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June 2019

GCSE Biology 1BI0 1F

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June 2019
Publications Code 1BI0_1F_1906_ER

Introduction

Paper 1BI0_1F is the first of two papers taken as part of the GCSE (9-1) Biology qualification.

The paper consists of a total of 100 marks and it is assessed by a mixture of different question styles, including multiple-choice questions, short answer questions, calculations and extended open-response questions. Candidates should answer all questions in a time of 1 hour 45 minutes. The extended open-response questions are identified by an asterisk (*) in the question paper to indicate that marks are also awarded for the ability to structure a response logically.

In addition, the new GCSE (9-1) Biology qualification assesses practical knowledge and mathematical skills, the requirements of which are given in the specification. Furthermore, there are eight core practicals which candidates must complete prior to the examination, as aspects of working scientifically are assessed in questions throughout the paper.

Paper 1BI0_1F assesses content from Topics 1-5. In 2019 this included questions on reproduction and inheritance, Punnett squares, mitosis and meiosis, pathogens, genetically modified crops, enzyme activity, DNA, antibiotic resistance and the eye. The extended open-response questions focused on the energy content of foods and evidence for human evolution.

Questions assessing practical skills included writing a method, using a microscope, controlling variables, aseptic techniques and extracting DNA from fruit. Mathematical skills included interpreting graphs, calculating the area of a zone of inhibition, converting units, calculating a mean and using significant figures.

Question 1 (a) (i)

This question asked candidates to name the type of reproduction involving flowers. The vast majority of candidates were unable to give the correct response of sexual (reproduction). A significant number stated that asexual reproduction was involved.

Question 1 (b) (i) - (ii)

Q01(b)(i)

In this question candidates had to complete a Punnett square to show the genotypes of the offspring. A large proportion of candidates were able to do this successfully. Candidates were not penalised if they wrote the alleles as rR instead of the more conventional Rr.

Q01(b)(ii)

This question required candidates to interpret the genotypes in their Punnett square from Q01(b)(i). It was surprising to see that a significant number of candidates who gained the mark for Q01(b)(i) did not give the correct answer of 100% here.

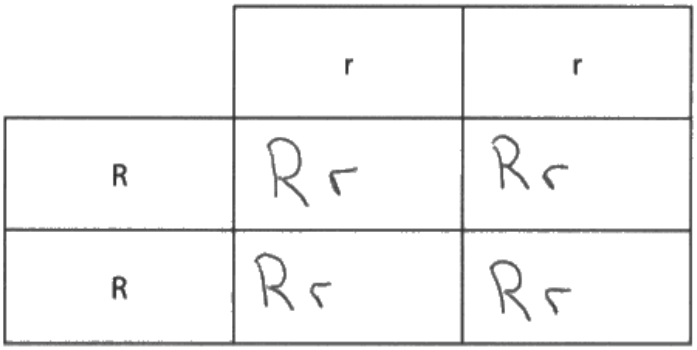
(b) The seeds produced by this pea plant can be round or wrinkled.

The allele for round seeds (R) is dominant to the allele for wrinkled seeds (r).

(i) A homozygous dominant round seeded plant was crossed with a homozygous recessive wrinkled seeded plant.

Complete the Punnett square to show the genotypes of the offspring.

(1)



(ii) State the percentage of the offspring that will produce round seeds.

(1)

percentage = 50 %

ResultsPlus
Examiner Comments

Q01(b)(i) In this answer the candidate has completed the Punnett square correctly and scores the mark.

Q01(b)(ii) The candidate has interpreted the genotypes incorrectly, so 50% does not gain any credit.

ResultsPlus
Examiner Tip

Always read the question carefully. This question tells you that the allele for round seeds (R) is dominant to the allele for wrinkled seeds (r). Each offspring genotype has the dominant allele, so 100% of the offspring will produce round seeds.

(b) The seeds produced by this pea plant can be round or wrinkled.

The allele for round seeds (R) is dominant to the allele for wrinkled seeds (r).

(i) A homozygous dominant round seeded plant was crossed with a homozygous recessive wrinkled seeded plant.

Complete the Punnett square to show the genotypes of the offspring.

(1)

	r	r
R	Rr	rr
R	Rr	rr

(ii) State the percentage of the offspring that will produce round seeds.

(1)

percentage = 50 %

ResultsPlus
Examiner Comments

The Punnett square has not been completed correctly for Q01(b)(i). However, an error can be carried forward, so this candidate has given a correct percentage of offspring that will produce round seeds from their Punnett square. 1 mark has been awarded.

Question 1 (c)

In this question candidates were asked to describe how a person inherits the blood group AB. Many candidates knew that A has to be inherited from one parent and B from the other parent. Candidates did not need to use the term allele, although some candidates demonstrated their knowledge by using the symbols I^A and I^B. Some candidates drew Punnett squares and these often helped them to gain credit for their answers.

Few candidates stated that the alleles for A and B are codominant.

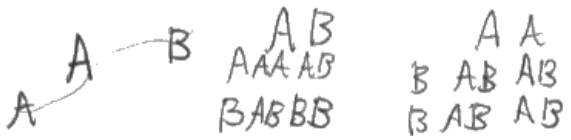
(c) The blood group of a person is determined by their genotype.

Describe how a person inherits the blood group AB.

(2)

The Parents must have blood type A and B as the genotype's are co-dominant and so create blood type AB rather than just A or B. The parents could be a homozygous A and B resulting in 100% chance of a genotype ~~A B~~ AB

(Total for Question 1 = 7 marks)



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Examiner Comments

This is a detailed description of how a person inherits blood group AB. The candidate knows that A and B are codominant. They also know that one parent could be homozygous for allele A and the other parent homozygous for allele B, resulting in a 100% chance of the offspring being AB. There is also Punnett square to show this scenario. This response scored 2 marks.

Make sure that you learn how your blood group is inherited.

Question 2 (a) (i)

Candidates were asked to explain why the tip of roots were used to investigate mitosis. Many responses referred to mitosis in the root tip, but this fact was given in the stem of the question. The term meristem was seen infrequently, but many candidates knew that growth occurs in root tips. There was some misinterpretation of the question, with a number of candidates describing the function of roots in terms of absorbing water and mineral ions.

2 (a) A student investigated mitosis in the root tip of a garlic plant.

(i) Explain why the student used the tip of the root.

(2)

the tip of the root will have been used as that is where the meristem is found. Mitosis then occurs during growth, repair or asexual reproduction (in this case growth).

ResultsPlus
Examiner Comments

This is a good answer which scores both marking points. The candidate has referred to the root tip containing the meristem and growth occurring.

The student used the tip of the root because that is where there will be growth and therefore a place where mitosis will occur.

ResultsPlus
Examiner Comments

This answer scores 1 mark for stating that growth occurs at the root tip. The reference to mitosis does not gain any credit.

Question 2 (a) (ii)

This question was based on a core practical, requiring knowledge of how to use a microscope to obtain a clear image of cells. Some candidates carefully described how to prepare a root tip squash, but this was not asked for in the question.

Candidates with a good knowledge of the parts of a light microscope and how a light microscope works were able to score two marks. There were many muddled references to eyepiece and objective lenses which could not be awarded a mark. References to zooming in and out were not credited, but different ways of describing how to focus on the cells were accepted, such as moving the stage up and down, or turning the focusing wheel.

(ii) The student squashed the root tip on a microscope slide to spread out the cells.

The slide was placed on the stage of a microscope.

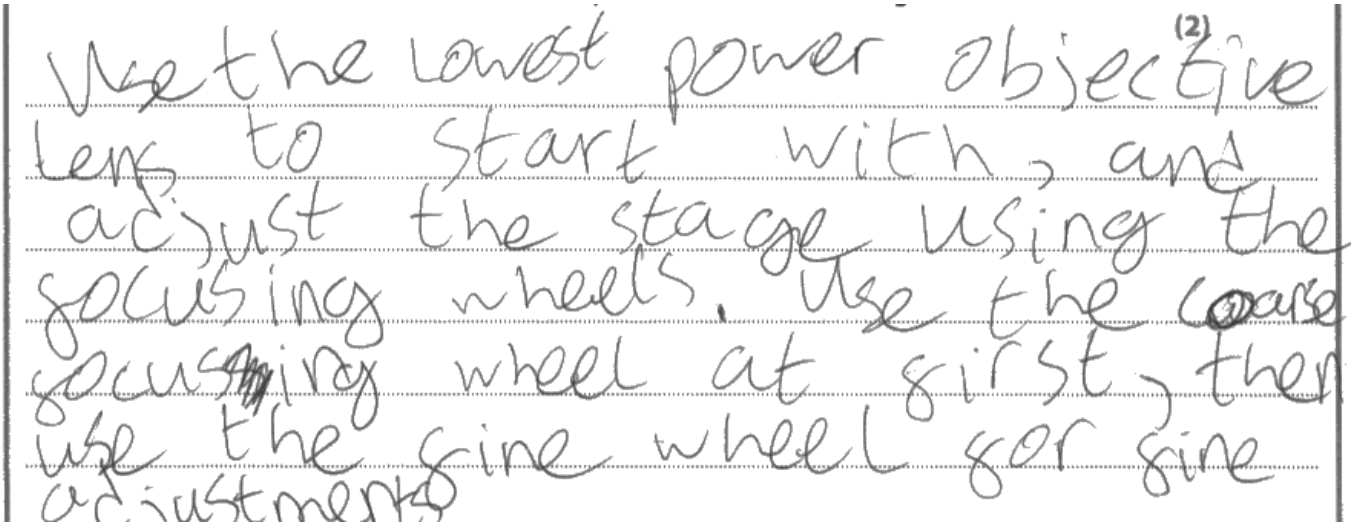
Describe how to use the microscope to obtain a clear image of the cells.

(2)

Start off on the lowest powered magnification and then by using the focus wheel, focus look into the eyepeice and focuss until clear image of the cells is acheived.

ResultsPlus
Examiner Comments

This answer scores full marks. The candidate has referred to using the focusing wheel and looking into the eyepiece (lens). The reference to lowest powered magnification does not gain any credit - the answer should refer to lowest objective lens.



ResultsPlus
Examiner Comments

This candidate has a good understanding of how to use a microscope to obtain a clear image of cells. The answer scores full marks, even though there is no reference to switching the lamp on.

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Examiner Tip

Check that you know the names of the parts of a microscope and how they are used to obtain a clear image of biological specimens.

Question 2 (a) (iii)

This question was answered very well. The question was based on a core practical and a large proportion of candidates gave the correct answer of use a stain, or they gave iodine (solution) as an acceptable example of a stain.

(iii) The student could not see the chromosomes inside the cells.

State what can be added to the root tip squash to make the chromosomes visible.

(1)

a dye which sticks to the chromosomes

ResultsPlus
Examiner Comments

Add a dye is an acceptable alternative to stain for this mark.

They can add a solution to make it clearer.

ResultsPlus
Examiner Comments

This answer does not score a mark because the candidate has not named the type of solution that should be added to make the chromosomes visible.

ResultsPlus
Examiner Tip

Always try to give a specific answer to a question. Just writing 'solution' is too vague.

Question 2 (b) (ii)

In this question candidates were asked to describe what is happening in a photograph showing a stage of mitosis. They were required to use their knowledge of mitosis to describe anaphase. The question was attempted well and it was encouraging to see that many candidates started by correctly listing the initial letters of the different stages of mitosis in order to organise their thoughts. However, there was often a great deal of confusion over the names of structures, what was moving and how it was moving. A small proportion of candidates wrote very succinct answers that scored all three marking points.

(ii) Describe what is happening in Figure 2.

(3)

Figure ~~2~~ 1 is the stage anaphase in mitosis – the spindal fibres are pulling the arms of the x-shaped chromosomes to opposite ends of the cells.

ResultsPlus
Examiner Comments

This is a good answer that covers all three marking points. The candidate has described spindle fibres pulling chromosomes to opposite ends of the cell.

Question 3 (b) (i)

This question required candidates to describe the trend in a graph and it was answered very successfully. The basic idea of an increase, then a decrease scored 2 marks. Correct references to data on the graph gave access to another marking point, such as 2011 being the year when the number of cases of chlamydia peaks.

(b) Figure 3 shows the number of cases of chlamydia in the United Kingdom per 100 000 people between 1996 and 2013.

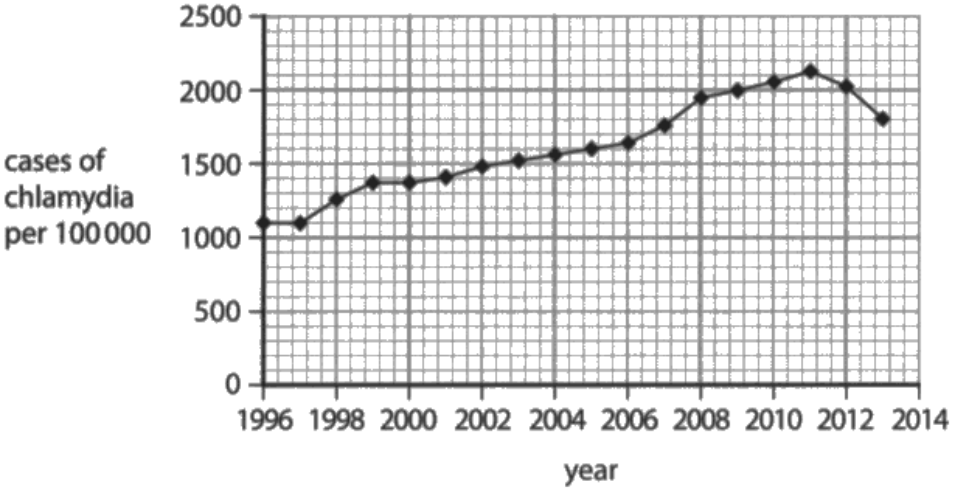


Figure 3

(i) Describe the trend in the number of cases of chlamydia between 1996 and 2013.

from 1996 to 2011 (2)

As the number of years increases, the cases of chlamydia also increases. After 2011, the number of cases started decreasing until 2013. The number of cases from year 1996 to 1997 was the same.

ResultsPlus
Examiner Comments

This answer describes the trends in detail and scores full marks. The candidate has referred to increases and decreases in the number of cases of chlamydia, with specific references to dates. In addition, the candidate has identified an initial period when the number of cases of chlamydia stays constant.

ResultsPlus
Examiner Tip

Always double check that the data you are using from a graph is accurate.

(i) Describe the trend in the number of cases of chlamydia between 1996 and 2013.

(2)

Between 1996 and 2013, the number of cases rose steadily up until 2011 at a peak of 2100 cases before ~~drop~~ dropping to 1800 cases in 2013.

ResultsPlus
Examiner Comments

In this response the candidate has correctly stated the number of cases of chlamydia at two particular points in the graph. The answer scores full marks.

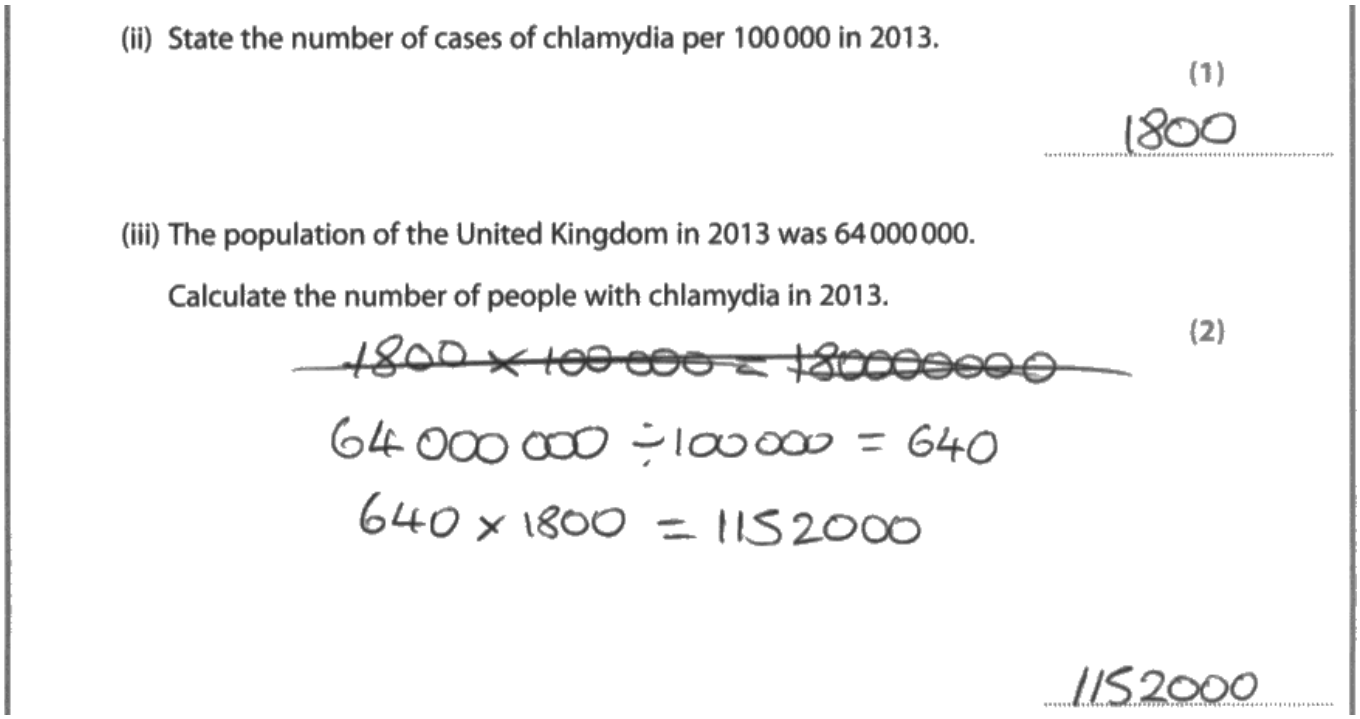
Question 3 (b) (ii) - (iii)

Q03(b)(ii)

In this question candidates had to read a value from a graph. The majority were able to do this accurately.

Q03(b)(iii)

This question examined maths skills. Candidates across the ability range found the question challenging, with many leaving it blank. Instead of dividing 64 000 000 by 100 000 for the first marking point, it was not uncommon to see 64 000 000 divided by 1800, giving the incorrect answer of 35 555.6.



(ii) State the number of cases of chlamydia per 100 000 in 2013.

(1)

1800

(iii) The population of the United Kingdom in 2013 was 64 000 000.

Calculate the number of people with chlamydia in 2013.

(2)

~~1800 × 100 000 = 180000000~~

64 000 000 ÷ 100 000 = 640

640 × 1800 = 1152000

1152000

ResultsPlus
Examiner Comments

This answer scores the full 3 marks for Q03(b)(ii) and Q03(b)(iii). The candidate's working is set out very clearly.

ResultsPlus
Examiner Tip

The number of cases of a disease is usually given per 100 000 of the population of a country.

Divide the population by 100 000, then multiply your answer by the number of cases per 100 000.

Question 4 (a)

This question asked candidates to explain how a specific structure in a leaf is involved in defence against pathogens. Many candidates were able to correctly identify structure Z as the waxy cuticle, although a significant number thought it was the cell wall or cell membrane.

The explanation of the role of the waxy cuticle in this context was awarded much less frequently, with many candidates suggesting that structure Z is sticky or contains toxins, instead of giving the straightforward answer that structure Z prevents pathogens entering the leaf.

4 (a) Figure 4 shows the structures in a leaf.

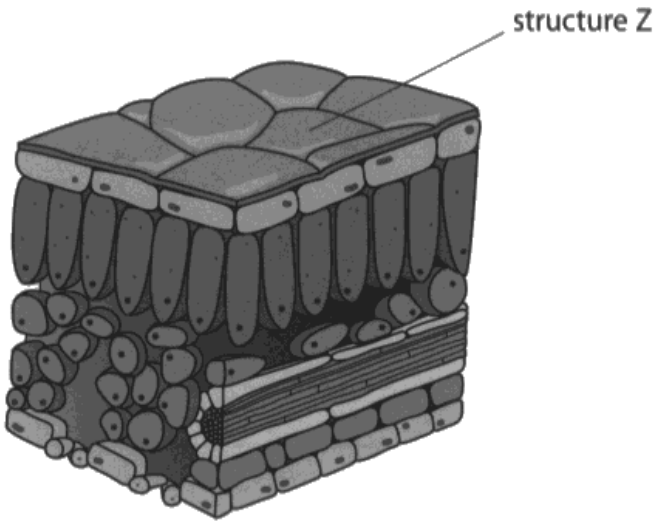


Figure 4

Explain how structure Z is involved in defence against pathogens.

(2)

(Z)

Structure Z has a thick waxy cuticle so it prevents lots of pathogens • from entering the cell • and pestisites.

ResultsPlus
Examiner Comments

This answer scores full marks for correctly identifying structure Z as the waxy cuticle and explaining that it prevents pathogens from entering.

Structure Z is a cell wall, the cell wall stops pathogens from getting inside the leaf and harming it.

ResultsPlus
Examiner Comments

In this response the candidate has identified structure Z incorrectly. However, they understand that structure Z prevents pathogens entering the leaf, so this point scores 1 mark.

ResultsPlus
Examiner Tip

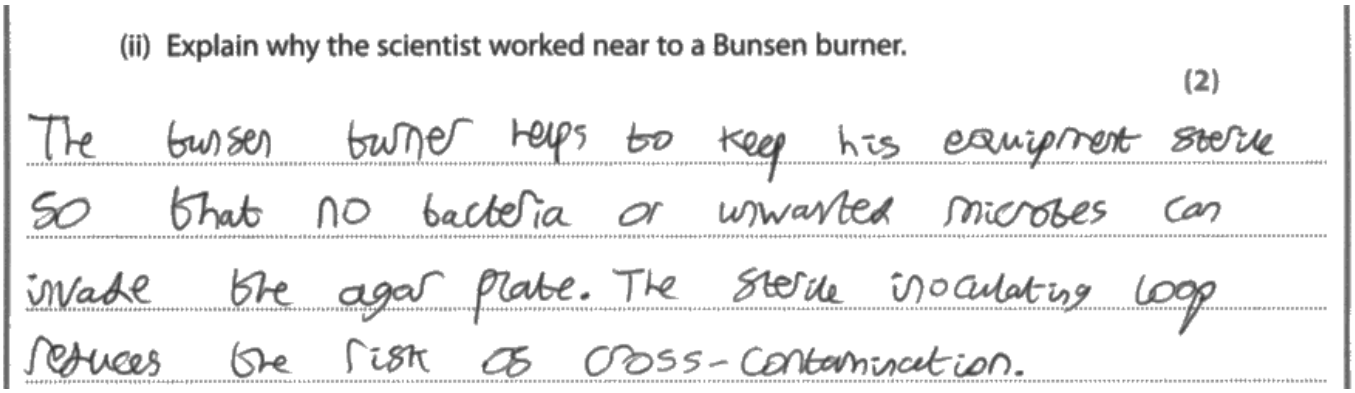
Check that you know how plants protect themselves against attack from pests and pathogens.

In this question you are being asked about a physical barrier.

Question 4 (b) (ii)

This question assessed practical skills related to aseptic techniques and culturing microorganisms. The few candidates who seemed to have first-hand experience of the procedures tended to score a mark for explaining that the Bunsen burner can be used to sterilise the inoculating loop/spreader. However, most candidates were unable to go on to explain that this prevents contamination (of the agar plate). Only a tiny proportion of candidates were aware that a Bunsen burner creates a convection current, which prevents microorganisms from falling onto the agar plate.

A large proportion of candidates thought that the Bunsen burner was a source of heat that would speed up bacterial growth or that the Bunsen burner would provide a sterile area to work in.



(ii) Explain why the scientist worked near to a Bunsen burner.

(2)

The bunsen burner helps to keep his equipment sterile so that no bacteria or unwanted microbes can invade the agar plate. The steride inoculating loop reduces the risk of cross-contamination.

ResultsPlus
Examiner Comments

This is good answer that shows a good understanding of the procedure and scores the full 2 marks. The candidate has explained that the Bunsen burner will sterilise the inoculating loop which then prevents cross-contamination.

The scientist burned the inoculating loop in the bunsen burner to kill any kind of microorganism on it, if there is any. He was near to a bunsen burner as the area around it is kept sterile. And it is best to work under sterile conditions.

ResultsPlus
Examiner Comments

This response scores 1 mark for the idea of killing microorganisms on the inoculating loop. However, the reason for doing this has not been explained. Keeping a sterile area around the Bunsen burner is not a creditworthy point.

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Examiner Tip

Make sure that you learn about aseptic techniques used in culturing microorganisms in the laboratory.

Question 4 (c) (i)

This question required a straightforward calculation of the area of a circle by substituting numbers into an equation. Most candidates were able to substitute into the equation correctly and calculate the area of the zone of inhibition for chemical A.

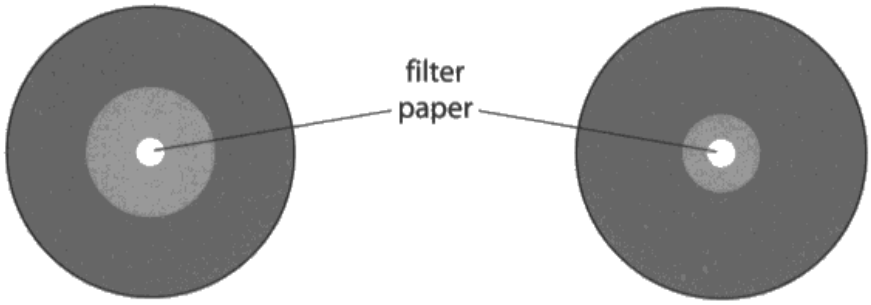
A small number of candidates gave incorrect answers because they calculated the area of the zone of inhibition for chemical B, or used half the radius, as they confused radius and diameter, or squared 3.14 instead of 12.

(c) A scientist spread bacteria onto the surface of two agar plates.

A filter paper disc was placed in the centre of each plate.

Each filter paper disc had been soaked in a different chemical extracted from plants.

The results are shown in Figure 6.



chemical A	chemical B
radius of zone of inhibition = 12 mm	radius of zone of inhibition = 8 mm

Figure 6

(i) The area of a circle is calculated using πr^2.

Calculate the area of the zone of inhibition for chemical A.

Use $\pi = 3.14$

$\pi \times 12^2 = 452.3893421$ (2)

452.4 mm²

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Examiner Comments

In this question, the value of π is given as 3.14, which gives an answer of 452.16. In this example the candidate has used the key for π on their calculator and has given an answer to one decimal place. This still scores the full 2 marks.

Question 4 (c) (ii)

In this question candidates' practical skills were assessed by asking them about variables that would need to be controlled. Candidates found the question accessible and good proportion of them scored 2 marks. However, many candidates were not awarded the second marking point because they referred to amount of chemical instead of the volume of chemical.

(ii) The scientist concluded that chemical A was more effective than chemical B at killing bacteria.

Give **two** variables the scientist needed to control to make this conclusion valid.

(2)

1 Same sized discs

2 Same amount of chemical used

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Examiner Comments

This answer scores a mark for same size (filter paper) discs. Same amount of chemical does not score a mark.

ResultsPlus
Examiner Tip

Always refer to the volume of a chemical or a solution, not the amount of it.

Question 4 (d)

In this question candidates were told that some crop plants have been genetically engineered to produce toxic chemicals. Candidates were asked to explain one advantage of producing these genetically engineered crop plants.

1 mark could be awarded for a reference to the toxic chemicals killing insects, pests or pathogens. Vague descriptions of keeping pests away from the crop, or stopping pests eating the crop, did not gain the mark. Many candidates who did score this mark went on to gain a second mark for explaining the consequence of pests being killed and not feeding on the crop.

Some candidates misunderstood the question and referred to general advantages of producing genetically engineered crops.

(d) Some crop plants have been genetically engineered to produce toxic chemicals in their leaves.

Explain **one** advantage of producing these genetically modified crop plants.

(2)

They would not be getting eaten by insects so ~~that~~ the overall yield will increase. The insects would die from consuming the toxin.

ResultsPlus
Examiner Comments

In this answer the candidate has correctly explained that the toxin will kill insects, which will then result in an increased crop yield. 2 marks have been awarded.

Producing these genetically modified crop plants will increas their survival time because they have been changed slightly.

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Examiner Comments

In this question candidates are expected to apply their knowledge of how plants defend themselves against attack from pests and pathogens by producing chemicals.

This response shows that the candidate has misunderstood the question and their answer is not worthy of credit.

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Examiner Tip

Always look for clues in the question that will enable you to write a relevant answer. The clue in this question is the reference to toxic chemicals. So, you should think about how chemicals protect plants against attack from pests and pathogens and what the advantage of this would be.

Question 5 (a) (i)

This question asked candidates to describe the trend in the activity of trypsin at different pH values and to use data from the graph.

Most candidates could access the question and were often awarded a mark for referring to enzyme activity in the correct context and for identifying the optimum pH for trypsin. Two more marks were available for describing that enzyme activity increases from pH 5.8 to pH 8 and that enzyme activity decreases between pH 8 and pH 9.8. These marks were awarded less frequently, often because the values taken from the graph were incorrect.

5 (a) Figure 7 shows the activity of the enzymes pepsin and trypsin at different pH levels.

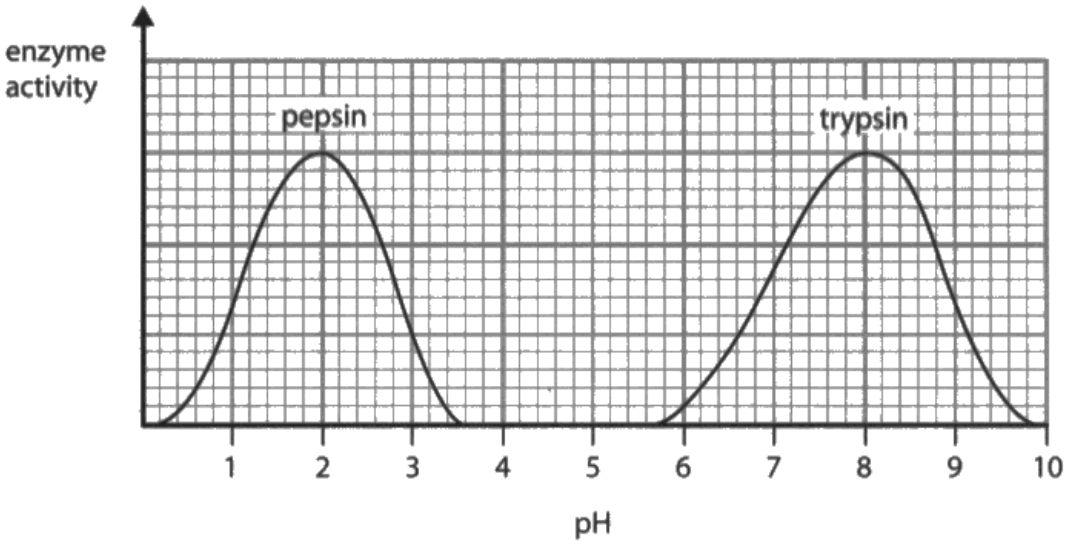

Figure 7

(i) Describe the trend in the graph for the enzyme **trypsin**.

Use data from the graph to support your answer.

(4)

at 6 pH trypsins activity is only starting to rise by the smallest amount but as it gets to 7 it's starts to rise quicker until it hits 8 pH being it's optimum pH for the enzyme. Just as quick as the activity rised it begins to drop aswell and becomes flat at 10

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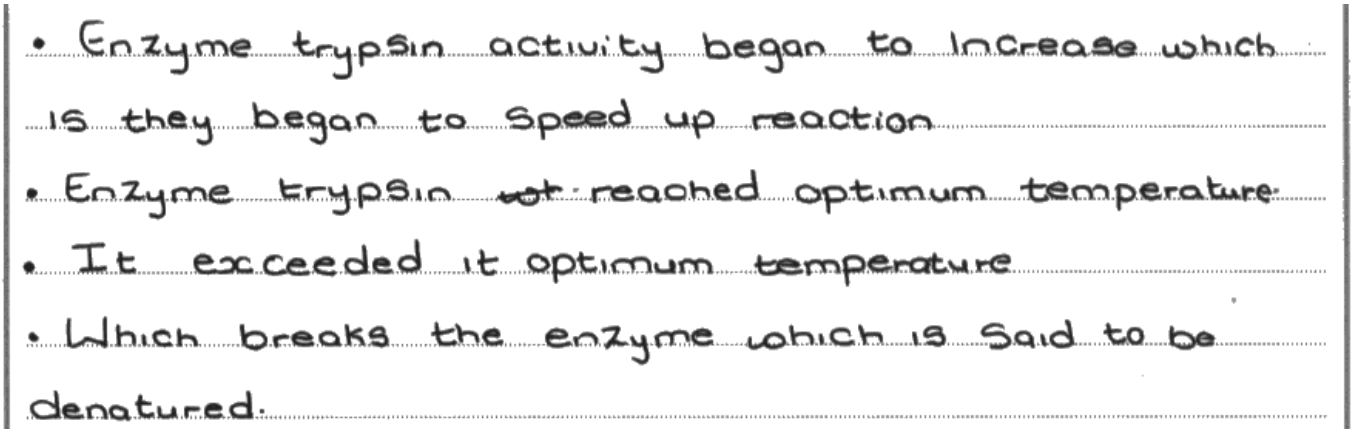
Examiner Comments

This is a detailed description which scores full marks for the question. The candidate has referred to enzyme activity in the correct context. They have stated the pH ranges between which trypsin activity increases and then decreases. The optimum pH for trypsin has also been identified.


• Enzyme trypsin activity began to increase which is they began to speed up reaction
• Enzyme trypsin ~~wt~~ reached optimum temperature
• It exceeded it optimum temperature
• Which breaks the enzyme which is said to be denatured.

ResultsPlus
Examiner Comments

This response just scores 1 mark for the reference to enzyme activity. There are no other creditworthy points. The candidate has also confused pH and temperature when referring to the optimum.

ResultsPlus
Examiner Tip

Always check that you are referring to the correct quantities when using data from a graph. Read the axes carefully so that you link the correct independent and dependent variables together.

Question 5 (a) (ii)

Most candidates could correctly state that the optimum pH for the enzyme pepsin is 2.

Question 5 (a) (iii)

In this question candidates had to describe the conditions in the stomach that allow pepsin to work effectively.

The idea that the stomach conditions are pH 2 or acidic scored 1 mark for many candidates. However, relatively few were awarded the second mark for stating that these conditions are due to hydrochloric acid in the stomach.

Question 5 (c)

This question required candidates to state the products of protein digestion. The correct answer of amino acids was seen infrequently.

(c) State what is produced when proteins are digested.

(1)

glucose .

ResultsPlus
Examiner Comments

The correct answer to this question is amino acids, not glucose.

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Examiner Tip

Check that you know what carbohydrates, proteins and lipids are broken down into when they are digested.

Question 6 (a) (i)

For this question candidates had to interpret a human karyogram and give two reasons why it could not be from a gamete. A mark could be scored by candidates who were able to count all the chromosomes correctly or identify that they are in pairs. Some candidates stated incorrectly that there are 44 chromosomes because they omitted the X and Y chromosomes. A second mark was awarded for a comparative statement about gametes, such as they only have 23 chromosomes. Correct comments about the presence of an X and a Y chromosome were seen infrequently for the third possible marking point.

6 (a) A karyogram is a picture of the chromosomes found in the nucleus of a single cell.

Figure 8 shows a human karyogram.

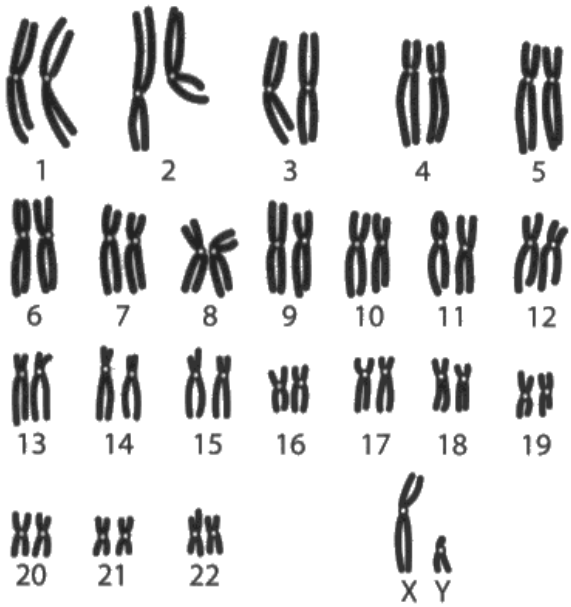

Figure 8

(i) State **two** reasons why this karyogram cannot be from a gamete (sex cell).

(2)

1 because it has both an 'x' and 'y' chromosome and male gametes only carry one gender indentifying chromosome

2 It has 46 chromosomes ~~are~~ gametes only have 23 chromosomes

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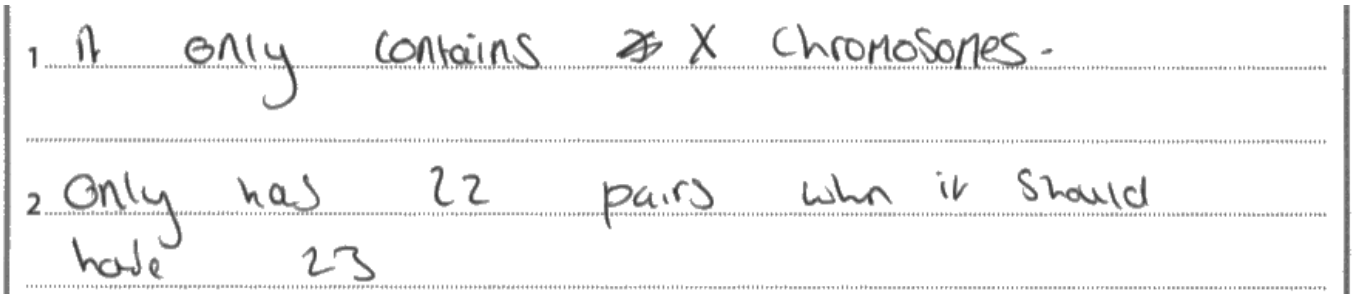
Examiner Comments

This is a good answer which scores full marks for the question. The candidate knows that gametes only contain one sex chromosome and that this karyogram shows two sex chromosomes.

In addition, the candidate knows that this karyogram cannot be from a gamete, because a gamete has just 23 chromosomes, not 23 pairs as shown.



ResultsPlus
Examiner Comments

In this response it is unclear if the candidate is referring to the karyogram or a gamete. However, the comment about X chromosomes is not creditworthy and the reference to the number of pairs of chromosomes is incorrect; 23 pairs of chromosomes are shown in the karyogram, but the candidate appears not to have taken the sex chromosomes into account. 0 marks have been awarded.

ResultsPlus
Examiner Tip

Try to avoid using the word 'it' and be specific about what your answer is referring to.

Always make your answer clear so the examiner can give you credit for relevant points.

Question 6 (a) (ii)

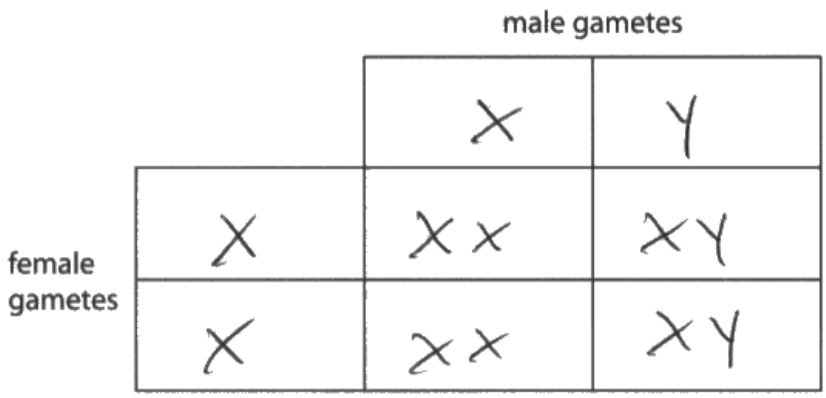
Many candidates were able to use the information in the karyogram to correctly state the gender shown.

Question 6 (a) (iii)

In this question candidates were asked to complete a Punnett square to show how gender is inherited. 1 mark was awarded for filling in the correct gametes and a second mark for completing the offspring genotypes correctly. Candidates who transposed the male and female gametes did not score the first mark, but could gain a mark if the subsequent offspring genotypes were correct.

(iii) Complete the Punnett square to show how gender is inherited.

(2)

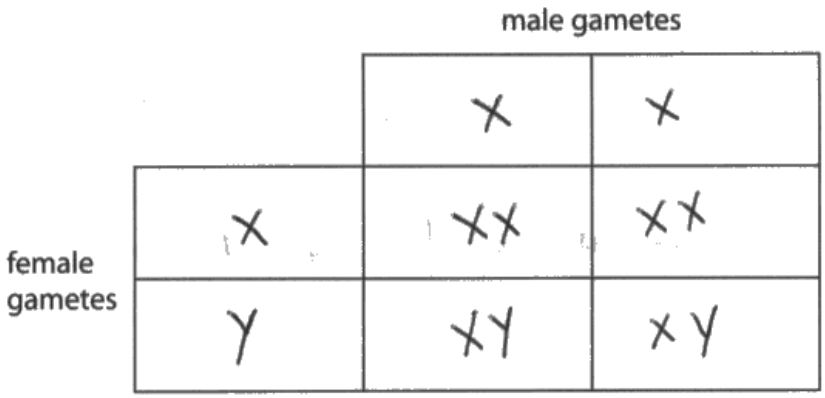


ResultsPlus
Examiner Comments

This Punnett square has been completed correctly and scores full marks for the question.

(iii) Complete the Punnett square to show how gender is inherited.

(2)



ResultsPlus
Examiner Comments

In this response the candidate has confused male and female gametes. However, the Punnett square has been completed correctly from these incorrect gametes so the answer scores 1 mark for an error carried forwards.

ResultsPlus
Examiner Tip

Check that you can describe how the sex of offspring is determined at fertilisation, using genetic diagrams.

Question 6 (a) (iv)

The majority of candidates could correctly state that the probability of a child being male is 0.5 or 50%.

Question 6 (b) (i)

Only a small proportion of candidates could correctly name structure Z as the acrosome.

(b) Figure 9 shows two sperm cells.

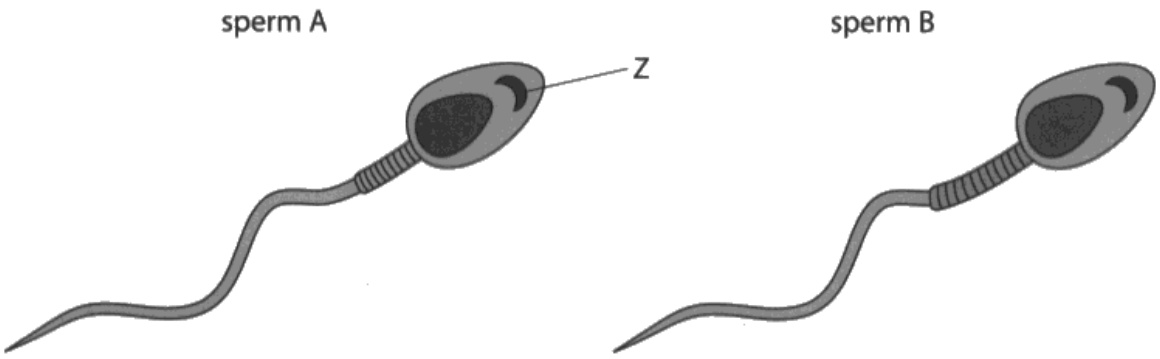


Figure 9

(i) Name structure Z.

(1)

Head of sperm cell

ResultsPlus
Examiner Comments

The correct answer for this question is acrosome. 'Head of sperm cell' is not creditworthy.

ResultsPlus
Examiner Tip

Make sure that you can identify the main parts of specialised cells, such as sperm cells, egg cells and ciliated epithelial cells.

Question 6 (b) (ii)

The diagrams in the stem of the question showed two sperm cells with different size middle pieces. Candidates had to apply their knowledge of the structure of sperm cells to explain why one would be more likely to fertilise an egg than the other if they were both released at the same time. 1 mark was awarded for stating that the middle section contains mitochondria and a second mark for identifying that sperm B would have **more** mitochondria. Candidates who could give the function of mitochondria gained a third mark. Many candidates scored the final available marking point for stating that sperm B would be able to swim faster.

(ii) Sperm B has a larger middle section than sperm A.

Explain why sperm B will be more likely to fertilise an egg than sperm A if they were both released at the same time.

(3)

Because the middle section is where the mitochondria is stored * and if sperm B has more mitochondria then it will have more energy, therefore making it faster at travelling to the egg.

* [which produces energy]

ResultsPlus
Examiner Comments

This is a detailed explanation which scores full marks for the question. The candidate has explained that the middle section contains mitochondria, so sperm B will have more of them. There is a link between mitochondria and energy, and sperm B being able to travel to the egg faster.

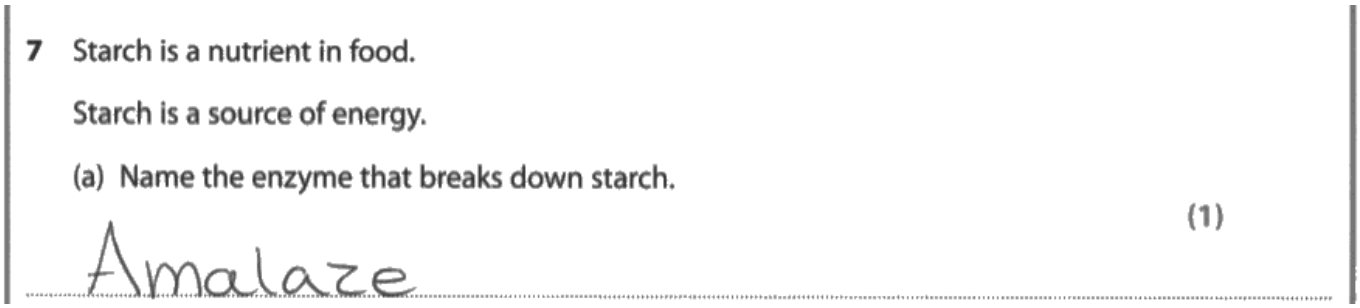
ResultsPlus
Examiner Tip

Remember that energy is **released** as a result of respiration taking place in mitochondria.

Never say that energy is produced.

Question 7 (a)

This question asked candidates to name the enzyme that breaks down starch. Amylase was the answer expected, but carbohydrase was also accepted. A large proportion of candidates did not answer this question correctly.



7 Starch is a nutrient in food.

Starch is a source of energy.

(a) Name the enzyme that breaks down starch.

(1)

Amalaze

ResultsPlus
Examiner Comments

In this response amylase has been misspelt. However, it would be difficult to interpret amalaze as anything other than amylase, so the mark can be awarded.

ResultsPlus
Examiner Tip

Always learn how to spell scientific terms correctly. In some cases mistakes will result in you not being awarded a mark.

7 Starch is a nutrient in food.

Starch is a source of energy.

(a) Name the enzyme that breaks down starch.

(1)

Glucose

ResultsPlus
Examiner Comments

This answer is incorrect. Glucose is the product of starch break down, not the enzyme that breaks down starch.

ResultsPlus
Examiner Tip

Check that you know the names of the enzymes that break down carbohydrates, proteins and lipids. Also make sure that you learn what carbohydrates, proteins and lipids are broken down into.

Question 7 (b) (i)

This question required an understanding of the test for starch, which is part of a core practical. Candidates had to interpret information from a table of results and give a reason why the contents of two test tubes were blue-black at the beginning. Many candidates found the question challenging and did not score the mark, which was awarded for stating that starch was present or that iodine had reacted with starch.

The colour of the contents of each test tube was recorded every two minutes for a total of ten minutes.

The results are shown in Figure 11.

time in minutes	colour of the contents of each test tube: test tube 1 starch and iodine solution with liquid from the mouth	test tube 2 starch and iodine solution with liquid from the stomach
0	blue-black	blue-black
2	blue-black	blue-black
4	brown	blue-black
6	orange	blue-black
8	orange	blue-black
10	orange	blue-black

Figure 11

(i) Give **one** reason why the contents of both test tubes were blue-black at the beginning of the investigation.

(1)

Because Starch is present in them both

ResultsPlus
Examiner Comments

In this answer the candidate understands that the blue-black colour means that starch is present.

(i) Give **one** reason why the contents of both test tubes were blue-black at the beginning of the investigation.

(1)

because the starch was not broken down by the enzyme yet.

ResultsPlus
Examiner Comments

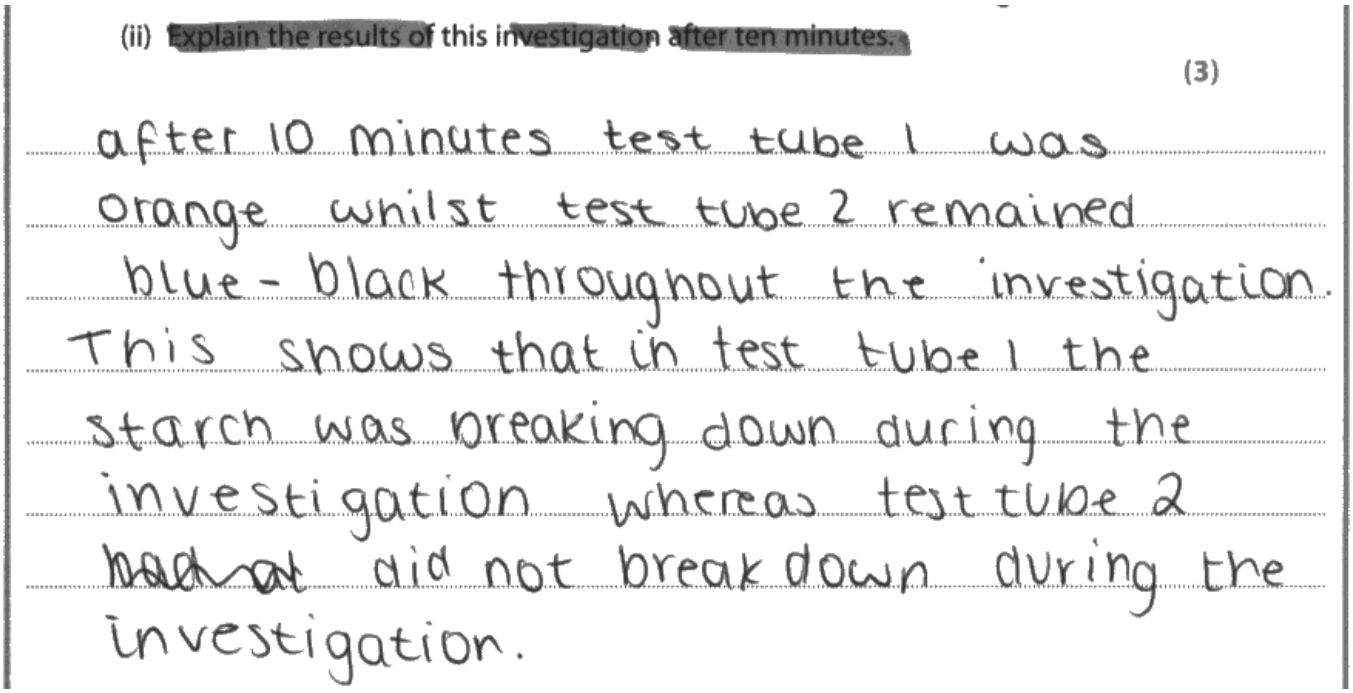
This is an alternative way of answering this question. The response scores the mark because the candidate understands that starch is present and hasn't yet been broken down.

ResultsPlus
Examiner Tip

Make sure that you learn the names of the chemical reagents used to identify starch, reducing sugars, proteins and fats.

Question 7 (b) (ii)

In this question candidates had to explain the outcome of an investigation involving enzymes from different parts of the digestive system. The majority of candidates found the question very challenging. The marking point awarded most frequently was for the idea that starch had been broken down in test tube 1. Fewer candidates were able explain that starch had not been broken down in test tube 2. Only those candidates who had a clear understanding of the investigation scored a mark for making a link between the presence of amylase and the breakdown of starch.



(ii) Explain the results of this investigation after ten minutes.

(3)

after 10 minutes test tube 1 was orange whilst test tube 2 remained blue - black throughout the investigation. This shows that in test tube 1 the starch was breaking down during the investigation whereas test tube 2 ~~had~~ did not break down during the investigation.

ResultsPlus
Examiner Comments

In this response the candidate has started by describing the colour of the contents of the tubes after 10 minutes. The description does not score any marks, but the candidate has then explained that in tube 1 starch was broken down. This scores one mark. The candidate has not stated that **starch** has been broken down in tube 2, so this point does not score a mark. The candidate has not explained that amylase is present in the mouth, or that amylase is not present in the stomach.

After 10 minutes the test tube I had changed from blue-black to orange. However, test tube 2 hadn't changed colour after 10 minutes.

ResultsPlus
Examiner Comments

This answer does not score any marks because it is a description of the results, not an explanation.

ResultsPlus
Examiner Tip

Remember to check the command words in questions. Explain means that you must say how or why something happens. So, in this example you should say why test tube 1 changed from blue-black to orange.

Question 7 (c)

This extended open-response question asked candidates to devise a method to compare the energy content of two foods, using the equipment shown in a diagram.

Candidates were also asked to include details of how to control the variables.

The detail and workability of the method determined the level of the response and the mark within the level was determined by the details about variables and how to control them.

A level 1 response required a simple method including at least one aspect of using the equipment for 1 mark. A reference to at least one variable allowed 2 marks to be awarded within this level.

A level 2 response required a method including more than one aspect of using the equipment for 3 marks. A reference to two or more variables, or a reference to one variable and how it could be controlled allowed 4 marks to be given within this level.

A level 3 response required a detailed, workable method, including several aspects of using the equipment. A reference to a least two variables and an explanation of how to control at least one of them allowed the top mark to be awarded within this level.

Many candidates were able to access the bottom of Level 2 by writing a straightforward method, but the top mark within that level was not always awarded because necessary details about variables and how to control them were missing. Only candidates who wrote coherent, workable methods scored a mark in level 3. In some instances candidates focused on the variables instead of the method and this restricted the mark they could be awarded.

*(c) The diagram shows equipment that can be used to measure the energy content of different foods.

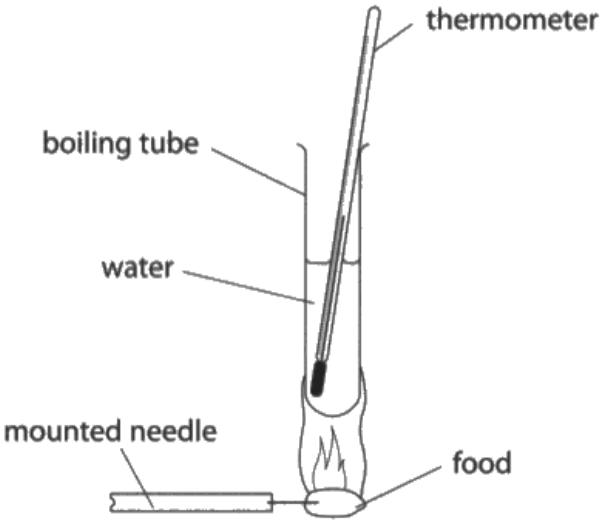


Figure 12

Devise a method to compare the energy content of two foods using this equipment.

Include details of how to control the variables.

(6)

you would need the same amount of water, you need the same amount of each foods. to see which one of the foods had more energy it's whichever one burns longer ~~and~~ or hotter you can measure the heat of the burning food on the thermometer.

ResultsPlus
Examiner Comments

This response is at the bottom of level 1. The candidate has included one aspect of using the equipment (burning the food). There are references to controlling variables, but none of the points stated are creditworthy because they refer to amount of water and food instead of volume and mass. One correct reference to a variable would have resulted in this candidate scoring a mark at the top of level 1.

You would always start with the same ~~amount~~ volume and temperature of water. You would light the food on fire and put it under the water and calculate the temp change of each food and repeat it 3 times which ever food increase the temperatur of the water the most has more energy.

ResultsPlus
Examiner Comments

This method scores a mark at the top of level 2. The method includes more than one aspect of using the equipment and the candidate has made reference to controlling two variables. This response scored 4 marks.

ResultsPlus
Examiner Tip

Always check what the question is asking you to do. In this question you have to devise a plan and include details of **how** to control the variables. In this case, volume of water can be controlled by using a measuring cylinder to measure it.

(6)

- First measure the room temperature of the water, note down findings
- With the mounted needle place the food onto it whilst taking note of foods mass
- Then proceed to light the food on fire via a bunsen burner
- place food under boiling tube and wait until food is either gone or out of flame
- note down final water temperature

- Repeat experiment with different food but keep same volume of water used by measuring it out (both times) and even use same mass of food by using a weighing scales.

ResultsPlus
Examiner Comments

This is a detailed level 3 response, which scores a mark at the top of that level. The method is very clear and workable. The candidate has identified two variables to control - volume of water and mass of food - and has stated how mass can be controlled. This response gained 6 marks.

Question 8 (a) (ii)

This question asked candidates to describe how data about the percentage of bases in human DNA provides evidence for base pairing. Many candidates scored 1 mark for identifying that the percentage of A and T or C and G are the same. For a second mark candidates had to state that A pairs with T **and** C pairs with G. Marks were not awarded if candidates did not specifically mention which bases have the same percentages and which bases are paired together.

(ii) Figure 13 shows the percentage of each base in human DNA.

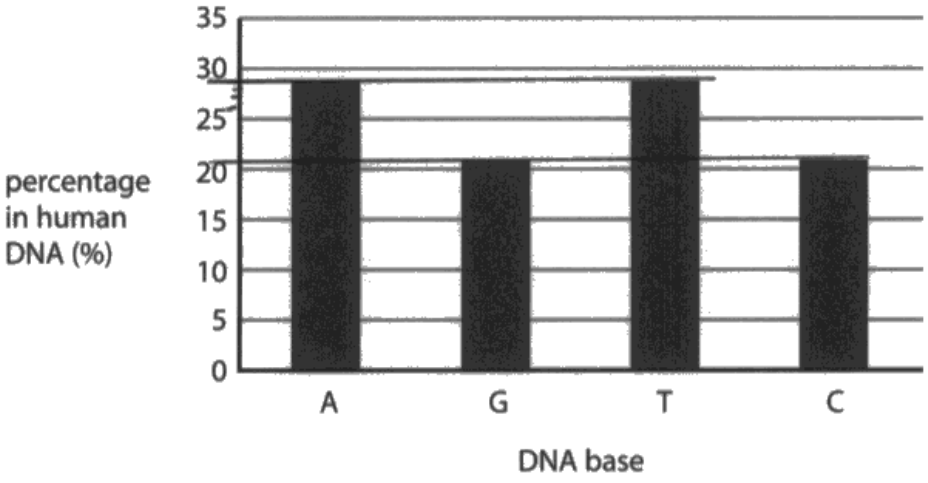


Figure 13

Describe how this data provides evidence for base pairing in DNA.

(2)

DNA base pairs A & T are a pair in they both have arand 29% in human DNA each. Gand C are also a pair and theyre both arand 22% each.

ResultsPlus
Examiner Comments

This response scores full marks. The candidate has correctly stated which bases pair together and has given the percentage of each base pair in human DNA from the bar chart.

Question 8 (b)

This question examined candidates' ability to convert units as well as their understanding of the difference between haploid and diploid cells. Many candidates forgot to take into account the fact that they were dealing with a haploid cell, not a diploid cell.

An answer of 6.2 was seen very frequently. This gained 1 mark for converting nanograms to picograms, but not both marks as this answer had not been divided by two.

(b) A scientist obtained a mass of 0.0062 nanograms of DNA from a diploid human cell.

Calculate the mass of DNA the scientist should obtain from a haploid human cell.

Give your answer in picograms.

(1 nanogram = 1000 picograms)

(2)

0.0062 ÷ 0.0062 × 1000 = 6.2

6.2 ~~6.2~~ picograms

ResultsPlus
Examiner Comments

This answer scores 1 mark for using information given in the question to convert nanograms to picograms.

ResultsPlus
Examiner Tip

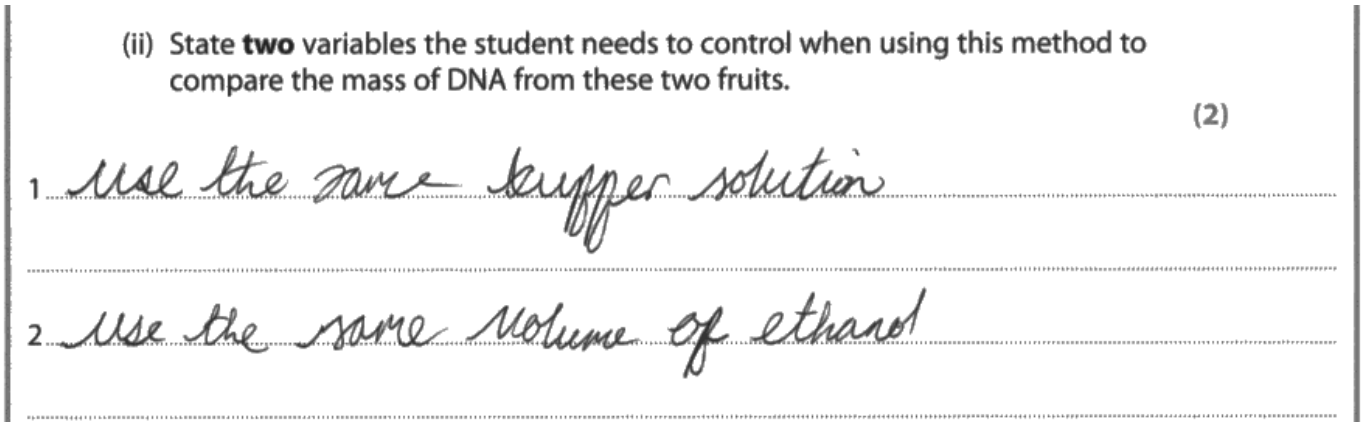
Remember that a haploid cell contains half the mass of DNA of a diploid cell.

Question 8 (c) (i)

This question was based on the practical procedure of extracting DNA from fruit. Candidates who had experience of the procedure tended to score the mark for stating that ethanol precipitates the DNA, although this was often described in terms of making the DNA visible or allowing the DNA to be seen. Overall, only a very small proportion of candidates gained the mark for this question.

Question 8 (c) (ii)

In this question candidates were asked to state two variables that need to be controlled in the DNA extraction procedure. This was an accessible question, but candidates were not awarded marks if they referred to amount of buffer or amount of ethanol, instead of the volume of these liquids.



(ii) State **two** variables the student needs to control when using this method to compare the mass of DNA from these two fruits.

(2)

1 use the same stopper solution

2 use the same volume of ethanol

ResultsPlus
Examiner Comments

This is a good response. The candidate has stated two relevant variables that need to be controlled.

ResultsPlus
Examiner Tip

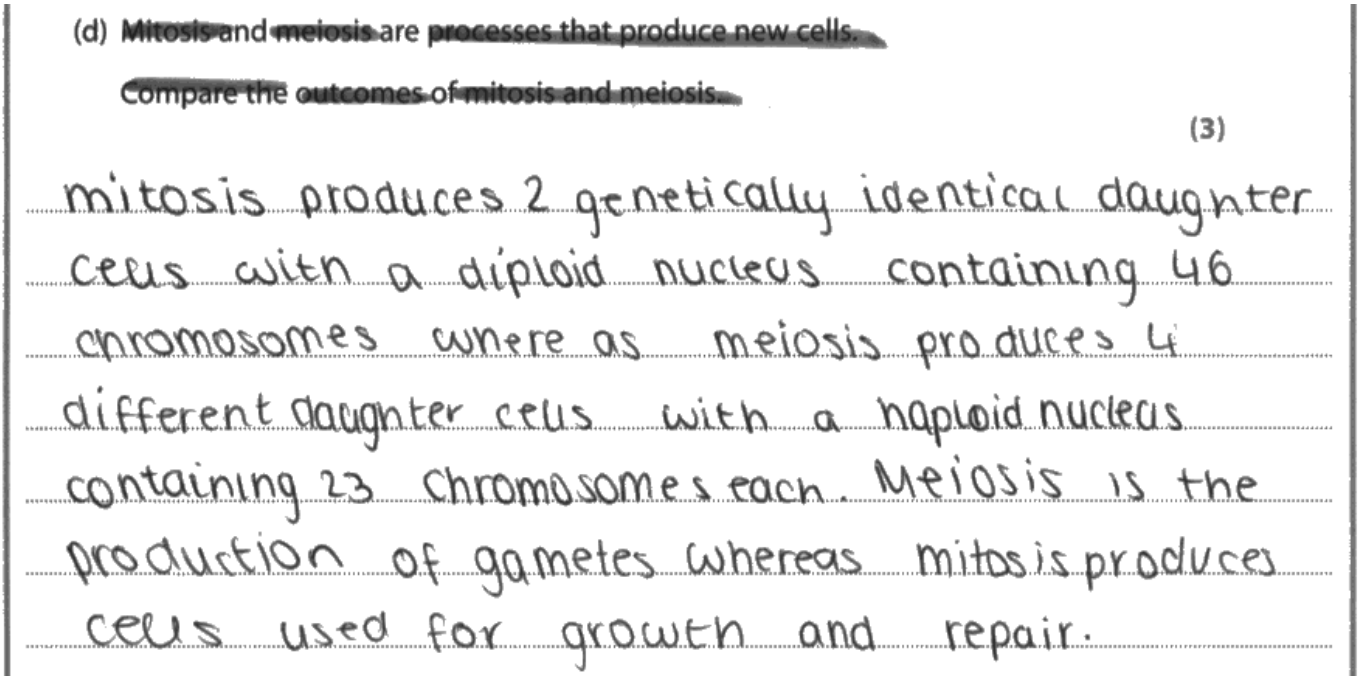
Always remember that it is important to use the same **volume** of solutions so that you can compare the results of an investigation.

Question 8 (c) (iii)

This question asked candidates to give a reason for repeating the experiment. This was another accessible question and all marking points were seen. However, candidates who commented on improving accuracy and fair testing did not score a mark.

Question 8 (d)

This question asked candidates to compare the outcomes of mitosis and meiosis. The question allowed candidates to demonstrate their knowledge of the two processes, but marks were only awarded for comparative statements, such as mitosis produces 2 cells and meiosis produces 4 cells. Candidates often stated that the cells produced are identical or the cells are different with respect to mitosis and meiosis, but for the second marking point they had to state that cells are genetically identical or genetically different.



(d) Mitosis and meiosis are processes that produce new cells.

Compare the outcomes of mitosis and meiosis.

(3)

mitosis produces 2 genetically identical daughter cells with a diploid nucleus containing 46 chromosomes where as meiosis produces 4 different daughter cells with a haploid nucleus containing 23 chromosomes each. Meiosis is the production of gametes whereas mitosis produces cells used for growth and repair.

ResultsPlus
Examiner Comments

This is a good response that scores full marks for the question. The candidate has compared the number of cells produced, the chromosome number and what type of cell each process produces.

The candidate has also stated that mitosis produces **genetically** identical daughter cells, but for meiosis they have just said that the daughter cells are different, so this cannot be awarded the second marking point.

Examiner Tip

If you are asked to compare two processes or structures, you must write about their similarities and differences.

Question 9 (a)

In this question candidates had to explain why children who are vaccinated against tetanus do not get the infection if the bacteria enter their body through a cut in the skin. Many candidates scored 1 mark for recognising that the children would be immune to *Clostridium tetani*. A mark was also frequently awarded for linking vaccination with the production of antibodies. The other marking points were awarded less often partly due to confusion about what the vaccine contained and references to memory cells rather than memory lymphocytes. Only a small proportion of candidates were able to make a correct reference to the secondary immune response.

9 (a) *Clostridium tetani* is a bacterium that can be found in soil.

It causes the infection tetanus.

Children are vaccinated against tetanus.

Explain why these children do not get tetanus if the bacteria enter their body through a cut in the skin.

(3)

Because when a child gets vaccinated, memory lymphocytes are produced so that when the pathogen enters the body, your ~~bette~~ body knows what ~~anti~~ antibodies to produce. These antibodies attatch themselves to the pathogens anti-gens ~~=~~ and acts as a marker so the white blood cells can find them and destroy them. The secondary response is always very fast, and occurs before symptoms occur

ResultsPlus
Examiner Comments

This response shows a good understanding of the principles of vaccination. 3 marks have been awarded.

The key points in this answer are the production of memory lymphocytes, which results in the production of antibodies and that the tetanus pathogens (bacteria) have antigens.

ResultsPlus
Examiner Tip

Remember that a vaccine may contain dead / inactive bacteria, or antigens.

Question 9 (b)

This question asked candidates to explain how some bacteria have become resistant to Colistin. Candidates across the ability range found the question challenging, but 1 mark was often awarded for the idea that people do not finish their course of antibiotics, or that antibiotics are overused. Marking point two could be awarded for the idea that natural selection had occurred or the bacteria had evolved. Marking point three was for the idea that some of the bacteria have a mutation and marking point four for explaining that these bacteria would survive.

(b) Colistin is an antibiotic used to treat infections in the bloodstream.

Some bacteria are resistant to Colistin.

Explain how these bacteria have become resistant to Colistin.

(4)

Due to ~~and~~ random mutations in bacteria when re-producing, ~~et~~ bacteria cells become immune to the ~~ante~~ anti-biotic. Then due to natural selection all of it's cells gradually become resistant to the ~~anti-bio~~ antibiotic, as only the resistant ones reproduce as all the cells susceptable to the antibiotic die and ~~and~~ leave only the resistant strain.

ResultsPlus
Examiner Comments

This is a good response scoring 3 marks. The candidate has gained marks for the references to random mutations in bacteria, natural selection and the resistant bacteria reproducing.

ResultsPlus
Examiner Tip

Remember that bacterial cells become resistant to antibiotics, not immune to them.

Question 9 (c)

This extended open-response question asked candidates to explain how information about tools found in different layers of rock provides evidence for human evolution. There are three areas of indicative content for this question. The level of the response is determined by the number of areas covered and the mark within the level is determined by how well the areas are linked together.

A level 1 response required a simple observation from the diagram with a brief explanation from one of the three areas of indicative content.

A level 2 response required a simple explanation from at least two areas of indicative content.

A level 3 response required a detailed explanation of linking ideas from all three areas of indicative content.

Many candidates scored marks for referring to the relative ages of the tools and for describing the level of sophistication of the tools. References to human skills and intelligence were articulated less well and candidates often discussed brain size and the development of tools.

*(c) Figure 15 shows three stone tools found in different layers of rock.

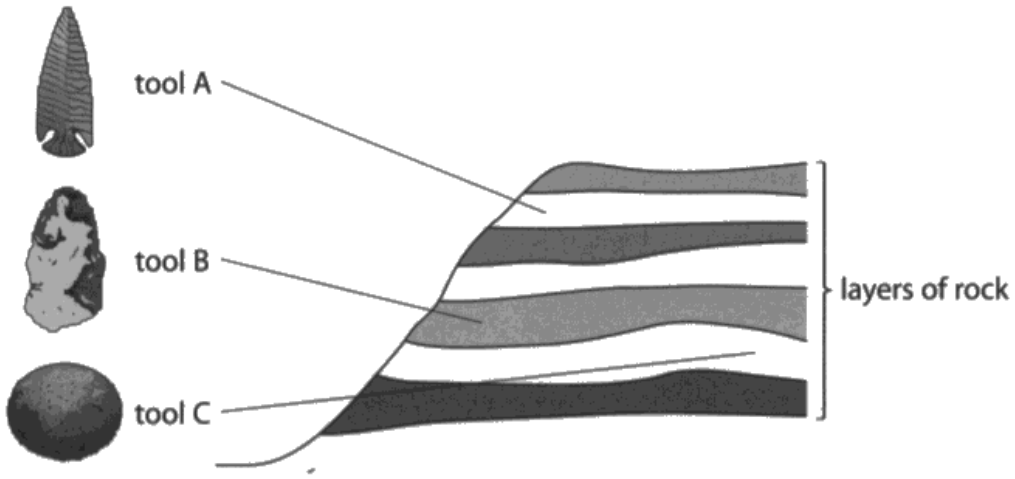


Figure 15

Explain how information from Figure 15 provides evidence for human evolution.

(6)

- tool C - very far down and has a very low layer of rock, meaning that the tool is very old. it is also not very good for hunting so ~~the humans~~ they would probably struggle for food.

- tool B - its found slightly higher up, probably showing it was earlier than tool C. A little bit sharper showing that it would have been easier to hunt and would ~~increase~~ reinforce that they were getting smarter.

- tool A - found just underneath us, where the tools are very sharp and would be very good for hunting.

(Total for Question 9 = 13 marks)

ResultsPlus
Examiner Comments

This is a level 3 response because the candidate has referred to all three areas of indicative content. Since the three areas are not clearly linked together, this answer scores a mark at the bottom of level 3. 5 marks have been awarded.

Stone tool C is more round and is found deeper under the layers of rock which shows that ~~it~~ the stone tool is older. Stone tool B has a better overall shape than Stone tool C which shows how it was used to help fix things. It is younger than Stone tool C. Stone stool A has more detail and is more pointy which shows how it is younger than Stone tool B and C. Stone tool A also shows how it could have been used as a knife or as something sharp. It also shows how the body structure has changed and that it has become taller and slimmer. It is also on top of the layers of rock which shows, it is more recent than Stone tool B and stone tool C. **(Total for Question 9 = 13 marks)**

ResultsPlus
Examiner Comments

This is a good example of a level 2 response. The candidate has written about where the tools were found, their ages and how sophisticated the tools are. These areas of indicative content are clearly linked, so a mark at the top of level 2 can be awarded: 4 marks in total.

ResultsPlus
Examiner Tip

The question asks you to explain how information from the diagram provides evidence for human evolution. If you do not refer to human evolution in your answer, you cannot score full marks for the question.

Question 10 (a) (i)

This question required the straightforward calculation of a mean, with the additional maths skill of giving answer to three significant figures.

The majority of candidates could calculate the mean distance correctly, but far fewer were able to round correctly, then give their answer to three significant figures. Answers of 296.7, 296.67 and 296.6 recurring were awarded 2 marks because the answer was not given to three significant figures.

An answer of 296.6 or 296.66 scored just 1 mark due to incorrect rounding.

An answer of 296 scored 2 marks for giving the answer to 3 significant figures, even though rounding was incorrect.

10 (a) The effect of age on focusing distance was investigated.

Volunteers of different ages had their eyes tested.

Each volunteer was asked to read words from a book. The book was moved closer to their eyes.

When the words became out of focus, the distance was recorded.

Figure 16 shows the results.

age of volunteers	distance (mm)			mean distance (mm)
	person 1	person 2	person 3	
40	256	261	257	258
45	282	275	280	279
50	292	301	297	?
55	311	309	307	309

Figure 16

(i) Calculate the mean distance for the volunteers aged 50.

Give your answer to three significant figures.

$\frac{292 + 301 + 297}{3}$

(3)

296.7 mm

ResultsPlus
Examiner Comments

This response scores 2 marks for calculating the mean and rounding the answer correctly.

ResultsPlus
Examiner Tip

Always check what the question asks you to do. In this case you are asked to give your answer to three significant figures.

(i) Calculate the mean distance for the volunteers aged 50.

Give your answer to three significant figures.

(3)

$$\frac{292 + 301 + 297}{3} = \frac{890}{3} = 296.6$$

296.6 mm

ResultsPlus
Examiner Comments

This answer has not been rounded correctly, so just 1 mark can be awarded for arriving at a total of 890.

The correctly rounded mean is 296.7.

ResultsPlus
Examiner Tip

Always check that you have rounded means correctly.

(i) Calculate the mean distance for the volunteers aged 50.

Give your answer to three significant figures.

(3)

292
301
297
896
11

890 ÷ 3 = 296.66

296

296 mm

In this response the candidate has not rounded the mean correctly, but the answer has been given to three significant figures, so 2 marks can be awarded.

Question 10 (a) (ii)

In this question candidates were asked to give one conclusion from data about age and focusing distance. Marking point one was awarded most frequently for the idea that focusing distance increases with age. Candidates who did not understand the data, often stated that eyesight becomes worse with age, instead of making a link between the variables in the data given.

(ii) Give **one** conclusion that can be made from the data in Figure 16.

(1)

With increasing age, focusing distance increases.

ResultsPlus
Examiner Comments

In this answer the candidate has given a correct conclusion by linking an increase in age to an increase in focusing distance.

(ii) Give **one** conclusion that can be made from the data in Figure 16.

(1)

that the older you get the eye sight becomes worse.

ResultsPlus
Examiner Comments

In this answer the candidate has not given a conclusion linking the two variables. There is no implication from the data that eyesight becomes worse with age, just an increase in focusing distance.

ResultsPlus
Examiner Tip

If the question asks you to give a conclusion that can be made from a table of results, always try to make a link between the independent and dependent variables.

Question 10 (a) (iii)

This was a practical skills question asking candidates to give two improvements needed in the investigation to be able to make a valid conclusion. Most candidates found the question accessible and often scored one from marking points one, two and three. Common responses included use more test subjects and extend the range of ages. The last three marking points were awarded much less frequently.

(iii) Give **two** improvements that are needed in this investigation before a valid conclusion can be made.

(2)

1 A wider range of ages could of been used.

2 More participants of each age.

ResultsPlus
Examiner Comments

This response scores 2 marks for giving improvements to the investigation: 'a wider range of ages' and 'more participants of each age' are both creditworthy points.

Question 10 (c) (i)

In this question candidates were shown a diagram and asked to describe how light rays are focused to give normal vision. Candidates who were familiar with the function of the relevant structures often scored 1 mark for stating that the cornea/lens refract light. The mark for the idea that light rays are then focused on the retina was awarded less frequently. This was often because candidates referred to the 'back of the eye' instead of the retina. In general, candidates found the question challenging and few scored a mark.

(c) Figure 17 shows light rays entering the eye of a person with normal vision.

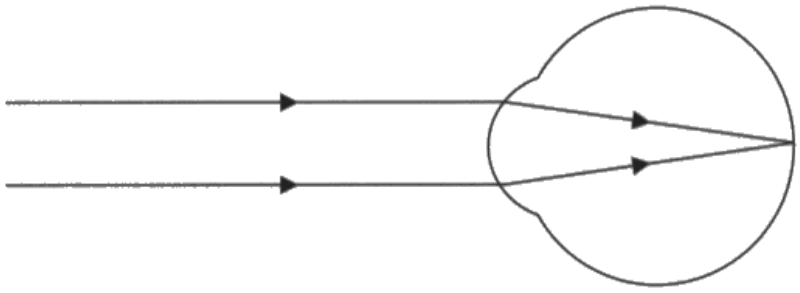


Figure 17

(i) Describe how light rays are focused to give normal vision.

(2)

The light rays are focused on the retina that is on the back of the eye to give normal vision. The light rays don't have to

ResultsPlus
Examiner Comments

In this response the candidate scores 1 mark for describing that light rays are focused on the retina. If the candidate had simply stated that light rays are focused on the back of the eye, then the answer would not score any marks.

(i) Describe how light rays are focused to give normal vision.

(2)

The lens refracts the light focusing it onto the iris at the back of the eye to create an image.

ResultsPlus
Examiner Comments

This answer scores 1 mark for describing that the lens refracts light. The reference to focusing light on the back of the eye is not creditworthy.

ResultsPlus
Examiner Tip

Make sure that you can explain the structure and function of the eye as a sensory receptor.

Question 10 (c) (ii)

This question asked candidates to explain which type of lens would be used to correct the eye defect shown in a diagram. Many candidates were familiar with the terms concave and convex, but were not awarded a mark because the terms were linked to the wrong lens in the diagram. Candidates who correctly selected the concave lens and scored this mark, did not often go on to explain that the concave lens causes light rays to diverge.

(ii) Figure 18 shows light rays entering the eye of a person with an eye defect and two lenses that can be used to correct eye defects.

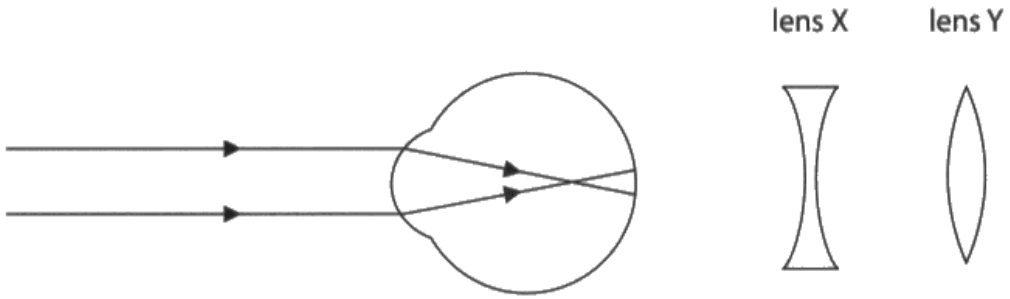


Figure 18

Explain which lens would correct the eye defect shown in Figure 18.

(2)

The person is short sighted to improve their vision, they will need a diverging lens. This means lens x is needed to correct the defect as it is a diverging lens.

ResultsPlus
Examiner Comments

This response scores 1 mark for explaining that a diverging lens is needed to correct the eye defect. Since there is no further explanation of how a diverging lens bends light rays, the full 2 marks cannot be awarded.

ResultsPlus
Examiner Tip

Check that you know how these eye defects can be corrected: cataracts, long-sightedness and short-sightedness.

(2)

lens X would correct the eye defect as the lens makes the light bend more outwards and so could fix ~~it~~ their eye.

ResultsPlus
Examiner Comments

This response scores 1 mark for explaining that lens X bends light rays outwards. Since lens X has not been identified as a diverging/concave lens, the full 2 marks cannot be awarded.

Paper Summary

Overall Performance

There were several questions where candidates needed to apply their knowledge and understanding to situations that were new to them. In these cases all the necessary information needed to lead candidates to the required responses was given in the stem of the questions. Candidates would benefit from reading the stem of questions carefully and considering how this links to what they have been taught. It was pleasing to see examples where candidates had underlined or highlighted the command words and key words in the information given.

The more straightforward questions where marks could be gained by interpreting information were answered well. It was also pleasing to see some excellent, coherent answers accurately applying relevant scientific terminology to questions that required extended prose.

In Q01(a)(i) a large proportion of candidates were confused about the type of reproduction involving flowers, but the majority were proficient in completing the Punnett square in Q01(b)(i). In general it seems that candidates have a better understanding of inheritance than they do of reproduction. However, completing the Punnett square in Q06(a)(iii) correctly proved to be more challenging for many candidates and the male and female gametes were frequently confused.

The ability to describe trends in graphs was demonstrated well in Q03(b)(i) and Q05(a). In Q03(b)(i) many candidates used data from the graph without any prompts in the stem of the question and overall this question was answered very well. Q05(a) specifically asked candidates to use data from the graph to support their answer. The majority followed this guidance and correctly identified the optimum pH of trypsin, but a significant number of candidates did not read pH values correctly from the x axis. As a result many did not score marks for aspects of their descriptions, even though a tolerance was allowed for these readings. Most candidates described the trend for trypsin as asked, but a small minority discussed the trend for pepsin.

In terms of practical procedures it was surprising that a large proportion of candidates were unable to write a clear description of how to obtain a clear image of cells using a microscope. In many instances it was apparent that candidates had little experience of using microscopes and knowledge of the basic components, such as eyepiece lens, objective lens and focusing wheel, was often limited. Q04(b)(ii) showed that few candidates were familiar with aseptic technique. While some were aware that the Bunsen burner could be used to sterilise the inoculating loop, few could explain why that is important. An awareness of the Bunsen burner creating a convection current was extremely limited.

Q07(b) showed that many candidates were familiar with the use of iodine solution to test for starch, although some had difficulty interpreting the colours of the solutions in Figure 11. Candidates are expected to be familiar with the procedure for extracting DNA from fruit, but a large proportion could not correctly state why ethanol was used in Q08(c)(i) and instead many of them suggested that it killed bacteria. Knowledge of how to control variables was often demonstrated successfully in Q08(c)(ii), but many candidates need to be more specific in terms of referring to masses or volumes instead of amounts.

A large proportion of candidates found the two extended open-response questions accessible. Many demonstrated experience of determining the energy content of food in Q07(c) and some very detailed methods were seen. However, while a large proportion of candidates correctly identified variables that should be controlled, they did not specify how to control them, as the question asked. As a result, these candidates could not be awarded the top mark in level 3 and sometimes in level 2.

In Q09(c) there were some good descriptions of the stone tools and where they were found, but in many cases information was not linked together to develop an explanation for human evolution. There was good evidence of planning in the extended open-response questions; many candidates annotated the diagrams, or made lists of key points before they constructed their answer.

In terms of mathematical skills, candidates were largely successful at calculating an area and calculating a mean, although the mean was not always given to three significant figures as asked. Many candidates found calculating the number of cases of a disease in a population very challenging because the data they were given was the number of cases per 100 000.

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

- Recognise that the word 'explain' means that additional scientific information is needed that is linked to the answer given.
- Use all the information given in the question to help construct an answer but avoid repeating the information which has already been given, and giving vague responses that will not gain credit.
- Consider the context of the question to ensure they apply their scientific knowledge to the situation they are being asked about.
- Develop their practical skills knowledge to ensure they understand the difference between the factors being investigated and controlled variables.
- Check the number of marks given for the question and ensure that they have included enough facts to match the mark available.
- Use accurate scientific terminology in responses.
- Always show mathematical workings when doing calculations as a mark may be awarded for an error carried forward.
- Think about the structure of the answer to the extended open-response questions before starting to write. This is to ensure that the answer shows clarity of writing, while remembering that accurate spelling and grammar in these questions is also important.

Grade Boundaries

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

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