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Examiners' Report
June 2018

GCSE Biology 1BI0 2F

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Introduction

Paper 1BI0_2F is taken by candidates doing GCSE biology as part of a linear assessment model at the end of the course. This was the first paper for the new specification. The paper consists of 100 marks assessed by a variety of questions including multiple choice, short answer and two extended answer questions worth 6 marks each. Candidates should answer all questions in a time period of 1 hour and 45 minutes. In the extended answer questions marks are also awarded for the ability to structure a response logically; these questions are marked with an asterisk (*). In addition, the new specification assesses practical knowledge and mathematical skills in the papers. These requirements are given in the specification and there are 8 core practical investigations which candidates must complete prior to the exam. Aspects of working scientifically were also assessed in questions throughout the paper.

The paper contained questions assessing the content from topic 1 and topics 6 - 9: enzyme action and specificity, cell structure, endocrine organs, the role of insulin and diabetes, the role of blood plasma, heart structure, oxygen absorption related to exercise, the urinary system, and urine production, the role of nitrate ions in plants, root hair cells, leaf structure, decomposition, energy pyramids and population dynamics. The two six-mark questions covered dialysis and transport of water and sucrose in plants. Questions on practical work included writing a plan for an investigation, safety precautions including aseptic techniques, using a microscope, controlled variables and the method and analysis of results for the practical testing of the elasticity of an artery. The maths skills assessed included interpreting graphs, magnification, surface area and percentage increase calculations.

The assessment of practical in examinations has replaced the controlled assessment component of the previous specification. Candidates were able to answer questions using their practical skills knowledge including questions on safety precautions and the identification of controlled variables. However, candidates need to ensure they use terms including volume and mass accurately. Candidates were able to recall practical methods including the use of quadrats to investigate populations and the elasticity of the artery although recalling accurately the reagent and result for testing for glucose was more challenging. Candidates also were successful in completing a method to test a hypothesis and suggesting variables that need to be controlled.

There were several questions where candidates needed to apply their knowledge to situations that may be new to them, but in these cases all the required information needed to lead candidates to the required responses were supplied in the stems of the questions and items. Candidates could benefit from practising reading the stem and considering which parts are key to stimulate the connections to areas of the specification covered. It was pleasing to see examples where candidates had underlined the command words and key words in the given information. Overall it was felt that these candidates gave a more targeted and balanced response than average.

The more straightforward questions where marks could be gained by interpreting given information were answered well although it was pleasing to see some excellent, coherent answers accurately applying germane scientific terminology to all items that required extended prose. It was encouraging that some candidates used the scaffolding provided to guide their responses. Even when candidates scored low or no marks there was clear use by a reasonable number of candidates of the diagrams, graphs and information in the stem of the question to guide their responses. A good example of this would be 7(c), the kidney dialysis six-mark question. There was an emphasis in a range of items on applying knowledge with a pleasing number of candidates clearly showing an understanding of the response required where the command word explain was used. However, too many candidates could still not develop their responses into a logical specific set of points that answered the question. A considerable number of candidates found it hard to answer the question, often reproducing stock answers related to the topic or based on key words

used instead of addressing the construct of the question. It was also not uncommon to see a question using the command word describe being extended to include an explanation.

The number of blank responses seen was in line with expectations on early questions but there was a notable increase in the number of candidates who stopped answering all, or those questions requiring written responses, from question 7 onwards.

The majority of candidates were able to describe trends in graphs and the mathematical items were answered well by many candidates although they were less able to express their answer in the format requested, for example in standard form or to a set number of decimal places. Candidates were more successful in calculating the percentage decrease in item 3(b)(i) than calculating the percentage increase in item 10(b)(i). This could be due to the difference in the level of scaffolding between the two exercises.

Question 1 (b)

This question gave rise to a range of answers and therefore range of marks awarded. Whilst many responses mentioned insulin, a significant proportion clearly did not understand its role fully with answers including vague statements which lacked scientific language which as a result were often not creditworthy. The inclusion of a graph, which should have helped candidates, seemed to confuse them rather than being used as a tool to help craft a good answer. Some took the clue from the graph about insulin but made completely incorrect statements about it, such as that glucose would break down into insulin.

(b) Figure 1 shows the blood glucose and blood insulin concentration for a healthy person during one day.

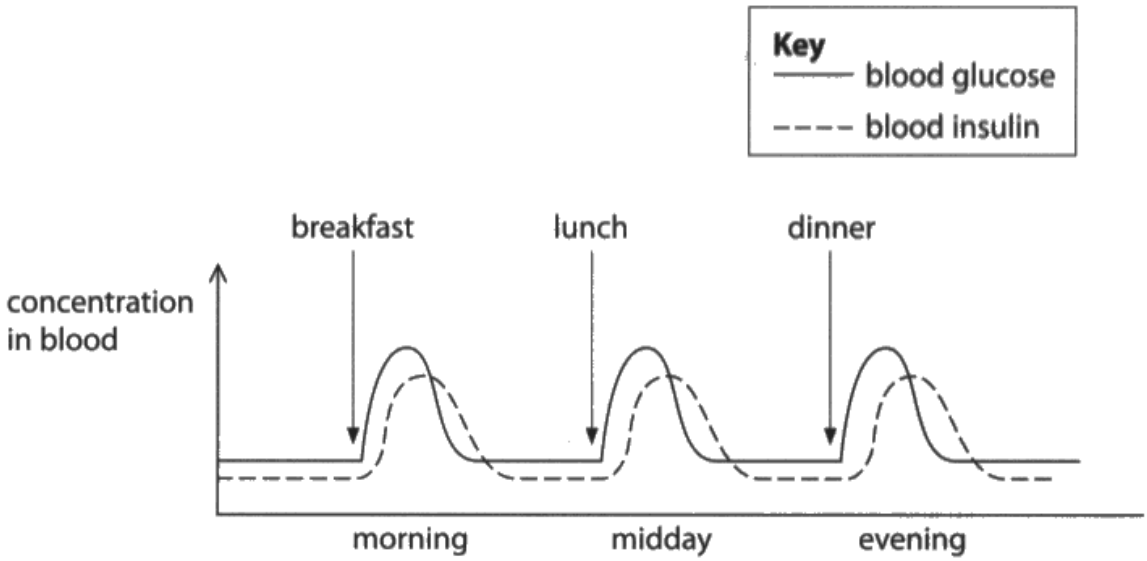

Figure 1

The blood glucose concentration increases after a meal.

Explain why the blood glucose concentration then decreases.

(2)

The blood glucose decreases because all the glucose is being transfered into insulin and stored in the liver.

ResultsPlus
Examiner Comments

This candidate knows that glucose transferred into the liver, for which they receive credit, although they lack the details regarding how it is stored to be awarded more than one mark. It is possible that the candidate has interpreted the graph for their comments about glucose being transferred into insulin.

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Examiner Tip

Use all the information in the stem of the question coupled with your own knowledge to answer the questions set.

Question 1 (c)

This item required candidates to state the cause of type 1 diabetes. Many candidates confused type 1 with type 2 diabetes with credit being awarded for it is inherited, it is genetic or simply, you get it from your parents.

(c) State **one** cause of type 1 diabetes.

(1)

Sugar.

ResultsPlus
Examiner Comments

Many candidates confused the reasons for type one and type two diabetes.

ResultsPlus
Examiner Tip

Try to write more than one word to answer even simple questions. This answer is incorrect, but does the candidate mean any sugar, some, too much or maybe a lack of it?

Question 1 (d)

Most candidates that gained marks here stated that controlling the diet will reduce the sugar eaten with some extending this to answer this explain question by saying that low amounts of sugar will either keep the blood glucose level lower or that if you lose weight type 2 diabetics can respond to any insulin produced better. Some candidates stated that this would change or control what is eaten which was considered to be too vague for credit.

Question 1 (e)

This item assessed candidate's ability to control variables in an investigation, in this case selecting people in a clinical trial. It was pleasing to see that candidates had a good idea of what was required to be given credit, with weight/BMI, age, gender and health being commonly seen creditable responses with some marks being lost by candidates stating height often when weight had been given as the first answer, presumably because these two are used in calculating BMI.

Question 2 (a)

This fill in the gaps question from the list of words supplied allowed most candidates to gain one of the two marks available with the two answers, smaller (surface area) and diffusion being seen in roughly equal amounts. Almost as many candidates gained both marks available.

Question 2 (b) (i)

For credit, candidates had to interpret the graph showing that oxygen consumption increases with running speed until a speed of 12km per hour with a generous range of 10 to 13km per hour being allowed, after which speed the oxygen consumption stays the same. Candidates lost marks by not being specific, for example, stating it goes up. Some candidates wrote that after 12km per hour there was no oxygen consumption. It was fortunate for most of these candidates that they had already gained the two marks available by stating the former two marking points.

Question 2 (b) (iii)

It was disappointing that many candidates could not gain credit on this item with inaccurate reasons for producing lactic acid including: as sweat to help cool you down, allow you to keep running faster and faster, toburn fat, lubricate joints and muscles and to break down glucose. Creditworthy responses were approximately equally likely to mention either anaerobic respiration or a lack of oxygen but rarely both.

(iii) Explain why the athlete produces lactic acid when running at 14 km per hour.

(2)

Because it helps the athlete to keep his temperature down, so he does not overheat. It also helps the ~~runner~~ athlete to move more smoothly as the lactic acid helps muscles and joints.

ResultsPlus
Examiner Comments

Common incorrect responses suggested that lactic acid was beneficial, e.g. linked lactic acid to sweating, as implied by this candidate; or as they also suggest, helping muscles and joints move more effectively .

Question 3 (b) (i)

To gain marks, candidates needed to extract data from the table of data to calculate the percentage decrease in mass of leaves caused by decomposition at 85°C. The vast majority of candidates who could calculate the percentage decrease also gained the second mark which was for writing the answer to two significant figures. The common error was to divide the final mass by the starting mass instead of using the decrease in mass, all three of which were given in the table.

Question 3 (b) (ii)

It was pleasing to see most candidates scoring on this explain question with a clear majority giving a reason to justify their choice of temperatures. If 55°C was not given, then marking points 2 and 3 could not be awarded as they were invalid for the other temperatures in the table. Candidates that only gained one mark either stated that this was because these leaves had the highest decrease in mass rather than the highest percentage decrease in mass. Marking point 3 was a less common response seen.

Question 3 (b) (iii)

This item again assessed the candidate's ability to improve practical procedures, here, in the context of the leaf decomposition investigation. Again, it was pleasing to see that candidates understood what was required of them with many stating leave for more time, check the mass every few days, have more temperatures around 55°C and use the same type of leaves for each temperature. Incorrect answers included a shorter time period and start all with the same mass. The latter was not credited as this was why the percentage decrease had been calculated.

(iii) State **two** improvements to the method for this investigation.

(2)

1 DO 1 temperature more than once

2 use a ~~stopwatch~~ clock to time accurately.

ResultsPlus
Examiner Comments

Repeating an investigation may increase the data on which to base a conclusion but we do not credit it as an improvement to an experimental procedure, although it may be credited if the candidate is asked to write a plan.

ResultsPlus
Examiner Tip

Make your improvements reasonable. Here the leaves were left for 25 days and so using a clock is not very helpful.

Question 4 (b) (i)

A large number of candidates showed good mathematical skills, showing clear working out and gaining 2 marks. These, however were in the minority with most candidates struggling to correctly work out the surface to volume ratio of the root hair cell.

Common sources of error included dividing the surface area by the volume, or multiplying the two figures. A large number of candidates employed a process of progressively dividing down both numbers. Some made errors in dividing, but many stopped too soon when they reached an odd number (because they didn't think to try dividing by a number other than 2 or 10) or at some arbitrary point.

(b) Figure 8 shows part of a root as seen using a light microscope.

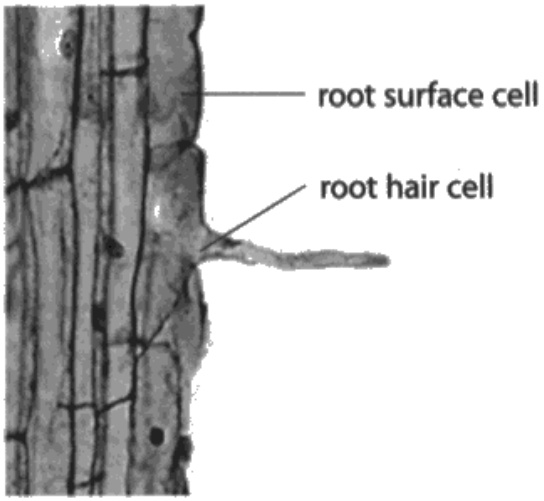

Figure 8

Figure 9 shows information about the two types of cell labelled in Figure 8.

type of cell	surface area in μm²	volume in μm³	surface area to volume ratio
root surface cell	5000	250000	1:50
root hair cell	36000	288000	?

Figure 9

(i) Calculate the surface area to volume ratio of the root hair cell.

(2)

288000 ÷ 36000 = 8

1 : 8

ResultsPlus
Examiner Comments

Relatively few candidates managed to correctly calculate the ratio 1:8. This candidate has gained two valuable marks by doing so.

Question 4 (b) (ii)

This item required candidates to explain the benefit to plants of having root hair cells and so just stating that root hair cells absorb water or mineral salts was not enough for crediting marking point two, although if marking point one had been given then the more in marking point two could be taken as implicit e.g. the root hair cells increase the surface area for absorbing water.A limited number of responses referring to root hairs providing anchorage were credited. Common misconceptions were that root hair cells act as a form of protection i.e. from bacteria or disease, insulate the root or act as a point for light to enter the plant

(ii) Explain the benefit to the plant of having root hair cells.

(2)

It will help the plant to absorb more water and helps in growth as well.

ResultsPlus
Examiner Comments

This candidate gives the benefit to the plant gaining one mark but this is an explain question and so requires a reason to show how the structure of root hair cells allow more water to be absorbed.

ResultsPlus
Examiner Tip

This response states the benefit of absorbing more water but if the command word is explain, make sure you give a reason to back up the benefit you state.

Question 4 (c)

This item was another explain question that required interpreting the trend in the graph to make the judgement that the number of algae increased for further marking points to be awarded. Again, reasons did require an idea of more, e.g. between February and June light/temperature or mineral ions increase for credit to be given. This could be gained simply by saying it is warmer in June to be awarded marking point 2 which was the commonest reason seen with few developing this to explain that more light means more photosynthesis will occur.

Question 5 (b) (i)

The first steps in an investigation into how the concentration of oxygen affected an enzyme-controlled reaction were given. To gain marks candidates had to complete the method by saying that the enzyme had to be added for marking point 1 and to measure the length of time or brightness of the glow caused by the light emitting reaction. It was pleasing to see that candidates could work their way through the investigation plan and added the enzyme in either step 1 or 2. Many candidates then mixed the solutions which although valid was not credited as allowing it would not answer the question; that needed add enzyme and measure the 'glow' to see the effect of changing the oxygen concentration.

(b) Female glow-worms have an enzyme called luciferase.
The glow is produced when this enzyme catalyses a reaction between oxygen and a protein.

A scientist devised a plan to investigate the effect of oxygen concentration on this reaction.

The scientist had:

- five flasks of water each with a different concentration of dissolved oxygen
- a solution of the protein
- a solution of the enzyme.

The first step of this plan is:

Step 1. Add some of the protein solution to each of the five flasks.

(i) Describe the next **two** steps that should be in this plan to obtain results for this investigation.

(2)

Step 2 Add the solution of the enzyme into each of the five flasks.

Step 3 ~~keep oxygen and water~~ Keep records and information when using the different concentration of dissolved oxygen.

ResultsPlus
Examiner Comments

Step 2 gains one mark. This could be credited as step 3 if the candidate wrote something like 'mix the solutions by swirling the flask as step 2.'

ResultsPlus
Examiner Tip

Be specific. Here step 2 is specific, thereby gaining a mark, but step 3 is vague. Ask yourself, in the planning an investigation tasks, 'if i was told to do this in a lesson, would I clearly know exactly what to do?'

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- a solution of the enzyme.

The first step of this plan is:

Step 1. Add some of the protein solution to each of the five flasks.

(i) Describe the next **two** steps that should be in this plan to obtain results for this investigation.

(2)

Step 2 Add some solution of the enzyme to the solution, ensuring all the measurements are the same.

Step 3 Measure the amount of 'glow' produced by each flask and create a conclusion.

ResultsPlus
Examiner Comments

A good response gaining both available marks.

ResultsPlus
Examiner Tip

Step 2 and 3 gain credit. If you are asked how you could measure the reaction as you are here, look in the stem of the question for the end result. Here the end result is producing light so any way of measuring how much light is produced would gain credit, e.g. measure the amount of glow is just creditable; the brightness or light intensity of the glow would be better or you could say 'measure how long the glow lasts'.

Question 5 (b) (iii)

This question stated that the best pH for the enzyme-controlled reaction was pH 8 and asked why the enzyme activity would reduce at pH 5. Many candidates just stated that pH 5 was not the best which was just restating the question or that pH 5 was lower than pH8 which was also not creditworthy. Some also wrongly stated that pH 8 was acidic and that pH 5 was alkaline with others referring to pH 5 being the wrong temperature. Some excellent responses were seen explaining that the optimum pH of 8 was alkaline and as pH 5 was acidic the active site would change shape, often coupled with the technical term denatured, making it less easy to bind with the substrate.

(iii) The enzyme luciferase works best at pH 8.

Explain why the activity of the enzyme decreases at pH 5.

(2)

As enzymes work best at pH8 which is the optimum ph for the enzyme to work best it decreases as pH5 as the rate of reaction with increase as the ph reaches its optimum pH level.

ResultsPlus
Examiner Comments

Another example of an explain question which is not developed to give a reason but restates the stem of the question.

ResultsPlus
Examiner Tip

Don't waste time copying out the stem but do use key words. For enzymes optimum is a key word which is where this response gains one mark. Other key words are active site and denatured. If the candidate had said that at pH 5 the enzyme was denatured, they would have gained the second mark.

Question 5 (c) (i)

A significant number of candidates gained maximum marks in this question for combinations of various marking points. In terms of describing the procedures for practical investigations and applications this item was well answered suggesting most candidates have had experience of sampling populations using quadrats. Most candidates understood that a quadrat needed to be used, although a substantial proportion did not state the term required missing out on marking point one with descriptions such as a metal square, grid, and quadrant or simply incorrectly saying punnet square. Most were able to state that the sampling must be done randomly with several samples taken, but the range of descriptions was large with some showing greater clarity than others. There was a very limited understanding of how to calculate the mean number from the information given with most describing how to work out an estimate of a total number instead.

(c) Female glow-worms are found attached to grass plants in a large field.

(i) Describe a sampling technique to find the **mean** number of female glow-worms in 1 m^2 of the field.

(3)

Using a transet line across the feild we could randomly place quadrats along the line. Count all of the glow worms we find in each quadrat and then dividing this number of glow worms between how many quadrats we had will give us a mean number of female glow worms

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Examiner Comments

A full answer gaining three marks with all 5 possible marking points.

ResultsPlus
Examiner Tip

This is based on a core practical. Make sure that you know each of the core practicals inside out.

Question 5 (c) (ii)

This simple calculation of the number of female glow worms in the field was well done with the majority of candidates gaining the one mark available.

Question 6 (a) (ii)

This mathematical skills question required candidates to interpret the bars in a histogram to state that the palisade mesophyll layer of a cell produced more glucose than the spongy mesophyll layer. The majority of candidates gained this mark with about one quarter of these quantifying their answer by either stating that the spongy mesophyll produced 14mg more glucose per hour or 2.75 times more glucose produced, the latter being gained by more simply saying more than two times or less than three times glucose being produced. The majority of candidates that tried to quantify their answer gained a mark with errors mainly due to misreading the scale thus stating the increase incorrectly.

(ii) Figure 13 shows the mass of glucose produced in each layer of a leaf per hour.

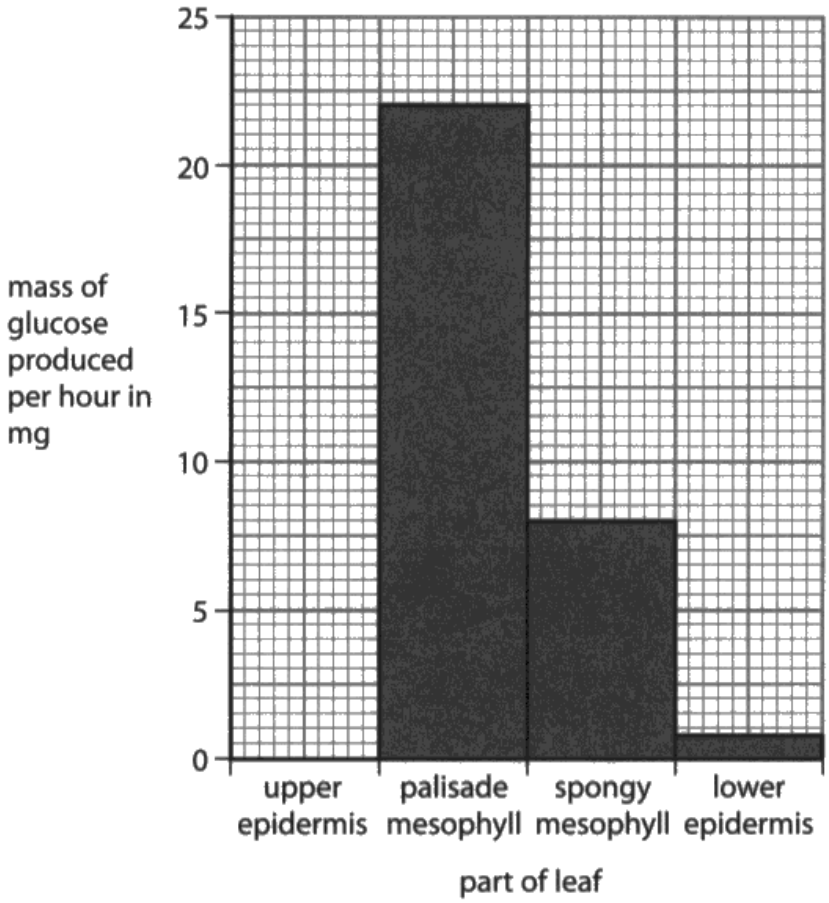

Figure 13

Describe the difference in the mass of glucose produced per hour in the palisade mesophyll and the mass of glucose produced in the spongy mesophyll shown in Figure 13.

(2)

In the palisade mesophyll there is more than double the amount of glucose produced per hour, and in the spongy mesophyll there is less glucose produced per hour

ResultsPlus
Examiner Comments

A full answer gaining both marks.

ResultsPlus
Examiner Tip

When presented with two marks for describing two bits of information in a graph, or table, manipulate the numbers. Here a take away sum saying that 14mg more glucose is produced in the palisade cell gets both marks available, one for more and one for the amount. The other way is to say how many times more glucose is produced. You can divide the larger number by the smaller and state that but this candidate has just been given credit for an even more general statement of 'more than double' the amount of glucose.

Question 6 (b)

This item was another graph interpretation question which required the first marking point of each pair to be awarded to allow the second to be considered. The two available marks could be gained by either saying light intensity is at its highest intensity, so more photosynthesis occurs or that a greater rate of photosynthesis occurring will mean that oxygen will move out of the leaf by diffusion. The majority of candidates that scored marks here gained them by addressing the former pair of points with more candidates gaining the increased light intensity for one mark than those that qualified it to gain the increased photosynthesis marking point.

Question 6 (c) (ii)

It was clear from the answers that candidates were familiar with the core practical on food tests, although it was disappointing that very few could correctly state Benedict's as the reagent to test for glucose with only a few of these able to give a correct resultant colour. 'Iodine' and 'turn black' were the common errors.

(ii) Describe a test for glucose.

(2)

~~iodine~~ have ethanol solution present it will turn milky or cloudy if glucose is present.

ResultsPlus
Examiner Comments

The vast majority of candidates knew a food test, but like this candidate did not know which one to use for glucose.

ResultsPlus
Examiner Tip

Learn the details of the food tests - one of the core practicals - but make sure you know which food each tests for. Here the candidate has used the lipid/fat test to test for glucose.

(ii) Describe a test for glucose.

(2)

Benedicts reagent is added to food in a boiling tube, then placed in a water bath at 75°C colour indicates result. blue green yellow orange red. (low-high)

ResultsPlus
Examiner Comments

A rare full answer that describes the correct food test including a detailed description of a positive result for the presence of glucose.

ResultsPlus
Examiner Tip

Learn the core practicals as well as those that are recommended in the specification.

Question 6 (d)

Candidates needed to match the chain of glucose molecules to the enzyme and thereby work out that the enzyme was amylase or carbohydrase. This item was targeted at higher grade foundation candidates, but it was still a disappointing number of candidates who managed to gain the available mark. Many candidates could not access the question with very few naming an enzyme; insulin being a commonly seen incorrect substance although blood cells were also regularly given as answers. Some candidates managed to match the chain of glucose molecules with the enzyme giving this as their answer to the question.

Question 7 (a)

This question required the candidates to correctly identify structures P, the ureter and Q the bladder. It was pleasing that the majority of candidates could score at least 1 mark here with the bladder being more often identified than the ureter. A few candidates stated that the ureter was the urethra, but many answers were given from the heart to the digestive system.

Question 7 (b) (i)

This item required candidates to apply their knowledge about how substances move from blood plasma into the nephron to explain the difference in protein concentration in blood plasma and the filtrate. Candidates could use data from the table to state that no protein passed into the filtrate but found explaining this by saying that it was because the proteins were too large to cross the membranes very challenging with some just stating there is no protein in the filtrate because it can't get into the nephron.

Question 7 (b) (ii)

To gain marks on this question, Candidates had to recall how glucose moves into the bowman's capsule by ultrafiltration. Very few candidates managed to score more than one of the three marks available with the majority of these stating that the glucose moved across a membrane. Candidates did not use technical terminology like ultrafiltration and used the idea of under pressure too vaguely for credit. It was not uncommon to see ideas of blood cells carrying the glucose through the membrane.

(ii) Explain how glucose moves from the blood plasma into the nephron.

(3)

The Glucose moves to the glomerulus. where then mass ~~to~~ to the Bowmans capsule. The glucose is reabsorbed and stored in the ~~ovaries~~ liver.

ResultsPlus
Examiner Comments

Candidates found this a challenging task but some, like this one, gained a mark for stating the glucose moves from the glomerulus to the bowman's capsule.

ResultsPlus
Examiner Tip

Learn the names of the structures involved in the areas of the specification and use them in your answers.

Question 7 (c)

For this item, the first of the six-mark questions, candidates were supplied with a comprehensive diagram showing someone undergoing dialysis. Although some pleasing answers were seen that used the scaffolding supplied in the diagram to explain how dialysis occurs many candidates could simply describe that blood is taken out of the arm, pumped around the dialysis machine and then the clean blood was pumped back into the body or that urea or alcohol were removed from the blood. Candidates who gained level 2 or 3 could state both of these ideas and that the urea moved across the membrane into the dialysis fluid although complete answers with this degree of detail were rare. A common error was that the dialysis fluid was pumped into the arm, cleaned the body and then came out again and went into the used dialysis solution bottle. Although these latter candidates did not score any marks unless they mentioned urea or alcohol being removed, their answer did show that they were interpreting the diagram.

*(c) Figure 18 shows a patient undergoing kidney dialysis.

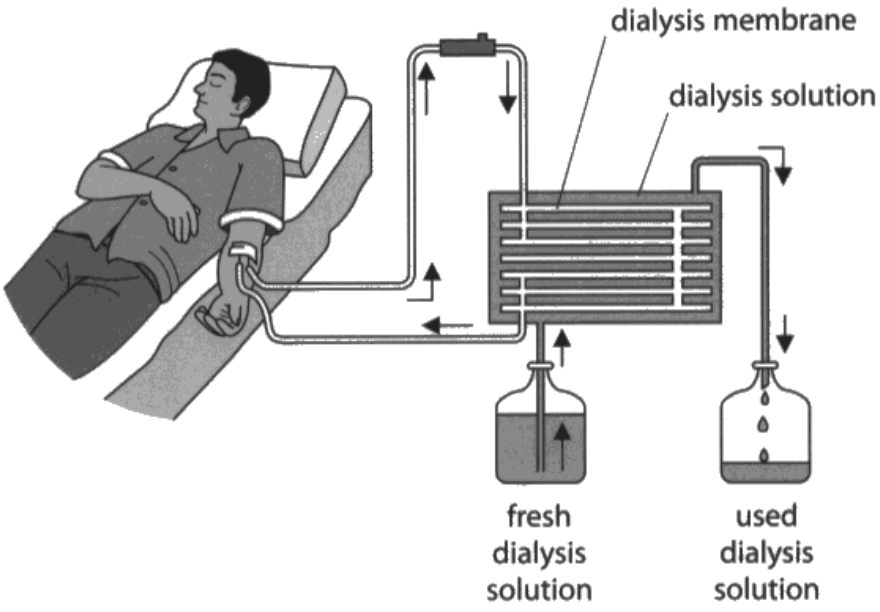

Figure 18

Describe how dialysis removes unwanted substances from the blood.

Include examples of unwanted substances in your answer.

(6)

The blood exits the body and moves into the dialysis machine. This is usally because their kidney dosent work because it failed. The dialysis machine has a semipermiable membrane that allows toxins (such as ions and acids) to diffuse out in to the dialysis solution. The dialysis solution is the clean out and fresh dialysis solution is added. This process could take a up hour because of the toxins build up with in the week. the patients without working. After the blood is cleaned from toxins the blood re enters back into the patients body because it is now clean.

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Examiner Comments

A good answer showing an understanding of how dialysis works with a well-developed structure that is clear, coherent and logical. Ironically, this candidate who scores all the marks available, left out urea or alcohol which is how many candidates got their 2 marks.

*(c) Figure 18 shows a patient undergoing kidney dialysis.

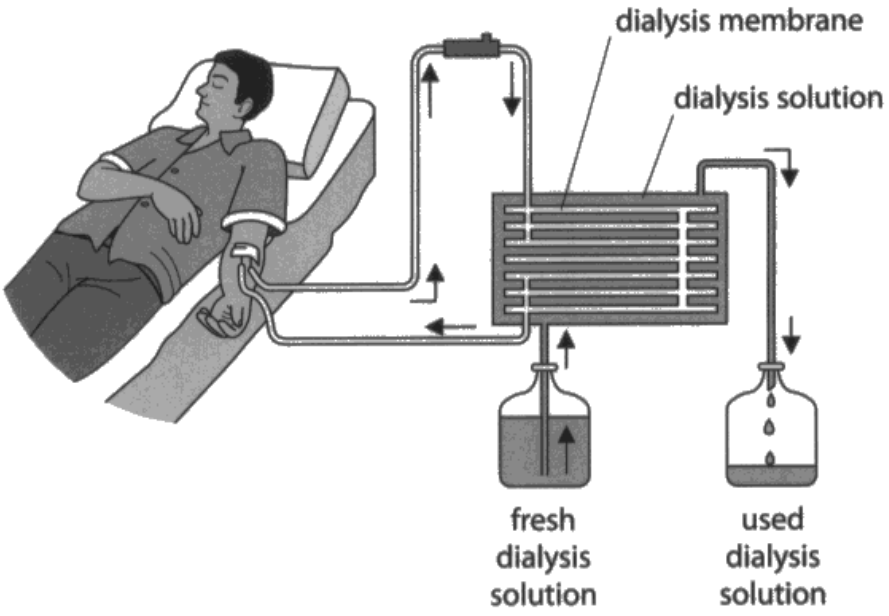


Figure 18

Describe how dialysis removes unwanted substances from the blood.

Include examples of unwanted substances in your answer.

(6)

~~The to~~ When your body is unable to ~~process the waste and glucose~~ use the urinary system, a dialysis is used. A dialysis takes the substance such as urea out of your blood. ~~and~~ The dialysis solution enters your blood stream. ~~through the tube and which~~ is The dialysis is full of a glucose and water solution and transport all a balance the nutrition to your body. What's left in your body is the urea which is then transported out with ~~any left over~~ the used dialysis solution.

ResultsPlus
Examiner Comments

This response is inaccurate but does show that the candidate knows that urea is removed by the kidneys and so is awarded level 1 and as the responses meets the written communication criteria, gets 2 marks.

Question 8 (a) (ii)

It was pleasing to note than the majority of candidates were able to access this mathematical challenge and correctly apply the magnification calculation. Common errors were dividing the actual size of the cell by the magnification rather than multiplying it.

(ii) The actual length of the red blood cell from a turtle is 20.5 µm.

Calculate the length of the magnified image of the red blood cell of the turtle when magnified 400×.

(2)

400 x 20.5 = 8200

8200 ..... µm

ResultsPlus
Examiner Comments

It was pleasing to see many answers like this one.

ResultsPlus
Examiner Tip

Learn the equation for magnification but if you can't remember it, use your common sense. The image is larger than the actual red blood cell so you must have to multiply the two numbers.

Question 8 (a) (iii)

This magnification calculation also required candidates to convert their answer into standard form. Several candidates calculated the correct response but missed the instruction to present their answer in standard form so therefore lost 1 mark.

(iii) The width of the human red blood cell, when magnified 400×, is 3.08 mm.

Calculate the actual width of the cell and show your answer in standard form.

(2)

7.7 mm

ResultsPlus
Examiner Comments

This candidate has the correct digits so presumably calculated the width correctly but has expressed it incorrectly.

ResultsPlus
Examiner Tip

Always show your working. The correct answer is 7.7×10^{-3}. Writing 7.7 implies that they calculated the sum correctly but did not write it down correctly. If working was shown, this candidate would most likely have gained a valuable mark.

Also look at your answer and ask yourself 'does this seem reasonable?' If red blood cells were 7.7mm wide, then we wouldn't need a microscope to see them.

Question 8 (b) (i)

This is one of the new style of questions on planning an experiment. The experiment may be a required practical or, as in this case, one of the suggested practical tasks. A significant number of candidates failed to score as they spoke generally about stretching the artery, which merely repeated the stem of the question. The majority of candidates stated that masses had to be added to cause the stretching and many of these extended the response to include measuring the original size and removing the masses and remeasuring the artery. The disparity in responses between centres may reflect that some had not carried out this suggested practical task.

(b) Red blood cells are carried in veins and arteries.

Figure 20 shows the equipment used to measure the elasticity of an artery.

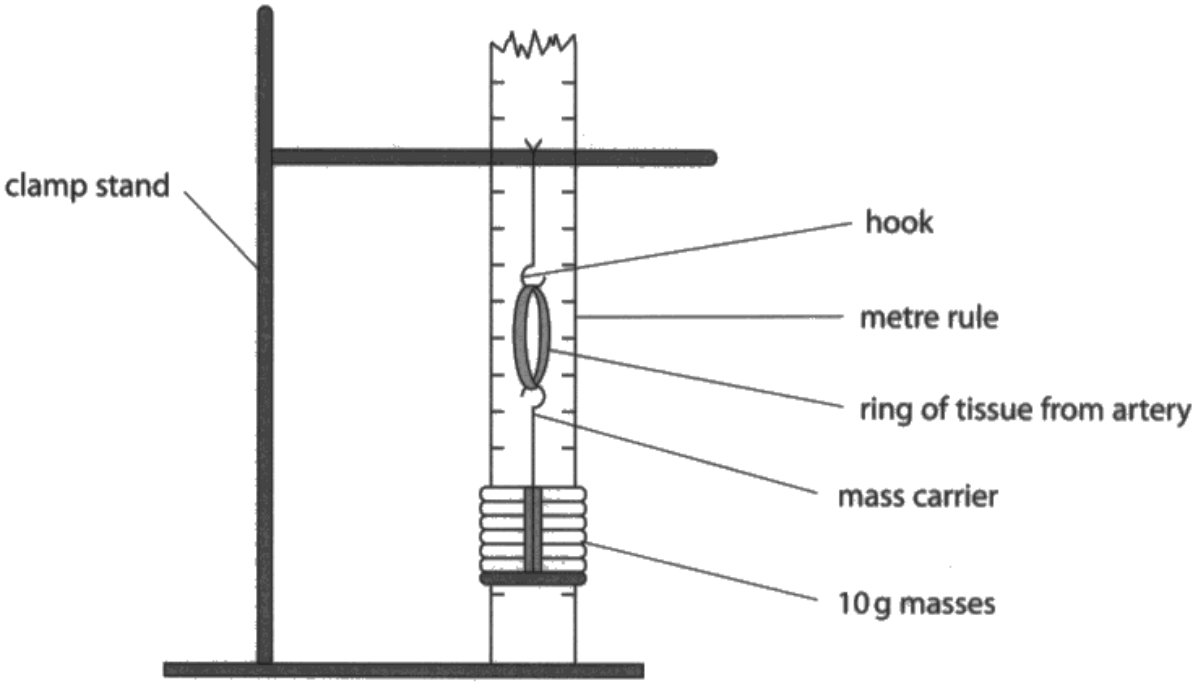


Figure 20

(i) Describe a method you could use to see how much the ring of tissue from an artery could stretch before it no longer returned to its original size.

(3)

you could have a rumber band being the ring of tissue and have two hooks attached to two stretches an time how long it will last.

ResultsPlus
Examiner Comments

No marks for this response as they have not answered the question.

ResultsPlus
Examiner Tip

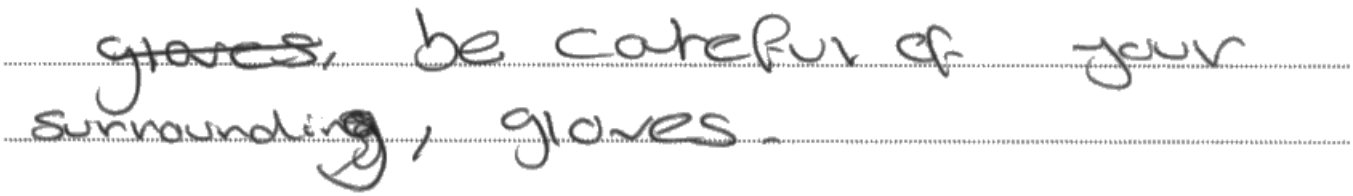
There are a lot of clues in what you need to do here. Original size is the last part of the question and the diagram includes a rule, for example - so include measuring it, preferably at the start so you know what the original size is, as well as through the investigation to see when the size changed. Also the diagram labels include 10g masses so say something about these, e.g. hang weights from the artery.

Question 8 (b) (ii)

Safety precautions must be appropriate to the practical task being assessed: in this case dealing with animal tissue so gloves, washing hands and sterilising equipment were the relevant precautions. General lab practice will not be awarded marks on this style of question as safety precautions have to be specific to the task.

(ii) Give **one** safety precaution you need to take when handling animal tissue such as blood vessels.

(1)



ResultsPlus
Examiner Comments

Gloves was the most common answer seen. Gloves on its own was credited in this item as it was thought that the only thing to do with them would be to wear them.

ResultsPlus
Examiner Tip

Avoid vague answers like 'be careful of your surroundings' as this is true for all practicals. For credit in the safety precaution questions they have to be specific to the practical in the question and not a general laboratory rule.

Question 8 (c)

This item required candidates to apply their knowledge of the human heart and circulatory system to that of the frog. The diagram showed one ventricle and selecting this piece of information was sufficient to be awarded one mark. Some excellent answers were seen that developed the one ventricle by comparing it to two in humans which kept the oxygenated blood separate from the deoxygenated blood. Common errors were that frogs are smaller than humans and so do not need such an efficient circulatory system or that frog capillaries are smaller than human capillaries.

Question 9 (a) (i)

There are some misconceptions about the use of a coverslip with many candidates believing that it is used to allow light to shine onto the sample. Acceptable responses were those which referred to keeping the sample still or keeping it flat. Also acceptable was the idea of protecting the sample from damage. Contamination by bacteria was not creditable.

9 A student compared the number of stomata on the upper and lower surfaces of a leaf.

She completed a leaf peel as shown in Figure 22.

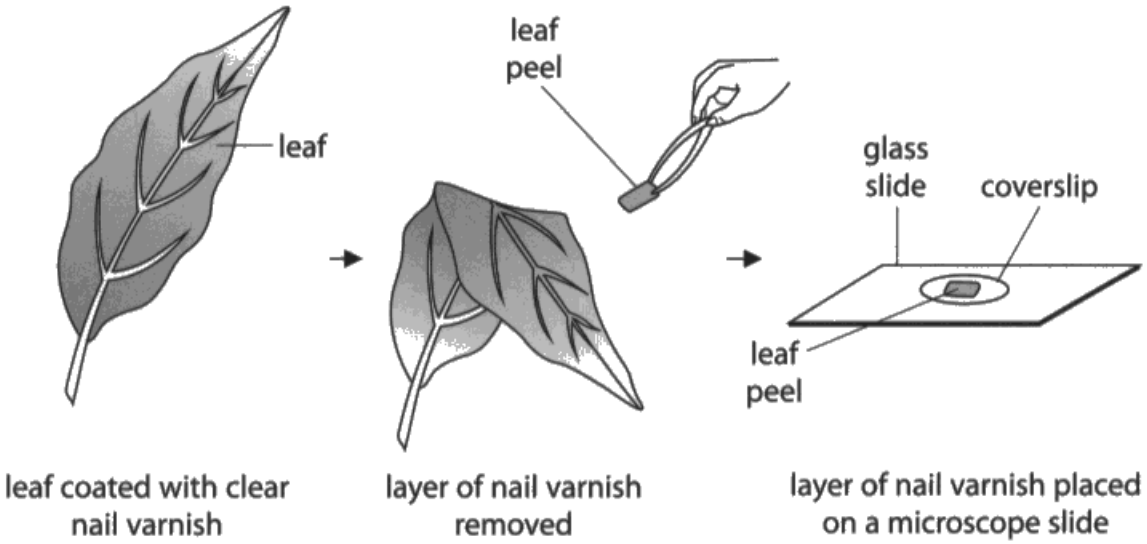


Figure 22

The layer of nail varnish shows an impression of the cells on the surface of the leaf.

(a) (i) State why a coverslip is placed on top of the leaf peel.

(1)

To hold the leaf peel in place.

ResultsPlus
Examiner Comments

This was one of the commonest creditable answers seen with keep the leaf peel flat being the other one.

ResultsPlus
Examiner Tip

This should have been part of the core practical so make sure that you thoroughly learn and revise these parts of the course.

Question 9 (a) (ii)

Many candidates stated that the leaf would be too big to fit under the lens to answer this question which is not correct. To gain credit, candidates had to be more specific stating that the leaf peel was thinner than the whole leaf for 1 mark, which allowed light to pass through it for the second mark. As the aim of this procedure is to see the lower epidermal cells, stating that this would allow you to see guard cells, for example, would also be given credit.

(ii) Explain why the leaf peel rather than the whole leaf was viewed with a microscope.

(2)

It only needs a small sample to see whats inside and on the leay.

ResultsPlus
Examiner Comments

This also gets the mark for thin layer of cells but too big or not small enough was considered too vague for credit, particularly for this later part of the examination paper.

ResultsPlus
Examiner Tip

Be specific: in what way it needs to be smaller and state what you are able to see, e.g. the outlines of the cells in the leaf peel.

(ii) Explain why the leaf peel rather than the whole leaf was viewed with a microscope.

(2)

because the whole leaf is too thick to get a detailed image.

ResultsPlus
Examiner Comments

This gets one mark for the reverse argument of needing a thin layer of cells on the slide.

ResultsPlus
Examiner Tip

What details? Be specific and state what you will be able to see, e.g. cell outlines.

Question 9 (b) (i)

This question asked candidates to count the number of stomata in the diagram of the lower epidermis shown by a leaf peal. The majority gave the correct answer of 3 with some candidates stating six, presumably counting the guard cells, and some stating the number of epidermal cells.

Question 9 (b) (ii)

This question caused some issues for candidates with many not answering the question posed. The question asked them to describe HOW the stomata open but many of the responses were to do with why stomata open including gas exchange, water loss etc. The response should have been the idea that water moves into guard cells by osmosis causing them to become turgid or swell.

(ii) The student observed that the stomata were open.

Describe how stomata open.

(3)

Stomata open when the two parts comes away from each other.

ResultsPlus
Examiner Comments

No marks for this answer as it does not name the guard cells as the parts that come away from each other.

ResultsPlus
Examiner Tip

Learn the key words. This would be 1 valuable mark if the candidate could have just said guard cells instead of the two parts.

Question 9 (c)

This item was the second six-mark question and required candidates to describe how water and sucrose move through a plant. The diagram included arrows and labels to help candidates answer the question. A simple answer would be to state that water/mineral ions are transported in the xylem and that sucrose is transported in the phloem. Writing that sucrose was carried in the stem disqualified the water in xylem area of credit but as some water and mineral ions are transported in the phloem these were treated as neutral although not deemed to be worthy of credit by themselves. It was pleasing to see a few answers that not only used terms correctly including transpiration, translocation but explained these, as well as giving accurate descriptions of other parts of the indicative content; for example, the structure of sieve tubes. Candidates that did not score tended to restate the information given in the diagram or confused water/sucrose with xylem and phloem.

*(c) Figure 24 shows xylem and phloem.
Xylem and phloem are involved in the transport of substances through a plant.

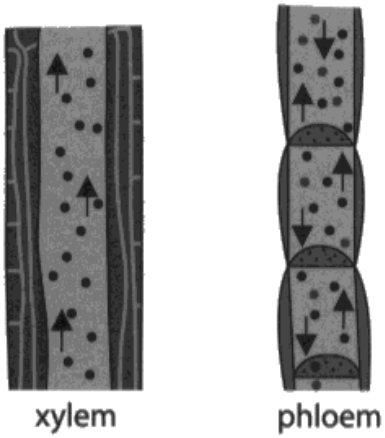


Figure 24

Use Figure 24 to help you describe how water and sucrose move through a plant.

(6)

water is sucked up the stem through the roots to get to the leaves in the xylem but sucrose travels through the phloem.

ResultsPlus
Examiner Comments

There are enough correct items of indicative content to allocate this response to a low level 2 and as it reasonably structured and coherent 4 marks are awarded.

ResultsPlus
Examiner Tip

Well done to this candidate who has used the diagram and their own knowledge to put a few points down. when you get to this point, look at the diagrams/information given and think what can I add; here the arrows pointing up in the xylem should trigger that it is carrying materials from the roots and taking them to leaves and flowers.

*(c) Figure 24 shows xylem and phloem.
Xylem and phloem are involved in the transport of substances through a plant.

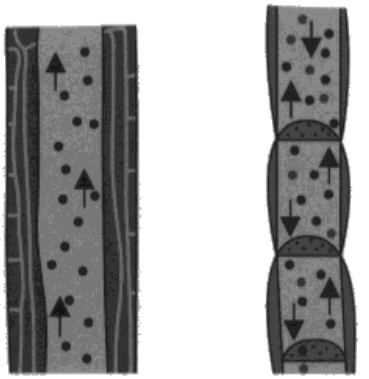


Figure 24

Use Figure 24 to help you describe how water and sucrose move through a plant.

(6)

Water in a plant moves by the xylem and moves in the process of transpiration. The water in a plant needs to move from the roots of the plant through the stem. Sucrose in a plant moves through the phloem and in the process of translocation. The sucrose in a plant move up and down the stem. and

ResultsPlus
Examiner Comments

A good answer that shows a good understanding of the movement of water and sucrose through the plant.

Question 10 (a) (i)

Question 10 is a biology only topic which required candidates to draw a pyramid of biomass from the information and data in a table. There were no other organisms given in the table and so candidates had to take the data and put it into the correct format. A few candidates just wrote the names of the organisms in the box supplied possibly suggesting that they had not covered this area of the specification adequately with others drawing the pyramid upside down. Candidates that were credited with the first marking point could have it awarded for a step pyramid or drawing a triangle with correctly labelled sections. However, for both available marks to be awarded, the energy pyramid need to be a labelled step pyramid based on the data given in the table.

10 Since 2003, in France, people have been buying Siberian chipmunks as pets but then releasing them into the wild when they are no longer wanted.

They are now classified as an invasive species.

Figure 25 shows a Siberian chipmunk (*Tamias sibiricus*).

© 2011, Søren Brøndum Christensen

Figure 25

(a) Siberian chipmunks eat acorns, which are the seeds of oak trees.

In Siberia, the natural predators of Siberian chipmunks are wild dogs.

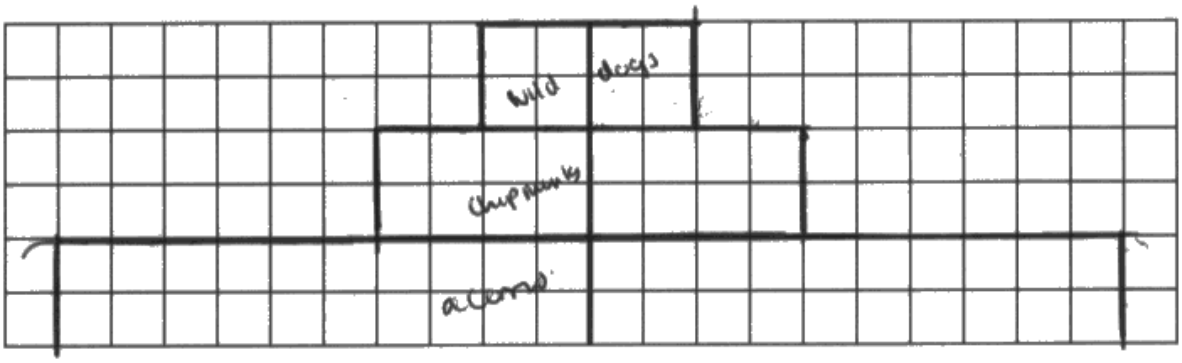
(i) Figure 26 shows the biomass of three organisms in a food chain from one area of Siberia.

organisms	biomass in kg
acorns	20650
chipmunks	2200
wild dogs	230

Figure 26

Draw a pyramid of biomass for this food chain.

(2)



ResultsPlus
Examiner Comments

This candidate just manages to get both marks available as a generous leeway allowed the second and third levels to be half, or less than half the size of the level below.

ResultsPlus
Examiner Tip

If a question gives data in a table - you will almost certainly be expected to use part, or all of it.

Question 10 (a) (ii)

This was generally well answered with most candidates able to identify that the population of the chipmunks increased. Marks were also awarded for more reproduction and the idea that less chipmunks wire killed/eaten.

(ii) In France, Siberian chipmunks have very few natural predators.

Describe how this affected the Siberian chipmunk population in France.

(2)

~~The~~ The chipmunk population will increase as very few predators to kill them off will allow them to grow (increase)

ResultsPlus
Examiner Comments

Many candidates just got one mark for saying the chipmunk population increases and then just missed the second mark by repeating the stem, saying as they have few predators. This candidate goes just a bit further to explain that they understand why fewer predators results in a larger population.

ResultsPlus
Examiner Tip

If there is some extra information given then it is there to help you but don't just repeat the question, use it and say how it affects the answer.

Question 10 (a) (iii)

Foundation Candidates found this percentage calculation challenging although the majority of candidates who scored here obtained all three marks available. There were some candidates who lost out on a mark by not giving the answer to the nearest whole number as requested in the question.

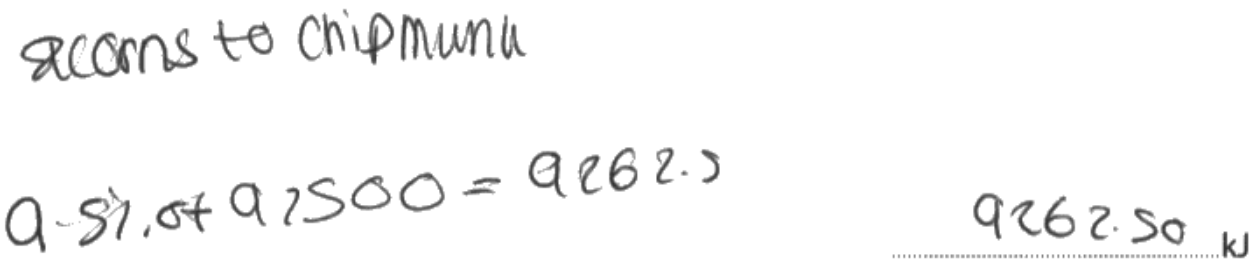
(iii) The percentage of energy transferred from the acorns to the chipmunks is 9.5%.

The energy contained in the acorns is 97 500 kJ.

Calculate the amount of energy transferred to the chipmunks.

Give your answer to the nearest whole number.

(3)



ResultsPlus
Examiner Comments

This candidate correctly calculates the energy transferred to the chipmunks but only gets 2 marks as they did not state the answer to the nearest whole number as requested.

ResultsPlus
Examiner Tip

Always check the question to ensure that you have completed all parts of it.

Question 10 (b) (i)

This percentage change calculation was the least well accessed of all the mathematical skills tested in the paper. Candidates often divided the change in population size by the 2015 data rather than the 2003 data and thus did not attain the correct outcome. A few candidates clearly do not think that 184% is a reasonable percentage change and took the 100 off the answer therefore lost 1 mark by having the incorrect answer on the answer line.

(b) The black-legged tick (*Ixodes scapularis*) is a parasite that feeds on the blood of animals including Siberian chipmunks and humans.

The tick transmits the Lyme disease pathogen.

Figure 27 shows the number of cases of Lyme disease in humans in France in 2003 and 2015.

Number of cases of Lyme disease in humans in France	
2003	2015
9500	27000

Figure 27

(i) Calculate the percentage increase in the number of cases of Lyme disease in humans in France from 2003 to 2015.

(2)

$\frac{27000}{9500} = 2.842$

$100 - 2.842 = 97.158$

$= 97$

97 %

ResultsPlus
Examiner Comments

This candidate has started off by dividing the population in 2015 by that in 2003. If they had then multiplied by 100 to get a percentage and then subtracted 100 to remove their starting population they could have reached the correct answer of 184.2%. Unfortunately they did neither of these steps and so received no marks.

ResultsPlus
Examiner Tip

When you have completed a calculation do a quick check by asking yourself if your answer is correct. Here, ask what the population of 9500 would be if it is increased by 97%. The answer here is slightly less than 19000 so it must be incorrect.

(b) The black-legged tick (*Ixodes scapularis*) is a parasite that feeds on the blood of animals including Siberian chipmunks and humans.

The tick transmits the Lyme disease pathogen.

Figure 27 shows the number of cases of Lyme disease in humans in France in 2003 and 2015.

Number of cases of Lyme disease in humans in France	
2003	2015
9500	27000

Figure 27

(i) Calculate the percentage increase in the number of cases of Lyme disease in humans in France from 2003 to 2015.

(2)

100% = 27000

27000 - 9500 = 17500

17 %

ResultsPlus
Examiner Comments

This candidate is awarded one mark for subtracting 9500 from 27000 to find the increase in the number of cases. Unfortunately they have not then used this to calculate the percentage increase as required by the instructions.

ResultsPlus
Examiner Tip

Use a quick check and ask if a 17% increase would raise the population from 9500 to 27 000. As the answer is no, then this cannot be correct and so needs to be rethought.

(b) The black-legged tick (*Ixodes scapularis*) is a parasite that feeds on the blood of animals including Siberian chipmunks and humans.

The tick transmits the Lyme disease pathogen.

Figure 27 shows the number of cases of Lyme disease in humans in France in 2003 and 2015.

Number of cases of Lyme disease in humans in France	
2003	2015
9500	27000

Figure 27

(i) Calculate the percentage increase in the number of cases of Lyme disease in humans in France from 2003 to 2015.

(2)

9,500 to 27,000
increase of 17,500

184% ..... %

ResultsPlus
Examiner Comments

This candidate has given the correct answer and so receives both marks even though they have not shown all their working.

ResultsPlus
Examiner Tip

It is advisable to show your working as there are marks for working if you get the final answer incorrect. Here the increase of 17500 is sufficient to be credited 1 mark on its own.

Question 10 (b) (ii)

For the last item candidates were able to identify that more black legged ticks were present thus more Lyme's disease occurred. The first mark could be gained by simply stating that there were more ticks or that the ticks had more food. The second mark required more than just that there was more transmission of Lyme's disease to humans as this was in the stem of the question; for credit, candidates needed to be more specific, e.g. stating that therefore there were more ticks infecting humans/biting humans or even feeding on the blood of humans.

(ii) Explain why there has been an increase in the number of cases of Lyme disease in humans in France.

(2)

As the number of siberian chipmunks in france has increased, the black legged tick has a healthy food supply and therefore has been able to survive and reproduce.

ResultsPlus
Examiner Comments

This response identifies the first part of the reason for the increase in number of cases of Lyme's disease: that there is more food for the ticks and further links this to them reproducing. It does not develop the comments though to explain why more ticks results result in more infection of humans.

ResultsPlus
Examiner Tip

Candidates should reread the question and ask themselves if their response has answered it fully .

This response is awarded both marks available as it links more ticks to how Lyme disease is transmitted from the ticks to humans.

(ii) Explain why there has been an increase in the number of cases of Lyme disease in humans in France.

(2)

There has been a increase in the type of tick so more people are getting ~~the~~ lyme disease from the tick feeding on their blood.

ResultsPlus
Examiner Comments

A good concise answer that shows a clear understanding of the relationship that has caused the increase in Lyme disease.

ResultsPlus
Examiner Tip

We do not penalise candidates for bad handwriting or grammar so although this example is not easily read, it gets full marks for comprehensibly covering both marking points available.

Paper Summary

Based on their performance on this paper, candidates should:

- Recognise that the word 'explain' means additional scientific information is needed that is linked to the answer given.
- Use all the information given in the question to help them construct their answer but avoid repeating the information which has already been given and giving vague responses which 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 marks available.
- Use scientific terminology accurately where possible in responses.
- Always show the working when doing calculations as a mark can be awarded for errors carried forward in this case.
- Think about the structure of the answer before starting to write, especially when tackling the extended answers, to ensure that the answer shows clarity of writing and flows, while remembering that accurate spelling and grammar in these questions is also important.

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