Comments

This response displays one of the common errors on this well done question. The candidate thinks that the use of Madagascan periwinkle is leading to a decrease in global biodiversity.

Question 2 (d) (i)

The idea of gaining marks for the *manipulation*, rather than just the quotation, of data seems to be alluding many. Also, very few candidates thought to say that the statement is only supported if the trend shown by the table continues. This notion of past trends having to be viewed with caution when thinking what might happen in the future is an important one.

(i) Explain how the data in the table supports her statement.

(3)

Her statement, refers to better survival rates of the patients which is shown by the table. The survival rate of patients ~~AEI~~ suffering from ALL & AML have increased from 4% and 0% to 90% and 60% respectively in the past 60 years. The rate for Hodgkin's disease also showed improvement from 40% to 92% survival rate. Bone cancer & Brain tumours patients showed an increase in the survival rate from 20% & 17% to 63% and 70% respectively. The greatest increase was seen in the ALL survival rate which showed an 86% increase.

(ii) The student decided to compare the percentage survival rates in 1950 with

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Examiner Comments

This response achieves the mark for saying that all the diseases shown in the table have shown some increase in survival, although they do this rather laboriously, spending a lot of time for one mark. It does get the manipulation mark, but right at the end in what almost looks like an aside.

(i) Explain how the data in the table supports her statement.

(3)

From 1990 to 2010 ~~what the research study~~ there is an increase in the percentage of patients survival rate in every single disease on the table except for hodgkins disease which stayed at a high percentage of survival rate. But all the others increase ALL increased from 75% - 90%, AML increase from 37% to 60%, Bone cancer increased from 62% to 63% (which isn't a significant increase) and brain tumours increased from 58% to 70%

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Examiner Comments

This answer only gets marking point 1 because the rest of it merely quotes data from the table.

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Examiner Tip

Again, never just quote data, but do use it to support a point you are making. Do this by manipulating it.

Question 2 (d) (ii)

This question proved to be highly discriminating. Many made the error of using space and time to say why the graph they had often very briefly described would be suitable. This was not wanted - it was a describe, not a describe and explain question. Most did choose a bar chart although line graphs and pie charts did figure in the responses seen. In this case, just a suggestion of a bar chart was not enough to gain the mark. The structure of the bar chart had to be right and many candidates didn't get it right. In the end, only the best candidates gained 2/2.

(ii) The student decided to compare the percentage survival rates in 1950 with 2010, using a graph. Describe a suitable graphical form for the data.

(2)

Bar chart. Types of disease will be independant variable (x-axis). Survival rate will be dependant variable (y-axis). For each disease draw two bar charts, one for 1950 and other for 2010. Using a key, cross one of the bars to indicate it's for ~~response~~ either 1950 or 2010.

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Examiner Comments

This is very clear and accurate answer, the allusion to IV and DV is ignored.

(ii) The student decided to compare the percentage survival rates in 1950 with 2010, using a graph. Describe a suitable graphical form for the data.

(2)

A bar graph would be a suitable form of graphical representation of the data. The size of the bars would help readers ~~create~~ evaluate the change in the years of 1950 with 2010.

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Examiner Comments

In this case the only description in the 5 line answer is 'a bar graph would be suitable'. The rest is a justification, which was neither asked for nor rewarded.

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Examiner Tip

Yet again, when asked to describe do not explain. You will waste time doing so and think you have given the right answer but will gain no credit.

Question 2 (e) (i)

Some candidates did not understand what the question was about and answered with a critique of Wikipedia or suggestions about graphs that could have been included. Where the general requirement was understood, the commonest errors were to talk about referencing books, without any suggestion as to what sort or to interview doctors or even patients.

(e) One of the comments of the student's teacher was that the references could be improved.

(i) Give **two** ways in which the student's references could be improved.

(2)

By adding more graphs and charts to describe and (survival rate) compare data, which make the reader easily understandable. ~~The report~~ By adding the symptoms of these ~~deare~~ dieseaces breifly and ~~survival rates~~ tables containing survivalrates rates of these dieseases.

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Examiner Comments

This candidate is really answering the question 'suggest ways in which the report might be improved'.

(e) One of the comments of the student's teacher was that the references could be improved.

(i) Give **two** ways in which the student's references could be improved.

(2)

- include the URL of the articles used
- include the date and author of the articles used

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Examiner Comments

This brief answer gains both marks.

Question 2 (e) (ii)

This question again proved to be a very good discriminator. Again, many talked about additional data in the form of graphs, tables etc. which could be sought rather than identifying some material already in the report which was unsupported by a reference.

(ii) Identify, using a line number, one place in the report which requires a reference to support the statement made. Give a reason for your answer.

(2)

Line number 35

Reason In this line she states that 30% of cancers in children are leukaemia, however there is no concrete evidence ~~to~~ or data given to support ~~thes~~ this statement. Hence ~~sh~~ this statement requires a reference to support it.

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Examiner Comments

A simple and effective answer for 2 marks

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