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Examiners' Report
June 2018

GCSE Biology 1BI0 1F

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June 2018
Publications Code 1BI0_1F_1806_ER

Introduction

The Pearson Edexcel GCSE (9-1) Paper 1 Biology (Foundation tier) paper is the first of two papers taken as part of the new GCSE (9-1) Biology qualification.

This is the first assessment of the new GCSE (9-1) Biology specification and the qualification follows a linear assessment model whereby candidates must complete the two papers in the same single year of certification.

Paper 1: Biology (Foundation tier) is awarded a total of 100 marks and it is assessed by a variety of question types, including, multiple-choice questions, short answer questions, calculations and extended open-response questions. Candidates should answer all questions in a time period of 1 hour and 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 maths skills; the requirements of which are given in the new specification. Furthermore, there are 8 mandatory core practicals which candidates must complete prior to the examination, as aspects of working scientifically are also assessed in questions throughout the paper.

The Paper 1: Biology (Foundation tier) paper contains questions assessing the content from Topics 1 to 5, as identified in the new specification. In this first examination series, candidates were required to respond to questions that tested their knowledge and understanding of the eye, how plants protect themselves from pests and pathogens, obesity and the risk of developing cardiovascular disease, osmosis, selective breeding and tissue culture.

Questions designed to assess practical work included writing a plan for an investigation, using a microscope, controlling variables and safety precautions. The maths skills assessment in this paper related to questions requiring completing a graph, BMI calculations, surface area calculations and calculating a ratio.

Question 1 (a)

This question asked candidates to match two pathogens with the disease they cause by drawing one straight line from each of the pathogens to the disease in the boxes. While many candidates could do this successfully, a significant number drew two lines from one or both of the pathogens and did not gain credit.

Question 1 (c)

This question required straightforward data interpretation. Candidates were asked to explain why the data suggests that a patient has a bacterial infection. The first mark was given for the idea that the patient has a higher white blood cell count. Responses, such as 'more' white blood cells were accepted. The second marking point was awarded for explaining that white blood cells kill bacteria. A common acceptable response was that white blood cells fight infection.

(c) Figure 1 shows the number of white blood cells in blood samples from three patients.

	Patient X	Patient Y	Patient Z
Number of white blood cells per µl	8 500	5 700	12 500

Figure 1

Explain why the data suggests that Patient Z has a bacterial infection.

(2)

Patient Z has 12 500 white blood cells when Patient X and Y have less which suggests they're fighting a pathogen so they created more.

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Examiner Comments

This response was awarded 2 marks. For the first marking point the candidate has made a comparative statement about the number of white blood cells. The reference to fighting a pathogen is sufficient for marking point two.

Question 1 (d)

This was a question that looked at the working scientifically aspect of the qualification assessing practical skills.

Candidates were told that HIV is diagnosed by blood tests. Candidates were asked to state two safety precautions that need to be taken when handling blood samples. Creditworthy responses for marking point 1 were seen most frequently, such as wearing gloves or wearing goggles. Good responses covering the other marking points were seen much less frequently. References to using and disposing of needles were not credited because the question was not about taking blood samples. This was an accessible question and many candidates scored at least one mark.

State **two** safety precautions that need to be taken when handling blood samples.

(2)

1 [redacted] wearing gloves (not in contact with the blood)

2 make sure the blood has a lid on the container its in so cannot be spild

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Examiner Comments

This response has been awarded the full 2 marks. Wearing gloves gains marking point 1 and making sure there is a lid on the container gains marking point 3.

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Examiner Tip

Read the question carefully. This question is about handling blood samples, not taking blood samples.

Question 2 (a) (iii)

In this question candidates were asked to state the type of bond that joins bases together in DNA molecules. Many candidates found this challenging and named a range of bonds, including covalent and ionic, rather than giving the correct response of weak hydrogen bond.

Question 2 (b)

This is a practical question asking candidates to describe how cells can be broken down to release DNA. Those with first-hand experience of extracting DNA from fruit or other sources were able to score marking point 1, for giving the basic idea of crushing fruit and marking point 2, for mixing cells with a salt/detergent solution. Using ethanol was an acceptable alternative response for marking point 2.

Describe how cells are broken down to release DNA.

(2)

Use a mortar and pestle to crush the fruit, then add the remains to a purified solution. You should then filter the solution and add washing up liquid to it. Lastly you should add cold ethanol

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Examiner Comments

This response was awarded the full 2 marks.
Crushing the fruit gains the first marking point.
Adding washing up liquid was accepted for marking point 2, as an alternative to detergent.
The candidate has also mentioned adding ethanol. This would also be accepted as an alternative for marking point 2.

Question 2 (c)

In this question, candidates were required to state two benefits that the Human Genome Project could have for medicine. This question challenged candidates across the ability range. The most common creditworthy responses seen were for the second marking point, such as treating genetic disorders or developing new medicines. The first and third marking points were seen much less frequently.

State **two** benefits that the Human Genome Project could have for medicine.

(2)

1 They'd know if there was a ~~error~~ mutation in someones DNA.

2 They have the Human Genome to look back on

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Examiner Comments

This response was awarded 1 mark. Identifying mutations was accepted as an alternative to marking point 1.

State **two** benefits that the Human Genome Project could have for medicine.

(2)

1 ~~Could~~ find out how to make medicine more advanced for more blood types, dieases and infections

2 make new medicine to treat/cure infections

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Examiner Comments

This response was awarded 1 mark for the idea of making new medicine, which is relevant to marking point 2.

Question 3 (a) (i)

The diagrams in the stem of the question were provided to help candidates describe how two pea plants could be crossed. Candidates found this challenging and answers involving planting anthers in the soil were not uncommon. Candidates who could describe using the brush to collect male sex cells from anthers on one plant and transfer them to the other plant gained two marks for marking points 1 and 2. Responses incorporating marking points 3 and 4 were rarely seen.

7 Describe how this equipment could be used to do this cross and discover the flower colour of the new pea plants produced.

Take male sex cell from anthers of the (3)

~~Breed cross the both red flowed and~~ white-flowered pea plants by using a small brush and put it male sex cell on the ~~ovaris~~ reproductive cell of the red-flowered pea plant to make them cross together. Then plant the ~~flower~~ produced seed in the tray containing soil to grow. The offspring's flower's colour will be white, because white is dominant.

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Examiner Comments

This is a good response which is awarded the full 3 marks. The candidate has described the transfer of sex cells from one flower to the other using the brush, then growing the seeds produced in the tray of soil. This response scores for marking points 1, 2 and 4.

Question 3 (a) (ii)

This question assessed working scientifically skills. Candidates were asked to describe how to make sure that the results obtained from this investigation are not anomalous. Some candidates misinterpreted this and described how to control variables. Candidates who gave the ideas of repeating the investigation and comparing results were able to score two marks for marking points 1 and 2. Marking point 3 was seen less frequently.

containing soil.

(ii) Describe how to make sure that the results obtained from this investigation are not anomalous.

(2)

To make sure the results aren't anomalous, you could repeat the experiment twice. If they aren't anomalous, the result of the experiment should be the same both times.

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Examiner Comments

This response was awarded 2 marks. The idea of repeating gained marking point 1. There is an implied reference to comparing results but marking point 3 was scored for the comment about the results being the same.

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Examiner Tip

Check that you know what is meant by 'anomalous results'.

Question 3 (b)

In this question, candidates were required to interpret data from a Punnett square to explain a conclusion. Many candidates repeated information from the stem of the question, such as the dominant allele is A. Clearly stating that all the offspring would be the same or would produce yellow seeds gained marking point 1. Responses, such as the offspring were nearly always yellow were not accepted. Marking point 2 was seen infrequently, but sometimes candidates stated that the offspring were heterozygous, then negated the point by adding dominant or recessive to this term. The third marking point was rarely seen.

Explain a conclusion that can be made from the results of this cross.

(2)

the out come was that all the off spring will be hetrozygous dominant and have yellow seeds

ResultsPlus
Examiner Comments

This answer indicates that all the offspring will have yellow seeds, which scores the first marking point. The reference to the offspring being heterozygous cannot be credited for the second marking point since the candidate has negated the answer by writing heterozygous dominant.

Question 3 (c)

This question required candidates to state a reason why Mendel could not fully explain his results. Many incorrect responses focused on a lack of technology in the 19th century. Creditworthy responses stating that chromosomes, DNA, genes or alleles were not known at the time were seen infrequently. References to a lack of technology were only credited when this was linked to discovering chromosomes or genes.

State **one** reason why Mendel could not fully explain the results of his investigations.

(1)

Mendel couldn't fully explain the results because they didn't have the right technology back then.

ResultsPlus
Examiner Comments

This response does not gain a mark because it does not give the idea that Mendel was unaware of alleles, chromosomes, genes or DNA.

State **one** reason why Mendel could not fully explain the results of his investigations.

(1)

Because ~~the~~ in the 19th centry they hadn't disscoved alot about the plants dominant and resesive alels. and they didn't have advanced technologig.

ResultsPlus
Examiner Comments

This answer scores a mark for the reference to the discovery of alleles. The comment about technology can be ignored.

Question 4 (a) (ii)

For this question candidates had to explain why the picture seen through eyes with cataracts is less clear. For marking point 1, the idea of a cloudy lens was needed. Some successful candidates were able to give extra information, stating that the cloudiness is due to the build-up of protein in the lens. Less successful candidates were not specific about which part of the eye becomes cloudy. References to the cornea, retina or just the eye were not uncommon. Very few candidates were able to explain that a cloudy lens means that less light reaches the retina. Consequently, marking point 2 was seen infrequently.

(ii) Explain why the picture seen through eyes with cataracts is less clear.

(2)

A cataract is ~~how~~ smooth a build up of proteins in the eyeball. It creates a white layer over the iris

ResultsPlus
Examiner Comments

This response did not score any marks. The candidate knows that cataracts are caused by a build-up of protein, but there must be a correct reference to the lens rather than the eyeball. The additional comment about the iris is also incorrect.

ResultsPlus
Examiner Tip

Revise the parts of the eye and the causes of eye defects.

(ii) Explain why the picture seen through eyes with cataracts is less clear.

(2)

as there is too much protein produced in the lens meaning that it will start to become cloudy.

ResultsPlus
Examiner Comments

This response scores 1 mark for correctly referring to cataracts being caused by proteins in the lens which makes it become cloudy.

Question 4 (b)

In this question, candidates were asked to describe the change in the estimated number of people with cataracts between 1980 and 2020. Straightforward answers indicating that the number increases gained marking point 1. Candidates who scored both marks went on to manipulate the data and successfully calculated that the estimated number increases by 125 million. Less successful candidates missed the unit on the y axis and stated that the estimated number increased by 125, which did not gain credit.

Question 4 (c) (i)

This question required candidates to explain how cataracts are currently treated. Many candidates gained the first marking point by giving the idea that treatment involves surgery to remove the lens. Less successful candidates did not go on to explain that the lens is replaced with a plastic one. Some candidates referred to removing parts of the eye other than the lens, so these responses did not gain credit for marking point 1.

(c) (i) Explain how cataracts are currently treated.

(2)

The persons lens will be removed from their eye, then replaced with a clear plastic lens that cannot cloud.

ResultsPlus
Examiner Comments

This response was awarded the full 2 marks for referring to removing the lens and replacing it with a plastic one.

Question 4 (c) (ii)

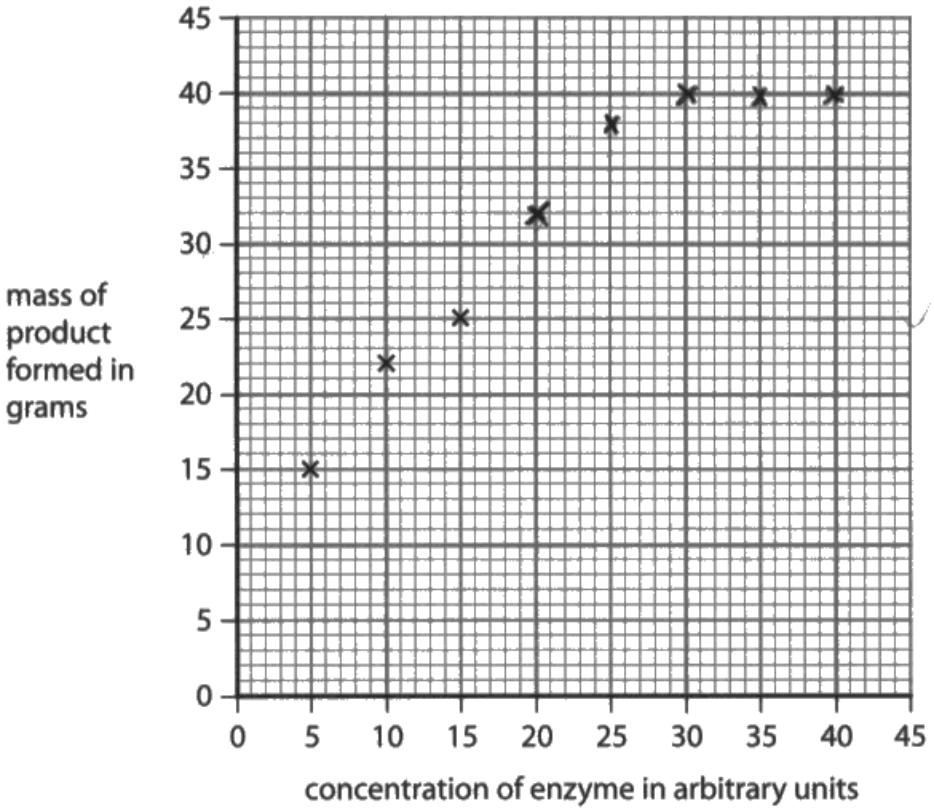
In this question candidates were asked to describe the advantages of using eye drops to treat cataracts rather than the current treatment. Marking point 3 was achieved by many candidates for giving the idea that treatment with eye drops would be cheaper, or that treatment with eye drops would be easier and would require fewer visits to hospital. Marking points 1 and 2 were seen much less frequently. Less successful candidates sometimes made reference to eyedrops presenting a lower risk but did not gain credit because the risk was not linked to an effect, such as infection as a result of surgery. Responses stating that treatment with eye drops would be quicker did not gain credit.

Question 5 (a)

This question required candidates to plot five points on a graph and then draw a line to show the trend in the data. While the majority of candidates were successful in achieving the first marking point, many candidates did not go on to draw a line, which precluded them from gaining marking point 2. A line showing a steady increase, then levelling off at 30 arbitrary units was required. Dot-to-dot lines were accepted.

(a) Complete the graph by plotting the points and drawing a line to show the trend in the data.
The first three points have been plotted for you.

(2)



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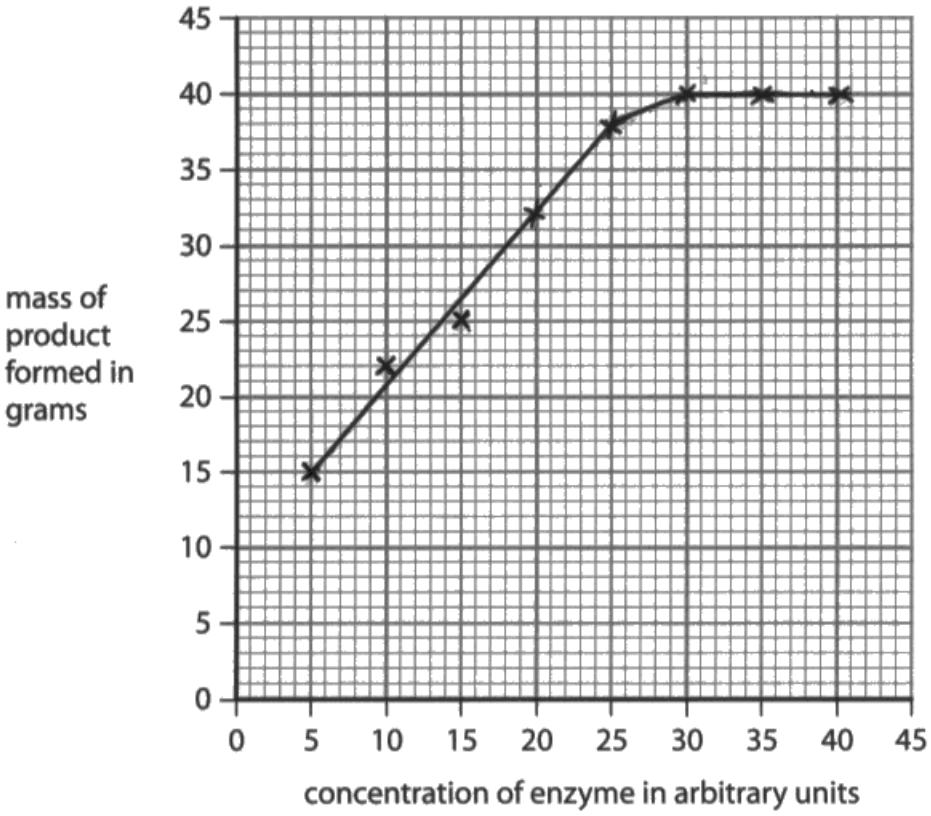
Examiner Comments

This response scores 1 mark for plotting all the points correctly. The candidate has not drawn a line to show the trend, so the second marking point cannot be awarded.



ResultsPlus
Examiner Comments

This answer was awarded the full 2 marks. The candidate has plotted the points accurately and has drawn a suitable line to show the trend in the data. Lines showing a steady increase that levelled off at 30 arbitrary units were accepted.

Question 5 (b)

For this question, candidates had to describe the effect that enzyme concentration has on the mass of product formed. The first marking point was for a straightforward statement that the mass of product increases as enzyme concentration increases. Many candidates were successful and achieved this mark but did not gain further marks by describing that the mass of product stays the same, or levels off from 30 arbitrary units.

(b) Describe the effect that enzyme concentration has on the mass of product formed.

(2)

The higher the concentration of enzymes, the higher the mass. (positive correlation)

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Examiner Comments

This answer scores 1 mark for describing the first part of the graph, (up to an enzyme concentration of 30 arbitrary units). The second and third marking points cannot be awarded as there is no reference to the line on the graph levelling off.

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Examiner Tip

Always look at the number of marks available for a question and give a full description of the trend shown by a graph.

Question 5 (c)

The maths skill of calculating a ratio was examined in this question. Candidates across the ability range found this question challenging, but when successful they usually gained both marks for giving the correct ratio of 1:3. Incorrect substitution (15:5) leading to an answer of 3:1 scored one mark for an error carried forward.

Question 5 (d) (ii)

In this question, candidates were asked to explain why a temperature of 80°C was not used in the investigation with pepsin. Many candidates were able to state successfully that the enzyme would denature at 80°C and so gained marking point 2. Some candidates were then able to explain that the enzyme or its active site would change shape, thus scoring the third marking point. A common response for the fourth marking point was that no reaction would take place or that the substrate would no longer fit into the active site. Marking point 1 was gained less frequently, mainly because comments about the optimum temperature were vague. However, giving the idea that 37°C is the best temperature for pepsin scored the mark.

(ii) Explain why a temperature of 80°C was not used in this investigation.

(3)

Because that would be to high for the enzyme to work. Because it is using pepsin from the stomach it will work best at body temprature, 37°. If the temprature was 80°C the active site of the enzyme would change shape so that the substrate couldn't fit into it, it would became denatured.

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Examiner Comments

This response was awarded the full 3 marks for giving a clear and concise explanation. All four marking points can actually be identified in the answer.

Question 6 (a)

This question is based on a core practical. It required knowledge of how to use a microscope effectively and an understanding of how to improve a procedure. First-hand practical experience of this is helpful in answering the question. There were several acceptable ways of improving the method, including using a stain, adjusting the focus of the microscope and increasing the magnification. While many candidates could give at least one way of improving the method, they were less successful at explaining the improvements and sometimes just repeated the stem of the question.

Many candidates suggested using an electron microscope. However, the question asked how this particular method using a light microscope could be improved, so references to electron microscopes did not gain credit.

Explain **two** ways this method could be improved to see details of the onion cells.

(4)

1. The student could use the magnification dial to used a higher level of magnification.

2. The student could use the focous dial to focouse the piece of onion more.

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Examiner Comments

This answer scores 2 marks. The candidate has identified two ways of improving the method, but neither of them have been explained.

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Examiner Tip

When a question begins with the command word 'explain', always give scientific evidence to back up your answer. In this case, the explanation would include the ideas that the onion cells or structures within the cells would be seen clearly.

Question 6 (b) (iii)

For this question candidates had to describe two genetic similarities of new cells produced by a plant cell dividing by mitosis. Candidates found this question challenging, but some were able to gain marking point 1 by stating that the new cells would have the same genes, chromosomes, DNA or alleles. The fact that the new cells would be genetically identical to cell Q was also accepted. Marking point 2 was seen infrequently, although some candidates clearly understood the relevant science and gave precise answers.

Question 6 (b) (iv)

Candidates found this question very accessible and demonstrated good knowledge of relevant safety precautions that should be taken when heating hydrochloric acid. Comments on general laboratory safety such as tying hair back, standing up or putting bags under benches were not creditworthy.

Question 6 (c)

This question asked candidates to explain one advantage of using an electron microscope to observe plant cells. Some candidates gave two advantages but explained neither, so just one mark could be awarded. Acceptable responses included a higher resolution so more detail can be seen, or higher magnification so more detail can be seen. Less precise responses such as better magnification did not gain credit, but references to being able to see sub-cellular structures did gain the second marking point. The second marking point of each pair was only awarded if the first marking point was awarded.

(c) Explain **one** advantage of using an electron microscope to observe plant cells.

(2)

Higher magnification and higher resolution

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Examiner Comments

This question asks for one advantage with an explanation. The candidate has stated two advantages without explaining either of them, so only 1 mark can be awarded.

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Examiner Tip

Remember to read each question carefully. The command word 'explain' means there must be scientific evidence to back up your answer. In this case the explanation could include the ideas that more detail would be seen, or more sub-cellular structures would be seen.

Question 7 (a) (i)

This was a practical skills question and most candidates found it very challenging. The straightforward answer expected was to mix 20cm^3 of the stock solution with 80cm^3 of water. Many candidates quoted percentages instead of volumes, even though the requirement was to prepare 100cm ^{3} of 20% solution.

(i) Describe how the farmer prepares 100 cm^3 of the 20% solution. (2)

take ~~make~~ 20 cm^3 of concentrated fertiliser and add 80 cm^3 of water.

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Examiner Comments

This response scores the full 2 marks for giving the correct volumes of concentrated fertiliser and water needed to prepare 100 cm ^{3} of the 20% solution.

Question 7 (a) (ii)

This is a practical question asking candidates to devise a plan to find the optimum fertiliser concentration for the growth of wheat plants. Candidates across the ability range found this question very challenging and few scored the full 3 marks. Marking points 1 and 2 were scored most frequently for the ideas of dividing the wheat plants into groups, then adding a different fertiliser solution to each group. For marking point 3 the idea of measuring the height of the plants after a period of time was required. Just commenting on finding how much the plants had grown was insufficient.

Devise a plan to find the optimum percentage solution of fertiliser for the growth of these wheat plants.

(3)

divide the 60 plants into 5 sections. The first section can have no fertiliser, The second section can have the 5%. solution, The 3rd can have the 10%. solution, The 4th set can have the 15%. solution and the 5th set can have the 20%. solution. measure the heights after 30 days and then take 20mm away to see how much it had grown.

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Examiner Comments

This answer scores all 3 marks. The candidate has included the idea of dividing the wheat plants into groups, adding different fertiliser solutions to each group and measuring the height after 30 days.

ResultsPlus
Examiner Tip

When devising a plan, check that you have written a clear step-by-step procedure.

Question 7 (a) (iii)

This was another question assessing practical skills in an applied situation. Candidates were required to state one variable the farmer should control when growing the wheat plants. Common creditworthy responses seen included light intensity, temperature and the volume of fertiliser. Some candidates misinterpreted the question and wrote about how to set up a control experiment, or they repeated information given in the stem of the question, such as the same height of plants.

State **one** variable that the farmer should control when growing these wheat plants.

(1)

the height the plants start at.

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Examiner Comments

This response does not score any marks.
Information in the stem of the question states that the wheat plants were 20 mm in height.

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Examiner Tip

Make sure that you read the entire question. You must state a different variable to any given within the question itself.

Question 7 (b)

This extended open-response question asked candidates to explain how plants protect themselves from being eaten by pests and against diseases caused by pathogens.

There are two aspects to this response; chemical defences and physical defences. A Level 1 response was awarded for any one piece of indicative content explained, or two relevant points identified. A Level 2 response was awarded for any two pieces of indicative content explained. Level 3 responses were characterised by three points of indicative content explained, covering both areas of indicative content. Many candidates were able to access Level 1, but achieving a higher level proved challenging for some because, although they identified relevant points from the indicative content, these were not explained.

***(b) Explain how plants protect themselves from being eaten by pests and against diseases caused by pathogens.**

(6)

Form their own protection to avoid being eater by pestiacdes,Hairs that grows on leaves.

Hairs on the branch and the leaves.
Poison on the leaves.
changes colour
~~wor~~ thorns
Smell
producing its own pesticide
extracting nutrients from the ground by having longer roots.
Having many leaves around it.

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Examiner Comments

In this response the candidate has listed some relevant points. This is a Level 1 response worth 2 marks. None of the points have been explained in terms of how they protect plants, for example, the thorns, poison on the leaves or the smell.

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Examiner Tip

Check that you have used scientific evidence to back up your answer. For example, you could explain that thorns deter pests.

*(b) Explain how plants protect themselves from being eaten by pests and against diseases caused by pathogens.

(6)

Plants use their leaves to protect themselves. They have chemicals that can be extracted from their leaves which will kill off any pests that try to eat them. They can also form a barrier layer which stops any diseases coming in contact with the actual plant to prevent any diseases from latching on and spreading.

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Examiner Comments

This is a Level 1 response and gains 2 marks. The candidate has explained one point correctly referring to chemicals that will kill off pests. There are no specific details of the barrier layer, for example, reference to a waxy cuticle, so no additional relevant points have been stated or explained.

Question 8 (a) (ii)

This question asked candidates to give a reason why cirrhosis is a non-communicable disease. Candidates found this question very accessible and a common creditworthy response was that cirrhosis cannot be passed on, or that it cannot be spread (from person to person). Correct responses seen less frequently included cirrhosis is not caused by pathogens, or that cirrhosis is not contagious.

Question 8 (b)

In this question, candidates were asked to explain why exercise can cause weight loss. The first marking point was gained for the idea that exercise requires energy. The idea of exercise burning calories was a common answer and this was given credit.The second mark was awarded for explaining that exercise reduces fats, or that the energy is obtained from fats. The suggestion of sweating was awarded a mark provided it was linked to the idea of water loss. The question was answered well, and many candidates scored at least 1 mark. Some candidates did not achieve marking point 2 as they only gave the idea that the energy in food intake was burned, rather than the idea of weight loss because fat already in the body was being lost. Using up stored glycogen was also accepted for marking point 2.

Explain why exercise can cause weight loss.

(2)

Because it allows the body to use up stored glycogen that, if not used up, turns into fat. If excercising this will not happen resulting in no weight gain.

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Examiner Comments

This response gains marking point 2 for the idea that stored glycogen is used up.

Explain why exercise can cause weight loss.

(2)

exercise causes muscles to engage and the heart rate to increase, this releases sweat sweat is also excreated, and it burns off past stored fat. energy (glucose) is used in respiration

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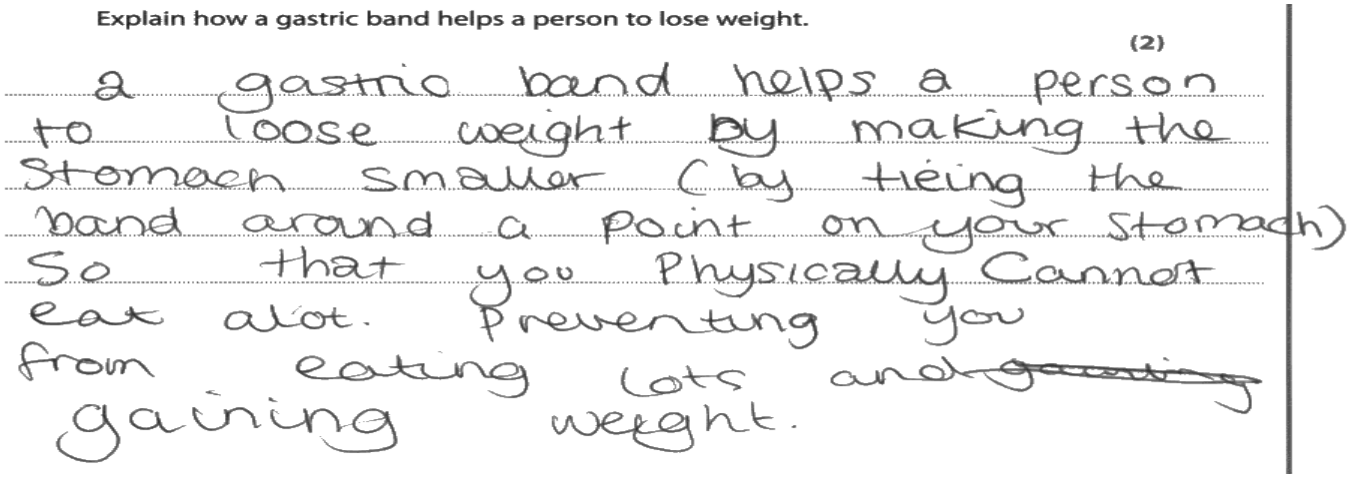
Examiner Comments

This answer scores the full 2 marks for the ideas that exercise uses energy and exercise burns off fat.

Question 8 (c)

This question required interpretation of the diagram that was given to the candidates, as well as the application of knowledge to an unfamiliar situation. Candidates were asked to explain how a gastric band helps a person to lose weight.

Marking point 1 was gained for reference to reducing the volume of the stomach. It was not awarded for the incorrect interpretation that the size of the entry to the stomach is reduced. Marking point 2 was gained for the idea of reduced food intake or restricting the amount of food entering the stomach; the basic idea of feeling full quicker was insufficient. Most candidates scored the full 2 marks by combining the idea of a smaller stomach volume with eating less. For marking point 3, few candidates recognised that stored fat must be used up to cause weight loss.



Explain how a gastric band helps a person to lose weight.

(2)

a gastric band helps a person to loose weight by making the stomach smaller (by tieing the band around a point on your stomach) so that you physically cannot eat alot. preventing you from eating lots and ~~gaining~~ gaining weight.

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Examiner Comments

In this response, the candidate has referred to the stomach being smaller and food intake being reduced. This scores the full 2 marks for marking points 1 and 2.

ResultsPlus
Examiner Tip

Think carefully about the structure of your answer. There is no need to repeat information from the stem of the question. Also try to avoid writing outside the space given for the answer to the question.

Question 8 (d) (i)

This question required a straightforward calculation of BMI with the additional maths skill of using significant figures. The correct answer, including the correct number of significant figures, scored the maximum 3 marks, and with no mathematical working shown. However, if the incorrect answer was given candidates were able to obtain some marks by substituting the correct numbers into the equation for marking point 1, and evaluating this equation to the incorrect number of significant figures for marking point 2. Furthermore, 2 marks were given for an evaluation without the correct number of significant figures and no workings shown. The answers of 21.977, 21.9 and 22 were seen most frequently and were awarded 2 marks. Note that an answer of 21.9 shows an error in rounding.

Calculate the BMI of male B.

Give the answer to 3 significant figures.

(3)

$$BMI = \frac{72\,kg}{(1.81)^2} = \frac{72}{3.62} = 19.889502\,76$$

BMI = 19.8

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Examiner Comments

This answer scores 1 mark for correctly substituting into the equation. The candidate has not evaluated correctly because height has been doubled instead of being squared.

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Examiner Tip

Remember to check equations carefully.

Question 8 (d) (ii)

In this question, candidates were required to interpret data given to conclude that 'male A' is overweight but not abdominally obese for marking point 1. In addition, answers that suggested male A is nearly abdominally obese were accepted. The explanation aspect for this question is that male A's weight distribution was not around his abdomen or vital organs. The idea that male A's weight was more evenly distributed or that he has more weight on his hips than waist was creditworthy. Some candidates demonstrated the misconception that because the data indicated that male A was only 0.05 away from 0.9 waist:hip ratio, male A had a large amount of abdominal fat. This response demonstrated a lack of understanding of waist:hip ratio, which is new for this specification.

Explain what the BMI and waist : hip ratio for male A shows about his weight distribution.

(2)

His BMI range is between 25.0 and 29.9 which shows he is overweight but not obese and his waist:hip ratio is 0.05 away from him being defined as abdominally obese.

ResultsPlus
Examiner Comments

This response scored 1 mark for commenting correctly on male A's BMI and waist:hip ratio. There needs to be a further comment about weight distribution to gain the second marking point.

(ii) Figure 10 shows the interpretation of BMI values.

BMI range	interpretation
below 18.5	underweight
18.5 – 24.9	normal
25.0 – 29.9	overweight
30.0 and above	obese

Figure 10

Males with a waist:hip ratio above 0.90 are defined as abdominally obese.

Explain what the BMI and waist:hip ratio for male A shows about his weight distribution.

(2)

The Bmi range shows that male A is in between 25 - 29.9 which shows he is overweight.

ResultsPlus
Examiner Comments

This response does not score any marks. The candidate has only commented on male A's BMI. There needs to be a comment about waist:hip ratio to access marking point 1.

Question 9 (a) (i)

In this question, the formula for calculating surface area was given and candidates were asked to calculate the surface area of chip B. Many candidates completed the mathematical calculation successfully and were awarded the full 2 marks for the correct answer, 48 or 48.0. The most common error seen related to the values XY, XZ and YZ being added together rather than the correct process of multiplying the values. Occasionally, candidates calculated the surface area of chip A, which was already given in Figure 12.

9 (a) Figure 11 shows two potato chips.

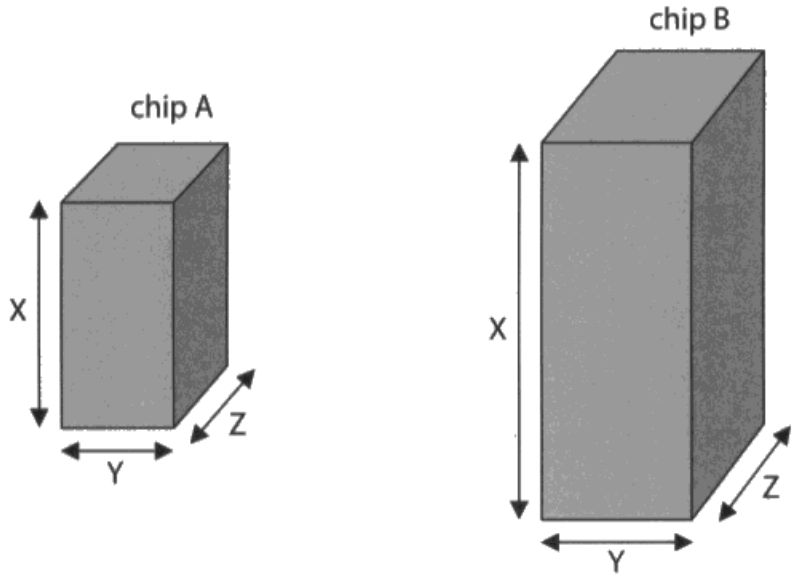


Figure 11

Figure 12 shows some information about each potato chip.

potato chip	length of X in cm	length of Y in cm	length of Z in cm	total surface area of four sides in cm²	total surface area of top and bottom in cm²	total surface area of chip in cm²
A	3.0	1.5	1.5	18.0	4.5	22.5
B	5.0	2.0	2.0	?	?	?

Figure 12

(i) Calculate the total surface area of potato chip B using the formula,

Total surface area = 2XY + 2XZ + 2YZ

(2)

$(2 \times 5 \times 2) + (2 \times 5 \times 2) + (2 \times 2 \times 2)$

$= 180$

total surface area = 180 cm²

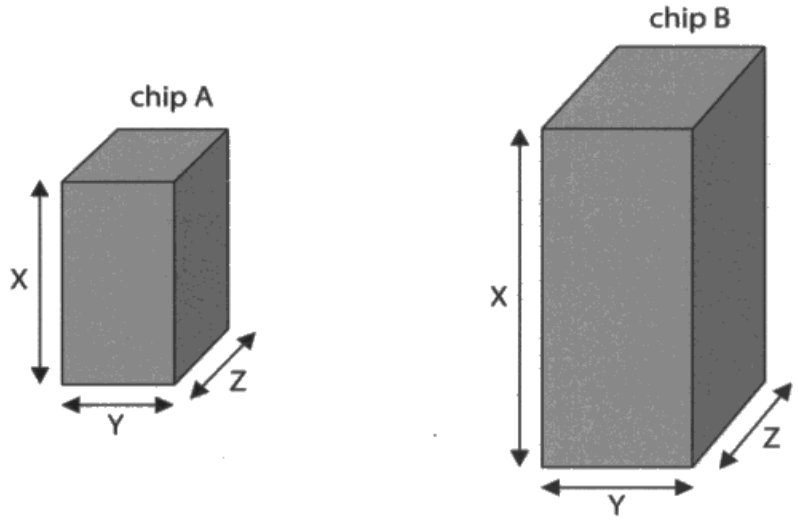
ResultsPlus
Examiner Comments

This answer scores 1 mark. The candidate has substituted into the formula correctly, but the evaluation is incorrect.

ResultsPlus
Examiner Tip

Always check your answers to maths questions.

9 (a) Figure 11 shows two potato chips.



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A	3.0	1.5	1.5	18.0	4.5	22.5
B	5.0	2.0	2.0	?	?	?

Figure 12

(i) Calculate the total surface area of potato chip B using the formula,

Total surface area = 2XY + 2XZ + 2YZ

(2)

4.5 2.25
2(3x1.5) + 2(3x1.5) + 2(1.5x1.5).

total surface area = 22.5 cm²

ResultsPlus
Examiner Comments

This response does not score any marks. The candidate has calculated the surface area of potato chip A instead of potato chip B.

Question 9 (a) (ii)

This question required candidates to provide an explanation as to why potato chip B had a greater increase in mass. For marking point 1, candidates needed to give a comparative idea for chip B, for example, that it had a larger, greater, bigger or more surface area. Many candidates could do this successfully. The idea of potato chip B having a higher solute concentration or lower water potential than chip A was also accepted. Answers which suggested a larger surface area:volume ratio were not accepted, because this is incorrect.

For marking point 2, candidates needed to refer to the idea that more water is going into potato chip B. Responses which indicated that chip B soaked up more water were accepted. Just the idea of water entering by osmosis was insufficient, as this also occurs in chip A as well. Candidates were less successful in giving an appropriate explanation.

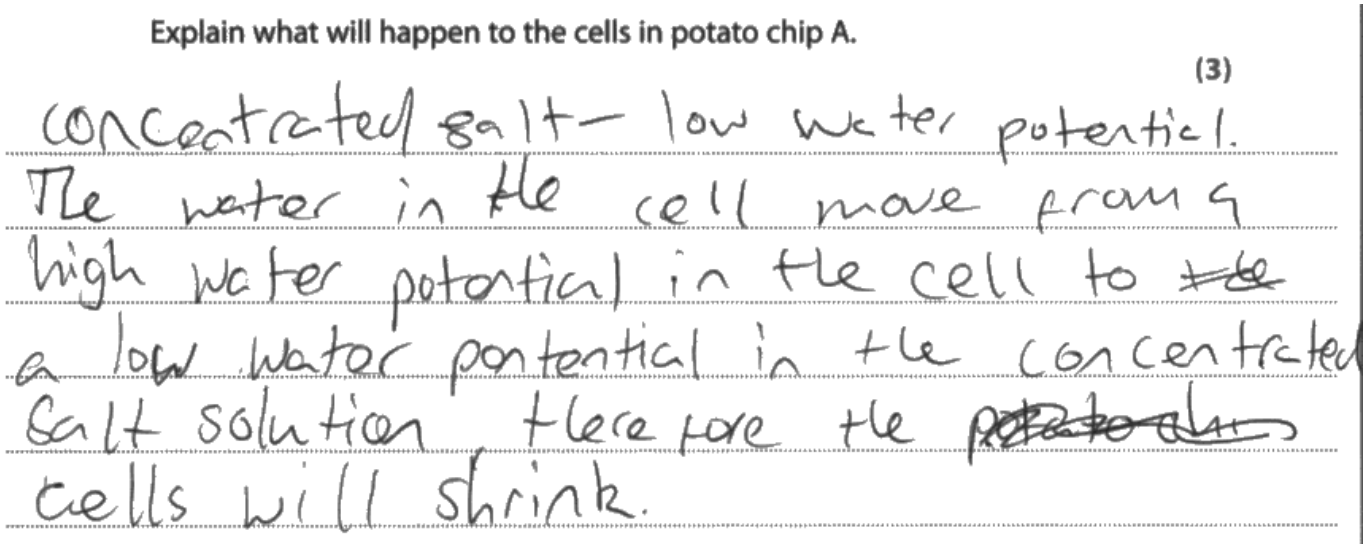
Question 9 (a) (iii)

In this question, candidates were required to explain what would happen to the cells of chip A if the chip was placed in a concentrated salt solution. This proved to be a very challenging question for many candidates. For marking point 1, candidates had to identify that the cells in chip A would lose water, become plasmolysed, get smaller, shrink or lose mass to gain marks on the linked explanation.

Marking point 2 was for osmosis; the use of the term 'diffusion' was ignored. Marking point 3 could be obtained by referring to the solute concentration gradient or the idea of water potential. Water concentration was accepted, as specific knowledge of water potential itself is not required, although candidates who used this concept were usually successful in obtaining full marks. Candidates who scored marks for this question were frequently successful in obtaining the full 3 marks.

Explain what will happen to the cells in potato chip A.

(3)



ResultsPlus
Examiner Comments

This answer scores 2 marks. There is a comment about cells shrinking for marking point 1 and a correct reference to water moving due to differences in water potential for marking point 3. Water movement by osmosis has not been mentioned, so marking point 2 has not been awarded.

ResultsPlus
Examiner Tip

Remember that water moves into and out of cells by osmosis.

Explain what will happen to the cells in potato chip A.

(3)

the Potato A will begin to lose mass due to the salt in the solution.

ResultsPlus
Examiner Comments

This response scores 1 mark for the idea that mass will be lost. The reference to salt solution is too vague to be creditworthy.

Question 9 (b)

This extended open-response question challenged candidates across the ability range. Candidates were asked to explain how two different varieties of potato plants could be selectively bred to produce new plants with characteristics of both.

There were three aspects to the question in terms of indicative content; the desirable characteristics of variety A and variety B, procedures for obtaining new plants and dealing with the outcomes of crossbreeding varieties A and B. A response was awarded Level 1 for stating some valid content from any one of these three areas. Repeating information from the stem of the question did not gain credit.

For Level 2, the response needed to include a good description of two areas from the indicative content. For Level 3, the response was required to give an explanation of selectively breeding potato plants A and B, covering all three areas of indicative content. Responses that were sufficiently structured and coherent gained the top mark at a particular level.

While some candidates had clear ideas about selective breeding, others confused the procedure with genetic engineering and thus gained little or no credit. Very few responses covered points from all three areas of indicative content.

Explain how selective breeding of the two varieties of potato plants can produce new potato plants that are all faster growing and produce many, large potatoes.

(6)

If you want to produce by selective breeding then you take the pollen from one plant and put it on another plant. So to get faster growing potatoes you simply take the pollen from plant variety B and put it in plant variety A and if you want larger growing ~~and produces~~ more potatoes than you simply take the pollen from variety plant A and put it in variety plant B.

ResultsPlus
Examiner Comments

This is a Level 2 response worth 4 marks. The candidate has included two areas of indicative content in this response. Firstly, there is a description of crossbreeding the two varieties of potato by transferring pollen from one plant to the other. Secondly, the candidate has correctly identified the desirable traits of variety A and variety B.

Question 10 (a) (i)

In this question, candidates were required to name the process that occurs as cells in plantlets develop into root cells. The marks were given for differentiation or specialisation. Candidates frequently gave tissue culture as the answer which referred to the method in Figure 15. Mitosis was also seen, but not worthy of any credit.

Question 10 (a) (ii)

This question asked for the advantages of producing plants by the method shown in the diagram. Marking point 1 was awarded for the idea that many plants could be produced, many plants from one parent or a higher yield of that plant. The idea of quicker needed to be clarified with the idea that sexual reproduction takes longer. Marking point 3 was awarded for the idea of genetically identical and the term clone was used frequently. This was often linked to the idea that the offspring would have the desired characteristics of the parent plant. Marks were also awarded for the idea of producing rare or endangered plants and for the idea of obtaining plants which are difficult to grow from seed. The idea that they can be grown all year round is not specific to this method and references to costs were ignored. The most common responses were the idea of producing many plants, that they were clones or that they will have the desired characteristics.

Question 10 (a) (iii)

This question asked why an autoclave was used to prepare the agar growth medium. The first mark was for the use of the term sterilise. Marking point 2 was for the idea of destroying bacteria, pathogens, fungi, microorganisms or that there was no contamination. The idea of preventing microorganisms getting into the agar was ignored. The final mark was for the idea that microorganisms would compete with the plants or use the nutrients from the agar. Where candidates knew what an autoclave was they frequently scored well on this question, but it was clear when they did not understand the science.

Question 10 (a) (iv)

This question asked for a reason why the leaves of one of the plantlets would be of a different colour. The plants are growing in identical conditions so environmental factors were not sufficient. The marks were given for mutation or affected by disease. The idea of a different allele would arise due to mutation was accepted alongside different genotype and genetic variation.

Question 10 (b) (i)

This is a practical question requiring candidates to describe the test to identify starch, which is one of the core practicals. The first mark was given for identifying the use of iodine solution, although iodine was accepted. The second mark was awarded for the expected positive result. This mark was awarded for blue-black or the idea of a darkening of the colour of the iodine solution, for example, light to a dark brown, as this is what is observed in the core practical investigating the effect of pH on the enzyme amylase.

(b) Crop plants provide a source of energy in the form of carbohydrates such as starch and sugars.

(i) Describe the test to identify starch.

(2)

The Iodine test, when you add Iodine to the plant and the color indicates if there's Starch

ResultsPlus
Examiner Comments

This answer scores 1 mark for stating that iodine should be used to test for starch.

ResultsPlus
Examiner Tip

Remember to state that iodine solution turns blue-black if starch is present.

Question 10 (b) (ii)

This question asked candidates to explain why a calorimeter has a lid. Marking point 1 was awarded for the idea of reducing energy loss, keeping the heat in, preventing energy escaping or heat escaping. Preventing evaporation or water loss was also awarded the mark and two marks were given if this was linked to the idea of maintaining a constant volume of water. The lid ensured the results are accurate or similar comments were also accepted for marking point 2. Comments referring to fair testing were not creditworthy.

Explain why the calorimeter has a lid.

(2)

So that none of the heat can escape and to make sure the ~~temp~~ energy stays in ~~so the results are accurate~~. to make sure that the results are accurate.

ResultsPlus
Examiner Comments

This answer scores the full 2 marks. The candidate has stated that the lid prevents heat loss and understands that this will ensure the results are accurate.

Question 10 (b) (iii)

This question required candidates to give a reason for stirring the water in the calorimeter. Candidates had to give the idea of the temperature being constant throughout the water, or that the heat was evenly distributed. Some incorrect answers stated that the temperature of the water stays constant throughout the investigation. Energy as an alternative to heat was accepted. Answers that just referred to keeping the water moving were not credited.

(iii) State why it is important to stir the water in the calorimeter.

(1)

so that the heat is evenly distributed.

ResultsPlus
Examiner Comments

This response scores 1 mark as it states that stirring the water will distribute the heat evenly.

Paper Summary

Overall Performance

Many candidates were able to demonstrate a good level of knowledge in the questions related to pathogens, the eye and non-communicable diseases.

In Question 5, many candidates demonstrated their skills in completing the graph and interpreting the data.

However, the questions related to osmosis challenged candidates across the ability range; many were able to interpret the data given in the question but could not then go on to apply their knowledge of osmosis sufficiently well to explain the results.

Most candidates were able to access the two extended open-response question, but with varying degrees of success. In the first of these questions, candidates were able to demonstrate some good knowledge of plant defences, but explanations of how these mechanisms protected plants were often less clear. In the second extended open-response question candidates often demonstrated a clear understanding of selective breeding but applying their knowledge to an unfamiliar context generally proved to be very challenging.

The assessment of practical skills in the new qualification has replaced the controlled assessment component of the previous specification. The use of equipment and how to improve or plan practical tasks make up a significant number of marks on the papers, so it is essential that candidates are exposed to, and experience, the practical side of the qualification. Candidates of all abilities were able to answer questions using their practical skills knowledge with varying degrees of success, including questions on safety precautions and the identification of controlled variables. Many candidates were able to recall methods including the test for starch. Candidates were less successful at writing methods, such as in the question investigating fertilisers, but many were familiar with appropriate safety precautions.

Candidates were able to analyse data to give a conclusion to the enzyme investigation, but only more able candidates were able to explain their conclusion using scientific ideas.

Candidates of all abilities were able to access the more straightforward maths questions, including calculating BMI and the surface area of a cuboid using a given formula. In general, the calculation of a ratio was much more challenging. Candidates should check whether they have been asked to 'describe' or 'explain' interpretations of data, such as in the question on BMI and waist:hip ratios.

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

- Recognise that the word 'explain' means 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:

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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