Pearson
Edexcel

Examiners' Report
June 2025

GCSE Combined Science 1SC0 1BF

ResultsPlus

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at https://www.edexcel.com or https://www.btec.co.uk.

Alternatively, you can get in touch with us using the details on our contact us page.

ResultsPlus

Giving you insight to inform next steps

ResultsPlus is Pearson's free online service giving instant and detailed analysis of your students' exam results.

- See students' scores for every exam question.
- Understand how your students' performance compares with class and national averages.
- Identify potential topics, skills and types of question where students may need to develop their learning further.

For more information on ResultsPlus, or to log in, visit https://www.edexcel.com/resultsplus. Your exams officer will be able to set up your ResultsPlus account in minutes via Edexcel Online.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: https://www.pearson.com/uk.

June 2025

Publications Code 1SC0_1BF_2506_ER

Introduction

Paper 1SC0_1BF is taken by candidates who have followed the GCSE combined science specification.

The paper consists of 60 marks assessed by a mixture of different question styles, including multiple-choice, short answers, calculations and one extended open-response question. The extended open-response question is identified by an asterisk (*) in the question paper to indicate that marks are also awarded for the ability to demonstrate biological understanding as well as to give a response that shows structure and coherence. All questions should be answered in the allowed time of 1 hour 10 minutes.

The Combined Science Biology papers assess aspects of working scientifically and mathematical skills, the requirements of which are given in the specification. There are six core practicals which must be completed prior to sitting the examination.

Paper 1SC0_1BF assesses content from topic 1 (which is also assesed on paper 2BF) and topics 2 – 5 of the GCSE (9-1) Biology specification.

The 2025 paper covered multiple areas of the specification including: phenotypic variation (3.2), cell structure (sperm) (1.1), DNA structure and extraction of DNA from cells (3.6), animal and plant cells (1.1c) , selective breeding (4.8), reaction times (2.14 + suggested practical), evolution (4.4/5), including dating of fossils (4/4.5), nervous transmission (2.13 X3), disease, microrgansims and transmission (5.2) (5.6) + (5.8) Waist Hip ratio (5.24), mitosis (2.3), osmosis (1.15 including core practical 1.16).

The extended open-response question required candidates to plan an investigation to the effect of the concentration of enzyme on the rate of activity (1.12/1.9).

Questions assessing practical skills included extraction of DNA from fruit, reaction timing, and devising a method to investigate the effect of pH on enzymes.

Mathematical skills tested included completing a bar chart, calculating a mean, calculating a waist to hip ratio, expressing an answer to two decimal places, calculating a volume, as well as interpretation of data from diagrams, graphs and tables.

There were several questions that allowed candidates to demonstrate their mathematical skills to novel situations. These included items 1bi and ii, 3aii, 4aii, 5aii, 5biii and 6c. The majority of candidates did so effectively on 1bi/ii, 4aii, 5aii, but less well on 5bii and all had great difficulty in interpreting the time line item 3aii. Where candidates suggested measuring the area or volume of digested/liquid agar in item 6c, they usually explained it well with many including the formula for the area of a circle or the use of a measuring cylinder.

There were a few examples where candidates had underlined the command words and key words as well as writing key words by the question were seen. The number of candidates was probably commensurate with the last two previous series, however, if anything, there was a small increase in the number of questions where the use of these 'good practice' procedures were seen.

The more structured questions and those where marks could be gained by interpreting given information were answered well and it was pleasing to see some excellent, coherent responses accurately applying relevant scientific terminology to items that required extended prose.

It is thought that the understanding and use of key words and biological terminology used in the specification was improved. However, centres still need to address this area of learning as many marks are not only linked to understanding the rubric in the stem of the question but also require a demonstration of the understanding as well as the ability to incorporate terms and nomenclature in responses. It was again pleasing to see some candidates using the scaffolding provided to help them answer questions. Even when candidates scored low or no marks there was a clear use by a number of candidates of the diagrams, graphs and information in the stem of the question to guide their responses.

One area that was tackled significantly better than in previous years was when answering items based on practical aspects of the subject. Although there is still a need for centres to ensure that candidates complete the core practicals given in the specification, there are also suggested practicals at the end of each topic to help illustrate the concepts and key aspects of the specification statements. The EOR six mark item was answered well as stated above, but a significant number of candidates still omitted basic aspects of the plan that would have gained them marks.

There was a smaller number of candidates who confused the requirements when the command words 'describe/explain' were given, with many responses seen where candidates stated a fact and then gave a reason to support their choice. Even where the reason did not gain the mark, good examination practice was still seen. For example in item 4aiii, the reaction time investigation, most candidates correctly stated that student J had the slowest reaction, but then their reasoning was not sufficient to award the second mark. It was also not uncommon to see the response to a question with the command word 'describe' being extended to include an explanation. At least the latter does not lose marks unless the candidate states something that contradicts what they have already written.

There seemed to be a similar number of blank responses seen on items marked this year. There was a noticeable drop in the number of blank responses in last year's 2024 series compared to previous ones and it is good to see that this appears to have been maintained this year.

Overall it was pleasing to see that the number of blank responses was down compared to last year, concomitant to the way that stimulus material was used by candidates.

Question 1(a)ii

Candidates had to identify the nucleus as the part of the cell that contains chromosomes in this A01.1 item. Mitochondria was also credited although strictly mitochondrial DNA is not a chromosome but there are sites that refer to the DNA as mitochondrial DNA. The majority of candidates scored this mark with ribosomes being the most common incorrect response seen.

Question 1(b)i

Candidates were presented with a set of 24 colours of hair. Candidates had to use AO3 1a skills to complete the 'tally and total' table by scoring the people with brown hair. There was 1 mark for scoring the tally for brown hair correctly and one for the total (10). If a candidate incorrectly scored the tally chart, eg 9 (which was a relatively common error) or less frequently 11 they were not awarded the tally mark, but were still credited with one mark under our 'transferred error' rule.

This candidate has sensibly crossed off the 'brown' hair colour people as they worked through the list of hair colours in Figure 1. Unfortunately one of the crossed out 'colours' is blonde, they therefore do not score the 'tally' mark. However they then have translated the incorrect tally to 11, which for their tally is correct so gain the 'total' mark. The next task is to draw bars to complete the bar chart in Figure 2. For this candidate, the drawing bars mark should have been given for a bar drawn at 11 as this was the total for brown hair, or one drawn to a height of 10 as this is the correct height/number of people with brown hair..

(b) The hair colour of 24 students was recorded.

Figure 1 shows the results.

brown	black	blonde	black	blonde	brown
black	black	red	brown	brown	black
blonde	brown	black	brown	brown	blonde
brown	blonde	blonde	black	brown	brown

Figure 1

(i) Complete Figure 2 to show the tally and the total for brown hair.

(2)

hair colour			
black	blonde	brown	red
𝍸 ||	𝍸 |	𝍸 𝍸 |	|
total = 7	total = 6	total = ||	total = 1

Figure 2

ResultsPlus
Examiner Comments

Check that you have only included the items intended. Although not a common error, this 'extra addition' was seen several times when marking this item.

ResultsPlus
Examiner Tip

When given a task to eg count the number of 'items' from a list or diagram, it is essential to cross them off as you go to reduce mistakes by eg counting the same individual twice. However, once you have completed the task, have a quick check to make sure that you have not include an 'incorrect' item.

(b) The hair colour of 24 students was recorded.

Figure 1 shows the results.

brown	black	blonde	black	blonde	brown
black	black	red	brown	brown	black
blonde	brown	black	brown	brown	blonde
brown	blonde	blonde	black	brown	brown

Figure 1

(i) Complete Figure 2 to show the tally and the total for brown hair.

(2)

hair colour			
black	blonde	brown	red
𝍸 ||	𝍸 |	𝍸 𝍸	|
total = 7	total = 6	total =	total = 1

Figure 2

ResultsPlus
Examiner Comments

This candidate has correctly tallied the number of students with brown hair, but then has not taken the task to the next stage, writing 10 in the total column. This item was clipped with the graph and so, if a column was drawn to a height of 10, the total mark could be awarded.

(b) The hair colour of 24 students was recorded.

Figure 1 shows the results.

brown	black	blonde	black	blonde	brown
black	black	red	brown	brown	black
blonde	brown	black	brown	brown	blonde
brown	blonde	blonde	black	brown	brown

Figure 1

(i) Complete Figure 2 to show the tally and the total for brown hair.

(2)

hair colour			
black	blonde	brown	red
𝍸 ||	𝍸 |	𝍸 𝍸 ||	|
total = 7	total = 6	total = 10	total = 1

Figure 2

ResultsPlus
Examiner Comments

Here the candidate has scored 10 'brown' hair colours on the list but somehow has completed a tally of '12', although then given the total as 10. In this case, the total, 10, mark was awarded and it was this number that would be used to judge whether the bar was correctly drawn.

ResultsPlus
Examiner Tip

When you have a task like this where one part of the response is dependent on another - just check that the two reponses match.

Question 1(b)ii

Item 1bii required the totals for blonde, brown and red hair from item 1bi to be drawn as bars to complete the given bar chart. The candidates were also required to label the x axis (eg colour of hair) as well as the hair colour of the three bars they were drawing. This item tested both AO2.1 and AO3.1a.

This was a very successful item with the majority of candidates scoring here, although marks were dropped in several ways. Two common ways seen were: not labelling the x axis as eg 'hair colour', and not drawing the height any one of the columns within our 'half a small square' tolerance. We give this tolerance to allow for thick pencil lines or 'wobbly' lines for candidates that do not have a ruler. It is the top of the line that we use for the height of the drawn bar. The order of the bars, or the width of the bars, were not penalised.

Candidates were required to complete the bar graph by drawing bars for blonde, brown and red hair. Most candidates scored here with candidates accurately drawing the bars.

A small but significant number of candidates drew a bar outside of the +/- half a small square tolerence. This was mainly seen on the 'red hair' bar as it was harder to plot 'one' due to the scale used. Many of those who did drop the 'bar' mark did not use a ruler to draw the line in.

(i) Complete Figure 2 to show the tally and the total for brown hair.

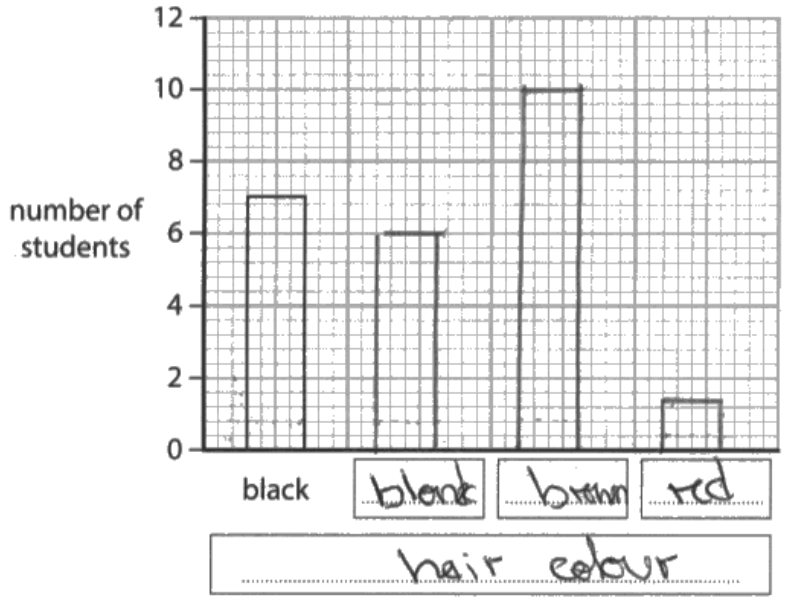
(2)

hair colour			
black	blonde	brown	red
𝍸 ||	𝍸 |	𝍸 𝍸	|
total = 7	total = 6	total = 10	total = 1

Figure 2

(ii) Complete the bar chart to show the totals in Figure 2 and label the *x*-axis.

(3)



ResultsPlus
Examiner Comments

Almost all science series examinations have at least one 'complete the graph/chart' item. Make sure that you can transfer the data required accurately. A ruler and sharp pencil are important to draw the top of a bar accurately, as is the case in this complete bar chart part of this item.

ResultsPlus
Examiner Tip

Use a ruler (and a sharp pencil) to draw any straight lines, be they: labelling lines, bar chart/histogram columns, or levels of liquid.

Question 2(a)i

This A01.1 item required candidates to identify the acrosome labelled R on a detailed diagram of a spermatozoon.

Although this item was reasonably well answered, a significant minority did not score here with the head, nucleus, enzymes and ribosomes being regularly seen (in order of most common to least common).

Although this item was reasonably well answered, a significant minority did not score here with the head, nucleus, enzymes and ribosomes being regularly seen (in order of most common to least common).

2 (a) Figure 3 shows a sperm cell.

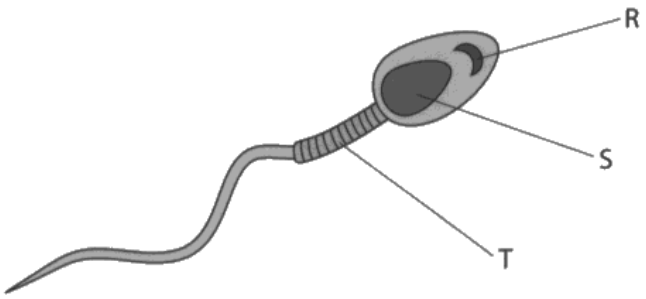


Figure 3

(i) Name the part labelled R.

(1)

The head

ResultsPlus
Examiner Comments

Specification topic 1 is common to both papers 1 and 2 and so is bound to feature highly in both papers 1 and 2, with maybe more use made of it in paper 1. Specification points 1.1 and 1.2 lend themselves to many examination questions as they relate to a plethora of other specification points. It is therefore very important to spend time revising the relatively simple points covered, especially as topic 1 is usually taught first, thereby making the points covered a 'learning' distance away from sitting the examination.

ResultsPlus
Examiner Tip

Candidates: you probably know the general parts of plant and animals cells well, but make sure you know the different parts of all the cells listed in the specification (specification points 1.1 and 1.2).

The correct, creditable response is '(the) acrosome'.

2 (a) Figure 3 shows a sperm cell.

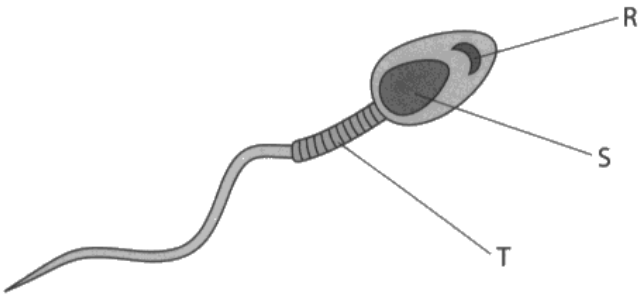


Figure 3

(i) Name the part labelled R.

(1)

Enzymes

ResultsPlus
Examiner Comments

The acrosome contains enzymes that help the spermatozoa get through the outer membranes of the ovum and so this answer shows that the candidate knows some correct knowledge about the acrosome but unfortunately it doesn't gain credit as it does not answer the question.

2 (a) Figure 3 shows a sperm cell.

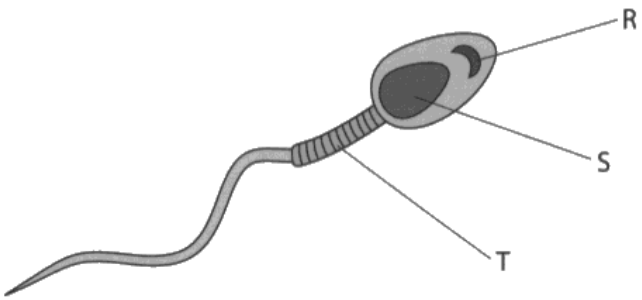


Figure 3

(i) Name the part labelled R.

(1)

Acrosome

ResultsPlus
Examiner Comments

The correct, creditable response. Acrosome is listed in the structures of sperm cells that are required.

ResultsPlus
Examiner Tip

The correct, creditable response. Acrosome is listed in the structures of sperm cells that are required. If the specification lists structures, substances, procedures, etc - make sure that you know what each and every one is and does.

Question 2(a)ii

This AO1.1 item is presented in a standard format as two 'boxes': here - part of the sperm cell - needs to be matched to their function. A choice of five functions was presented to candidates.

No responses were seen where either part S or part T were linked to the lowest box: helps the egg enter the sperm.

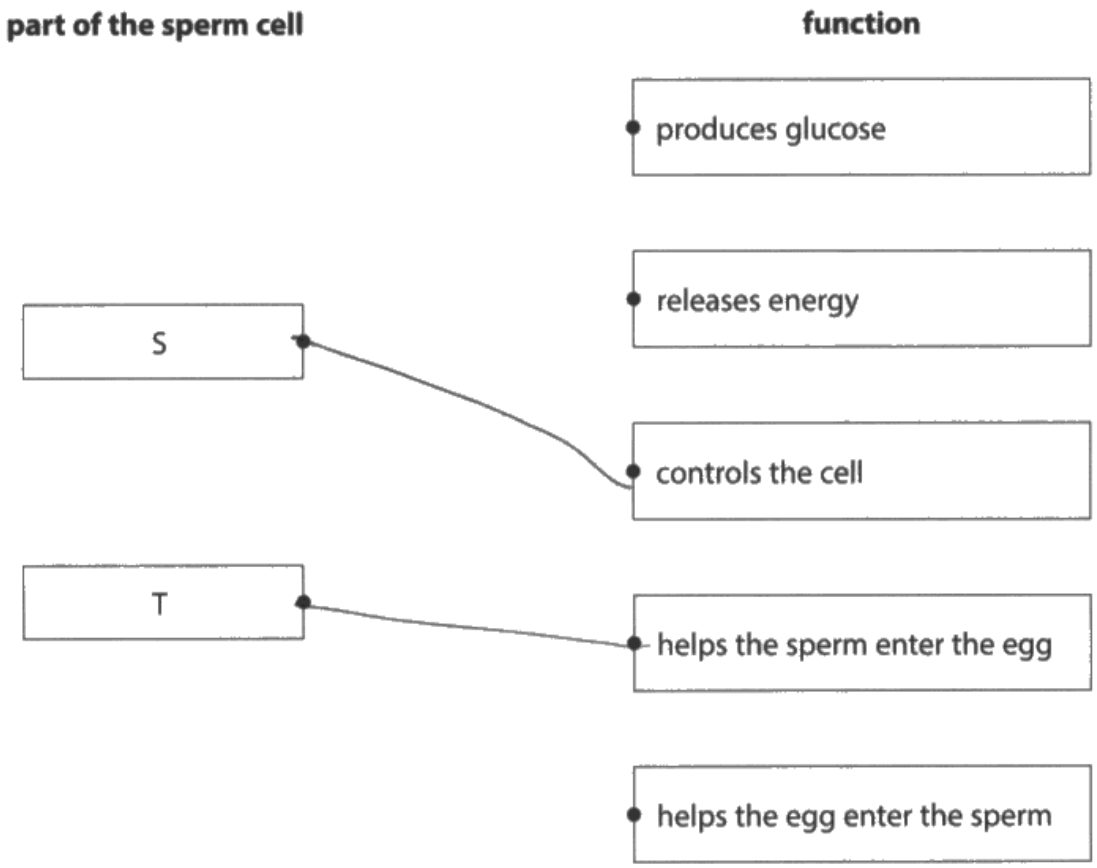
It was disappointing that, although a small minority, some candidates linked either one of the boxes to produce glucose. Candidates really should know that glucose is the end product of photosynthesis/made in chloroplasts and used by all cells as a source of energy.

The fourth 'function' box was incorrectly chosen by a significant minority of candidates. It does sound reasonable but is not specific enough to be creditable.

It was good to see very few responses where more than one line was drawn from either or both 'part of the sperm cell' boxes. The instruction clearly states draw one straight line from each part of the sperm cell to its function. However, even a few is a few too many and candidates need this point reinforced during examination revision/ preparation sessions.

(ii) Draw **one** straight line from each part of the sperm cell to its function.

(2)



ResultsPlus
Examiner Comments

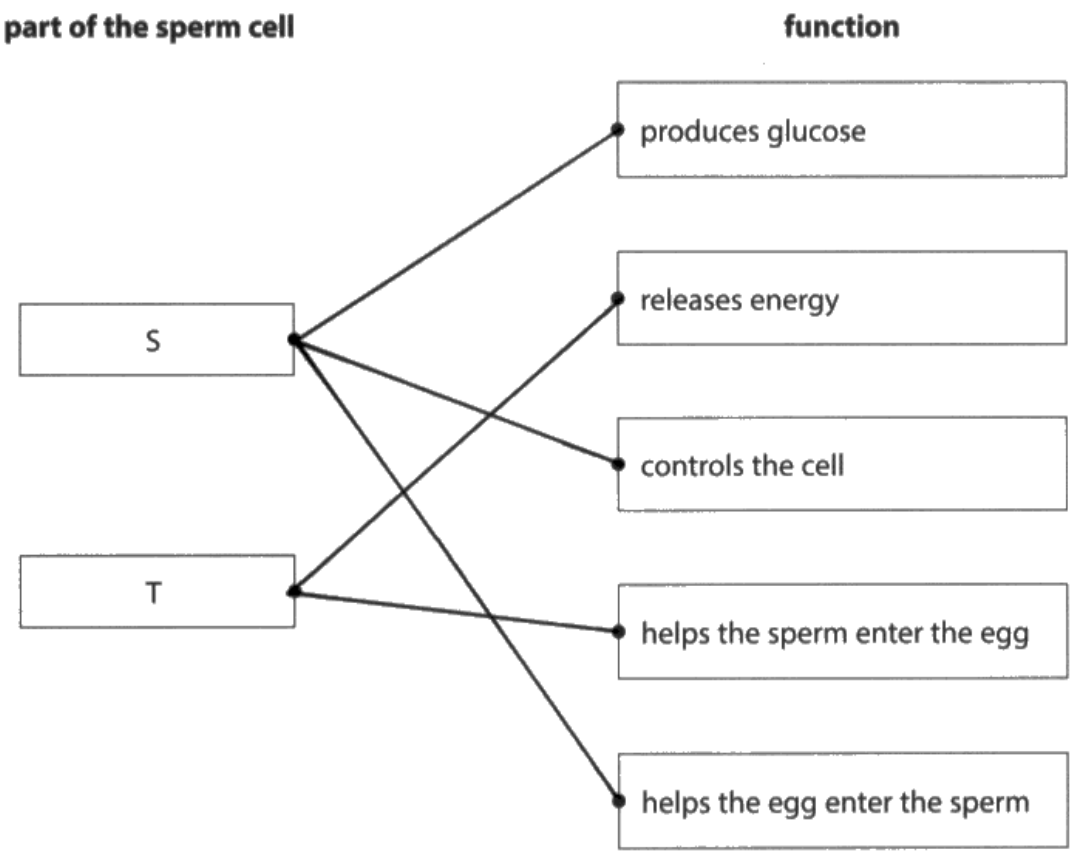
See below.

ResultsPlus
Examiner Tip

When tackling 'join the boxes'/multiple choice items, firstly see if you know the correct answer: join the box in the left hand list to the correct box in the right hand list, paying attention to the one line from each (part of sperm cell) instruction. If you are not sure, cross out the very wrong responses that you are sure of and also look at the alternatives - here the second set of boxes is function. Function is a fairly specific term and almost always in lessons will have been given fairly specific answers. So think carefully, and if you don't know, cross off any vague response which are unlikely to be (here) a function of sperm cells.

(ii) Draw **one** straight line from each part of the sperm cell to its function.

(2)



ResultsPlus
Examiner Comments

If the instruction says draw one line from each 'part of sperm' ... then do not draw more than one line from any of the relevant boxes.

ResultsPlus
Examiner Tip

Tackle the multiple choice questions, and this is a version of a multiple choice question by 1. knowing the correct response. 2. crossing out any wrong answers (if you are not sure of the correct box). This will reduce the number of boxes that you will then need to consider and make it more likely that you will choose a correct response.

Question 2(b)

In this AO2.1 item, candidates are asked to state *one*structure found in a plant cell that is not found in an animal cell.

An earlier comment stresses the need to ensure that specification points 1.1 and 1.2 are fully revised as the detail of each are tested regularly, as they relate to many parts of the specification. This is another example of that point.

Here, the creditable answers were: chloroplast, cell wall and vacuole. These three answers were fairly evenly split in the responses seen and on occasions all three were written down. Although the latter shows good understanding, it is important to just name one structure if one is in the stem of the question as if more than one answer is written down and one is wrong, then no marks will be awarded.

Vacule: a correct response for vacuole. Some candidates more accurately wrote large vacuole/permanent vacuole but vacuole was deemed enough for credit.

(b) Animal cells and plants cells are both eukaryotic cells.

State **one** structure found in a plant cell that is **not** found in an animal cell.

(1)

A vacule

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

This is an incorrect spelling of 'vacuole' and candidates should strive to spell words correctly; however we mark sensibly and use the 'what else could this word realistically be/mean?' An example where candidates have to be careful with the spelling rule, 'mitosis' and 'meiosis'. Here a slight misspelling can lose a mark, eg meitosis. Here we use the phonetic principle where this sounds more like mitosis and so that is how the word will be treated.

(b) Animal cells and plants cells are both eukaryotic cells.

State **one** structure found in a plant cell that is **not** found in an animal cell.

(1)

cell wall or cytoplasm.

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

This candidate has written a creditable and a non-creditable response. The list rule applies here where the wrong response cancels out the right response and so the candidate scores no marks. If an item is, for example, worth 3 marks, then the list rule is still applied and a list of eg 4 points is made, if 3 are correct and one wrong the list rule says 3 - 1 = 2 marks. It is therefore advisable to only ever give the number of responses stated in the stem of the question. If you have two possible responses, when ' write one ' is stated, choose the best one, rather than write both down.

Question 2(c)ii

This AO1.1 item asks for a reasonably technical response as to how the bases of a DNA molecule are held together.

Candidates have been asked in previous examinations about the bases in DNA: where eg two weak hydrogen bonds are between A and T are paired and held together by (weak) hydrogen bonds and 3 weak Hydrogen bonds. Here, the only help was a diagram of DNA, but with no information, eg the base pairs were not given and there was no indication of hydrogen bonds, eg 2/3 dashed lines.

This item scored well with the majority of candidates gaining credit. Complementary base pairs was creditable along with a specific example: any one of A-T, C-G or both for a mark. Weak bonds and hydrogen/H bonds were also creditable responses with weak hydrogen bonds awarded both available marks. A few candidates lost marks by stating incorrect pairing A-C. AT/ CG were the commonest responses seen with (held together) by weak/hydrogen bonds also being seen regularly.

Candidates were asked to describe how the bases of a DNA molecule are held together.

(ii) Describe how the bases of a DNA molecule are held together. (2)

The bases of DNA are held together with weak hydrogen Bonds and are easy to split up into Polymers.

ResultsPlus
Examiner Comments

'Weak' and 'Hydrogen' bonds was a common response seen gaining both marks available: Mps 3 and 4.

ResultsPlus
Examiner Tip

Put as much detail into a response as you can without giving a different answer: here weak bonds and hydrogen bonds gain a mark but weak hydrogen bonds gain both marks available.

An excellent, detailed response covering all marking points.

(ii) Describe how the bases of a DNA molecule are held together.

(2)

The base of DNA is held together by (weak) hydrogen bonds and the four bases are ATCG which A-T, C-G.

ResultsPlus
Examiner Comments

An excellent, detailed response covering all marking points.

ResultsPlus
Examiner Tip

There are certain items that can be easy to score on if you learn the specification points - this is one of them. The only extra detail from the specification points is the names of the four bases. Go through the specification carefully and make sure that you have learnt all the points within it. You could make a table with two columns: column 1 = word/idea/detail from the specification and column 2 - what it means and column 3 key point to learn/remember.

(ii) Describe how the bases of a DNA molecule are held together.

(2)

the structures are held together by hydrogen bonds, without these hydrogen bonds, the Double Helix DNA Molecule would fall apart.

ResultsPlus
Examiner Comments

This candidate has answered the question and probably feels that they have done a good job to address the marks available. However it only scores 1 mark for hydrogen bonds, as the last part merely reiterates the first.

ResultsPlus
Examiner Tip

Try not to repeat yourself, but ensure that you add extra information to gain subsequent marks.

Question 3(a)ii

This AO31a item was the least accessible item to candidates on the paper with only 2 creditable responses seen by this marker. Candidates had a time line with bars showing when different hominid species lived. Candidates were asked to estimate the length of time that *Homo habilis* is thought to have lived on Earth.

Candidates could have worked the estimate out by measuring how long the *H habilis* bar is (15mm) then measured the distance on the scale for each million years (21 mm) and used these two figures to work out that these hominids were thought to be have lived for about 0.7 million years. A +/- 0.1 million years tolerance was allowed, giving a creditable range of between 0.6 and 0.8 million years. Alternatively, candidates could have transferred the length of the H. habilis bar to the scale and judged by eye that the length of time was about 0.7 million years.The total bar represented just over 5 million years and yet candidates were giving answers in the tens of millions of years showing that many had a problem understanding what Figure 5 was showing, or could not understand how to translate the diagram into years. Some candidates did work out the range for the length of time H.habilis is thought to have lived on Earth, but did not convert this to the number of years.

Question 3(a)iii

For this A02 based item, candidates had to describe two methods scientists use to date the fossils of Ardi or Lucy. Methods of dating/relative dating of fossils is an area of the specification that candidates find complex and difficult with previous questions giving some more stimulus material such as a stratified cliff with different fossils in different layers. This is a question that is more complex than at first it seems. Candidates scored by describing the depth in the Earth in which the fossils were found. This was credited although of course it only gives a relative date, not an actual date. Just stating looking at the fossil's shape or looking at the stone tools found with the fossils were insufficient for credit as well. For both of these aspects of a hominid fossil there had to be some idea of comparing with other fossils/known aged fossils/stone tools with an indication of what they were comparing, eg skull shape/cranial capacity of the fossils or the shape and how well made the tools were that were found with the fossils. Candidates did not gain credit here as they did not give enough detail and just stated for example, "what the tools looked like". Radiometric dating could be creditable if expressed as such, though it was rarely seen. Carbon dating was not accepted as there wouldn't be enough carbon in fossils and carbon dating would not be accurate for fossils of Ardi's or Lucy's age.

(iii) Describe **two** methods scientists used to date the fossils of Ardi or Lucy, as shown in Figure 5.

(2)

1 DNA from the fossils by testing it.

2 Estimate how to then.

ResultsPlus
Examiner Comments

There is empathy for candidates trying to score here as dating fossils is quite a hard concept where biological chemicals like DNA are all destroyed in the fossilisation process. This candidate gives a valid second response estimate.

ResultsPlus
Examiner Tip

For this specification point, there needs to be a few specific ways of dating old fossils given to candidates. The specification does state methods of dating stone tools. Although carbon dating can be discussed, it should be noted that it is not suitable for dating stone and even if stone tools are dated using radiometric dating, the date would be for when the stone was formed, not when it was fashioned into the tool. To gain credit for stone tools to date these fossils: Firstly, the candidate should state that the tools were found with the fossil/ in the same stratification as the fossil. Secondly, that the sophistication of the tool has to be compared / matched with other fossils of known age (from the same area).

(iii) Describe **two** methods scientists used to date the fossils of Ardi or Lucy, as shown in Figure 5.

(2)

1 The skull size of Ardi and Lucy

2 The tools they used at that time period

ResultsPlus
Examiner Comments

This candidate gains one mark as stating the skull size of Ardi and Lucy as this implies a comparison of the two. The tools they used does not gain credit as there is no indication of what aspect of the tools would be used to date/relative date the fossils.

ResultsPlus
Examiner Tip

When stating, eg, a tool can be use to date a fossil, firstly you should state that the tools were found with the fossil. That is achieved here as the candidate writes "the tools they used" but also say something about the tools that will enable them to be dated/relatively dated. Here for example, the candidate could say compare with tools in museums that have already been dated.

(iii) Describe **two** methods scientists used to date the fossils of Ardi or Lucy, as shown in Figure 5.

(2)

1 ~~Showing~~ what layer it was found in

2 comparing it to known fossils that people know the dates from

ResultsPlus
Examiner Comments

This response gains both marks available. The most common way that candidates scored a mark was the relative dating method of expressing that the age of the fossil was older if it was found deeper in the ground: response 1. The second response gains the second mark as the candidate is comparing the found fossil not just with other fossils, but with fossils of known age.

Question 3(b)i

Methods of dating/relative dating of fossils is an area that candidates find difficult with previous questions giving, for example, a stratified cliff with different fossils in different layers. Item 3bi required candidates to describe two methods scientists use to date the fossils of Ardi or Lucy. This is a question that is more complex than it seems. Candidates scored by describing the depth in the Earth in which the fossils were found. This was credited although of course it only gives a relative date, not an actual date. Just stating looking at the fossils shape or looking at the stone tools found with the fossils were insufficient for credit as well. For both of these aspects of a hominid fossil there had to be some idea of comparing with other fossils/known aged fossils/stone tools with an indication of what they were comparing, eg skull shape/cranial capacity of the fossils or the shape and how well made the tools were that were found with the fossils. Candidates did not gain credit here as they did not give enough detail and just stated for example, "what the tools looked like". Radiometric dating could be creditable if expressed as such, though it was rarely seen. Carbon dating was not accepted as there wouldn't be enough carbon in fossils that old and carbon dating would not be accurate for fossils of that age.

Question 3(b)ii

This item carried on from 3bi where words from the box were used to complete sentences about selective breeding. Candidates scored very highly on 3bi which possibly helped them access this AO2.1. 3bi was the highest scoring item seen with almost all candidates scoring the available mark.

Candidates had to suggest one feature of a banana that could be improved by selective breeding. Some scored this by just stating, for example, the taste or a part of the banana, for example the skin, whereas others gained the mark by giving a fuller response, eg the time it takes to go off so it has a longer shelf life.

(ii) Suggest **one** feature of a banana that could be improved by selective breeding.

(1)

How many are produced per banana tree.

ResultsPlus
Examiner Comments

Although most answers were related to the banana fruit, a number of candidates gave a response related to the banana tree as shown here, which was credited as a reasonable answer to the task set.

ResultsPlus
Examiner Tip

On a general, open question, as seen here, a response like this would gain the mark, but it may help in future questions where there are 2 marks available to specify how the suggestion would help, eg indicating that more bananas would provide more food/bigger profits.

(ii) Suggest **one** feature of a banana that could be improved by selective breeding.

(1)

~~How big it is.~~
How fast it can grow and the ripper time for take.

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

This item asks clearly for one feature of a banana that could be improved by selective breeding. Although this response gains the mark as all the points made: how fast it grows, the ripening time and the taste, are creditable. If one is specified in the stem of the question, you run the risk of losing the mark if you give one creditable response and one wrong response under our list rule.

Question 3(c)i

Item 3ci (A02.2) tested knowledge of why steps in the DNA extraction from fruit procedure were used (specification statement 3.6: 'Explain how DNA can be extracted from fruit'). This specification statement has been tested in 1BF papers before and it was pleasing to see a high level of understanding of the procedures by many candidates. The procedure was presented as a flow chart with 3ci asking candidates to state the purpose of steps 1 and 3. Candidates' reponses showed that they could express the reason for step 1: crushing fruit cells and then mixing the resulting juice with salt solution and washing up liquid easier to access, then step 3 filtering the mixture (produced from step 1). The majority of candidates that scored the mark for step 1 mainly stated to break cells/cell membranes/cell walls open, with many others saying to release DNA from the cells with the majority stating both gaining the first available mark. Candidates clearly understood what filtering the mixture meant but found it hard to clearly express the filter paper let small (soluble) molecules through but, for example, large lumps, complete cells were kept in the filter paper, with many stating the lumps were too big to get through (which of course gained the available second mark).

A detailed response gaining both available marks. Candidates did tend to state cell membrane more than cell walls or just cells.

To get rid of any insoluble pieces is a little weaker but clearly is sufficient to gain the second available mark.

(c) The DNA of fruit can be modified to produce new varieties.

Figure 6 shows part of a method used to extract DNA from fruit.

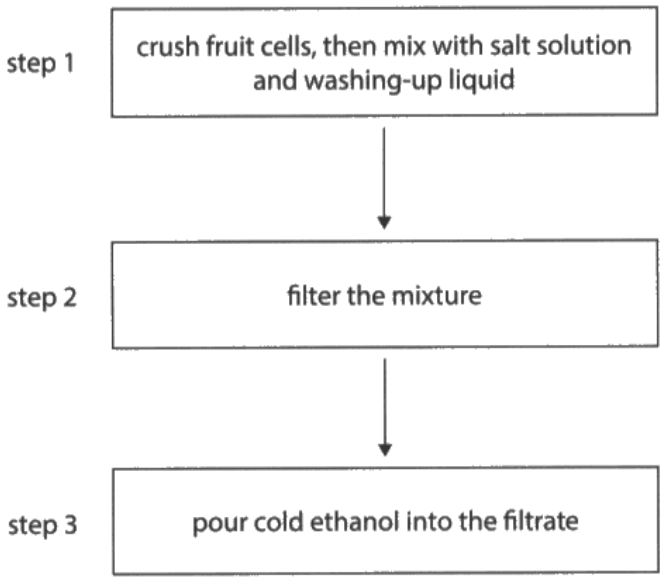


Figure 6

(i) State the purpose of both step 1 and step 2.

(2)

step 1 To break the cell membrane and then release the DNA.

step 2 to get rid of any insoluble pieces.

Note how simply each response is put. Yes, include technical points and data if required but in tasks such as are required in this item, just state the reasons why each step was used simply and clearly.

Apart from the core practicals and other suggested practicals stated in the specification there are several specification statements that require knowledge of a procedure as illustrated in this item. Ensue that you not only know the stages, but why each stage is included in the procedure. One way of learning and understanding the procedures wiould be to make flow charts for each and then write down why each part of the procedure was included.

Question 3(c)ii

Candidates were asked to state why cold ethanol was added in step 3. This understanding of a practical procedure again tested A02.2. Whilst the majority of candidates focused on the ethanol, stating that the ethanol makes the DNA visible/ precipitates DNA/so you can see the DNA/so the DNA appears as white strands, a minority gained the mark by stating why the ethanol used was cold including a few stating the safety point that hot ethanol could catch fire.

A good clear answer showing good understanding of the reason why cold ethanol was used in step 3 of the DNA from the fruit extraction practical.

(ii) State why the cold ethanol was added in step 3.

(1)

To percipitate the DNA so it is visible

ResultsPlus
Examiner Comments

The slight spelling mistake can be ignored under our spelling rule: the idea of what else could this candidate mean by 'percipitate'. We usually only reject a misspelt word if it could clearly be/mean something else.

(ii) State why the cold ethanol was added in step 3.

(1)

So that we can see the DNA better.

If your response says what you want, keep it simple as shown here. The introduction states that the procedure is used to extract DNA from fruit, so realistically, what else could the last stage be for?

The introduction states that the procedure is used to extract DNA from fruit, so realistically, what else could the last stage be for?

Question 4(a)iii

Item 4aiii used a practical often used to test reactions which is listed in the suggested practicals for topic 2. As such, the introduction clearly showed and explained how the reaction time investigation could be conducted.

Items ai and aii were included to test the candidates but also help them understand the procedure fully to help with answering this item which tested A03 2a/2b.

Most candidates correctly chose student J but to gain the second mark candidates had to state, for example, because 15cm was the longest/biggest distance, or the ruler fell further before being caught (compared to the other students). A significant number of candidates did not gain this second mark as just stating 15 is the biggest number did not explain the reason without 'too much reading into the student's response'. Most candidates that did not score here opted for student k giving the reason that the distance was smaller.

No mark is awarded here as this candidate has given the wrong student with the opposite reason to that required to gain credit.

(iii) Explain which of the five students had the slowest reaction time.

(2)

K. R had the slowes Reaction time becaus there number is the lowest as every one else has higher numbers.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

It is a good idea to at least look at all the suggested practicals, even if not all are done as a class investigation (although the latter is most desirable). If notes are available for each core and suggested practical, make sure that you know what the possible results show.

(iii) Explain which of the five students had the slowest reaction time.

(2)

J had the slowest reaction time his ruler travelled further before he caught it

ResultsPlus
Examiner Comments

This response gains both available marks as the candidate not only selects student J but explains why in a way that shows understanding better than just saying because 15cm is the longest distance.

(iii) Explain which of the five students had the slowest reaction time.

(2)

B Student J because the bigger the number, the slower the reaction

ResultsPlus
Examiner Comments

This candidate gains one of the available marks: for selecting student J. However just saying that the number was larger is insufficient. The table heading clearly states what is being measured and to explain the idea of a larger distance has passed before being caught, is required to gain credit.

Question 4(a)iv

Candidates often have difficulty with this A03.3b task - to give two variables that need to be controlled during this investigation. The task can be rephrased as 'give two variables that need to be kept the same so that the results can be compared without bias'. To answer this, candidates need to look carefully at the introduction that shows/states the method used. The instructions include: hold the ruler as shown and suddenly let the ruler fall. Therefore stating one of these points would not gain credit. This was an accessible item with all reponses seen having a good attempt to answer it correctly with the large majority of candidates scoring marks.

Although most candidates focused on the set up as shown in figure 7, most commonly stating that the same ruler should be used; there was a wide range of creditable responses including, those that may affect the students for example, windows should be shut so no wind would affect how the students reacted/how the ruler fell.

(iv) Give **two** variables that need to be controlled during this investigation.

(2)

1 The distance the ruler falls

2 The ~~distance~~ distance between to hands

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

When asked to give two variables that need to be controlled during an investigation, look at what is being measured. Here it is the distance where the ruler is caught. If we controlled this so that all distances were the same, then we wouldn't get any useful data. So make sure you are not making the dependent variable the same.

Although 'the diagram' accompanying the method shows the ruler being held at the top, with the fingers catching the ruler at the bottom, it was thought that even a few cm difference would be significant so the distance between the hands was a creditable response. 'The same ruler' is how the mark scheme phrases MP1, but equally acceptable is stating the length of the ruler.

(iv) Give **two** variables that need to be controlled during this investigation.

(2)

1 The distance between the two hands

2 The length of the ruler

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

Use the stimulus material to help you with tasks set if it helps. Here figure 7 shows how the ruler is being held before it is dropped and caught, to see which variables need to be kept constant to make results more comparable. However, when doing this, make sure that you don't make the factor being measured (here: different students) the same.

Question 4(b)i

This item, testing A01.1, asked for the role of a motor neurone in a reflex arc. Figure 9 showed a motor neurone with a bracket showing a motor neurone with the synaptic/axon terminals being bracketed to the word muscle. Candidates should be familiar with reflex arcs as it has been used in several past papers including being used in the EOR question on last year's paper. The mark available could be gained by either stating transmitting impulses to an effector/muscle/gland (named muscles/glands were credited), or transmitting impulses from the CNS/ spinal cord/relay neurone/brain. This item was answered reasonably well but many candidates were looking for a more complicated response which often resulted in no credit being given. A significant number of candidates confused the sensory and motor neurones resulting in a response that was the wrong way round, eg takes messages from the muscle to the spinal cord.

This response is the wrong way round and so gets no credit, a motor neurone takes messages from the brain/ CNS/spinal cord, not to it.

(b) Figure 9 shows a motor neurone.

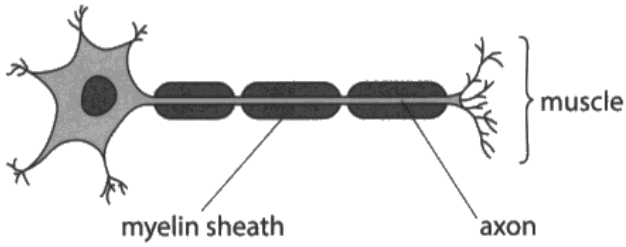


Figure 9

(i) State the role of a motor neurone in a reflex arc.

(1)

send messages to brain.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

Use parts of names to help you remember what certain structures do: sensory neurones take what you have sensed, motor neurones take messages to things that make you move.

This response is the wrong way round and so gets no credit, a motor neurone takes messages from the brain/ CNS/spinal cord, not to it.

(b) Figure 9 shows a motor neurone.

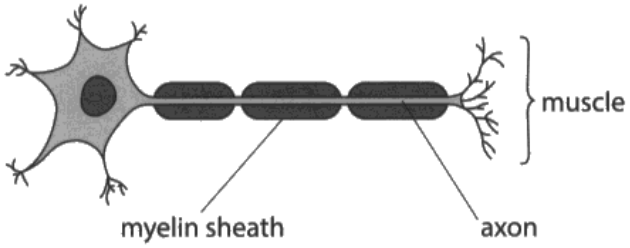


Figure 9

(i) State the role of a motor neurone in a reflex arc.

(1)

Send signals to your brain
~~So you do~~ to move your arm/leg.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

Use information in diagrams and text to help you with your response. Here the diagram clearly shows a link between the motor neurone and a muscle. Also use the names of structures, here a motor neurone - motors move so it is likely to be with movement, whereas sensory neurones are going to be related to sensing things and so take the stimulus to what has been sensed to the CNS (spinal cord/brain) so the information can be processed.

No marks are awarded here as the response contradicts itself.

(b) Figure 9 shows a motor neurone.

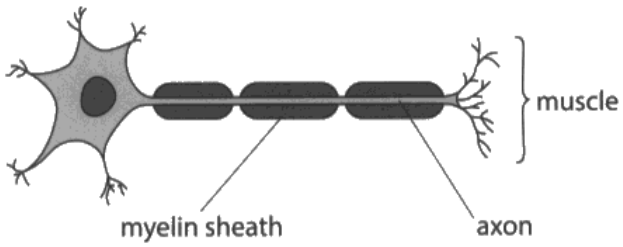


Figure 9

(i) State the role of a motor neurone in a reflex arc.

(1)

The motoneurone sends reflex arc to the effector causing the muscle to contract. Can be sent to the spinal cord or unconscious part of the brain.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

Take care that you do not contradict yourself as this will result in no mark being awarded. Here the response is confused, stating that the reflex arc is sent and then correctly that the motor neurone sends to the effector which causes the muscle to contract, but then says the opposite that it is sent to the brain/CNS. Make sure that your response does not say two different things that contradict each other.

Question 4(b)ii

This was a very specific item, testing AO1.1, and required candidates to explain the function of the myelin sheath.

'Protect by itself' was insufficient with the minimum response here being, for example, 'protect the axon'.

Candidates that scored here tended to state this point, but only a few could extend this to say in what way it protected the axon or how it benefitted transmission/how it affected the impulse.

A very few excellent responses were seen with reference to insulation and the nodes (of Ranvier) with increased speed of transmission.

A superb response gaining both marks by loosely linking insulation of axons by the myelin sheath to increased speed of propagation of the impulse.

(ii) Explain the function of the myelin sheath.

(2)

Myelin sheath covers the axon of a neurone and acts as an electrical insulator as well as speeding up impulses along the axon.

ResultsPlus
Examiner Comments

'Explain' items usually need to have two parts, the adaptation/property of the adaptation and the effect of that adaptation. Here the adaptation, the myelin sheath is an electrical insulator is correctly linked to increased speed of the transmission of the impulse.

ResultsPlus
Examiner Tip

When revising - ensure that you match adaptation with how that adaptation helps the process/organism survive. You could practice with diagrams - first label the structures shown, checking that the labels are correct, then add functions of the labelled parts, and finally add notes on how the structure and its function affect/help the structure function/survive.

(ii) Explain the function of the myelin sheath.

(2)

The myelin sheath helps to keep the axon at the correct temperature.

ResultsPlus
Examiner Comments

A good attempt, but the candidate should know that your internal body is kept at a temperature at or very close to 37.4 o C so it is unlikely that the nerves will be at a different temperature.

(ii) Explain the function of the myelin sheath.

(2)

The ~~was~~ Myelin sheath is the long part that goes to different areas of the body.

ResultsPlus
Examiner Comments

'Explain' means that the candidate almost always has to state something about the part that is being tested and then give a reason - here: how the myelin sheath affects (usually positively) the neurone transmission of the impulse.

ResultsPlus
Examiner Tip

Make sure that you do not just describe the structure in question. Here the candidate just states that the myelin sheath is long, with no attempt at saying how this helps the nerve function.

Question 4(b)iii

Candidates found this item, that tested AO1.1, particularly hard. The item tested knowledge of how a nervous impulse is transmitted across the gap between two neurones. Many candidate responses stated that the impulse jumped across the gas and then continued through the next neurone. Some of these did pick up a mark for stating the gap was called a synapse. Occasional answers that showed a good knowledge of chemicals/neurotransmitters being released and diffusing across the synapse were seen but these were the exception. Some candidates did mention some key words, for example 'diffuses', but this has to be in the context of chemicals /neurotransmitters/named neurotransmitters, and so candidates that stated the impulse diffuses across the gap gained no credit. There was an 'all or nothing' effect on this item with a definite tendency for candidates to score nothing, or if they could say a neurotransmitter/chemical is released tended to get at least one, and usually both other marks available.

The low number of scoring responses was a little surprising because a significant number of responses to last year's 6 mark question, based on describing a reflex arc, often referred to the impulse crossing synapses, with a significant number of these responses referring to chemicals crossing the synapse.

This response gains two of the three marks available: for synapse and neurotransmitters.

The candidate almost loses the mark by confusing neurotransmitters and the electrical impulse.

(iii) Describe how a nerve impulse passes across the gap between two neurones.

(3)

A nerve impulse passes across the gap between two neurone called the Synapse by neurontransmitters where the electrical impulse is taken to the other neurone from the other.

ResultsPlus
Examiner Comments

This is one of the parts of the specification that simply has to be learnt. Teachers can present it as a series of points, a flow chart or a cartoon, but in the end, candidates have to learn certain processes/facts and this topic is probably one of them.

ResultsPlus
Examiner Tip

One way to learn and thereby score well on this type of question that involve a detailed process is to learn a basic fact, eg chemicals are released, and then build the story up slowly introducing new parts each time. Possibly you could learn that when the impulse gets to the gap between neurones, it causes chemicals to be released into the gap ... then: these chemicals are called neurotransmitters which diffuse across the gap (between two neurones) which is called a synapse.

Question 5(a)ii

This A02.1 calculation item required candidates to calculate the increase in the number of new cases of chlamydia from 2020 to 2022 in England from the graph provided in figure 10.

Candidates scored well here and it was pleasing to see the majority of candidates had drawn straight(ish) lines on the graph to help them read the numbers of new cases.

(ii) **Calculate the increase in the number of new cases of chlamydia diagnosed from 2020 to 2022.**

(1)

160 000 &
200 000
= 40 000

40 000 cases

ResultsPlus
Examiner Comments

This candidate has correctly taken the number of new cases from the graph and written them down and although they have written them the wrong way round for a take away sum, they have arrived at the correct answer, probably by using a calculator (as there are no 'working' indications on the sum).

ResultsPlus
Examiner Tip

Candidates are expected to bring a ruler and a calculator to the examination as stated on the front of the examination paper as well as being transmitted to the pupils via teachers before the exam. Ensure that for reading data from a graph, you use a ruler to draw vertical and horizontal lines so that data read off the axes is as correct as it can be, and then let the calculator do the hard work for working out, in this case the difference in number of cases between 2020 and 2022.

(ii) Calculate the increase in the number of new cases of chlamydia diagnosed from 2020 to 2022.

(1)

3
51,000 cases
or
10000

ResultsPlus
Examiner Comments

Only give one answer for a question like this one which asks for a specific response. If you give two answers to a question like this that clearly asks for 'the increase', ie one response, then at least one will be wrong and so we apply the list rule where one right and one wrong = no marks.

ResultsPlus
Examiner Tip

Only give one answer for a question like this one which asks for a specific response. Otherwise you are asking us to do the hard work for you and pick the right response for you.

(ii) Calculate the increase in the number of new cases of chlamydia diagnosed from 2020 to 2022.

(1)

200,000
− 160,000
40 000

40,000 cases

ResultsPlus
Examiner Comments

A clear set of both readings from the graph with a correct answer from the subtraction sum.

ResultsPlus
Examiner Tip

Although we expect the answer to be written on the 'answer', if nothing is written on the answer line, we look for a clearly shown answer as shown here in the 'sum' and credit the correct answer accordingly.

Question 5(a)iii

With the restrictions put in place to limit the spread of Covid still in the minds of candidates, it was not surprising that this item scored well with all of the different marking points in the mark scheme regularly seen. As a result this was a high scoring item with many candidates gaining both available marks. Vaccinations was a creditable response, however just stating take medicines was not as this would include taking 'over the counter' medicines, for example aspirin. However prescribed medicines would have been credited.

Take care not to give two versions of the same answer, as illustrated below.

Although the command word here is 'give', many candidates explained why or how preventative measures were used. This of course did not cancel the marks but it was good to see the understanding as to why the stated precautions were used.

(iii) Tuberculosis is a disease that is spread through airborne droplets.

Give **two** ways of reducing or preventing the spread of tuberculosis.

(2)

1 One way is to be ~~Vaccinated~~ vaccinated.

2 Another way is to wear face masks to prevat catching it.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

The command word 'give' is the same as stated so there is no need to give a reason or to describe how something, like face masks, here work to reduce the spread of tuberculosis.

(iii) Tuberculosis is a disease that is spread through airborne droplets.

Give **two** ways of reducing or preventing the spread of tuberculosis.

(2)

1 Antibiotics

2 medicine

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

Antibiotics is creditable here as tuberculosis is a bacterial disease. However, antibiotics are a form of medicine and is also too vague for credit, as 'medicine' could mean any of a range of over-the-counter medicines which are thereby not creditable.

(iii) Tuberculosis is a disease that is spread through airborne droplets.

Give **two** ways of reducing or preventing the spread of tuberculosis.

(2)

1 Catching your a sneeze into a tissue

2 coughing into the elbow

See below.

Beware of giving the same type of response to an item. Here 'catching a sneeze into a tissue' and 'coughing into your elbow' are basically the same response and so only score one mark.

Question 5(b)i

This statement in the specification is regularly tested and was the basis of this item asking candidates to state why liver disease is not a communicable disease.

Although this AO1,1 item has been asked numerous times, there were still candidates who did not score by, for example, stating the partial answer of 'it isn't spread'.

For credit we need to say that the disease cannot be caught off someone else, or that it can not be passed to someone else/another person.

Other ways that credit could be given is if the candidate wrote liver disease/it is not caused by a pathogen, or, for example, because liver disease is caused by drinking too much alcohol.

However, it was thought that there was an increase in the number of correct responses seen compared to previous years where an item has tested the same idea.

No mark here as 'can't be caught' has to be qualified with eg 'from someone else' to gain credit.

(b) Obesity is a risk factor for some non-communicable diseases.

(i) State why liver disease is a non-communicable disease.

(1)

Because you can't catch it it's not like a flu

ResultsPlus
Examiner Comments

See above.

This response gains the available mark as it actually states a main reason (with others) that causes liver disease to develop which explains why it is not classed as communicable.

(b) Obesity is a risk factor for some non-communicable diseases.

(i) State why liver disease is a non-communicable disease.

(1)

Liver disease is a non-communicable disease which is not spread because it is something you get if you drink too much alcohol, wrong foods. Not looking after

See above and below.

Although in this case, the extra comments do not disqualify the mark, take care with giving a list of reasons, as a wrong part could disqualify a creditable part of the answer.

Question 5(b)ii

This AO2.1 calculation requires the given waist and hip measurement data to be used to calculate the waist-to-hip ratio.

The equation to calculate a waist-to-hip ratio was given.

This item was successful with a large majority of candidates able to calculate the waist-to-hip-ratio as 0.8 recurring, gaining the first mark available. Although a significant number of candidates calculated the hip-to-waist ratio, thus not gaining credit.

The second mark was for giving their answer to *two*decimal places. This was on the whole also well done with the majority of candidates gaining this mark.

If a candidate had miscalculated the waist-to-hip ratio, they could still gain the '**two** decimal places' mark.

A well set out, correct calculation, gaining both available marks.

(ii) The waist-to-hip ratio can be used to show if excess weight is a health risk.

An adult has a waist measurement of 80 cm and a hip measurement of 90 cm.

Calculate the waist-to-hip ratio for this adult, using the equation:

$$\text{waist-to-hip ratio} = \frac{\text{waist measurement}}{\text{hip measurement}}$$

Give your answer to **two** decimal places.

(2)

waist-to-hip ratio = $\frac{80\text{ cm}}{90\text{ cm}} = 0.\dot{8}$

0.88888888...

0.88 | 88888889

0.89

waist-to-hip ratio 0.89

ResultsPlus
Examiner Comments

It was good to see the correct answer given as 0.8 recurring and the candidate's system for giving the answer to the required 2 decimal places. A calculator appears to have been used, and the answer then reduced to the required two decimal places of 0.89. These details show a good understanding and mathematical skills.

This candidate gains one mark for correctly calculating 80/90 as 0.88 (although more decimal places shown would have been preferred).

However the second available mark was not granted as the correct answer to 80/90 of 0.8 recurring should have been rounded up to 0.89.

(ii) The waist-to-hip ratio can be used to show if excess weight is a health risk.

An adult has a waist measurement of 80 cm and a hip measurement of 90 cm.

Calculate the waist-to-hip ratio for this adult, using the equation:

$$\text{waist-to-hip ratio} = \frac{\text{waist measurement}}{\text{hip measurement}}$$

Give your answer to **two** decimal places.

(2)

$\frac{80}{90}$

waist-to-hip ratio 0.88

See above and below.

Remember that when giving a mathematical answer to a set number of decimal places, if the number after where the decimal place is going to be placed is 5 or over, the last number is increased by 1 so here 0.88888888 becomes 0.89.

Question 5(b)iii

Candidates were given the waist-to-hip ratio of a female as 0.75 and were asked to use the table that related waist-to-hip ratios to health risk.

This was successfully completed by the majority of candidates with the majority stating that the female had a low health risk. A very low risk was also credited.

Candidates then had to state why they had given the low very low health risk to the female.

Candidates were then fairly evenly split with around half stating because the table says that anything 0.8 or less is low health risk and 0.75 is less than 0.80 and the other half unable to see what was required to score the second mark.

Candidates could also get the second mark by stating that any excess weight is unlikely to be around eg the heart/vital organs; however this response was not seen.

(iii) Figure 11 shows the health risk of some waist-to-hip ratios.

health risk	waist-to-hip ratios	
	males	females
low	0.95 or less	0.80 or less
medium	0.96 to 1.0	0.81 to 0.85
high	1.1 or more	0.86 or more

Figure 11

Explain the health risk for a female with a waist-to-hip ratio of 0.75.

(2)

Females with the ~~hip to~~ to waist to hip ratio of 0.75 have a ~~health~~ low health risk

ResultsPlus
Examiner Comments

This candidate scores one mark as they have not explained why they have given the female a low health risk status.

(iii) Figure 11 shows the health risk of some waist-to-hip ratios.

health risk	waist-to-hip ratios	
	males	females
low	0.95 or less	0.80 or less
medium	0.96 to 1.0	0.81 to 0.85
high	1.1 or more	0.86 or more

Figure 11

Explain the health risk for a female with a waist-to-hip ratio of 0.75.

(2)

there is a very low health risk. This is because on the graph it says for females 0.80 or less is low health risk

The candidate gains both marks available here as: 1. They have stated the health risk as very low (this is allowed as low is 0.8 or less and 0.75 is significantly lower than 0.8 as the next category up is 0.01 to 0.05 above 0.80 2. They have given an implied reason that this has been given as a person with a waist-to-hip ratio of 0.8 or less is low health risk.

Question 5(c)

This A01.1 targeted item required candidates to describe the properties of cells produced by mitosis. The introduction stated that cancer occurs when cell division by mitosis is uncontrolled and this threw some candidates as some responses were linked to cell growth and cancer.

It is also possible that the term 'properties' threw some candidates as some answers seen were trying to address properties of cells rather than giving the result of mitosis which is two daughter cells that are diploid, genetically identical and are body cells (which are used for growth/repair).

The question asks for properties of the cells produced by mitosis and so stating used for growth and repair is not answering the question, and could not be credited.

This response gains 1 mark for two cells are produced.

(c) Cancer occurs when cell division by mitosis is uncontrolled.

Describe the properties of cells produced by mitosis.

(2)

Two identical cells are produced by mitosis

~~23 pairs~~ 23 cell pairs are also produced

ResultsPlus
Examiner Comments

Cells produced by mitosis are genetically identical, not just identical, and so this part of the response was not credited. Again 23 cell pairs is not close enough to each cell has 23 pairs of chromosomes, so this was also not credited.

ResultsPlus
Examiner Tip

This type of straightforward recall of properties or facts about parts of the specification are going to be asked so make sure that you learn as many as possible so that you can gain marks on this type of item with confidence.

Question 6(a)

This AO2 based item presented candidates with a diagram of a potato cylinder in a beaker of distilled water.

The candidates had to explain why the mass of the potato cylinder would change when put into the distilled water.

Candidates regularly stated the water moved by osmosis, often explaining osmosis in detail.

Candidates also mainly stated correctly that water would enter the potato cylinder or that this causes an increase in mass, but a significant number of those failed to link the two together.

This candidate gains all 3 available marks by stating that water moves by osmosis and that the potato will pick up water/weight. Here weight can be accepted for mass. The high concentration/low concentration cannot be credited as the candidate does not specify whether the concentration they are referring to is of water or solute.

6 (a) Figure 12 shows a beaker containing a potato cylinder in distilled water.

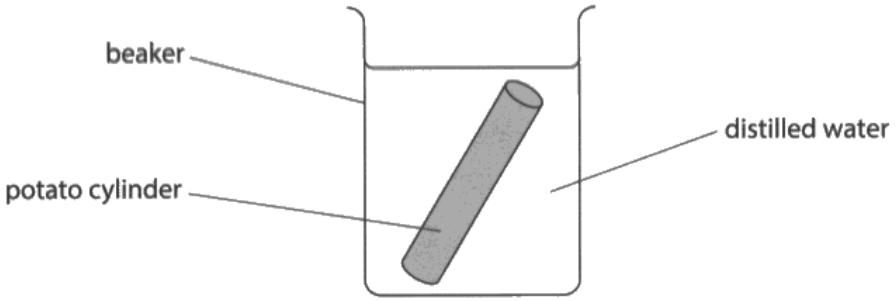


Figure 12

Explain why the mass of this potato cylinder will change when it is placed in distilled water.

(3)

It will change ~~as~~ because of osmosis, this is where water moves from a high concentration to a low concentration. This means the potato cylinder will pick up water weight

See above and below.

Make sure you know certain definitions off by heart as they regularly come up in examinations. These include diffusion, osmosis, and respiration.

Question 6(b)i

Candidates were presented with a table with information about three cubes: A, B and C.

To gain credit on item 6bi which tested AO2.1 candidates had to calculate the volume of cube C.

There were two ways that the data could be used to calculate the volume:

1. By cubing the length of each side of the cube: 3 cubed
2. By dividing the surface area to volume area by the given surface area: 54: 2/1

Both giving a volume of 27 cm3.

Many candidates just gave the answer, but those that showed working were roughly evenly split between the two methods.

(b) A scientist investigated the rate of diffusion using three agar cubes of different sizes.

Each cube contained a pH indicator that changed from pink to colourless when placed in acid.

The cubes were placed in a beaker containing an acid.

Figure 13 shows some information about each cube.

cube	length of each side of cube in cm	surface area in cm^2	volume in cm^3	surface area to volume ratio	time taken for the cube to become colourless in seconds
A	1.0	6	1	6:1	170
B	2.0	24	8	3:1	260
C	3.0	54	?	2:1	500

Figure 13

(i) Calculate the volume of cube C.

(2)

x2 ÷2

54 : 27

2 : 1

54÷2=27

27 ..... cm^3

ResultsPlus
Examiner Comments

This candidate calculated the volume by dividing the given SA of 54 by the SA:vol of 2(:1)

This candidate calculated the volume by multiplying the length x height x depth, giving 3 x 3 x 3 = 27.

(b) A scientist investigated the rate of diffusion using three agar cubes of different sizes.

Each cube contained a pH indicator that changed from pink to colourless when placed in acid.

The cubes were placed in a beaker containing an acid.

Figure 13 shows some information about each cube.

cube	length of each side of cube in cm	surface area in cm^2	volume in cm^3	surface area to volume ratio	time taken for the cube to become colourless in seconds
A	1.0	6	1	6:1	170
B	2.0	24	8	3:1	260
C	3.0	54	?	2:1	500

Figure 13

(i) Calculate the volume of cube C.

(2)

3X3X3=27

27 cm^3

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

There is often more than one way to work out a mathematical calculation. As long you are sure and confident about one way, use it, providing the correct data as given in the stem of the question.

(b) A scientist investigated the rate of diffusion using three agar cubes of different sizes.

Each cube contained a pH indicator that changed from pink to colourless when placed in acid.

The cubes were placed in a beaker containing an acid.

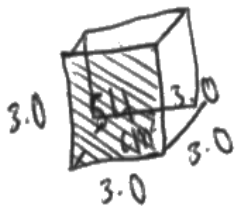
Figure 13 shows some information about each cube.

cube	length of each side of cube in cm	surface area in cm^2	volume in cm^3	surface area to volume ratio	time taken for the cube to become colourless in seconds
A	1.0	6	1	6:1	170
B	2.0	24	8	3:1	260
C	3.0	54	?	2:1	500

Figure 13

(i) Calculate the volume of cube C.

(2)



3.0 x 3.0 x 3.0
= 27

27 cm³

ResultsPlus
Examiner Comments

This candidate has drawn a cube to help them remember how to calculate the volume.

ResultsPlus
Examiner Tip

There is often more than one way to work out a mathematical calculation. As long you are sure and confident about one way, use it providing the correct data as given in the stem of the question.

Question 6(b)ii

6bii, testing AO31a1b, asked candidates to explain the difference in the times taken for cubes A and B to become colourless.

As in all 'explain' questions where the difference is not stated, there will be a mark for stating the difference (here cube A takes less time to become colourless) and a mark for explaining why the difference has occurred, here because, for example, cube A is smaller, or there is a shorter distance to the centre of cube A or that cube A has a larger surface area:volume.

This candidate is awarded no marks as:

They have not identified which cube is 90 seconds slower nor which cube has 'more' surface area'.

(ii) Explain the difference in the times taken for cubes A and B to become colourless.

(2)

The difference is 90 seconds this is most likely because there is ~~less~~ more surface area

ResultsPlus
Examiner Comments

Make sure that you clearly say to which cube the comments made refer. This response is like saying the cube is faster. If we do not know which data/which cube you are referring to in your response, we can't award credit.

(ii) Explain the difference in the times taken for cubes A and B to become colourless.

(2)

It takes 170 seconds for A to become colourless

And it takes 260 seconds to become colourless.

See below.

This candidate has merely stated data from the table. Make sure that you answer the question - here 170 is quicker than 270, so state 'cube A becomes colourless faster'. Then, as this is an 'explain' question, give a reason for the difference in time to become colourless.

Question 6(c)

The final item is a 6 mark EOR task, testing A02.2 and A03.3a.

The introduction to this item showed a petri dish and outlined a method, to set up an agar plate with a well containing kiwi fruit juice. The candidates were also told that kiwi fruit juice contains an enzyme that digests set agar into liquid agar.

Candidates had to devise a plan to use the equipment shown to investigate the effect of using different concentrations of kiwi fruit juice on the breakdown of the set agar.

Candidates were told that their plan should include: measurements to be taken and variables that needed to be controlled.

This was a readily accessible questions to a high majority of candidates with most obtaining at least level 2. To gain level one -1 mark - candidates had to include part of a plan or measurement; to be taken to gain 2 marks the candidates needed to also include a variable to control; for level 2 (3/4marks) candidates had to have parts of a plan but also had to include the use of different concentrations of kiwi fruit juice.

For level 3 candidates also needed to include a way of measuring how much agar had been broken down. This could be, for example, measuring the area, the volume of liquid agar, or indeed the area of solid agar left.

To get to the top of each of level 2 or 3 the candidate needed to control a variable for level 2, and variables for level 3.

Overall some excellent plans were seen with a relatively high proportion of candidates getting into each of levels 2 and 3.

This candidate has stated that they are going to use three different concentrations of kiwi fruit juice, so we are already looking at level 2 as long as there is some method included.

They then state that you should measure 10 ml of each concentration - a control, and to put the different concentration kiwi fruit juices into each petri dish well.

They are timing how long it takes for all (a second control) the agar to turn into liquid. This measurement gets the candidate response into level 3 and with more than one variable being controlled: 6 marks.

* (c) Liquid agar was poured into a Petri dish and allowed to set.

A well was cut in the centre of the set agar.

Kiwi fruit juice was poured into the well.

Kiwi fruit juice contains an enzyme that causes set agar to break down into a liquid.

Figure 14 shows the results after 30 minutes.

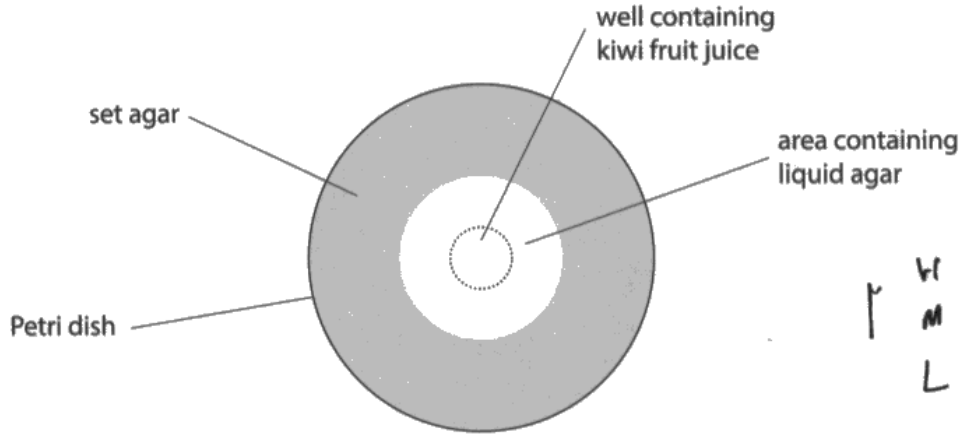


Figure 14

Devise a plan to investigate the effect of different concentrations of kiwi fruit juice on the breakdown of set agar, using the equipment shown in Figure 14.

Your plan should include:

- measurements that need to be taken
- variables that need to be controlled.

(6)

- get a high, medium and low concentration of kiwi fruit juice.

- get three petri dishes of set agar with wells

- measure ~~out~~ out the high medium and ~~the~~ low concentration

of Kiwi juice to the same amount 10ml.

- pour the different strengths of the Kiwi juice into each petri dish well.

- time the time taken for the agar to turn into liquid completely using a stop watch

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

Plot the results in a table then on a graph

ResultsPlus
Examiner Comments

A good logical plan with two 'control' points included and has an end point to measure and this method would enable the candidate to see which concentration worked fastest, and by how much.

ResultsPlus
Examiner Tip

There are certain clues on what to do set out in the introduction. For example investigating the effect of different concentrations of kiwi fruit juice should have given the variable that needs to be changed as at least three different concentrations of kiwi fruit. Telling us that the kiwi fruit breaks down agar tells us that we need to measure how much agar has been broken down/turned into liquid. The rest of the method can be gleaned from the introduction and it just depends on the variables that need to be controlled. Knowing that enzymes are being used should have indicated that the temperature and pH should be kept the same as you should know that the two things affect enzyme rate of activity. Finally how much agar is broken down can be measured as the volume of liquid agar after, for example, 30 minutes (30 minutes then becomes another variable that we are controlling) or how long to break down all/a set area of agar gives an easy other variable to control either time or volume of agar.

* (c) Liquid agar was poured into a Petri dish and allowed to set.

A well was cut in the centre of the set agar.

Kiwi fruit juice was poured into the well.

Kiwi fruit juice contains an enzyme that causes set agar to break down into a liquid.

Figure 14 shows the results after 30 minutes.

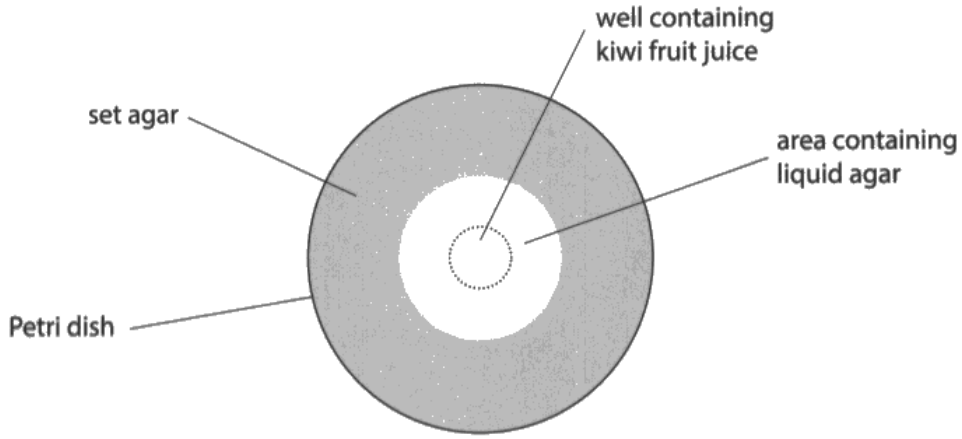


Figure 14

Devise a plan to investigate the effect of different concentrations of kiwi fruit juice on the breakdown of set agar, using the equipment shown in Figure 14.

Your plan should include:

- measurements that need to be taken
- variables that need to be controlled.

(6)

~~Independent~~ variables like ~~inside amount~~ the ~~Petri dish~~

By doing the experiment ~~mm~~ times. ~~with~~ using the same amount of kiwi fruit juice and area of liquid agar.

Using equipment in a sterile ~~environment~~ environment.

Petri dish size should be the same size every test

ResultsPlus
Examiner Comments

By not using different concentrations of kiwi fruit juice, this response is limited to level 1 and 2 marks. The response does state a couple of valid points however: Doing ..... many times = repeat the investigation. Same amount of kiwi fruit juice is very weak for credit - we expect same, for example, volume of kiwi fruit juice. Same area of liquid agar is not creditable as the volume of liquid agar is something to measure to see which concentration digested the agar the most. Same size petri dish. So level 1 - 2 marks awarded.

ResultsPlus
Examiner Tip

If the instruction is to devise a plan to investigate the effect of different concentrations of kiwi fruit juice, start off with using different concentrations of kiwi fruit juice.

* (c) Liquid agar was poured into a Petri dish and allowed to set.

A well was cut in the centre of the set agar.

Kiwi fruit juice was poured into the well.

Kiwi fruit juice contains an enzyme that causes set agar to break down into a liquid.

Figure 14 shows the results after 30 minutes.

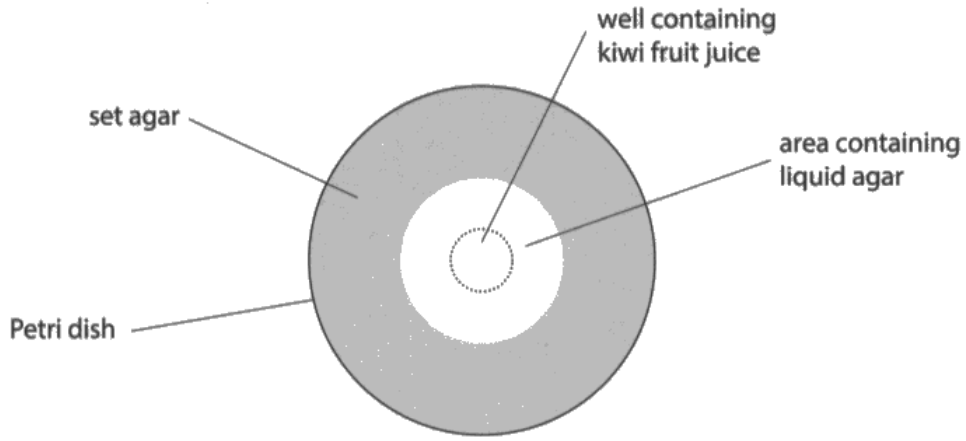


Figure 14

Devise a plan to investigate the effect of different concentrations of kiwi fruit juice on the breakdown of set agar, using the equipment shown in Figure 14.

Your plan should include:

- measurements that need to be taken
- variables that need to be controlled.

(6)

• As the kiwi juice was poured into the well, the enzymes in which it is said to contain caused the set agar to melt into a liquid again ✓. The starch in this enzyme broke down the agar into OR fats.

• By using different concentrations of kiwi juice, it changes the way

in which the the agars state of matter changes. To investigate this, we can try different measurements of kiwi juice to determine how high of a concentration is needed to break the agar back into a liquid. measurements needed to be taken are the ~~amount~~ amount of juice used in each test, the time which is taken for a change. the control variables are the juice, the petri dish and the agar. the amount of juice is also a controlled variable.

(Total for Question 6 = 13 marks)

TOTAL FOR PAPER = 60 MARKS

The account is not very logical and is a mixture of plan and account. The candidate does refer to using different concentrations of kiwi fruit juice, as well as references to same size petri dishes and pouring the kiwi juice into the well. Overall there are a few steps of a plan plus using different concentrations of kiwi fruit juice so level 2 - 3 marks awarded.

If you are asked to write a plan to investigate how a factor effects something write your plans as bullet points or numbered steps. Ensure that what you change is what you are investigating — here it is the concentration of kiwi fruit juice. Work logically through what you need to do - step by step, then state what will be kept the same, and finally how you will measure the effect of what you are changing.

Paper Summary

Based on their performance on this paper, candidates should:

Recognise that the word 'explain' means additional scientific information is needed that is linked to the answer, giving a justification or reason. Recognise that 'describe' requires candidates to give an account of something or to say how data in a table or graph changes. Use all the information given in the question to help construct an answer, but avoid just repeating the information which has already been given as this is unlikely to gain credit. Consider the context of the question to ensure that they apply their scientific knowledge to the question being asked. Develop their practical skills knowledge to ensure they can answer questions on the core practicals in detail. Check the number of marks given for the question and ensure that they have included enough facts to match the marks available. Use scientific terminology accurately, where possible, in responses. Always show the working when doing calculations as a mark can be awarded for errors carried forward. If a sequence of points need to be made, eg in a plan or method, present them as bullet points or numbered points to make sure that you don’t miss out a stage. Recognise that the word 'explain' means additional scientific information is needed that is linked to the answer, giving a justification or reason.

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

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL.