Pearson Edexcel

Examiners' Report June 2025

GCSE Biology 1BI0 1F

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 1BI0_1F_2506_ER

Introduction

Biology Paper 1BI0/1F is the first of two papers taken as part of the GCSE (9-1) Biology qualification. The qualification follows a linear assessment model whereby candidates must complete the two papers in the same single year of certification.

The paper consists of 100 marks and is assessed by a variety of question types. These include, multiple-choice, short answer questions, calculations and extended open response question. Candidates should answer all questions in a time period of 1 hour and 45 minutes. The extended open response questions marks are 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.

In addition, Biology Paper 1BI0/1F assesses practical knowledge and maths skills, the requirements of which are given in the specification. Furthermore, there are eight mandatory core practicals in the specification, which candidates must complete prior to sitting the examination. Candidates need to use their knowledge and understanding of these practical techniques and procedures in the written assessments.

Biology Paper 1 contains questions assessing the content of Topics 1 to 5 from the specification. In this examination series, candidates were required to answer questions that tested their knowledge and understanding of a range of topics including, specialised cells, DNA structure and its extraction from plant cells, functions of parts of the brain and the eye, agricultural solutions to feeding a growing human population, a virus life cycle, the nervous system and reflexes, human defences against disease, the spread of pathogens, biological control, osmosis, inheritance and genetic crosses, asexual reproduction and sexual reproduction.

The first extended open response question (EOR) on the paper was in the context of advantages and disadvantages of biological control. The second EOR question asked candidates to devise a plan to investigate the effect of different concentrations of kiwi fruit juice on the breakdown of set agar.

In addition to the second EOR question, knowledge and understanding of practical work was assessed through questions based on extracting DNA from fruit, investigating reaction times and investigating osmosis and diffusion.

The assessment of maths skills included drawing a bar chart, calculating a mean, interpreting data on a timeline, using data from line graphs, calculating a volume, completing a Punnett square and determining a percentage probability from the outcome of that cross.

Some good examination technique was seen, including annotating diagrams, listing key words and showing the working for calculations.

The more straightforward questions, where marks could be gained by interpreting given information, were answered well. It was also pleasing to see some excellent answers accurately applying relevant scientific information to items that required extended prose, such as explaining why the mass of a potato cylinder changes when it is placed in distilled water.

Most questions on the paper were attempted by candidates and relatively few were routinely left

blank, indicating that the paper was accessible to the majority of the cohort. It was evident that many candidates had been taught how to interpret the different command words used in questions. There was a perceived improvement in the quality of responses to 'explain' questions in this series.

In general, candidates made good use of the diagrams and information given in questions. However, some ignored instructions in the stem of questions to refer to these diagrams, thus limiting the number of marks that could be awarded. Some improvements in the quality of answers to items based on practical biology were seen, but devising a workable plan is still a challenge for a large number of candidates.

Question 1(a)ii

Many candidates could name the nucleus as the part of a human cell where chromosomes are found. Candidates who named mitochondria were also credited with a mark. The most common incorrect responses were DNA and double helix.

(ii) Genes are found on chromosomes.

Name the part of the human cell where chromosomes are found.

(1)

nucleaus

ResultsPlus
Examiner Comments

Nucleus and mitochondria were the correct answers for this item. Phonetic spellings were credited.

ResultsPlus
Examiner Tip

Phonetic spellings are sometimes accepted, but it is better to learn the correct spellings of biological terms.

Question 1(b)i

This question was accessible for most candidates with the majority scoring two marks. However, there was a significant number of candidates who miscounted the number of students with brown hair or were careless with their tally.

(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

The tally for brown hair is incorrect, so no mark is awarded. The total for brown hair is correct, so this scores one mark.

In questions requiring a table of data to be completed, always double-check your work. In this case check that the tally matches the total given.

Question 1(b)ii

Many candidates completed the bar chart correctly and scored three marks. Credit was given to candidates who had given an incorrect total for Q01(b)(i) but plotted this value correctly on the bar chart.

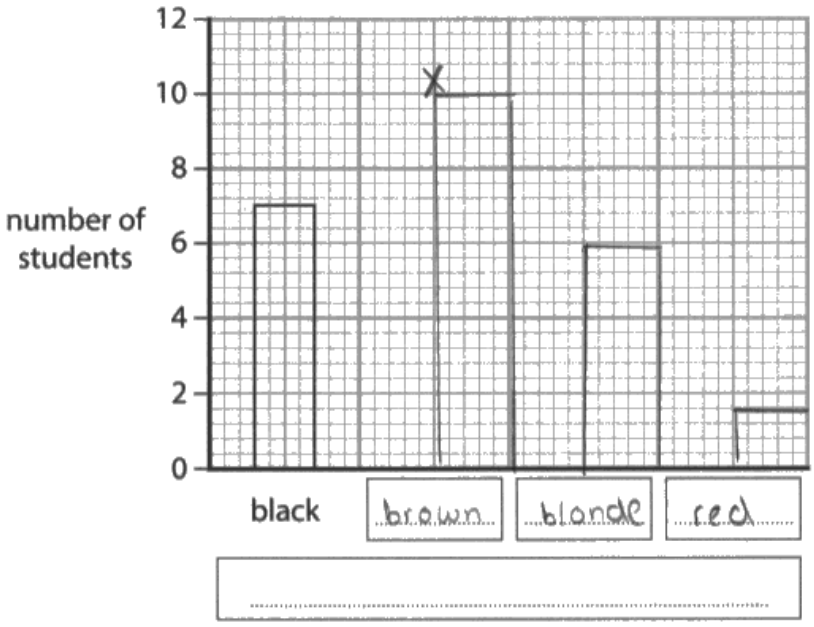
Some candidates struggled with using the scale for the number of students and this resulted in some inaccuracies in plotting the bar for red hair. However, the plotting tolerance of +/- one small square on the height of the bars meant that most candidates scored the mark available for this skill.

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

This response scored one mark for completing the names of the bars. The bar for red has been drawn incorrectly so no mark is awarded for this skill. Bars drawn within a tolerance of plus or minus half a small square were credited. The label for the x axis has not been completed.

ResultsPlus
Examiner Tip

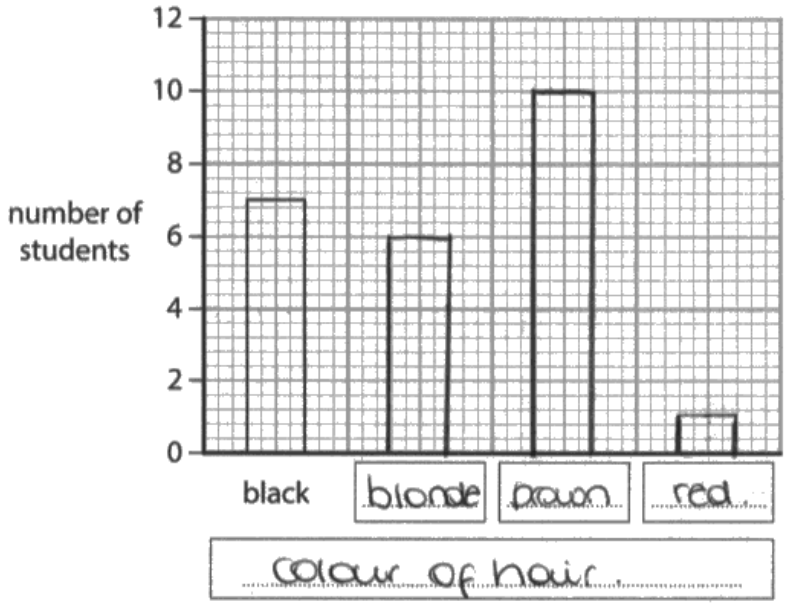
Make sure that you understand the scales on bar charts and line graphs to avoid making plotting errors. Always check that you have completed every missing part of a question.

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

All aspects of the bar chart have been completed correctly, so this response scores full marks. Note that the bars could be drawn in any order.

Question 2(a)i

In this question candidates had to name a part on a diagram of a sperm cell. While many knew acrosome, a large proportion were unfamiliar with the structure of a sperm cell. Nucleus was commonly given as the answer.

Question 2(a)ii

This matching pairs question was about parts of a sperm cell and their functions. The item proved to be a little more challenging than similar items in previous series. It is disappointing to note that despite the comments made in previous examiner reports, some candidates still ignored the instruction in the question to draw just **one** straight line between a box on the left and a box on the right.

Question 2(b)

This was a straightforward item for most candidates. They were able to recall differences between animal cells and plants cells and write an appropriate answer such as cell wall or vacuole. Chloroplast was seen less frequently.

(b) Animal and plant cells are both eukaryotic.

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

(1)

Cell membrane

ResultsPlus
Examiner Comments

This response is incorrect because the cell membrane is found in animal cells and plant cells. Creditworthy responses were cell wall, chloroplast and vacuole.

ResultsPlus
Examiner Tip

Remember to learn the differences between animal cells, plant cells and bacterial cells.

Question 2(c)ii

In this question candidates had to describe how the bases of a DNA molecule are held together. Similar questions have been asked in previous examination series. Some very succinct answers were seen, such as 'by weak hydrogen bonds', that scored both marks. Confusion about base pairing was seen in some responses, such as T pairs with G. Only a small proportion of candidates referred to complementary bases. Descriptions of the double helix and sugar-phosphate backbone were common in responses, but these were not credited as they did not answer the question.

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

(2)

The complimentary base pairs A → T, C → G are held together by weak hydrogen bonds

ResultsPlus
Examiner Comments

This is a very concise answer that includes all four points on the mark scheme.

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

(2)

The bases of a DNA molecule are held by a hydrogen bond between the [redacted] bases.

ResultsPlus
Examiner Comments

This response scores one mark for 'hydrogen bond'. Some additional detail stating how the bases are paired, or that the hydrogen bonds are weak, would have gained a second mark.

Question 3(b)i

This question required a labelled line touching any part of the cerebral hemisphere on the diagram of the brain. It was apparent that many candidates did not know the location of the main regions of the brain as detailed in the specification. The cerebral hemisphere was mislabelled in many cases.

When answering this type of question, candidates should be advised to make sure that their label line touches the appropriate structure and does not end a short distance away from it.

3 Figure 5 shows a human brain.

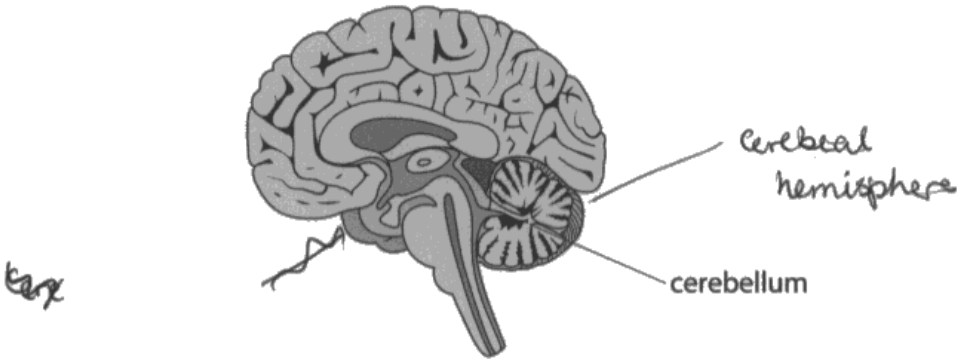


Figure 5

ResultsPlus
Examiner Comments

The end of the line labelled cerebral hemisphere is between two parts of the brain, so no credit can be given.

ResultsPlus
Examiner Tip

When labelling a diagram, make sure that label lines touch the relevant structures and do not end a short distance away from them. Make sure that you learn the position of the main parts of the brain.

Question 3(b)ii

Responses to this question showed that some candidates were unfamiliar with the functions of different parts of the brain. It was not uncommon to see candidates using distractors from Q03(a) in their answers to this item, thus scoring no marks.

A wide range of functions was accepted, including memory, vision, speech and conscious thought.

(ii) State **two** functions of the cerebral hemispheres.

(2)

1 controls breathing rate

2 controls balance?

ResultsPlus
Examiner Comments

Neither of the stated functions are creditworthy. Breathing rate is controlled by the medulla oblongata and balance is controlled by the cerebellum.

ResultsPlus
Examiner Tip

Make sure that your revision includes learning the functions of the different parts of the brain.

(ii) State **two** functions of the cerebral hemispheres.

(2)

1 Controls memory, helps you remember things

2 ~~&~~ Speach, helps you talk.

ResultsPlus
Examiner Comments

This response scores two marks. Both of the functions stated are creditable.

Question 3(c)i

A large proportion of candidates could recall the name of a neurone, but many gave the incorrect neurone when answering this question.

Motor (neurone) was the answer required.

Question 3(c)ii

This question asked candidates to explain how the pupil changes size. Credit was given for stating that the pupil can become bigger or smaller, then for explaining how this happens. A reference to muscles in the iris contracting or relaxing was sufficient to score the second mark.

(ii) Figure 6 shows a human eye.

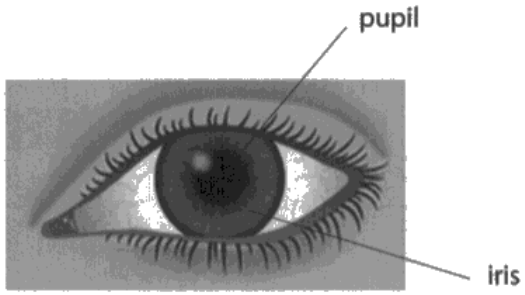


Figure 6

Explain how the pupil changes size.

(2)

the pupil changes based on the light if there is loads of light the pupils will be small but if there barely any light the pupils would go big to get more light

ResultsPlus
Examiner Comments

This response scores one mark for the reference to the pupil becoming smaller or bigger. There is no credit for the link to changes in light intensity. Additional detail, such as a comment about the iris or muscles, is necessary for a second mark.

(ii) Figure 6 shows a human eye.

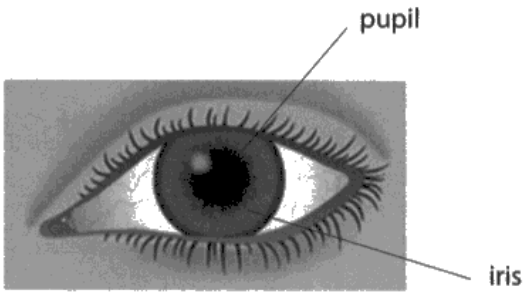


Figure 6

Explain how the pupil changes size. (2)

iris

the small muscles in the ~~eye~~ contract which allows the pupil to dialate and become larger. The small muscles can also relax which allows the pupil to shrink to ~~be smaller~~

ResultsPlus
Examiner Comments

This is a concise answer that shows understanding of how the pupil changes size. The answer includes four out of the five points on the mark scheme, so full marks can be awarded.

ResultsPlus
Examiner Tip

To avoid crossings out, think carefully about the structure of your answer before you begin to write.

Question 3(c)iii

There have been several questions based on defects of the eye in previous examination series. Therefore, it was disappointing that many candidates were unable to give a straightforward answer stating that short-sightedness is caused by factors such as the eyeball being too long or the lens being too curved.

(iii) Short-sightedness is a defect of the eye.

State **one** cause of short-sightedness.

(1)

The cornea being too flat.

ResultsPlus
Examiner Comments

There is a comparative statement in this response, but the cornea being too flat is incorrect. Too curved would have been awarded the mark. Other creditworthy responses include the eyeball being too long and the lens being too thick or too curved.

ResultsPlus
Examiner Tip

Make sure that your revision includes learning about the cause of defects of the eye and how they can be corrected.

Question 4(a)ii

In this question candidates had to estimate the length of time *Homo habilis* lived on Earth from a given time line. A range of values from 0.6 to 0.8 million years was accepted. Many candidates were able to give an appropriate value within the range accepted, some estimated the beginning or end of the time period that *Homo habilis* was thought to have lived on Earth.

(ii) Estimate the length of time *Homo habilis* is thought to have lived on Earth. (1)

2.5
−1.6
0.9

= 900,000 years

0.9 million years

ResultsPlus
Examiner Comments

The estimated value given on the mark scheme is 0.7 million years. An answer between 0.6 and 0.8 million years was accepted, so 0.9 does not score the mark. In this response the candidate has converted their answer into 900 000 years. If they had done this with an answer within the accepted range, they would need to cross out 'million' on the answer line to score the mark.

ResultsPlus
Examiner Tip

Do not try to introduce extra steps in a calculation. This can result in errors and answers that cannot be credited. Changing million years into years is an example of this.

Question 4(a)iii

In recent examination series, there have been a number of questions related to dating stone tools. This was an applied question that asked candidates to describe two methods scientists could have used to date fossils of Ardi or Lucy. Although the depth fossils were found in the ground is a relative measure of dating fossils and stone tools, this was a common response that was credited with a mark. Many candidates found it less easy to score a second mark. Carbon dating was not accepted because the fossils of Ardi and Lucy would be too old, but radiometric dating was a creditworthy answer.

(iii) Describe **two** methods scientists used to date the fossils of Ardi or Lucy, as shown in Figure 7.

(2)

1 How far underground the fossils are found

2 Physical features of the fossil

ResultsPlus
Examiner Comments

This response scored one mark for 'how far underground the fossils are found'. Many candidates added extra detail to answers such as this, for example, by writing that fossils found deeper underground are older. Physical features of the fossil is not a creditworthy point. There needs to be a comparative statement, such as comparing the features of Ardi or Lucy with other fossils (of a known age).

ResultsPlus
Examiner Tip

Remember to learn how to interpret different command words in questions. Describe means you should state the points of a topic or give the main features. This may include making simple comparisons. For the second point given in answer to this question, extra detail about what the physical features could be compared with, could be given.

Question 4(b)i

This sentence completion question was answered very well by the majority of candidates.

Question 4(b)ii

The majority of candidates scored a mark for this applied question about a feature of a banana that could be improved by selective breeding. A wide range of responses was accepted, with the size of the banana being a very common answer. Some candidates thought about the question rather more deeply and gave good answers such as breeding bananas that were slower to ripen (so they have a longer shelf life).

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

(1)

the taste

ResultsPlus
Examiner Comments

A wide range of responses was accepted in answer to this question. Size, taste and ripening time were among the more frequently seen answers.

Question 4(c)i

Extracting DNA from fruit has been examined in previous series. In this question, candidates were given the basic procedural steps in Figure 8 and were asked about the purpose of the first two of these steps. It was apparent that candidates who had first-hand experience of the method were able to give much better answers. Some candidates did not think carefully enough about the method, so their answers were confused and often not creditworthy.

Step 1 was about breaking open cells or membranes to release DNA (from the nucleus). Some candidates knew the specific roles of the salt solution and the washing-up liquid. The basic idea of step 2 was to remove the crushed up fruit or fruit cells from the mixture. Removing lumps and chunks was accepted.

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

Figure 8 shows part of a method used to extract DNA from fruit.

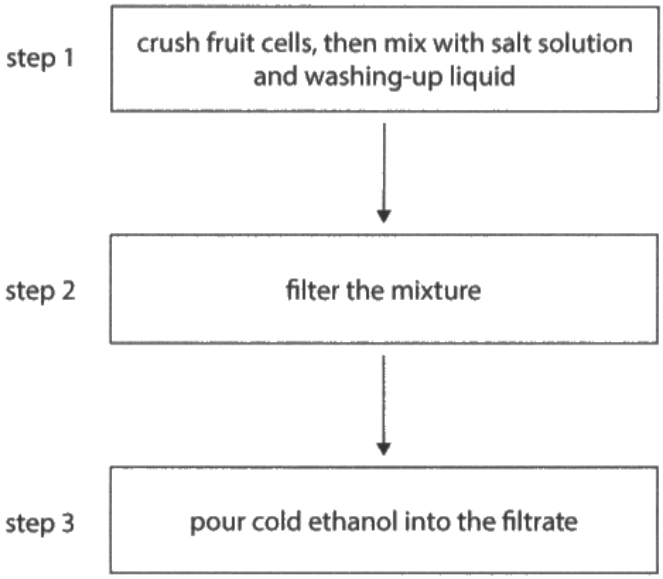


Figure 8

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

(2)

step 1 to break the cell membrane to allow genetic material such as DNA to leave the cell.

step 2 we filter the mixture to seperate the chunks of fruit from the liquid so extraction will be easier

ResultsPlus
Examiner Comments

Step 1 - breaking the cell membrane to allow DNA to leave the cell scores one mark. Step 2 - filter to separate chunks of fruit from the liquid is an acceptable response for one mark. References to making extraction easier were not credited.

ResultsPlus
Examiner Tip

It is important that you know how DNA can be extracted from fruit and the reasons behind different steps of the method. You can watch videos of practical procedures as a reminder of how they are performed.

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

Figure 8 shows part of a method used to extract DNA from fruit.

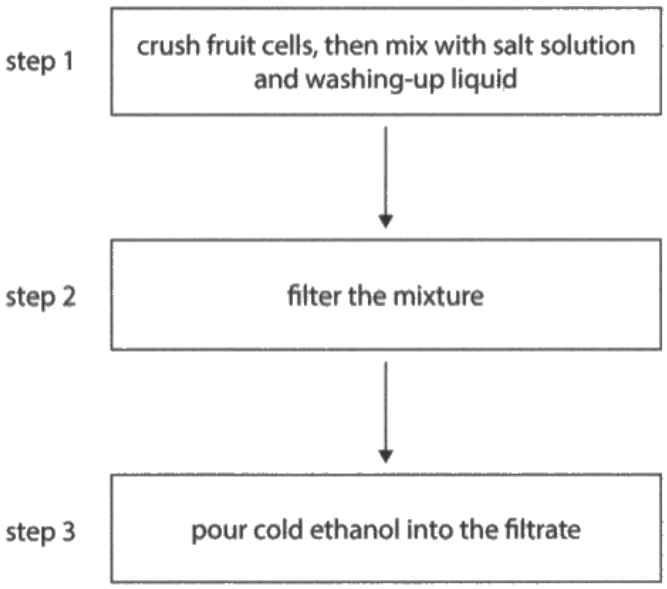


Figure 8

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

(2)

step 1 Break apart the cells

step 2 Make sure the solid stays.

ResultsPlus
Examiner Comments

Step 1 - break apart the cells scores the first point on the mark scheme. Step 2 - the idea of separating solid material from liquid is unclear, so no mark was awarded for the statement 'make sure the solid stays'.

Question 4(c)ii

This question asked candidates about the reason for adding cold ethanol to the filtrate. Again, candidates with first-hand experience of the procedure could give a concise answer stating that cold ethanol precipitates the DNA.

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

(1)

As the ethanol precipitates the DNA to then form a white precipitate which is the DNA.

ResultsPlus
Examiner Comments

This is a clear answer that shows good understanding of the process of extracting DNA from fruit. References to adding cold ethanol to make the DNA visible were also accepted.

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

(1)

Freeze molecules

ResultsPlus
Examiner Comments

Comments about making the contents of the filtrate cold, or even freezing them, were not credited. Candidates are expected to know that adding cold ethanol precipitates DNA or makes DNA visible.

Question 5(a)i

Reading data from graphs is a fairly common style of question used to assess mathematical skills. It was disappointing that many candidates did not look carefully at the scale on the y axis to read the crop yield when no fertiliser was added to the soil. This value was often given as 3.7 or 3.8, so final calculated answers of 0.7 or 0.8 were common. The expected final answer was 0.75, because the value read from the graph when no fertiliser was added to the soil is 3.75.

5 (a) Figure 9 shows how adding fertiliser to the soil affects the yield of a food crop.

The area of a field is measured in hectares.

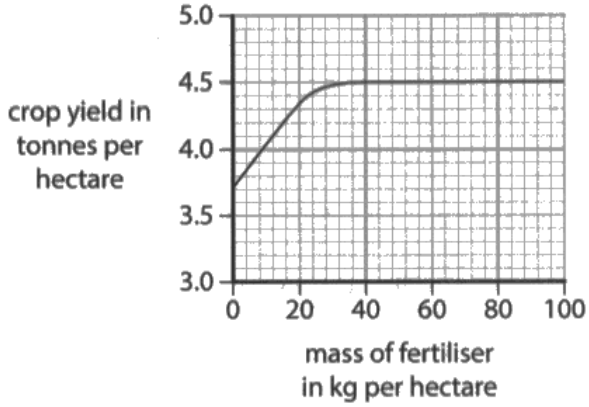


Figure 9

(i) A farmer added 100 kg per hectare of fertiliser to a field.

Using Figure 9, calculate the increase in crop yield.

(2)

4.5 / 100

100 / 4.5

22.2

kg per hectare

ResultsPlus
Examiner Comments

This response scores one mark for identifying 4.5 (tonnes per hectare) as the yield when 100 kg per hectare of fertiliser is added to the soil. The final answer is incorrect. The candidate has not determined the crop yield when no fertiliser is added to the soil (3.75 tonnes per hectare) and the difference between 3.75 and 4.5 has not been calculated.

ResultsPlus
Examiner Tip

Think carefully about what the question is asking you to do. In this example you have to calculate an increase in a value, so check that your final answer fits the values given on the axes of the graph.

5 (a) Figure 9 shows how adding fertiliser to the soil affects the yield of a food crop.

The area of a field is measured in hectares.

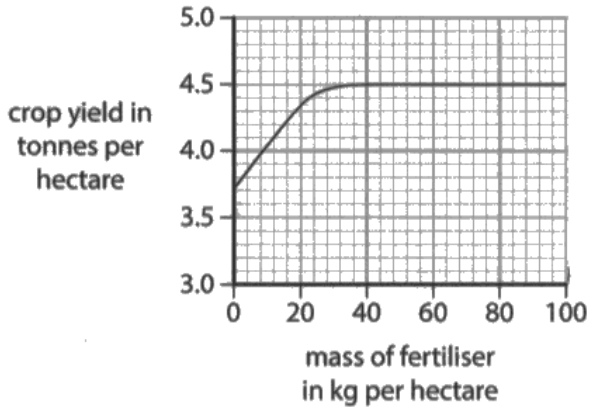


Figure 9

(i) A farmer added 100 kg per hectare of fertiliser to a field.

Using Figure 9, calculate the increase in crop yield.

(2)

$$\begin{array}{r} 4.5 \\ -\ 3.7 \\ \hline 0.8 \end{array}$$

0.8 kg per hectare

ResultsPlus
Examiner Comments

This response scores full marks. the candidate has read the initial value and the final value of the crop yield from the graph. The increase in yield has been calculated correctly.

ResultsPlus
Examiner Tip

In this example the candidate has shown their working. This is always a good idea because it allows marks to be awarded if you make a mistake with the overall calculation.

Question 5(a)ii

It was pleasing to note that many candidates were able to give clearly thought out answers to this question. They appreciated that the yield did not increase further if more than 40 kg per hectare of fertiliser was added to the soil, so adding more would be an unnecessary expense that could not be recouped.

(ii) Explain why farmers should not add more than 40 kg per hectare of fertiliser to the soil.

(2)

because when there is 40 kg of fertilizer, the crop yield will stop increasing. Therefore 40 kg of fertilizer per hectare is the optimum amount for increasing crop yield.

ResultsPlus
Examiner Comments

The candidate has used the graph in Figure 9 to identify that there is no further increase in crop yield if more than 40 kg per hectare of fertiliser is added to the soil. This scores the second point on the mark scheme, with the comment that 40 kg per hectare is the optimum amount (of fertiliser) scoring the first point on the mark scheme.

(ii) Explain why farmers should not add more than 40 kg per hectare of fertiliser to the soil.

(2)

the reason farmers should not add more than 40 kg per hectare of fertiliser because it does not ~~x~~ the crop yield does not increase any more than 4.5 tonnes after 40 kg of fertiliser

ResultsPlus
Examiner Comments

This response scores one mark for noting that crop yield does not increase any more than 4.5 tonnes per hectare. To gain the second mark for this question, the answer needs to be developed with a point of reasoning, such as using more than 40 kg per hectare of fertiliser would cost more and no additional benefit would be gained.

(ii) Explain why farmers should not add more than 40 kg per hectare of fertiliser to the soil.

(2)

The croes would intalce the chemicals from the fertillisarers.

Would damge the soil and the croes

ResultsPlus
Examiner Comments

The first part of this response is not creditworthy. However, damage to the soil is sufficient to score the additional point on the mark scheme.

Question 5(b)

The virus life cycle is not commonly assessed on paper 1BI0_1F. In this four mark question, candidates were given a diagram of part of a virus cycle. The question asked candidates to use the diagram to describe how new viruses are made. Some candidates were clearly familiar with the topic and they used appropriate terminology to describe the process. Others were much less confident, but many candidates managed to score at least one mark for telling part of the story. The basic points that scored marks included a virus attaching to a bacterial cell, virus DNA being injected into the bacterial cell, virus DNA replicating to then produce more viruses and finally the bacteria cell bursting open.

(b) Figure 10 shows part of a virus life cycle.

This virus infects bacterial cells.

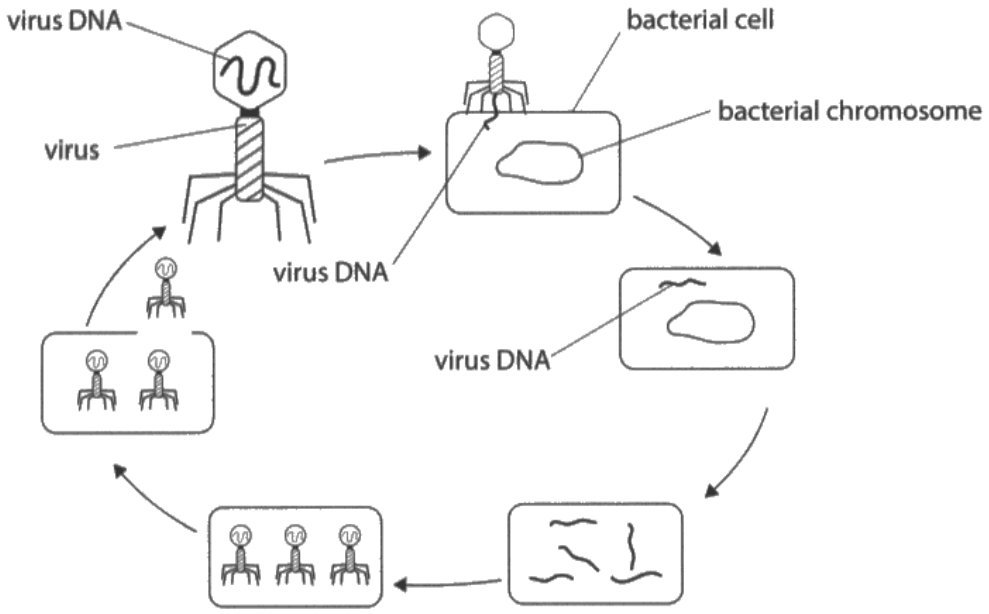


Figure 10

Use Figure 10 to describe how new viruses are made.

(4)

- Virus DNA is placed into the bacterial cell.
- The bacterial cell reproduces and the virus DNA gets passed on
- The virus multiplies and the cycle repeats.
- The virus and bacterial cell are pathogens.

ResultsPlus
Examiner Comments

This response was awarded two marks. The candidate has made an attempt to interpret the diagram in order to describe how new viruses are made, but some details are missing. The first bullet point in the answer scores one mark (virus DNA placed into the bacterial cell). The third bullet point in the answer (the virus multiplies) scores a second mark.

ResultsPlus
Examiner Tip

Don't forget to check the number of marks available for a question, then try to include a relevant number of points in your answer. Using bullet points, as in this response, is a good way of structuring answers to this style of question.

Firstly, A virus attaches to a bacterial cell, injecting viral DNA which ~~is~~ replicates inside the cell. this viral DNA will be used to create more viruses inside ~~of~~ of the bacterial cell, which will eventually burst out of the cell, and the process will repeat.

ResultsPlus
Examiner Comments

This is a well-structured response that scores full marks for describing how new viruses are made. The candidate has made good use of Figure 10, but the use of terms such as 'replicates' also demonstrates the inclusion of prior knowledge.

Question 5(c)

This was a very accessible question, with the majority of candidates scoring the mark. Common answers referred to pests eating crops, so less yield and less food for humans.

(c) Plants can be affected by pests such as insects.

Give **one** way that plant pests can affect the food available for the human population.

(1)

~~Aphids~~ ~~The mosquito transfer of Malaria into good~~

~~Insects~~ Pests can eat the good reducing availability of the good for human population

(Total for Question 5 = 9 marks)

ResultsPlus
Examiner Comments

This is a very typical response to this question. References to pests eating plants / crops / food or reducing the availabilty of food for humans were commonplace. These answers scored the mark available.

ResultsPlus
Examiner Tip

Questions such as this only require brief answers. Remember to think about your answer before you write it. In this example the candidate started to write about disease transmission in humans, before realising their mistake.

(c) Plants can be affected by pests such as insects.

Give **one** way that plant pests can affect the food available for the human population.

(1)

They can lay egg in it.

ResultsPlus
Examiner Comments

It is likely that many pests will lay eggs on plant. If this response had been developed further to indicate how pests can affect the food available for humans, then it may have been possible to award the mark available.

Question 6(a)iii

This question was about reaction times that were measured by catching a falling ruler. Most candidates probably had some experience of this type of practical and the question was generally answered well, with some good explanations given about why student J had the slowest reaction time.

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

(2)

J because the faster your reaction the less cm you would have in distance.

ResultsPlus
Examiner Comments

This answer scores one mark for identifying the student who had the slowest reaction time. The explanation is insufficient to warrant awarding a second mark. An additional point of detail, such as 'the ruler fell further for J, so their reaction time was slowest', would have secured the second point on the mark scheme.

ResultsPlus
Examiner Tip

Check that your response actually answers the question. Make sure that you have included sufficient detail.

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

(2)

Student 5 because ~~the ruler fe~~ they caught the ruler at 15cm whereas the students who had a quicker reaction eg caught the ruler faster making it a lower measuremen. e.g. 13cm.

ResultsPlus
Examiner Comments

The student with the slowest reaction time has been identified. The explanation is clear and scores the second point on the mark scheme.

Question 6(a)iv

Most candidates scored at least one mark. Use the same ruler was the most common response seen. Many candidates found it difficult to think of a second variable that needed to be controlled, but credit was also given for comments such as keep the finger and thumb the same distance apart and always catch the ruler with the same hand.

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

(2)

1 Start point

2 Same hand

ResultsPlus
Examiner Comments

This is not a creditworthy response. Both points could have been clarified by the inclusion of extra detail about what 'start point' and 'same hand' refer to. For example, a comment such as 'always catch the ruler with the same hand', would have scored the third point on the mark scheme.

ResultsPlus
Examiner Tip

Check that you have written in enough detail to answer the question. Sometimes you need to write more information about the points you have given.

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

(2)

1 The temputure of the room.

2 the surface area.

ResultsPlus
Examiner Comments

This response scores one mark. The temperature of the room is a suitable variable to control. Surface area has no direct relevance to this investigation.

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

(2)

1 How far the ruler is from the students hand when being dropped

2 length of ruler has to be the same for every student.

ResultsPlus
Examiner Comments

Both of the variables given are appropriate, so this response scores two marks. The candidate has written in sufficient detail to make each point clear.

Question 6(b)i

Candidates were given a diagram of a motor neurone. They were asked to state the role of a motor neurone in a reflex arc. Many candidates correctly referred to the transmission of electrical impulses, but unfortunately, the direction of transmission was sometimes incorrect, with answers often stating to the brain or CNS.

(b) Figure 13 shows a motor neurone.

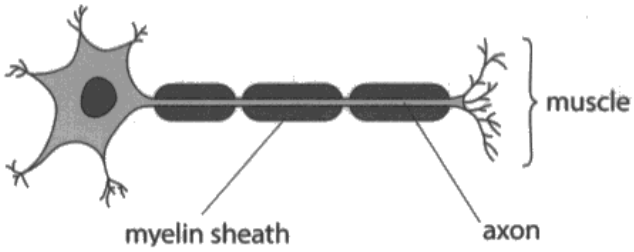


Figure 13

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

(1)

to transmit signals from the CNS to effecter.

ResultsPlus
Examiner Comments

This is a good answer. Signals is an acceptable alternative to impulses or messages. Just the first line would have been sufficient to score the mark, as would 'to transmit signals to effectors'.

(b) Figure 13 shows a motor neurone.

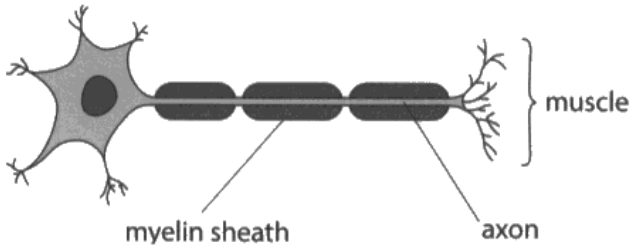


Figure 13

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

(1)

transmitts nerve impulses from the brain to the muscles in the iris of the eye.

ResultsPlus
Examiner Comments

This response shows understanding of a reflex arc. The location of the muscles can be ignored. The mark is for the knowledge that impulses travel from the brain (or CNS) to muscles.

(b) Figure 13 shows a motor neurone.

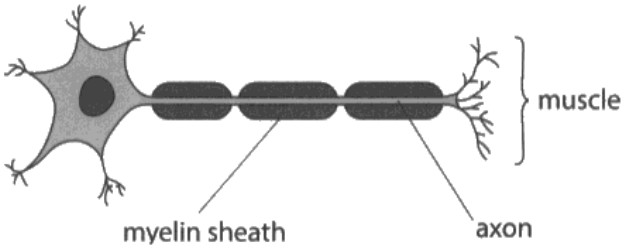


Figure 13

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

(1)

Send signal to the brain.

ResultsPlus
Examiner Comments

This response is not creditworthy. Impulses or signals do not travel to the brain in motor neurones.

ResultsPlus
Examiner Tip

Make sure that you check your knowledge and understanding of nerve impulses in a reflex arc and the different neurones involved.

Question 6(b)ii

This question asked candidates to explain the function of the myelin sheath that was labelled on a diagram of a motor neurone. It was pleasing that a large proportion of candidates knew that the myelin sheath is an insulator, but a specific reference to the axon was required to gain the first mark. Protecting the axon was also credited. While some candidates were able to explain that having a myelin sheath to insulate the axon results in nerve impulses travelling faster, many candidates did not have this knowledge.

(ii) Explain the function of the myelin sheath.

(2)

insulation

ResultsPlus
Examiner Comments

On its own, insulation does not score a mark. Some additional detail is needed about what is being insulated.

ResultsPlus
Examiner Tip

A one word answer is insufficient to score a mark on a question that uses the command word 'explain'. In this example you need to say what is being insulated and why.

(ii) Explain the function of the myelin sheath.

(2)

It acts as an insulator for the axon, and protects it.

ResultsPlus
Examiner Comments

Insulator for the axon scores one mark. This response has not been linked to the faster transmission of nerve impulses. Protecting the axon would also be sufficient to score the first point on the mark scheme.

(ii) Explain the function of the myelin sheath.

(2)

insulates the axon, and also speeds up the electrical impulses

ResultsPlus
Examiner Comments

This concise response scores two marks. A large proportion of candidates did not mention that the myelin sheath results in nerve impulses travelling faster.

Question 6(b)iii

This was a more challenging question that asked candidates to describe how a nerve impulse passes across the gap between neurones. A large number of candidates scored one mark for knowing that the gap between two neurones is called a synapse. Describing what happens at the synapse was a more difficult proposition. Only the more able candidates could recall that neurotransmitters are released at synapses and that the neurotransmitters diffuse across the synapse. Some candidates knew that diffusion occurs at a synapse, but they sometimes wrote about the nerve impulse diffusing. This is incorrect and resulted in no mark being awarded for diffusion.

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

(3)

between two neurons is called the synapse, nerve impulses themselves dont cross the gap but messenger neurons do.

ResultsPlus Examiner Comments

This response scores one mark for the knowledge that the gap between neurones is called a synapse. The reference to messenger neurones is incorrect.

ResultsPlus Examiner Tip

Remember to try to match the number of points you write to the number of marks available for the question.

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

(3)

there is a synapse between each neuron and the nerve impulse ~~is~~ diffuses from one neuron to the other.

synapse is the gap in between.

ResultsPlus
Examiner Comments

This response scores one mark for the reference to a synapse. The candidate has incorrectly stated that the nerve impulse diffuses across a synapse. As a result, the point on the mark scheme for diffuses is not credited. If the candidate had written that a chemical diffuses across a synapse, this response would have scored full marks.

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

(3)

the nerve impulse will reach the synaps and when it does will cause the release of a chemical which will diffuse across to the other side causing an identical impulse to be created on the other side to continue on.

ResultsPlus
Examiner Comments

This detailed response gains full marks. The answer includes four of the points on the mark scheme. The reference to an identical impulse being created 'on the other side' is sufficient to score the first of the two additional points in the mark scheme additional guidance column.

Question 7(a)ii

While many candidates understood the context of the question, they often found it difficult to communicate their knowledge and understanding effectively. It was not fully appreciated that children who are immunised against a disease may still contract that disease, but they are less likely to become severely ill and their body will produce antibodies to protect them. Many candidates scored a mark for recognising that the disease is less likely to spread through a population if children are immunised and there were also many correct references to herd immunity.

(ii) In the UK, most children are immunised against serious infections such as measles.

Give **two** advantages of immunising children against measles.

(2)

1 reduces the spread of measles

2 less ~~pe~~ people admited to hospitals.

ResultsPlus
Examiner Comments

Both of the advantages given are creditworthy. Reducing the spread of measles was a common response. Relatively few candidates scored the second point on the mark scheme for stating that children would be less likely to need medication, or less likely to be admitted into hospital.

(ii) In the UK, most children are immunised against serious infections such as measles.

Give **two** advantages of immunising children against measles.

(2)

1 increases herd immunity

2 gives them memory lymphocytes

Both points given in this response are acceptable answers noted in the additional guidance column of the mark scheme.

Make sure you know about the advantages and disadvantages of immunisation. You can apply that knowledge to diseases named in examination questions. Some questions also ask you how the body responds to immunisation.

Question 7(b)i

The majority of candidates could name two physical barriers that prevent bacterial infections. Skin and mucus were the physical barriers named most frequently.

Question 7(b)ii

Most candidates scored a mark for stating stomach acid or hydrochloric acid.

Amino acid was not a creditworthy answer because amino acids do not destroy bacteria in the stomach.

(ii) State the chemical in the stomach that destroys bacteria.

(1)

Amino acid

ResultsPlus
Examiner Comments

This is not a creditworthy response because amino acids do not destroy bacteria in the stomach. Acid, hydrochloric acid and stomach acid were common answers that scored the mark.

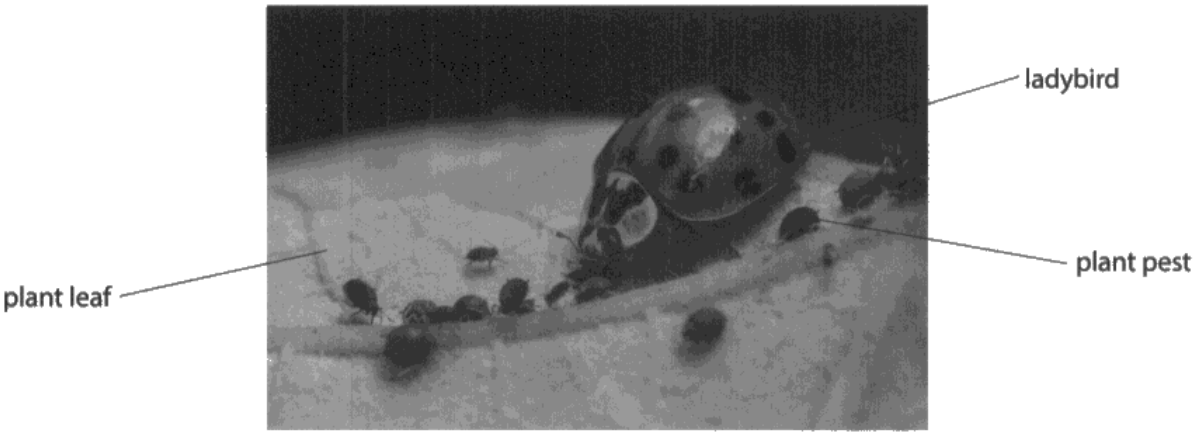
Question 7(c)

Candidates who had a sound understanding of biological control used the information in the stem of the question to good effect and could clearly identify advantages and disadvantages. Many of these candidates appreciated that there would be a reduction of the use of pesticides, that would have a positive effect on the environment and farmers' profit. Only a small proportion of candidates had a good grasp of disadvantages of biological control, such as it being a slower process than using pesticides and the control organism may move away for the crop die out.

*(c) Many food crops are damaged by pests.

Some farmers use insects for the biological control of plant pests.

Figure 14 shows a ladybird which can be used for biological control.



(Source: © IanRedding/Shutterstock)

Figure 14

Explain the advantages and disadvantages of biological control.

(6)

An advantage of biological control would be the less ammount of pest around plants. A ~~Disadvantag~~ Disadvantage would be theyd more insects around.

ResultsPlus
Examiner Comments

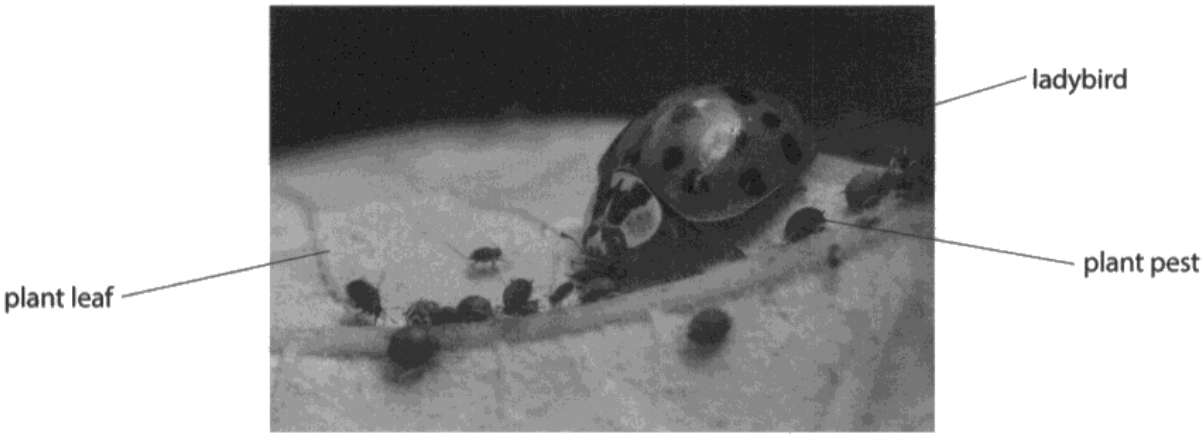
A basic advantage of biological control has been given - less pests. No consequence of this

advantage has been stated and the disadvantage is unclear. This response scores a mark at the bottom of level 1.

*(c) Many food crops are damaged by pests.

Some farmers use insects for the biological control of plant pests.

Figure 14 shows a ladybird which can be used for biological control.



(Source: © IanRedding/Shutterstock)

Figure 14

Explain the advantages and disadvantages of biological control.

(6)

Advantage - The animal will eat all the pests and keep the crops safe.

Disadvantage - The animal will start competing with other animals or it can start eating animals you dont want to be ate.

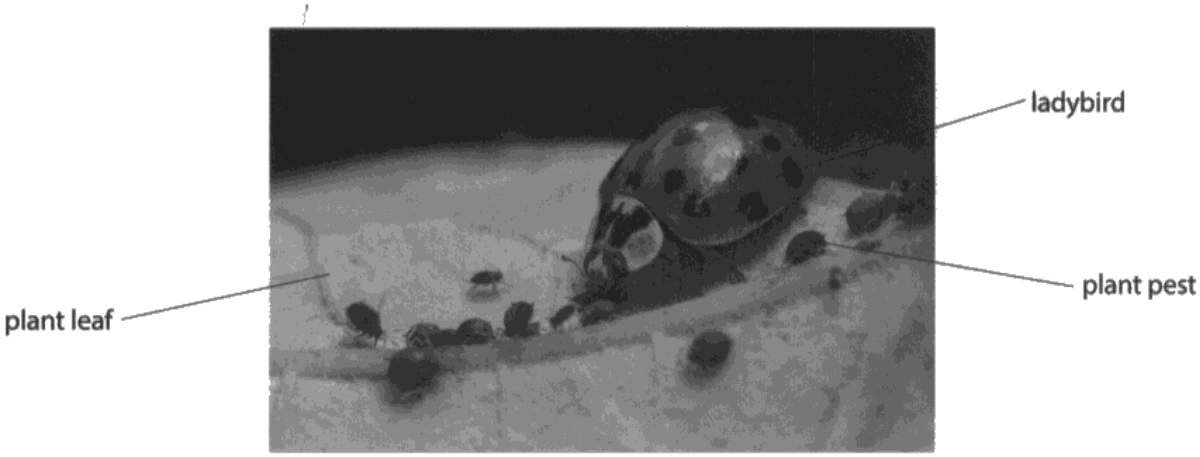
ResultsPlus
Examiner Comments

This response includes a basic advantage of biological control and a disadvantage. Therefore, this is a level 2 response. A consequence of either the advantage or the disadvantage must be given to score a mark at the top of level 2, for example, if the pests are eaten there will be less crop damage. This answer scores a mark at the bottom of the level 2 (three marks).

*(c) Many food crops are damaged by pests.

Some farmers use insects for the biological control of plant pests.

Figure 14 shows a ladybird which can be used for biological control.



(Source: © IanRedding/Shutterstock)

Figure 14

Explain the advantages and disadvantages of biological control.

(6)

An advantage could be that farmers can invest in this type of control to save their crops from dying out and being eaten by pests. This could lead to greater sucessful yield for the farmer, and can result in the farmer making profit from it.

A disadvantage could be attracting birds because it causes curios birds to eat the insects and could affect the farmer's crops negatively by them trodding and pecking at their yield. Leads to less yield resulting in less farmer profit.

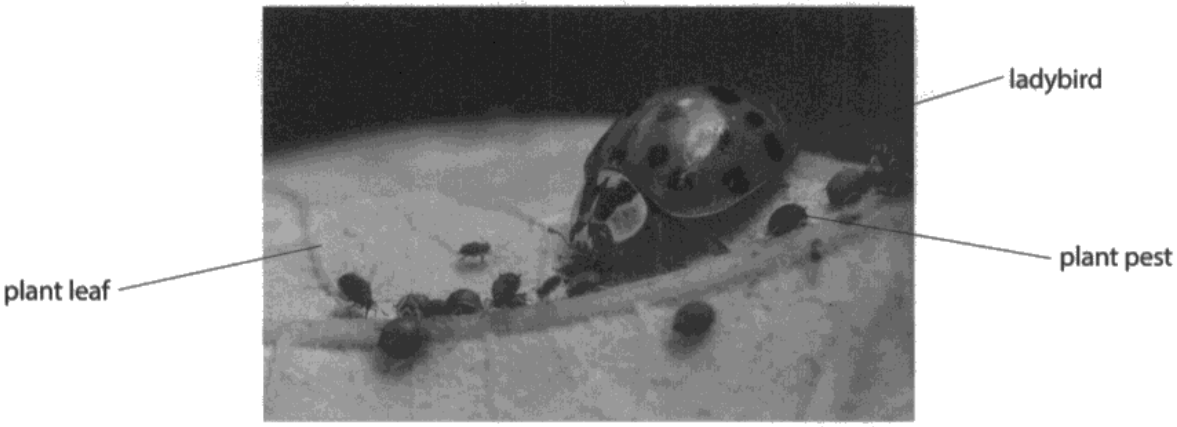
ResultsPlus
Examiner Comments

This response includes an advantage and a disadvantage of biological control. Consequences of the advantage and the disadvantage have been explained. Therefore, the answer scores a mark at the top of level 2 (four marks). A level three response must include advantages and disadvantages of biological control.

*(c) Many food crops are damaged by pests.

Some farmers use insects for the biological control of plant pests.

Figure 14 shows a ladybird which can be used for biological control.



(Source: © IanRedding/Shutterstock)

Figure 14

Explain the advantages and disadvantages of biological control.

(6)

An advantage to using biological control is, it is safer for the environment as insects such as ladybirds will get rid of the pests, without harming the plants in the surrounding area.

A disadvantage to using biological control is, these insects can just move ~~away~~ away from your plants, this means you may have to get an enclosed space such as a greenhouse or purchase more ladybirds, as a result of this the farmers will have to pay more.

However, using biological control is better than using something such as a pesticide. Pesticides remove all kinds of

insects from your plant, even the ones that help your plant grow. as a result of this the plants will be lower quality and can cause healthrisks.

In conclusion, biological control is the safer way to go as it keeps your plants healthy while maintaining a high quality and this is what farmers want.

ResultsPlus
Examiner Comments

There is just enough detail in this answer to award a mark at the top of level 3. More than one advantage and more than one disadvantage is needed for a level 3 response. Here, two advantages of biological control can be identified - the removal of pests and not using pesticides. Disadvantages include the insect used as a biological control agent could move away from the crops and the control agent may have to be reapplied. A consequence of an advantage and a disadvantage has been explained, so full marks can be awarded.

Question 8(a)ii

This was a very straightforward question for most candidates. Incorrect answers were due to mistakes in reading the scale on the y axis, so 30 000 and 50 000 were sometimes seen.

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

(1)

16000

20000

4000 cases

ResultsPlus
Examiner Comments

The calculated increase is incorrect by a power of 10. The values taken from the y axis have been written down incorrectly; 16 000 instead of 160 000 and 20 000 instead of 200 000.

ResultsPlus
Examiner Tip

Always check that you have copied numbers from graphs and tables correctly.

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

(1)

170,000 - 200,000

30,000 cases

ResultsPlus
Examiner Comments

30 000 is incorrect. The number of new cases of chlamydia from 2020 to 2021 has been misread from the graph at 170 000 instead of 160 000.

ResultsPlus
Examiner Tip

Check that you understand the scale used on a graph before reading off a value.

Question 8(a)iii

Most candidates answered this question very well, probably due to their experience of the pandemic. Wearing a face mask, covering the mouth when coughing and references to isolation were the most common creditworthy responses.

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

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

(2)

1 Keep the infected people indoors

2 ventillate rooms , keep windows open

ResultsPlus
Examiner Comments

Both of the points given are creditworthy. However, this response only scores one mark because the answers are linked to the same point on the mark scheme.

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

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

(2)

1 Wearing face masks

2 Social distancing

ResultsPlus
Examiner Comments

This answer scores two marks. Wearing face masks and social distancing were common responses to the question.

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

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

(2)

1 Covering mouth when coughing

2 washing hands.

ResultsPlus
Examiner Comments

This response scored two marks. Covering the mouth when coughing is the same point on the mark scheme as wear a face mask. Relatively few candidates referred to washing hands or disinfecting surfaces.

Question 8(b)i

There have been several questions based on communicable and non-communicable diseases in previous examination series. In this question candidates had to state why liver disease is non-communicable. Many candidates forgot to state that liver disease cannot be passed from **person to person**. Answers that simply stated 'it cannot be spread' or 'cannot be passed on' did not score the mark. Other creditworthy responses to this question include 'it is not caused by a pathogen' and it is caused by consuming alcohol.

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

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

(1)

because it can not be spread

ResultsPlus
Examiner Comments

'It cannot be spread' is insufficient to score the mark. There needs to be a clear statement that a non-communicable disease cannot be passed or spread from person to person.

Question 8(b)ii

This was an accessible calculation question, with many candidates scoring at least one mark. The stumbling block to scoring both marks was giving the waist-to-hip ratio to two decimal places. For two marks an answer of 0.89 was expected. Answer including 0.88, 0.8, and 0.9 scored one mark.

(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)

$\frac{80}{90} = 0.\dot{8}$

waist-to-hip ratio 0.89

ResultsPlus
Examiner Comments

This response scores full marks. The working shows an answer of 0.8 recurring. The candidate has gone on to give the answer correctly to two decimal places.

(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)

$\frac{80}{90} = 0.\dot{8}$

waist-to-hip ratio 0.8

ResultsPlus
Examiner Comments

This response scores one mark. The working shows an answer of 0.8 recurring, but the candidate has not taken the extra step of giving an answer to two decimal places.

ResultsPlus
Examiner Tip

Remember to check how your answer should be presented in a calculation question. For example, to the nearest whole number, to a certain number of decimal places or to a certain number of significant figures.

Question 8(b)iii

This question was linked to waist-to-hip ratio data. Most candidates could identify that the health risk for a female with a waist-to-hip ratio of 0.75 was low. A much smaller proportion of candidates could articulate why the health risk was low, but a reference to 0.75 being less than 0.8 was the most common answer that scored a second mark. Relatively few candidates scored the second mark by referring to excess mass not being around the waist or vital organs. A surprising number of candidates referred to risks to health caused by being underweight, but that was not the focus of the question.

(iii) Figure 16 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 16

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

(2)

women with a waist to hip ratio of 0.75 have a low ~~health~~ risk to health.

ResultsPlus
Examiner Comments

This response scores one mark for identifying that the risk to health is low. The candidate has not used information from the table to explain their reasoning.

ResultsPlus
Examiner Tip

Remember that you need to give some reasoning in questions that use the command word 'explain'. In this question you must show that you have used data from the table to give a reason why a waist-to-hip ratio of 0.75 is a low risk to health.

(iii) Figure 16 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 16

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

(2)

There is a low risk for the female as the catagory for low is whether ~~or~~ the waist-to-hip ratio is 0.8 or less and the female has a waist-to-hip ratio of 0.75 which is less than 0.8

ResultsPlus
Examiner Comments

This is a typical well-reasoned answer that scored both marks.

(iii) Figure 16 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 16

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

(2)

- They have a low health risk. This is because there is not alot of fat on the important organs.

ResultsPlus
Examiner Comments

This response scores full marks. The answer shows good knowledge of waist-to-hip ratios, in that a low waist-to-hip ratio means less mass around the the waist or vital organs, so the risk to health is low. Relatively few candidates demonstrated this knowledge.

Question 8(c)

Questions on mitosis have been asked several times in recent examination series. This question asked candidates to describe the properties of cells produced by mitosis, such as two cells are produced, they are diploid and they are genetically identical. Some very succinct answers were seen that scored both marks in a short sentence. There were many references to identical cells, but the marking point required **genetically** identical cells. References to haploid cells usually negated otherwise correct references to two sets, or full sets, of chromosomes.

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

Describe the properties of cells produced by mitosis.

(2)

mitosis makes ~~two~~ genetically identical daughter cells that are diploid cells.

ResultsPlus
Examiner Comments

Genetically identical and diploid cells are both creditworthy points.

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

Describe the properties of cells produced by mitosis.

(2)

Mitosis produces 2 genetically identical daughter cells with a haploid nucleus with 23 chromosomes.

The first two lines of the response could score two marks. However, the candidate has gone on to write that the daughter cells are haploid, which is incorrect. The list rule is applied to this question, so two correct responses and one incorrect response means that only one mark is awarded.

This question is worth two marks, so just two properties of cells produced by mitosis are required in an answer. If you are unsure of any of the points you are making, just limit your answer to two of them. A list of incorrect points will result in you losing marks because incorrect biology is not being rewarded.

Question 9(a)

This was a very accessible question on osmosis. In previous series candidates have struggled to explain the different osmosis scenarios presented to them, but it was pleasing to see some well-thought through responses to this item. Most candidates appreciated that the potato cylinder would gain mass because water moves into the potato cells by osmosis. References to partially permeable membranes were made less frequently, but nevertheless, it was not uncommon to see full marks scored.

9 (a) Figure 17 shows a beaker containing a potato cylinder in distilled water.

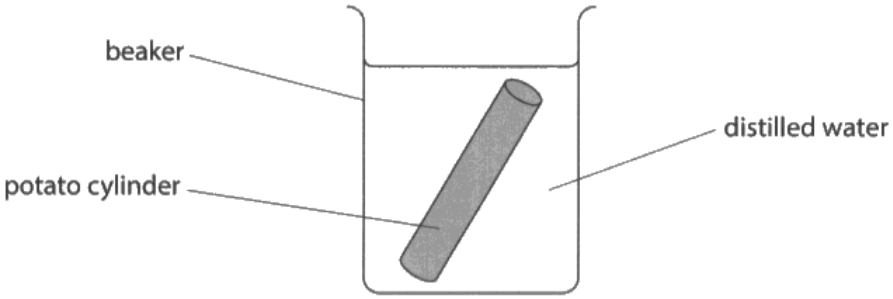


Figure 17

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

(3)

This is through osmosis where the concentration will move from a higher concentration level to a low concentration level.

ResultsPlus
Examiner Comments

This response scores one mark for the reference to osmosis. If the candidate had written about water moving from a higher concentration to a lower concentration, then a second mark could have been awarded.

9 (a) Figure 17 shows a beaker containing a potato cylinder in distilled water.

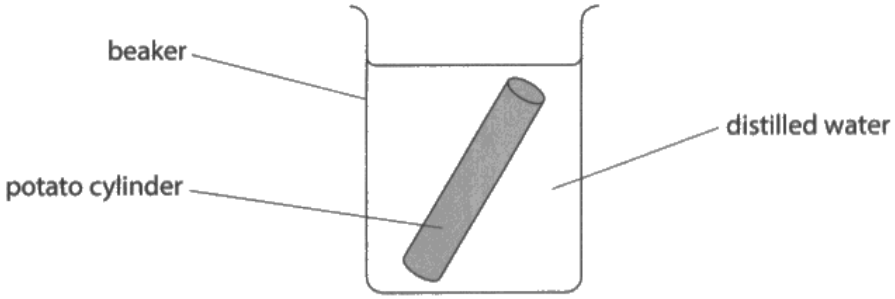


Figure 17

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

(3)

When placed in the water the potato ~~potato~~ cylinder will increase in mass because it will absorb some of the distilled water which will add to its mass.

ResultsPlus
Examiner Comments

This response scores two marks. The creditworthy points are increase in mass and absorb water.

ResultsPlus
Examiner Tip

Remember to check that the number of points you have written matches the question total.

9 (a) Figure 17 shows a beaker containing a potato cylinder in distilled water.

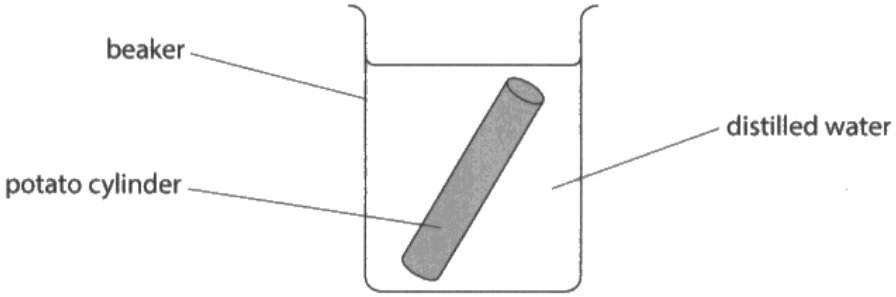


Figure 17

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

(3)

This is because water enters the ~~Potatoe~~ Potato through osmosis this is when water enters through a semi Permeable membrane and goes through a place of high concentration to low concenertion

ResultsPlus
Examiner Comments

This detailed answer shows good understanding of the scenario in Figure 17. Appropriate scientific terms have been used in the explanation. Full marks can be awarded.

Question 9(b)i

The majority of candidates scored both marks on this question. Most used the 2 : 1 ratio from the table and divided 54 by 2 to get 27 (cm3).

However, it was not uncommon to see working of 54 divided by 3 to get an answer of 18. This was not creditworthy.

(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 18 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 18

(i) Calculate the volume of cube C.

(2)

27
~~162~~ cm^3

ResultsPlus Examiner Comments

This response scores two marks. No working is shown, but a correct answer on the answer line is awarded full marks. 162 has been crossed out and replaced with the correct value.

ResultsPlus Examiner Tip

Always show your working in case you make a mistake when calculating the final answer.

(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 18 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 18

(i) Calculate the volume of cube C.

(2)

$\frac{54}{3} = 18$

18 cm^3

ResultsPlus
Examiner Comments

This response scores zero marks. The candidate has shown some working, but they have chosen to divide 54 by three instead of two. The final answer of 18 is incorrect and there is no error carried forward.

Question 9(b)ii

Many candidates could state that cube A takes less time to become colourless (than cube B). Explaining the reason for this was more challenging for some candidates, but a simple answer that cube A is smaller, or cube B is bigger was sufficient to score the second mark. Some responses showed confusion with surface areas and volumes. Relatively few candidates referred to surface area to volume ratios. Only a very small proportion of candidates made reference to cube A having a shorter diffusion distance.

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

(2)

- 90 seconds 170 − 260

= −90

ResultsPlus
Examiner Comments

No marks are awarded for this answer. The data quoted does not give any indication that cube A takes less time to become colourless than cube B.

ResultsPlus
Examiner Tip

Always support data from graphs and tables with a statement that explains what it means. Just quoting values is insufficient to score marks in a question that requires an explanation.

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

(2)

~~300 - 170 = 330 seconds it took to become~~ ~~colourless~~ B took longer by 90 Seconds to become colourless Compared to A.

ResultsPlus
Examiner Comments

This response scores one mark. The candidate has identified that cube B took longer to become colourless. However, no reasoning has been given, such as cube B has a larger volume or a smaller surface area to volume ratio.

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

(2)

in cube A the time taken in seconds is to become colourless is much shorter due to the smaller volume whereas because the volume is much higher in the cube B C it takes more time to become colourless.

ResultsPlus
Examiner Comments

This response scores both marks. Cube A has been identified as taking less time to become colourless than B because A has a smaller volume. The comments about cube C are correct, but they can be ignored since the question does not ask about that cube.

ResultsPlus
Examiner Tip

Try to avoid introducing unnecessary information into your answers. This question asks about cube A and cube B, so there is no need to write about cube C.

Question 9(c)

This extended open response question asked candidates to devise a plan to investigate the effect of different concentrations of kiwi fruit juice on the breakdown of set agar. The question stimulus gave useful information that could be used as a framework to devise the plan. Candidates were asked to include measurements that need to be taken and variables that need to be controlled. It was surprising that many candidates failed to discuss repeating steps of their plan with different concentrations of kiwi fruit juice, which limited them to a mark in level 1. In general, candidates found it easier to identify variables that need to be controlled, than measurements to be taken. Some indication of measuring the area of liquid agar, or the volume of liquid agar was seen in many responses, but some candidates also referred to measuring the time taken for liquid agar to break down (with different kiwi juice concentrations).

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 19.

Your plan should include:

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

(6)

Controlled variables include how much kiwi juice

measurements to be taken are how much agar is broken down as well as the concentration

Change the concentration of juice

ResultsPlus
Examiner Comments

A basic attempt has been made to answer the question. 'How much' kiwi juice and 'how much' agar is broken down are not creditworthy points. There needs to be a reference to volume or area. The reference to changing the concentration of kiwi juice is sufficient to award a mark at the bottom of level 1.

ResultsPlus
Examiner Tip

Remember that if you are writing about variables to control or measurements to be taken, you should state quantities, such as area, mass or volume.

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 19.

Your plan should include:

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

(6)

You need to measure the ~~area~~ liquid agar area ~~containing~~ containing liquid Agar. You need to keep the amount of kiwi fruit juice controlled, also you need to keep the amount of time waited the same.

ResultsPlus
Examiner Comments

This plan includes a relevant point about measuring the area of liquid agar, so it is in level 1. One relevant variable has been given. Amount of kiwi juice is not creditworthy, it must be volume (or mass). However, the amount of time can be accepted as a variable. Therefore, a mark at the top of level 1 can be awarded.

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 19.

Your plan should include:

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

(6)

- start off with 4 petri dishes
- pour liquid agar into dish and set
- make a well for the juices
- in each dish add a different concentration of kiwi fruit juice
- time for 30 minutes and look at results
- make sure to keep the same amount of liquid in each dish, ~~and~~ to keep all in the same environment so they aren't effected by e.g. sunlight and make that you time them all for the same amount.

ResultsPlus
Examiner Comments

This plan includes several relevant points, including the use of different kiwi juice concentrations. This puts the response into level 2. Only one variable has been controlled - the time (the agar plates are left for), so the response is at the bottom of level 2. To get four marks, a second relevant variable needs to be stated. No measurements are planned, such as finding the area of liquid agar, so this is not a level 3 response.

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 19.

Your plan should include:

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

(6)

To investigte the effect of different concention of kiwi fruit juice breaks down set agar we would first need to repeat the origional experiment and measure the area conteing liquid agar to find our zone of inhabition. We would do this by finding the radius of the zone then doing πr^2 to find the area of the zone of inhabition. Now we have our control We can now repete our experiment but Now with a higher concentration of kiwi juice. Variables to control here would be the to make sure its the same volume of juice and the well is also the same size and shape. We can repete this experiment and keep chaing the concentration of the juice to see what concentration is best a breaking agar down into a liquid.

ResultsPlus
Examiner Comments

This is an appropriate plan to investigate the break down of set agar. The use of different kiwi juice concentrations is planned and the area containing liquid agar is to be calculated using πr 2. This puts the response into level 3 and the control of appropriate variables puts the response at the top of the level (six marks). Without the control of relevant variables, the response would only score five marks.

Question 10(a)ii

This question was linked to a diagram showing one of Mendel's experiments on the inheritance of pea shape. Candidates had to use the information provided to state a conclusion that could be made about one of the characteristics. A simple answer that the characteristic is recessive was required. References to the round pea characteristic being dominant was ignored because the question asked about the wrinkled pea.

(ii) Figure 20 shows one of Mendel's experiments on the inheritance of pea shape.

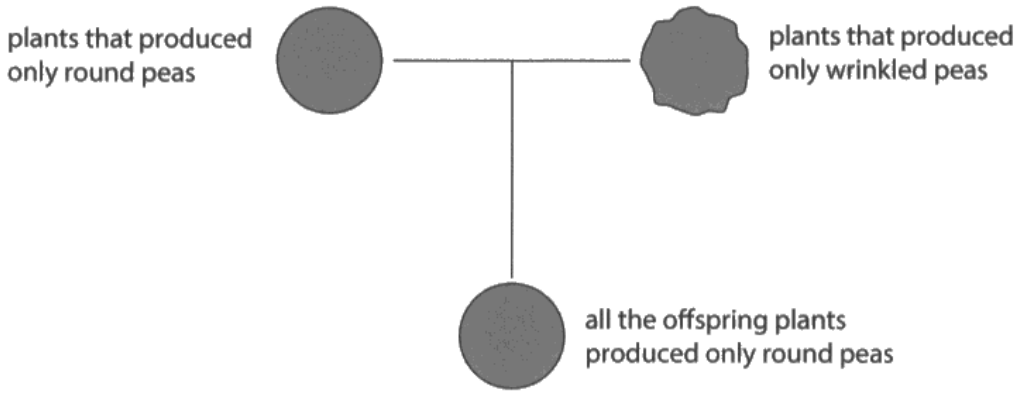


Figure 20

State the conclusion that Mendel was able to make about the wrinkled pea characteristic.

(1)

the round pea is the ~~dominant~~ dominant characteristic.

ResultsPlus
Examiner Comments

This response is factually correct, but it does not answer the question, which is about the wrinkled pea characteristic.

(ii) Figure 20 shows one of Mendel's experiments on the inheritance of pea shape.

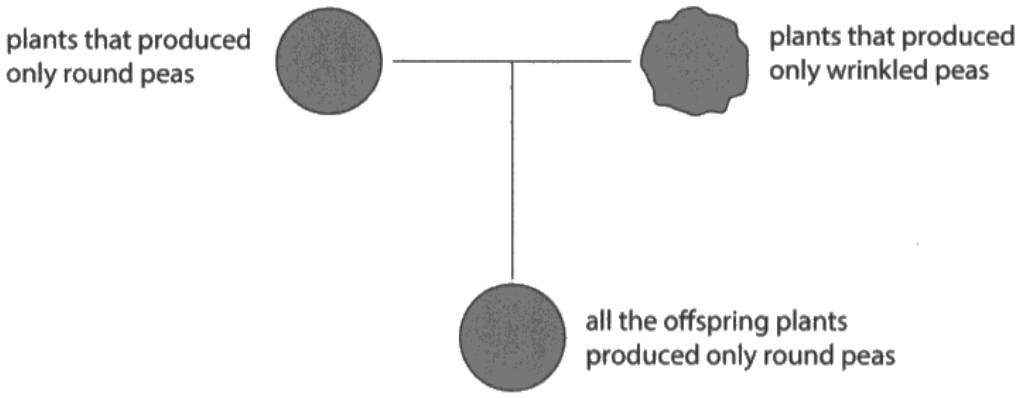


Figure 20

State the conclusion that Mendel was able to make about the wrinkled pea characteristic.

(1)

It was a recessive trait.

ResultsPlus
Examiner Comments

This response refers to the wrinkled pea characteristic and scores the mark for 'recessive trait'.

Question 10(b)i

Many candidates answered the question correctly and scored full marks. However, it was not uncommon to see confusion with the letters used to represent the gametes, so the first point on the mark scheme was often not awarded. It is important that candidates learn the meaning of terms such as heterozygous and homozygous and use the information provided in a question to apply their knowledge and understanding.

Most candidates completed the Punnett square correctly once they had chosen two sets of gametes. They could interpret the results to give an appropriate percentage probability of producing a plant with wrinkled peas based on the completed Punnett square.

(b) A scientist crossed two pea plants that were heterozygous for pea shape.

(i) Complete the Punnett square to show the inheritance of the alleles for pea shape and the percentage probability of producing a plant with wrinkled peas.

Use the letter R for the allele for round shape.

Use the letter r for the allele for wrinkled shape.

(3)

		heterozygous	
		R	R
heterozygous	r	Rr	Rr
	r	Rr	Rr

percentage probability of producing a plant with wrinkled peas 50 %

ResultsPlus Examiner Comments

Both sets of gametes are incorrect. However, the Punnett square has been completed correctly for these gametes, so one mark can be awarded for this skill. The percentage probability of producing a plant with wrinkled peas is 0% for this Punnett square, so no additional credit has been gained. The points on the mark scheme are awarded independently, so had the candidate written 25%, this would have scored one mark, regardless of the Punnett square.

ResultsPlus Examiner Tip

Check that you understand the terms used in genetics, such as heterozygous, homozygous, dominant and recessive.

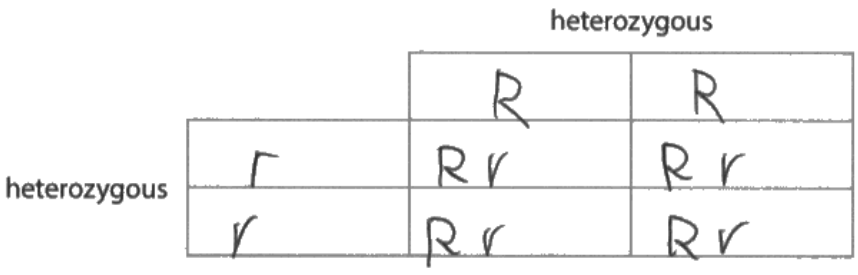
(b) A scientist crossed two pea plants that were heterozygous for pea shape.

(i) Complete the Punnett square to show the inheritance of the alleles for pea shape and the percentage probability of producing a plant with wrinkled peas.

Use the letter R for the allele for round shape.

Use the letter r for the allele for wrinkled shape.

(3)



percentage probability of producing a plant with wrinkled peas 0 %

ResultsPlus Examiner Comments

Both sets of gametes are incorrect, but the Punnett square has been completed correctly for these gametes, so one mark can be awarded. The percentage probability of producing a plant with wrinkled peas is correct for this Punnett square, so a second mark can be awarded.

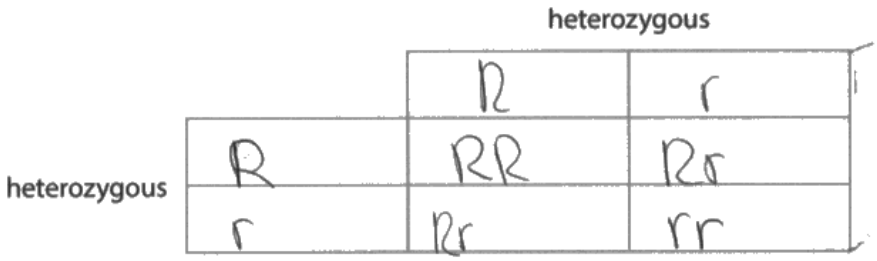
(b) A scientist crossed two pea plants that were heterozygous for pea shape.

(i) Complete the Punnett square to show the inheritance of the alleles for pea shape and the percentage probability of producing a plant with wrinkled peas.

Use the letter R for the allele for round shape.

Use the letter r for the allele for wrinkled shape.

(3)



percentage probability of producing a plant with wrinkled peas 25 %

ResultsPlus Examiner Comments

All aspects of the question have been completed correctly, so this response scores full marks.

Question 10(b)ii

The majority of candidates could suggest at least one way of controlling the environmental conditions to grow plants in. References to growing the plants in a greenhouse, and controlling factors such as temperature, light intensity and water were common creditworthy responses.

(ii) Plants used to study inheritance are grown in controlled environmental conditions.

Suggest **two** ways of controlling these environmental conditions.

(2)

1 making the plants ~~adap~~ adapt to new conditions in the ~~en~~environment.

2 Give it the right amount of sunlight it might need for photosynthesis to happen.

ResultsPlus
Examiner Comments

The first point is not relevant to the question. The second point implies that light needs to be at an optimum level for photosynthesis to take place, so this can be credited.

(ii) Plants used to study inheritance are grown in controlled environmental conditions.

Suggest **two** ways of controlling these environmental conditions.

(2)

1 heat lamps, allowing control over the temperature.

2 water, allowing control over precipitation.

These are typical responses that scored both marks. References to controlling carbon dioxide concentration, controlling soil conditions and eliminating organisms were seen far less frequently.

Question 10(c)i

This question assessed knowledge and understanding of asexual and sexual reproduction in a different way. Most candidates answered the question as instructed by writing the words 'yes' or 'no' in each box. However, it was not uncommon to see a tick in just one box in each row of the table, with candidates perhaps making the assumption that a tick is the same as 'yes'. No credit was given for these responses, but ticks **and** crosses in the correct place were awarded the marks.

(c) Some plants can reproduce asexually and sexually.

(i) Complete the table by writing **yes** or **no** in **each** box to show the features of asexual and sexual reproduction.

(3)

feature	asexual reproduction	sexual reproduction
produce genetically identical offspring	✓	
requires male and female gametes		✓
rapid reproductive cycle		✓

ResultsPlus
Examiner Comments

This response scores zero marks. The instruction in the question is to write 'yes' or 'no' in each box in the table. Ticks were accepted as an alternative to yes, but no credit was given if boxes were left blank.

ResultsPlus
Examiner Tip

Always follow the instructions given in the stem of the question. The key words to use are emboldened in the stem of this question.

(c) Some plants can reproduce asexually and sexually.

(i) Complete the table by writing **yes** or **no** in **each** box to show the features of asexual and sexual reproduction.

(3)

feature	asexual reproduction	sexual reproduction
produce genetically identical offspring	Y	N
requires male and female gametes	Y	Y
rapid reproductive cycle	Y	N

ResultsPlus
Examiner Comments

Y and N were acceptable alternatives to 'yes' and 'no'. Y has been overwritten with N in the third row of the table. The second row of the table is incorrect, so this answer scores two marks.

(c) Some plants can reproduce asexually and sexually.

(i) Complete the table by writing **yes** or **no** in **each** box to show the features of asexual and sexual reproduction.

(3)

feature	asexual reproduction	sexual reproduction
produce genetically identical offspring	yes	NO
requires male and female gametes	NO	yes
rapid reproductive cycle	yes	NO

ResultsPlus
Examiner Comments

This response has been completed as expected and scores full marks.

Question 10(c)ii

Many candidates struggled with this last item on the paper about the meaning of a diploid nucleus. A reference to chromosomes was necessary for an answer to be creditable, so a straightforward response such as chromosomes are in pairs or a diploid nucleus has a full set of chromosomes or 46 chromosomes scored the mark. Many candidates confused their answers by referring to haploid nuclei.

(ii) A zygote with a diploid nucleus is formed by sexual reproduction.

State what is meant by a diploid nucleus.

(1)

a nucleus with all the chromosones.

ResultsPlus
Examiner Comments

'All the chromosomes' is too vague. There needs to be a specific reference to a diploid nucleus having two copies or two sets of each chromosome, or a full set of chromosomes. Having 46 chromosomes or 23 pairs of chromosomes were common creditworthy responses.

(ii) A zygote with a diploid nucleus is formed by sexual reproduction.

State what is meant by a diploid nucleus.

(1)

This means the nucleus has a full set of 46 chromosomes (23 pairs.)

ResultsPlus
Examiner Comments

This is a typical response that scored the mark.

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.