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Examiners' Report
June 2023

International Advanced Level Biology WBI13 01

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June 2023

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Introduction

This paper generated responses broadly in line with those of previous series. It is clear the candidates are now very familiar with this new style of paper since its inception in 2019. However, one general comment to make here in the introduction is that, on the basis of the evidence from this paper, candidates do not seem to be well versed in the details of recommended additional practicals as they are in those of the core practicals. Attention is drawn to the question on the recommended additional practical to do with factors affecting pollen grain growth and the one on the disc diffusion method for assessing antimicrobial properties. The latter was done very well, the former quite poorly. Hopefully, this will act as a reminder that the recommended additional practicals are just as likely to be examined as the core practicals.

In other areas, things were very much as before, with the majority of candidates understanding different kinds of variables, best practise for graph plotting and table drawing and how to carry out mathematical operations.

Question 1 (a)(i)

Most candidates were able to gain one mark on this question, with the commonest correct answer being xylem. The commonest incorrect answer was phloem. Some candidates had no idea what to write and wrote down the names of organelles and totally inappropriate cells.

1 The photograph shows elephant grass (*Pennisetum purpureum*).

(Source: © ASHLEY COOPER/SCIENCE PHOTO LIBRARY)

Elephant grass grows well in the nutrient-poor soils in dry areas in East Africa and is widely used as food for cattle.
Its use as a source of fibres has been studied.

(a) The strength of plant fibres is partly due to the arrangement of cellulose microfibrils in the cell walls of these fibres.

(i) Name **two** types of cell found in plant fibres.

(2)

1 ~~xylem cell~~ meristimatic cells

2 Scharavengma

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Examiner Comments

Although we are somewhat lenient on spelling, this one is just too far from the correct version, sclerenchyma.

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Examiner Tip

Try to learn the spellings of key terms. Make a list as you go along and regularly review it before the examination.

1 The photograph shows elephant grass (*Pennisetum purpureum*).

(Source: © ASHLEY COOPER/SCIENCE PHOTO LIBRARY)

Elephant grass grows well in the nutrient-poor soils in dry areas in East Africa and is widely used as food for cattle.
Its use as a source of fibres has been studied.

(a) The strength of plant fibres is partly due to the arrangement of cellulose microfibrils in the cell walls of these fibres.

(i) Name **two** types of cell found in plant fibres.

(2)

1 Schlyrocheama cells, / Parachaema cells

2 Xylem cells

ResultsPlus
Examiner Comments

Here it was judged that the spelling was close enough phonetically.

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(Source: © ASHLEY COOPER/SCIENCE PHOTO LIBRARY)

Elephant grass grows well in the nutrient-poor soils in dry areas in East Africa and is widely used as food for cattle.
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(i) Name **two** types of cell found in plant fibres.

(2)

1 ~~Cellulose xylem cells~~ Sclenchyma

2 ~~Starch phloem cells.~~ collenchyma

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Examiner Comments

Here the importance of clearly indicating what you want to be read is shown. This gained 1 mark.

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Examiner Tip

Always make crossings out very clear.

Question 1 (a)(ii)

This question was reasonably well answered, with effects on the structural properties being far commoner then any suggestions to do with permeability.

(ii) Fibres have cell walls with secondary thickening of lignin.

Describe **two** ways in which secondary thickening affects the properties of the cell.

(2)

1 keeps the cell intact, tight, ~~doe~~ cell doesn't overflow or rupture.

2 Controls what enters and exits the cell.

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Examiner Comments

This candidate clearly had some ideas which are not completely hopeless but unfortunately are not precise enough to gain either of the marks. The notion in the first sentence that the cell does not rupture may be related to it being strengthened, but they do not say that clearly. The second sentence again is along the right lines but not close enough to the correct answer, which is specifically about cell permeability.

(ii) Fibres have cell walls with secondary thickening of lignin.

Describe **two** ways in which secondary thickening affects the properties of the cell.

(2)

1 ∴ impermeable to water

2 cells ~~are~~ ~~have thicker cell wall~~ are good for mechanical support ~~for the plant to withstand the pressure~~

ResultsPlus
Examiner Comments

In this case the candidate's first sentence is worth a mark. Unfortunately their second sentence, although in a sense correct, does not answer the question. The candidate clearly knows that secondarily thickened cells often provide good mechanical support for the plant of which they are a part. What we wanted to know was how secondary thickening with lignin affected the cell's properties not its function.

(ii) Fibres have cell walls with secondary thickening of lignin.

Describe **two** ways in which secondary thickening affects the properties of the cell.

(2)

1 Secondary thickening ~~creates the mesh like formation of cellulose microfibrils and that increases~~ provides the cell with tensile strength to withstand high pressure.

2 It makes the cell impermeable.

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Examiner Comments

A clear 2 mark answer.

Question 1 (b)(i)

About three quarters of candidates were able to answer this question correctly, which still leaves a quarter who do not understand the basic principles of types of variables in a scientific experiment.

(b) Soaking plant fibres in sodium hydroxide causes them to swell and so increases their strength.
The effect of length of time of soaking on the strength of elephant grass fibres was investigated.
The breaking strength of the fibres after this soaking was determined to calculate the tensile strength, in Newtons per square millimetre (Nmm^{-2}).

(i) Name the independent variable in this investigation.

(1)

breaking strength of the fibres

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Examiner Comments

It is still something of a surprise when candidates are not clear about the various types of variable.

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Examiner Tip

Make sure you are very clear about the three types of variables at the heart of scientific experiments. The DV, the IV and all the control variables.

Question 1 (b)(ii)

This question illustrates the necessity of being familiar with all 14 core and recommended additional practicals. Although in large part related to the core practical on tensile strength (core practical 8) this item tests a skill that should have been covered as part of core practical 5.

(ii) After soaking, the diameter of each fibre was measured.

Describe how fibre diameter could be measured accurately using a microscope.

(3)

By placing the fibre cross-section on a slide and covering it with a cover slip. Then place it under the microscope and calibrate the eyepiece graticule with the stage micrometer and measure the diameter.

ResultsPlus
Examiner Comments

This response shows how a 3 mark answer can be given in just a few lines of carefully written prose.

(ii) After soaking, the diameter of each fibre was measured.

Describe how fibre diameter could be measured accurately using a microscope.

(3)

A light microscope should be used. The fibers should be placed on the glass surface ~~under~~ right abth the light of the microscope. To measure accurately a small divider glass reange with a ruler like marking should be used (scale).

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Examiner Comments

At this level, candidates need to be familiar with the correct scientific terms, especially when they are on the specification. Core practical 5 says "use a **graticule** with a microscope...". It would have to be a very detailed description of a graticule to get the mark, which this is not, missing the key fact that it is inside the eyepiece.

Question 1 (b)(iii)

This question raised a number of issues for candidates. There appears to be a general misunderstanding of what is meant by tensile strength. The force needed to break a fibre is the breaking strength of **that particular fibre**. This can be measured by hanging masses on a fibre until it breaks. The tensile strength is a property of a material and is the same for all examples of that material, whatever form they take. So, for example, we can say that the tensile strength of concrete is 2 Newtons per square metre (N m^{-2}).

So, the fibre diameter is needed to calculate the cross sectional area, and this area is, in turn, needed to calculate the tensile strength. The assertion made by many candidates, therefore, that the tensile strength depends on the area is incorrect. Breaking strength depends on it though. So, a fatter fibre will have greater **breaking strength** than a thinner one, but the material from which the fibres are made always has the same **tensile strength**.

A 'clue' was in the question where it says: The breaking strength of the fibres after this soaking was determined to calculate the tensile strength, in Newtons per square millimetre (Nmm^{-2}).

(iii) Give **two** reasons why fibre diameter was measured.

(2)

1 Fibre's diameter affect the tensile strength of the fibre.
The thinner the fibre, the lowest the tensile strength.

2 Also to make sure that the diameter of each fibre was same
and the tensile strength is not of varying because of its diameter.
but because of the extract it's soaked in.

ResultsPlus
Examiner Comments

In this response the candidate does not appreciate the difference between strength and tensile strength in their '1'. Their '2' is neither appropriate nor practical.

(iii) Give **two** reasons why fibre diameter was measured.

(2)

1 The strength of the fibre depends on it's diameter. the ~~smaller~~ larger the ~~strength~~ diameter, the larger the strength.

2 Measuring diameter helps finding accurate area of the fibre.

ResultsPlus
Examiner Comments

'1'. is a true statement but it is not why the diameter was measured.

(iii) Give **two** reasons why fibre diameter was measured.

(2)

1 diameter is one of the factor that affect the tensile strenght of the fibre ~~because~~ hence it was measured.

2 diameter is measured to give a valid compaision in the lenght of time ~~soak~~ soaking the fibre.

ResultsPlus
Examiner Comments

'1'. is not a true statement, so that is the reason here that no mark was given.

Question 1 (c)(i)

The graph question is usually tackled reasonably well by most candidates. This year was no exception but there are still candidates who fail to gain full marks.

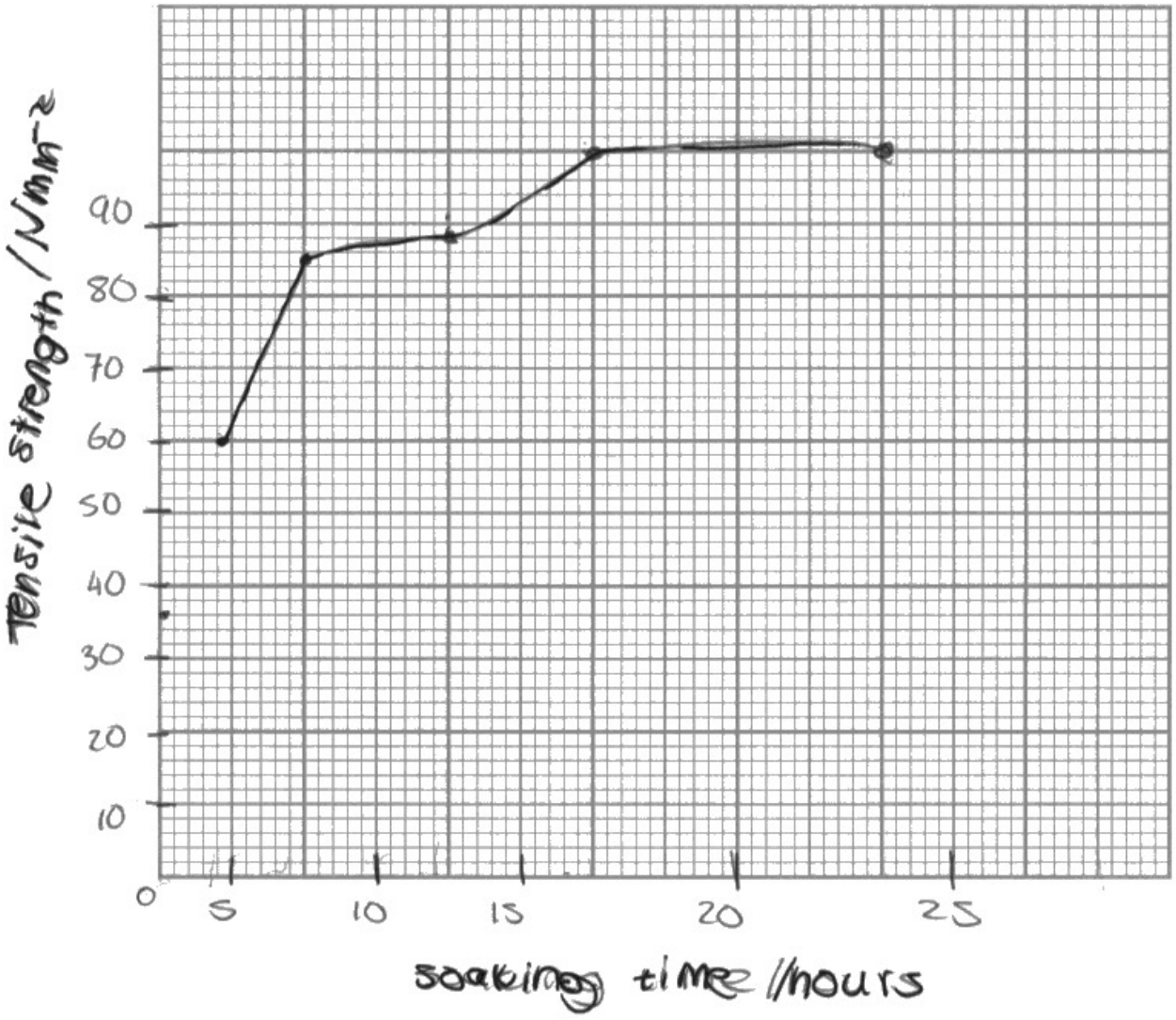
The commonest reason for loss of marks is a failure to join the points by clean straight lines. The second commonest on this occasion was those candidates who produced a non-linear X axis by simply transferring the figures in the first column (3, 6, 12, 18 etc) on to it.

(c) Some of the results of this investigation are shown in the table.

Soaking time /hours	Tensile strength /Nmm^{-2}
0	38
3	60
6	86
12	88
18	90
24	90

(i) Plot a suitable graph to show the effect of soaking time on tensile strength. Join the points with straight lines.

(4)



ResultsPlus
Examiner Comments

This response has started well when setting up the axes. Both mark points A and L are awarded. However, the plotting is very inaccurate and the lines used to join the points are not straight.

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Examiner Tip

There will always be a graph to plot on this paper so you should practise the basic graph plotting skills on a regular basis. These include deciding which way round to put the two variables on the x and y axes, deciding on a suitable linear scale, ideally with divisions which are two or multiples of two (scales based on 3 are very rarely satisfactory), accurately plotting points and finally neatly joining points with straight lines. Sometimes the best graph to plot may be a bar graph when some of the details are slightly different. You should practise doing both.

(c) Some of the results of this investigation are shown in the table.

Soaking time /hours	Tensile strength /Nmm^{-2}
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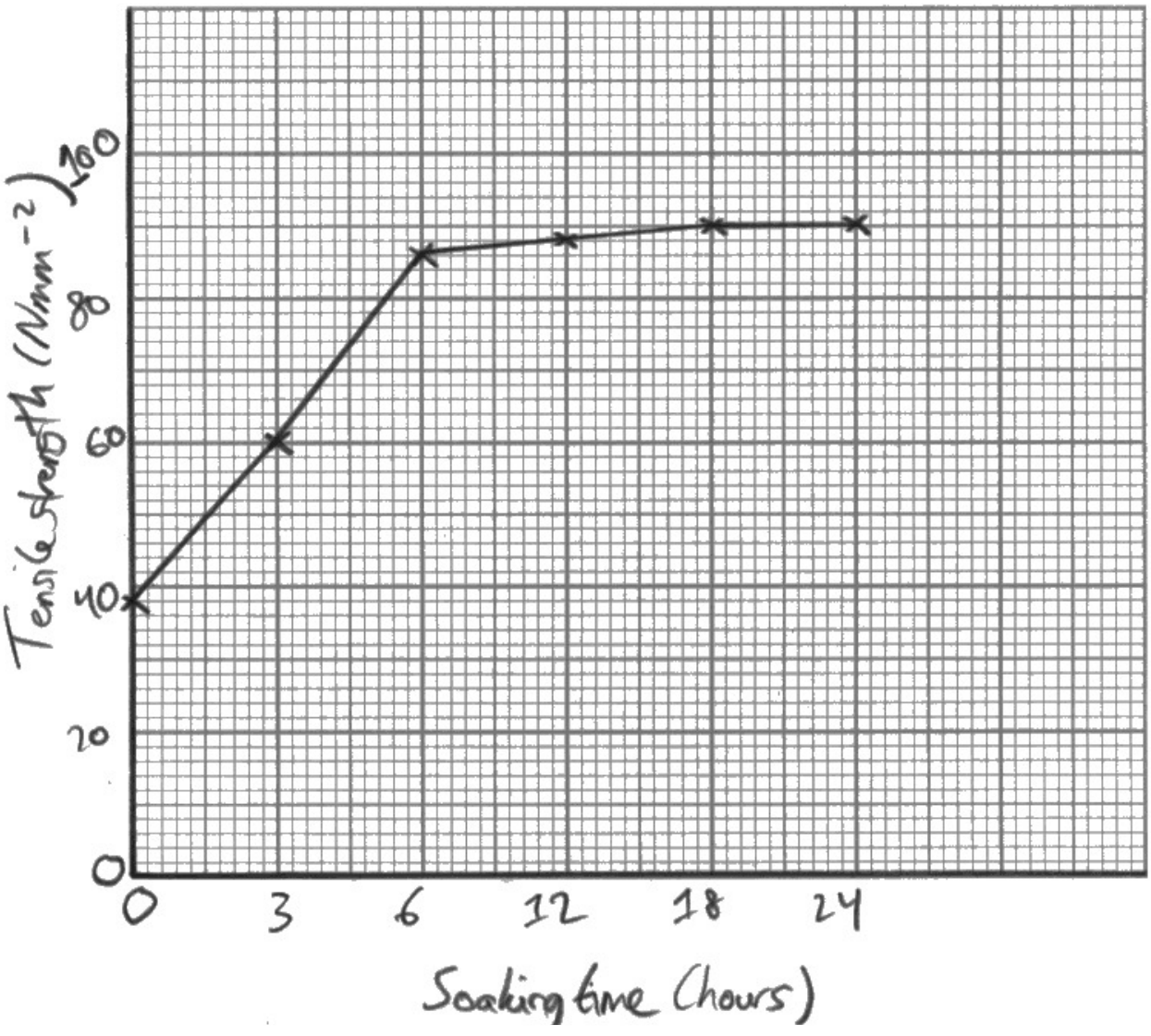


This is a clear example of a non-linear x-axis, a common mistake on this occasion. They have 3 = 1 large square for the first two large squares and then 6 to a large square next, between 6 and 12, 12 and 18 and 18 and 24.

Both axes should generally be linear, it would be very rare for this not to be the case.

Question 1 (c)(ii)

This question was very well answered and proved to be one of the most accessible on this paper. Most candidates were able to gain marking points three and four. Mark point one was less common and mark point two was rarely seen.

(ii) Describe the results of this investigation.

(3)

Increase in soaking time upto 18 hours increases tensile strength of fibres.
Tensile strength increases rapidly for the first six hours then ~~levels~~ slows.
There is no increase in tensile strength after 18 hours of soaking

ResultsPlus
Examiner Comments

A nice succinct answer which gains all three marks for marking points 1, 3 and 4.

Question 2 (a)

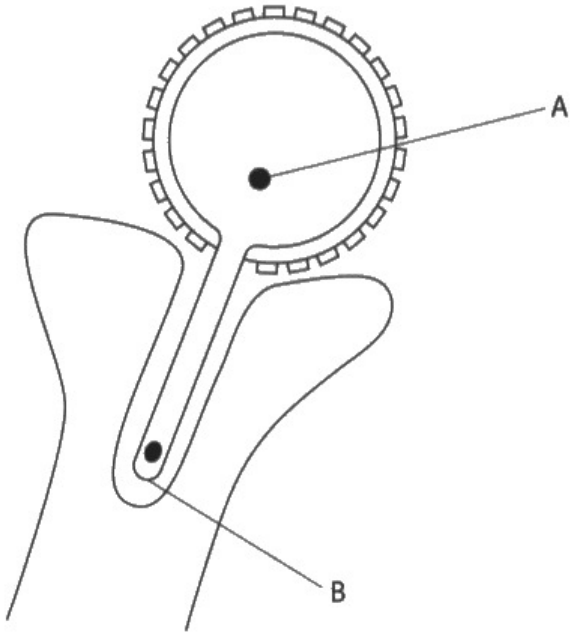
It was a little disappointing to see the rather low general standard of answers. A relatively large number of technical terms and details seemed to lead to endless confusion on the page. Of those candidates who correctly identified that the pollen grain is a source of male nuclei, few understood that cell division was required to produce them. B proved to be more mark yielding, with a range of possible answers.

2 Scientists use pollen grains to artificially pollinate certain crop plants.

Collecting pollen by hand is very time consuming.
However, bees collect large amounts of pollen in their daily activity.

Pollen traps can be used to remove pollen when the bees return to their hive.
The viability of the pollen collected by these two methods was investigated.

(a) The diagram shows a germinating pollen grain.



Give a function for each of the structures labelled A and B.

(2)

A Divides by mitosis to produce 2 gamete cells, one fuse with egg cell and the other fuses with 2 polar nuclei cells.

B ~~Eff~~ releases digestive enzyme to digest the style tissue and creates a pathway. ~~fert~~

ResultsPlus
Examiner Comments

A common mistake here, shown by this example, was to fail to specify the type of gamete formed.

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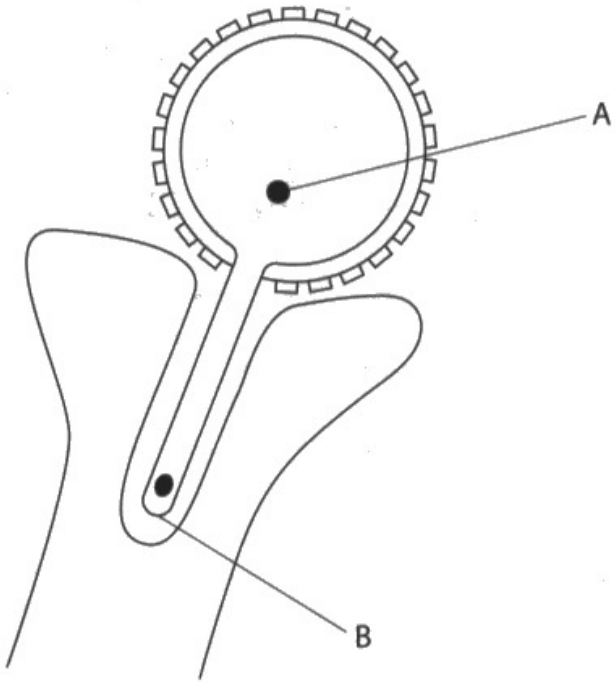

Give a function for each of the structures labelled A and B.

(2)

A Generative nucleus divides by mitosis to give to male nuclei that fertilises the egg to form a zygote with polar nucleus to form the endosperm

B Tube nucleus controls the growth of pollen tube it secretes digestive enzymes.

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Examiner Comments

A very good answer easily gaining two marks.

Question 2 (b)

This question was not at all well answered, suggesting that this practical is not well covered. Many candidates thought that the data could be obtained by fertilising flowers on living plants. Another common mistake was made by those who gave extensive details about measuring pollen tube length, which would, of course, not be relevant here.

On the safety aspects the responses were disappointing, most candidates who addressed it were content to talk about goggles, gloves and lab coats. Others, who thought more carefully about it realised that there was a possibility of bee stings and of allergies to pollen, both of course being well known risks in day-to-day life.

If the facilities to carry out this work are lacking there are good resources online, such as at https://www.saps.org.uk/teaching-resources/resources/222/student-sheet-4-pollen-tube-growth/.

(b) The percentage germination of the pollen grains was used to determine the viability of the pollen.
Describe a procedure to compare the percentage germination of pollen collected by the two methods used in this investigation.

(5)

for safety, the person hand collecting must wear gloves. They must collect pollen from the same species ~~of~~ from the same area, at the same time of year. To compare percentage germination, they must be kept at the same temperature and should measure the mass at regular time intervals to see if it increases. Then to compare, they can calculate ratios. They must repeat 5 times and find ~~an average~~ a mean and standard deviations.

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Examiner Comments

This response includes a number of vague statements. It is not clear, for example, what is meant by 'they' must be kept at the same temperature. It is also not clear why a measurement of mass would illuminate germination rates but quite a number of candidates said it.

(b) The percentage germination of the pollen grains was used to determine the viability of the pollen.
Describe a procedure to compare the percentage germination of pollen collected by the two methods used in this investigation.

(5)

Set a stop watch ~~to limit~~ for 12 hours ~~write that~~ for the pollens to be collected by hand and bees. After this time, use the same seeds for both and add the pollen grains. Control the temperature, pH, and light intensity and let them germinate for 12 hours.

After that count how many seeds have germinated for each method.

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Examiner Comments

An alarming number of candidates transformed pollen into seeds as soon as they started answering the question, as here. This further reinforces the impression that this practical is not carried out.

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Examiner Tip

Make sure that you have experience of all the core practicals and all the recommended additional practicals on the specification. Hopefully you will address most, if not all, of them in centres. However, it is your responsibility to fill in any gaps that may be left. To do this there are various books that you could look at but possibly easier is to find films of the practicals being carried out. Many such films and other relevant resources are available on the Internet.

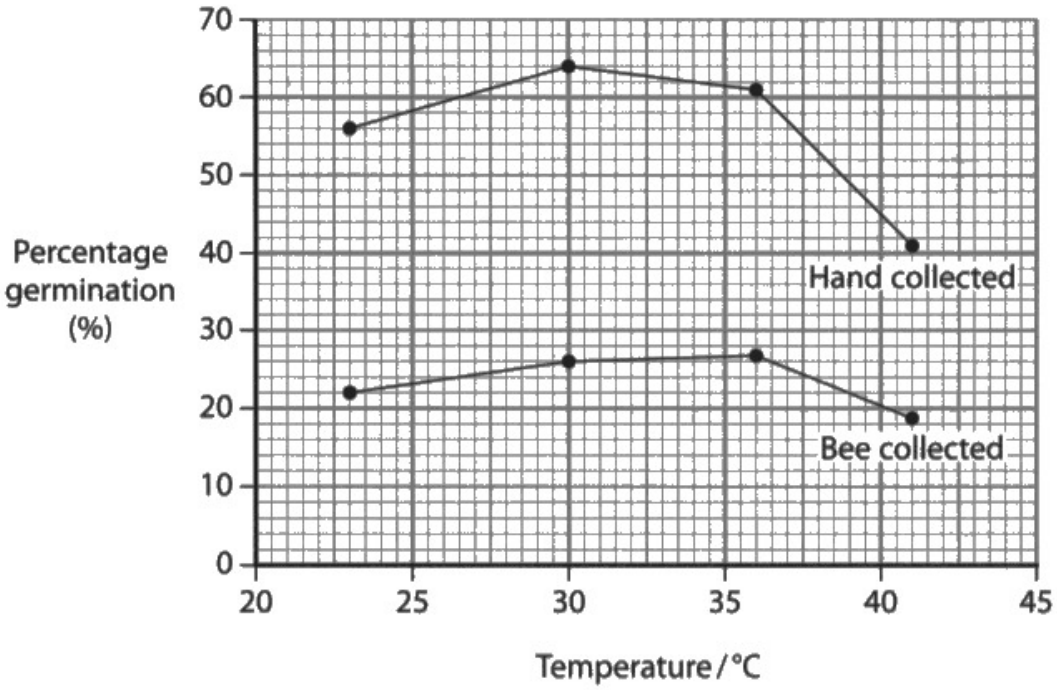
Question 2 (c)(i)

Stronger candidates spotted that there were four marks available here and attempted to make four points.

'Comment' questions allow for more than a mere description of data, although that is part of it. There was an opportunity here to link the data to understanding of enzyme biology, or to question its significance.

(c) (i) The effect of temperature on percentage germination of pollen collected by both methods was investigated.

The results are shown in the graph.



Comment on the results of this investigation.

(4)

~~Hand collected pollen has higher % ger~~

Hand collected pollen had higher % germination. Only 4 temperatures were recorded for each method and no mean or SD is mentioned so the reliability is low. No data about controlled variables like conc. of sucrose solution given or amount of time left to germinate ~~ger~~ so the results have low validity.

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Examiner Comments

This response does not make much of an attempt to describe the data, but it does look at another angle, which was not commonly addressed, this being the lack of any measure of variability.

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Examiner Tip

Make sure you are clear about the meanings of all the command words that may be used in questions on this paper. A full list is available in the current specification on page 68.

For the command word "comment on" it says "Requires the synthesis of a number of factors from data/information to form a judgement. More than two factors need to be synthesised".

So here it would be possible to talk about what the data shows, for example to notice that the optima for the two kinds of column are different. It also would be appropriate to attempt an explanation for what happens, in this case enzyme denaturation above the optimum, whatever value that may be and to also comment on the experimental design which is reflected in data which is unreplicated. All of these possibilities were credited on the mark scheme.

Question 2 (c)(ii)

This question was quite well answered, which was expected as it is along the lines of a number of questions on past papers. It appears that candidates are well versed in the ideas of obtaining descriptive statistics by repeating experiments under constant conditions. They also seemed to generally understand that once these descriptive statistics, such as standard deviation, are available some tentative conclusions about the significance of the data can be formed.

(ii) Describe how the investigation could be modified to allow the significance of the difference between the percentage germination for bee collected pollen and hand collected pollen to be determined at 30 °C.

(4)

Repeat both methods at 30°C, keeping all conditions the same. Calculate mean and SD and compare error bars to calculate significance.

ResultsPlus
Examiner Comments

An almost model answer which shows a very clear grasp of this concept. Three out of four marks in two and a half lines.

(ii) Describe how the investigation could be modified to allow the significance of the difference between the percentage germination for bee collected pollen and hand collected pollen to be determined at 30 °C.

(4)

This investigation could be modified by calculating the standard deviation and the mean as well as using error bars to see if they overlap with each other, if not the results given would be significant. Moreover, repeating the two methods to make sure that the results given are valid and reliable and measuring the initial rate to compare the results at the end.

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Examiner Comments

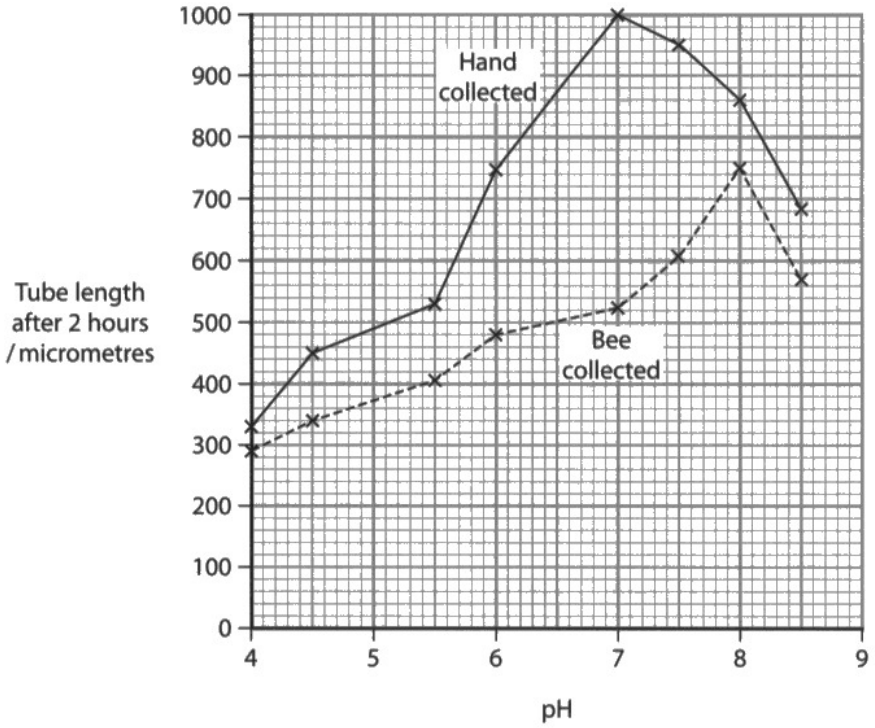
This candidate has understood the basic statistics needed to show significance. However there is no clear indication of how the data, to calculate and manipulate these statistics, will be obtained experimentally.

Question 2 (d)(i)

Certain aspects of mathematical skills are regularly tested and should be prepared for. The quoting of answers to either a specified number of decimal places or significant figures will often arise. An alarming number of candidates failed to follow the instruction in this question and consequently lost a mark.

(d) The effect of pH on pollen tube growth of pollen collected by these two methods was also investigated.

The results are shown in the graph.



(i) Calculate the percentage difference in pollen tube length between the optimum pH for hand collected pollen and the optimum pH for bee collected pollen.

Give your answer to three significant figures.

(3)

hand collected → pH 7 → 1000 μm

bee collected → pH 8 → 750 μm

$\frac{1000 - 750}{1000} = 0.25$

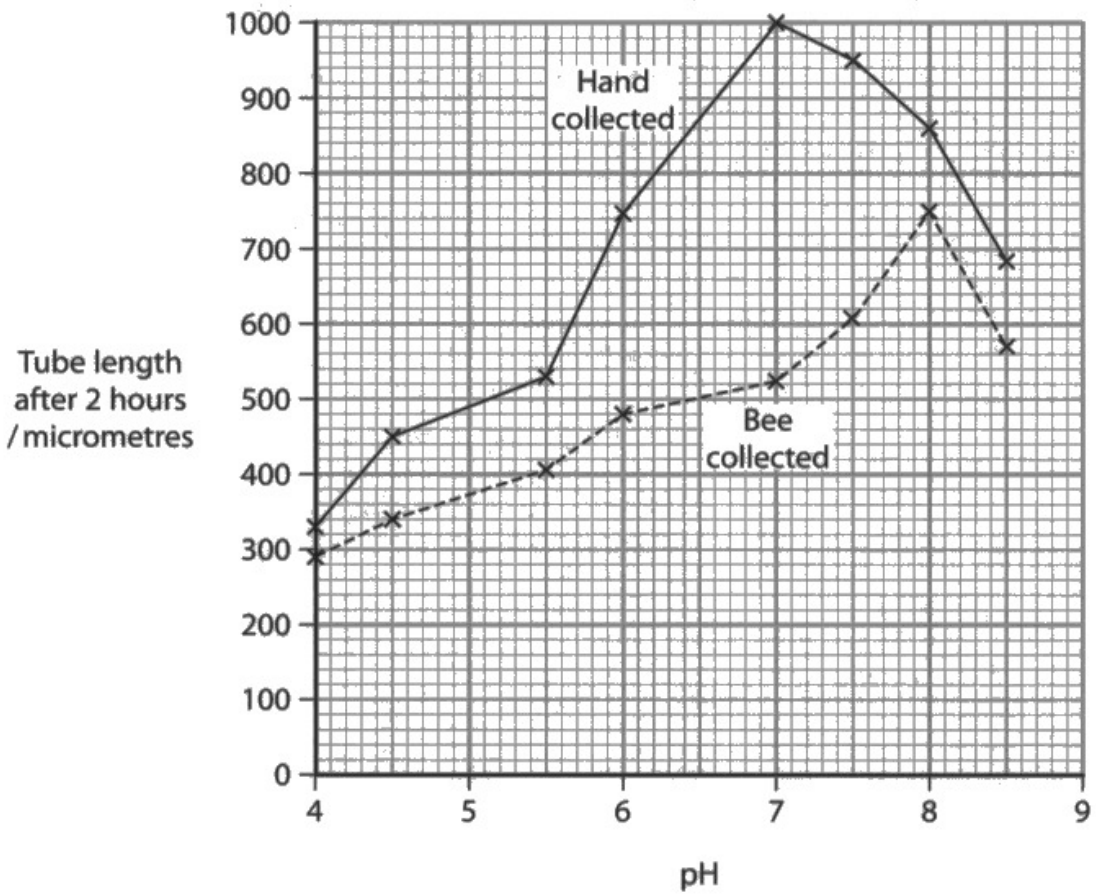
Answer 25 %

ResultsPlus
Examiner Comments

A perfectly correct calculation but the candidate has not understood or not followed the instruction to give the answer to three significant figures and thus lost a mark.

(d) The effect of pH on pollen tube growth of pollen collected by these two methods was also investigated.

The results are shown in the graph.



(i) Calculate the percentage difference in pollen tube length between the optimum pH for hand collected pollen and the optimum pH for bee collected pollen.

Give your answer to three significant figures.

(3)

Optimum ~~temp.~~ pH } for hand collected = 7
for Bee collected = 8

Tube length } for HC = 1000 Hm
for BC = 750 Hm.

∴ % difference = $\frac{1000 - 750}{1000} \times 100$

Answer 33.33 %

$= \left(\frac{1000}{700} \times 100\right) - 100$

$= 33.33\%$

A perfectly correct calculation but again a mark lost for a failure to follow the instruction about significant figures.

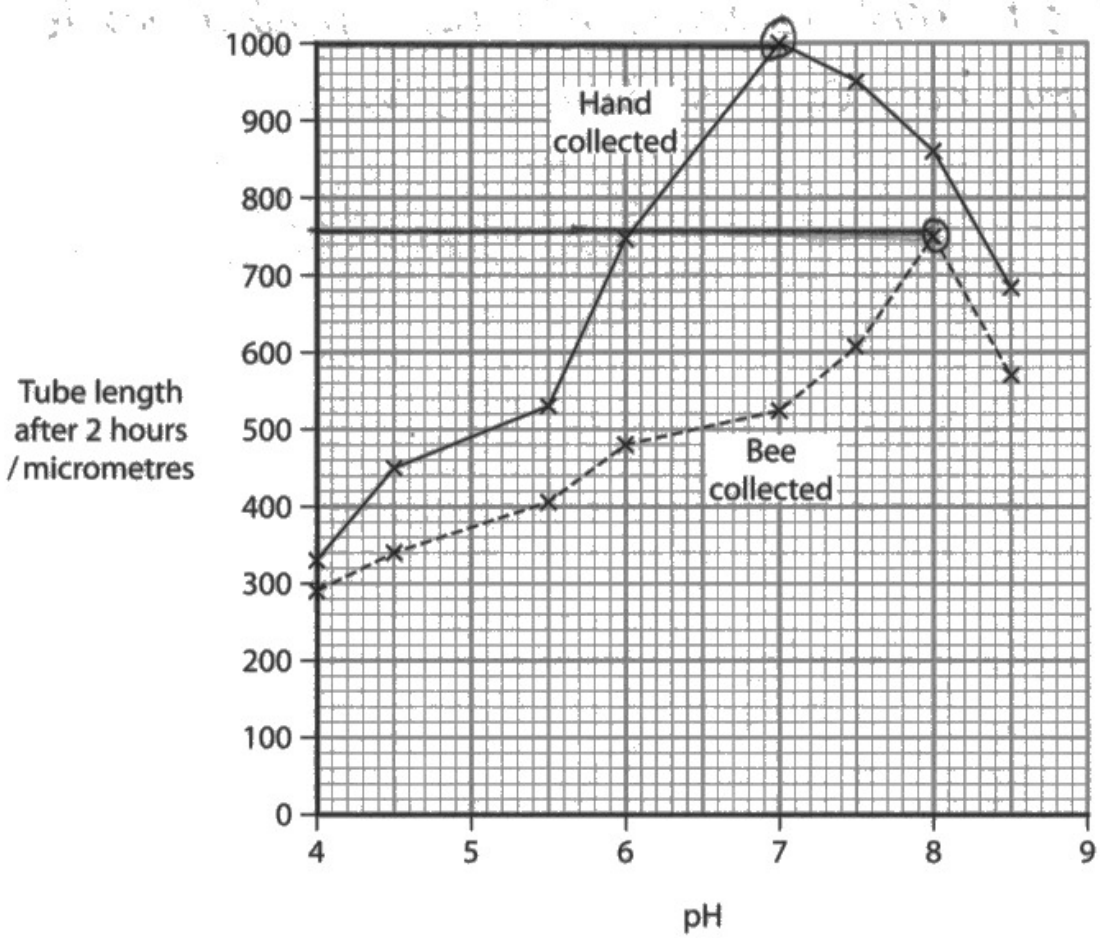
Make sure that you understand the various ways of quoting an answer. A.1.1 in the required mathematical skills says “use an appropriate number of significant figures”.

Sometimes, as in this particular question, you will be told how many significant figures to quote to. However, you are also expected to be able to apply simple rules to decide for yourself what the relevant number of significant figures is. Again in A.1.1 it says “understand calculated results should be reported only to the limits of the least accurate measurement”.

Similar rules, which you should also understand, surround the use of decimal places.

(d) The effect of pH on pollen tube growth of pollen collected by these two methods was also investigated.

The results are shown in the graph.



(i) Calculate the percentage difference in pollen tube length between the optimum pH for hand collected pollen and the optimum pH for bee collected pollen.

Give your answer to three significant figures.

(3)

$$\frac{1000 - 760}{760} \times 100 = 31.57 \simeq 31.6$$

Answer 31.6 %

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Examiner Comments

This response shows the 'error carried forward' rule in operation. The number 760 is incorrect but, after that, the calculation has been handled correctly and so 2 marks are awarded.

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Examiner Tip

Always show your working. A wrong answer on its own will get zero, but a wrong answer with some correct steps shown could gain you some marks.

Question 2 (d)(ii)

A wide range of possible suggestions were allowed here and candidates were quite inventive in their suggestions.

(ii) Suggest **one** reason for the differences in tube growth of the pollen collected by these two methods.

(1)

The pollen may have been damaged ~~by~~ by the pollen trap inhibiting their growth

ResultsPlus
Examiner Comments

A perfectly reasonable suggestion which gained 1 mark.

(ii) Suggest **one** reason for the differences in tube growth of the pollen collected by these two methods.

(1)

in pollen that promote pollen growth

Enzymes denature when collected by bees while they are intact when collected by hand

Damage to tube nucleus when bee collected

ResultsPlus
Examiner Comments

Two suggestions here, either of which would have gained the mark.

(ii) Suggest **one** reason for the differences in tube growth of the pollen collected by these two methods.

(1)

bees may apply inhibitatory enzymes onto pollen while collecting to reduce their function.

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Examiner Comments

Another good suggestion.

ResultsPlus
Examiner Tip

Be aware that the command word "suggest" means that you should "Use your knowledge and understanding in an unfamiliar context". This may include material or ideas that have not been learnt directly from the specification.

Question 3 (a)(i)

This question was reasonably well answered, but many candidates only gained the one mark for the idea of preventing contamination. To gain both marks they would need to expand this concept into contamination of the experimenter and contamination of the culture. These are two separate ideas and worth a mark each.

It is common for candidates to use phrases such as more accurate, reliable, precise etc as a panacea for many questions about why things were done. This will rarely, if ever, be an adequate answer and was not so in this question.

(a) The method used in this study involved aseptic techniques.

(i) Explain **two** reasons why aseptic techniques were used in this study.

(2)

1 In order for no other bacteria to ~~enter~~ enter, bacterial lawn used, to change results making ~~their~~ results invalid.

2 In order for no E.coli to escape, ~~so that~~ and infect the researchers and outside enviornment.

ResultsPlus
Examiner Comments

In this answer both ideas were expressed well enough for the mark.

(a) The method used in this study involved aseptic techniques.

(i) Explain **two** reasons why aseptic techniques were used in this study.

(2)

1 to reduce / eliminate risk of contamination

2 to get as accurate and reliable ~~fast~~ results as possible

ResultsPlus
Examiner Comments

Reducing contamination is a portmanteau 1 mark answer. However, it does not specify whether it is contamination of the culture or of the person so it can only get 1 mark. Accuracy and reliability are not relevant here.

Question 3 (a)(ii)

This standard core practical methodology was generally well understood. The least often awarded mark point was the first with nothing in a Petri dish into which extracts were placed, or bacteria growing just in a Petri dish. A minimum of an agar (plate) and bacteria in it was needed for the mark.

(ii) Describe a method to obtain the data in this graph.

(4)

First culture bacteria into an agar plate. Then sterilise all the equipment. Use a filter papers for each of the four extract solutions and let them soak. Place each filter paper on the agar plate and label the lid to know which one is which. Let the agar plate with the lid on # for at least 48 hours and then measure the zone of inhibition of each one.

ResultsPlus
Examiner Comments

It is important that candidates show attention to detail. Here 3 marks have been awarded for the idea of culturing bacteria in agar, placing filter paper soaked in extract on the culture and measuring the zone of inhibition. However, 'at least 48 hours' is too vague for the fourth mark.

ResultsPlus
Examiner Tip

When explaining how to do a piece of laboratory practical work think, "would someone be able to follow these instructions and get a result"?

(ii) Describe a method to obtain the data in this graph.

(4)

Cut two equal sized peices of each of the plants and ensure they are of the same mass. Turn these masses into a fine paste add one of each plant paste into equal ammounts of water and ethanol. Use filter paper and cut out disks and place them into the extract solution for around 20 seconds & then leave them out to dry. Place these dry disks in a bacterial culture and observe the diameter of zone of inhibition at intervals, plot this on a graph. Make sure to use gloves and masks to avoid infections and allergies.

ResultsPlus
Examiner Comments

The first five lines of this response address something which, if the question had been carefully read, did not need to be addressed. It should have been clear from the stem of the question that we were starting with extracts, so there was no need to explain how they are made.

ResultsPlus
Examiner Tip

The wording of questions, including all the material in the stem, is very carefully thought out. This means it is all there for a reason so you must read **and** take account all of it when crafting your answers.

Question 3 (b)

The table generation question is one of the more accessible on the paper, but again attention to detail is required. In this case the detail that was often missed was consistency in the number of decimal places on the data in the table.

The specification says (on page 64, Maths A.1.3) "represent a range of data in a table with clear headings, units and consistent decimal places".

There were many less incidences of units in the cells of the table than in the past.

(b) Draw a table to show the data in the graph.

(3)

Extract made with	Inhibition of Growth / a.u.	
	Roselle	clove
Water	15.5	13
Ethanol	21	17.5

ResultsPlus
Examiner Comments

This is a perfectly adequate table with suitable headings but the data points have been quoted to either no or one decimal place, losing one of the marks.

Question 3 (c)(i)

Again, as in an earlier question, some basic mathematical skills are being tested. Ratios must be quoted as X:1 or 1:X.

(c) (i) Calculate the ratio of the inhibition for the ethanol extracts of roselle and clove.

(1)

21 : 17.5
÷3 7 : 5.8

Answer 21 : 17.5

ResultsPlus
Examiner Comments

Here the candidate has simply quoted the two numbers that they have read from the bar chart. This is not a ratio.

(c) (i) Calculate the ratio of the inhibition for the ethanol extracts of roselle and clove.

(1)

21/17.5

$\frac{17.5}{21} = 0.833$

Answer 0.833.

ResultsPlus
Examiner Comments

Here the correct calculation has been carried out but the answer has not then been quoted as a ratio to 1 or as 1 to the answer obtained, so this could not be awarded the mark.

ResultsPlus
Examiner Tip

A ratio must always be quoted in relation to 1, although it can be either way round, so 1:X or X:1 would both be OK.

Question 3 (c)(ii)

Somewhat sloppy language, or a misunderstanding of the technique involved often led to the loss of a mark in this question. It was often not clear which was the case, just that candidates gave the impression that they thought that the ethanol or water were having an inhibitory effect on the bacteria rather than extracts made in ethanol or water.

(ii) Describe **two** conclusions that can be drawn from the results of this investigation.

(2)

1 roselle has more antimicrobial properties than cloves

2 ethanol has more antimicrobial properties than water

ResultsPlus
Examiner Comments

This answer illustrates a very common misconception or possibly sloppy misuse of language. Their '1'. is correct but their '2'. clearly shows that they think that it is the ethanol which is having an inhibitory effect on the bacteria. Anyone who has done this core practical should realise that the discs of paper soaked in an ethanol extract would be dried before being placed on the bacterial lawn, so that any inhibitory effect was caused by chemicals extracted and not the ethanol itself.

Question 3 (d)

Although there were four marking points for two marks, this question was not particularly high scoring.

(d) In another study, the effect of these extracts on the internal pH of the cells of *E. coli* was investigated.

The internal pH of *E. coli* was reduced by each of the extracts.

Suggest why these extracts have an antimicrobial effect on the bacteria.

(2)

To protect themselves from any potential diseases. as bacteria can be deadly. PH is reduced so bacteria can't grow

ResultsPlus
Examiner Comments

This answer has misinterpreted the kind of why question being asked.

Paper Summary

Based on their performance on this paper, candidates should:

- Thoroughly know and understand all nine core practicals **and** all five recommended assessed practicals. Any one of these 14 pieces of practical work could form either the whole or part of a question on any of the three papers set for WBI13 during the year.
- Remember that this paper is required to examine some of assessment objective 1, that is basically knowledge of biological facts. This generally will amount to five or six marks. Make sure to learn the biology when you are preparing.
- Make a special effort to learn how to spell new biological terms that they meet in the course. To this end it would be a useful exercise for them to make regular, for example weekly, lists of new words they have met. These can then be referred to when preparing for tests and examinations, both in terms of what they mean and how they are spelt.
- Not try and hedge your bets when asked to name or give **one** by naming or giving more than one. The examiner will not make the choice for you.
- Make sure you thoroughly understand the basic elements of the scientific method as taught at A Level. One variable is varied (the IV), one is measured, as the IV is varied, (the DV) and any other variables which may affect the DV are kept at constant values.

Grade boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link:

https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

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