Pearson
Edexcel

Examiners' Report
June 2025

GCSE Biology 1BI0 2F

ResultsPlus

Edexcel and BTEC Qualifications

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

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

ResultsPlus

Giving you insight to inform next steps

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

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

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

Pearson: helping people progress, everywhere

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

June 2025

Publications Code 1BI0_2F_2506_ER

Introduction

Introduction

GCSE Biology paper 1BI0_2F is taken by foundation candidates who have followed the GCSE Biology specification.

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

As well as biological knowledge being tested on the individual topics within the specification, the biology papers assess aspects of working scientifically and mathematical skills, the specific areas being detailed in the specification.

There are eight **core** practical investigations in the biology content which must be completed prior to sitting the examination. There are further suggested practical investigations listed at the end of each topic which are considered highly beneficial, not only in understanding core concepts within the topic but also in developing the practical skills used in biology.

Paper 1BI0_2F assesses content from Topic 1 and Topics 6 – 9 of the specification. The 2025 paper covered areas of the specification including: endocrine glands and hormones, focusing on insulin and diabetes; photosynthesis, including the role of phloem in transporting sucrose; skin structure and temperature control; rates of diffusion; the nitrogen cycle, linked to eutrophication; adaptations of animal and plant cells and tissues; tropic responses, as well as plant adaptation to extreme environments.; the role of the heart, heart rate and veins; aerobic respiration; the urinary system and dialysis; plant adaptation and competition, and the effect of pH on bacterial growth and decay.

Questions assessing practical skills included microscopy – scaling and drawing, ecological surveying, gathering data, measuring, respiration, as well as improving the quality of results.

Mathematical skills tested included measuring, interpretation of data from diagrams, tables and graphs, as well as pie charts, percentages, relationships, scales, trends and rates.

There were several questions that tested candidates' ability to apply their knowledge to different situations but in these cases, the information needed to allow candidates to gain credit was supplied in the stems of the questions.

Candidates who circled the command word concomitant to eg underlining the salient parts of the stem of an item structured their responses better and were less likely to drop marks due to giving a fuller account and were less likely to omit key points.

It was also noted that annotating and writing key words by the question for extended prose responses helped candidates write a fuller response, thus gaining more marks. However, it was noticed that if anything this skill was used less this year compared to previous years. The more straightforward questions and those where marks were gained by analysing and interpreting

information supplied in either written, diagrammatic or in tabular form / interpreting given information were answered well, and it was noticed that there was a slight increase in the number of candidates who expressed their ideas clearly in a way that covered the marking points, thus gaining marks.

The number of candidates who confused the requirements for describe with the requirements for explain were roughly consistent with previous years with 'explain' items only being partly answered with a repeated or elucidated descriptions in their response. There was, however, a reduction in the number of 'describe questions' answered as 'explain' questions with candidates given shorter answers without reasons.

It was pleasing to see that, as in the past few years, almost all items were accessible to most foundation candidates with comparatively few blank responses seen.

Question 1(a)

This item, which tested AO1.1 asked candidates to link the hormones: insulin and oestrogen, to the endocrine gland that produces them. This was a gentle join the boxes exercise and the majority of candidates correctly linked insulin to the pancreas and oestrogen to pancreas. The instruction states **one** line from each hormone. Multiple lines from each box were seen which resulted in two valuable marks lost for these candidates. This was far more commonly seen on exception scripts and all, but particularly these candidates would gain from 'only using one line' being reinforced before the examination starts.

Question 1(b)i

This item, testing AO1.1a required the highest glucose concentration (7.7) shown during the six hour period shown on the graph in Figure 1 to be stated. Candidates who drew a line from the highest point across to the y axis were, on average, closer to the reading we took. However, because the graph printed was relatively small, concentrations within a generous range of 7.5 to 7.7 were credited.

This candidate has misread the instruction and given either the start or the end concentration of glucose in the blood.

(b) Figure 1 shows the concentration of glucose in the blood of a person for a period of six hours.

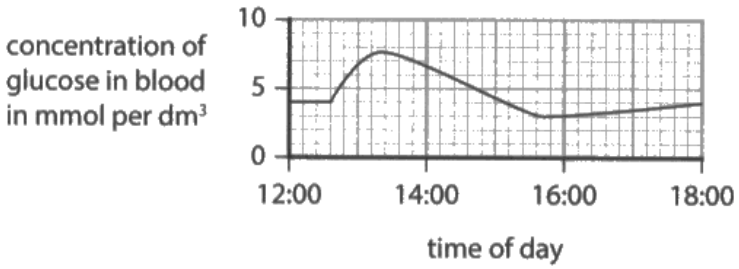


Figure 1

(i) State the highest blood glucose concentration during this six hour period.

(1)

4 mmol per dm³

ResultsPlus
Examiner Comments

This is an example where if candidates, for example, underlined the key words in the stem of the question, they are more likely to focus on what is being asked, thereby gaining a mark.

ResultsPlus
Examiner Tip

Underline the key words in the question to help you focus on what is being asked.

Question 1(b)ii

Item 1bii tested AO3.1 requiring candidates to describe the changes in the concentration of glucose in the blood between 13:30 and 18:00.

As this was an early question in the paper it was targeting lower levels of demand. As well as the size of the graph making it harder to state the concentrations at the turning points, it was decided to award the marks for just stating the concentration of glucose in the blood decreases (1 mark) and increases (1 mark) without the need to quote data.

A detailed response describing the changes in blood glucose concentration. However, this only gains 1 mark as it gives an overall change of decrease but does not outline that the concentration falls and then rises.

(ii) Insulin was released from the pancreas at 13:30.

Describe the changes in the concentration of glucose in the blood from 13:30 to 18:00.

(2)

At 13:30, the blood concentration begins at 7.5mmol per dm^3, after 13:30 it begins to decrease until 18:00 at 4mmol per dm^3.

ResultsPlus
Examiner Comments

The question asks for the changes in blood glucose concentration - not the overall change. Make sure that you read the question carefully.

ResultsPlus
Examiner Tip

Read the question carefully and mark the changes, here down and then up, on the graph to make sure that you give a full answer.

It is not uncommon to have questions in science examinations that ask you to describe trends shown in the data.

An early question, like this 1bii item will award marks for general trends shown in the data.

The other data that could have been used is using figures in the change in concentration - here the blood glucose concentration decreases from 7.5 mmol per dm3 to 3 mmol per dm3 before rising to 4mmol per dm3.

(ii) Insulin was released from the pancreas at 13:30.

Describe the changes in the concentration of glucose in the blood from 13:30 to 18:00.

(2)

From 13:30 to around 15:36 the concentration was decreasing. From 15:48 to 18:00 the concentration started to increase.

ResultsPlus
Examiner Comments

Here is a mark for stating that the concentration in blood glucose decreases and then increases. This response goes a little further giving the time for how long the blood glucose concentration decreases and again for how long it increases, which is a more useful interpretation of the data.

ResultsPlus
Examiner Tip

When being asked to describe a trend / trends in data from graphs or tables, always state the overall trend, here a decrease and then an increase, but to ensure that you get the marks available awarded, add in data from the graph/table to make the trend more specific.

Question 1(c)

Item 1c tested AO3.2ab and asked candidates to describe a logical description of two ways that a person with type 2 diabetes can control the concentration of glucose in their blood. The stem of the question did tell candidates that people with type 2 diabetes do not respond to insulin. Many answers just stated by dieting or watching what they eat which were deemed too general for credit as was control your diet / have a healthy diet / eat a good diet as these would not necessarily help the person control their blood glucose concentration. (More) exercise was a creditable response, with lose weight creditable against either MP1 or MP2. Take a pill / use medicine was not credited as this is considered to be more 'over the counter' medicines. However, medicine prescribed by a doctor, medication, using a named medicine that is used to control type 2 diabetes was creditable. Metformin is a common medicine used so was allowed. Examiners were instructed to look up other named medicines if stated by a candidate. We recognise that there are many diabetics in our candidates / candidates' families and so they may well know of, and name medicines, that do lower the blood glucose concentration for type 2 diabetics and should gain credit for their knowledge.

This candidate gets 1 mark for 'through exercise'. We assume they mean through **more** exercise because of the way the question / response is phrased.

through glucagon.

(c) The cells of people with type 2 diabetes do not respond to insulin.

Describe **two** ways that a person with type 2 diabetes can control the concentration of glucose in their blood.

1 through diet

2 through exercise

ResultsPlus
Examiner Comments

See above.

Monitoring, by itself, would not control blood glucose concentration and injections of glucose is also not a creditable response, so no marks awarded.

(d) The cells of people with type 2 diabetes do not respond to insulin.

Describe **two** ways that a person with type 2 diabetes can control the concentration of glucose in their blood.

(2)

1 injections of glucose to keep their blood sugars at bay.

2 blood sugar monitor.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

When revising make tables of, for example, what you can do, and, how it helps so that you understand in the case of diabetes, the reasons for doing each procedure.

Question 2(a)

This item tested AO1.1 and AO2.1 showing application of knowledge. To score, candidates had to write down the two missing parts of the word equation for photosynthesis. There was one mark for the missing reactant (carbon dioxide) and one for the missing product (oxygen). This item scored well with oxygen being the commonest correct answer. Although many candidates did write carbon dioxide, a significant number of candidates did not gain this mark with: carbon, light, oxygen, and even some writing glucose for carbon dioxide when glucose is written in as a product. Oxygen scored better as the missing product with most candidates scoring here. A few candidates wrote the symbols for carbon dioxide and water. This is creditable as long as the symbols used are correct, which includes, for example the 2 in CO2 being subscripted.

This is a word equation so complete the equation for photosynthesis by writing the WORDS for the missing reactant / product - not the symbols.

Here the candidate scores no marks as the 2 in H2O and the 2 in CO2 are not subscripted and so are wrong. H2O means 1 hydrogen and 2 oxygen atoms per molecule. This is wrong and so does not gain credit.

2 Plants produce glucose by photosynthesis.

(a) Complete the word equation for photosynthesis shown in Figure 2.

water + H20 ⟶ glucose + CO2

Figure 2

ResultsPlus
Examiner Comments

See above.

See below.

2 Plants produce glucose by photosynthesis.

(a) Complete the word equation for photosynthesis shown in Figure 2.

water + Co2 ⟶ glucose + O2

Figure 2

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

This item instructs candidates to 'complete the word equation....' We will accept symbols instead of words as we are testing the candidates on the equation. However, the symbols have to be correct. Here we have Cobalt squared carbon/oxygen/2. Carbon dioxide in the first space would have scored 1 mark. The second space should be oxygen. As the symbol CO2 is not carbon dioxide, this candidate scores no marks. If the instruction is incomplete the word equation, write words.

Question 2(b)i

2bi asked "Why does photosynthesis not occur in roots?" thereby testing AO2.1, applying knowledge with reasoning.

Some excellent responses were seen on this 1 mark item with the majority of candidates seen gaining the available mark. For example, roots are underground so have no light which is needed for photosynthesis. Common answers were because there is no light and because roots are underground. Some answers stated that you don't get carbon dioxide in roots and root cells do not contain chlorophyll/chloroplasts a less common but creditable response. Some candidates did not gain credit as they said that the roots could not reach the sun. The sun is not the same as sunlight so no credit was given in these cases.

There is only one mark available so there is no need to give reasons or elucidations.

(b) (i) State why photosynthesis does **not** occur in the roots of plants.

(1)

The roots are not exposed to sunlight so cannot photosynthesise.

ResultsPlus
Examiner Comments

See above.

ResultsPlus
Examiner Tip

Note that this candidate has used the good practice of underlining key words and putting a square around the command word 'State', as well as giving a clear concise response. State means just write a simple statement that answers the question.

Question 2(c)

This AO2.1 targeted item testing application of knowledge and understanding, required students to describe the role of chlorophyll in leaf cells. There was therefore no mark for describing aspects of chlorophyll, for example chlorophyll is a green chemical. However, creditable responses did include that chlorophyll is found in chloroplasts as well as chlorophyll absorbs light.

Please note that again, there is no mark for 'absorbs the sun' as 'the sun' is not the same as sunlight.

This response scores no marks as the candidate is describing chlorophyll which is not the same as describing **the role** of chlorophyll.

(c) Chlorophyll is found in green leaf cells.

Describe the role of chlorophyll in leaf cells.

(2)

chlorophyll is the green pigment found in leaf it gives the leaf the green colox

ResultsPlus
Examiner Comments

Read the question carefully. This is about the role of chlorophyll, what chlorophyll does for the plant - not what chlorophyll is.

Question 2(d)

Item 2d tested Assessment Objective 2.1. Here the candidate has to apply knowledge about what an oil burning heater supplies to a greenhouse to how this factor will affect the rate of photosynthesis. A relatively high level thinking skill. The main ways a heater may affect photosynthesis is from increased heat and increased carbon dioxide levels. Many candidates will not be familiar with oil burning heaters so 'producing light' and 'increased humidity/water levels', although probably negligible, are also creditable.

Two clear creditable responses showing a good understanding and application of the process of photosynthesis.

(d) A greenhouse contained an oil burning heater.

State **two** ways this could increase the rate of photosynthesis in the greenhouse.

(2)

1 enzymes will speed up ~~reaction~~ rate of photosynthesis because ~~temp~~ temperature, increases.

2 more CO_2 produced for plants to take in for photosynthesis.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

When tackling a question like this - think what does photosynthesis need to occur: here chlorophyll, light, carbon dioxide, water and a reasonable temperature eg 20 o C. Then think what does an oil burning heater produce? and go through the list to see if and how it will affect the rate of photosynthesis. Photosynthesis is in the stem of the question, so any marks awarded will be for how the oil burner will increase the rate of photosynthesis.

Keep your answers simple as long as your response answers the question. The question is about increasing the rate of photosynthesis so you may feel more comfortable stating 'it gives light to the plants because light is needed for photosynthesis / to speed up photosynthesis'.

(d) A greenhouse contained an oil burning heater.

State **two** ways this could increase the rate of photosynthesis in the greenhouse.

(2)

1 it gives light to the plants

2 It gives heat to the plants aswell.

ResultsPlus
Examiner Comments

Although you don't need to say '... which increases the rate of photosynthesis', as long as you are not running out of time and if it makes you feel more comfortable - state it anyway.

There are no marks here as 'the temperature' does not tell us if the temperature has increased, kept the same or decreased. Decreasing the cell wall is incorrect.

(d) A greenhouse contained an oil burning heater.

State **two** ways this could increase the rate of photosynthesis in the greenhouse.

1 The tempture.

2 Decrease Cell Wall Of Cells

ResultsPlus
Examiner Comments

If you are going to include something that will affect the rate of a biological process, a factor that may affect eg rate of reaction, make sure you say how the factor is changing - eg getting hotter.

Question 3(a)i

Candidates were presented with a cross section diagram of the skin showing labelled structures including: sweat gland, capillary network, fat cells and hair.

To gain credit, candidates were asked to explain how the action of the hair erector muscle helps to keep the body warm.

Candidates were guided to the structures shown in Figure 3 in the stem of the question.

Many responses stated that the hair 'stood up' gaining mp1 with a significant number gaining a second mark for MP2 or 3.

Mp4 was not given for eg "...which keeps the body warm" as this was just a repeat of the last part of the question.

This item tested AO1.1.

3 Figure 3 shows a diagram of the skin.

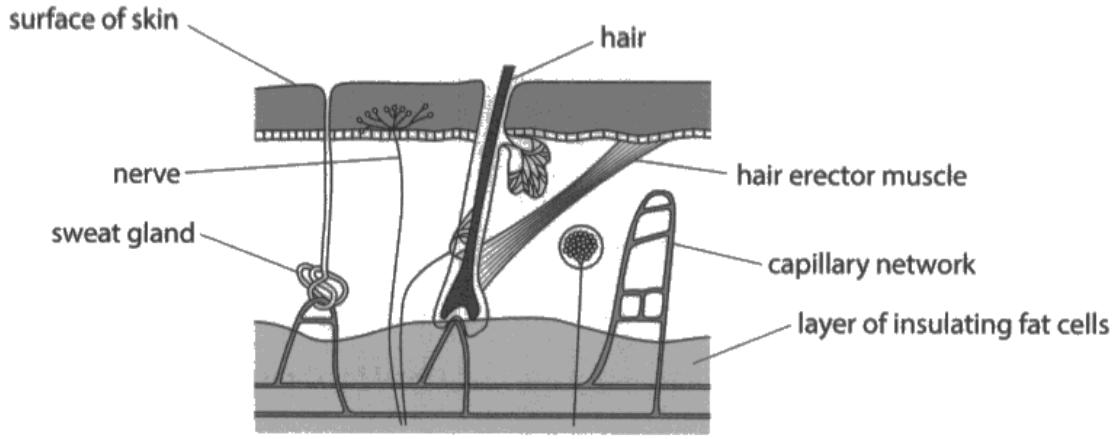


Figure 3

(a) Structures in the skin, shown in Figure 3, help to control body temperature.

(i) Explain how the action of the hair erector muscle helps to keep the body warm.

(2)

It traps a layer of air around your body which insulates heat

it = the hair so it traps a layer of air = MP3 which insulates (heat) = MP4

Try not to use the word 'it' in your responses - here 'it' clearly means 'the hair' but it is not always so.

Question 3(a)ii

To score on item 3aii, which addressed AO1.1, candidates had to explain how sweating decreases body temperature. There are three possible ways of gaining the two available marks. The idea of sweat being on the surface / spreading over the surface of the skin, then evaporating, which removes heat from the skin and cools the body down. In previous years there had been a large nuber of candidates incorrectly stating that sweat is cold so cools the skin. The number of such responses has decreased significantly, although this was still a high scoring item as candidates still had problems expressing decreases in body temperature in terms of sweat. Very few still said that the sweat / the water in sweat evaporates. With most candidates that scored both marks hitting marking points 1 and 2.

There was a marked improvement in understanding, with the number of candidates saying that sweat is cold so cools you down **when it is released** being significantly less common than in previous years.

The item asks how sweating decreases body temperature and few stated that the sweat evaporates, with those scoring both marks gaining credit for saying it spreads over the skin / body and that it takes heat away from the body.

(ii) Explain how sweating decreases body temperature.

cold water exits warmer body parts ultimately decreasing your temperature

ResultsPlus
Examiner Comments

See above.

Question 3(c)i

3ci required candidates to use a temperature line (figure 4) to give the optimum body temperature for humans. This addresses A03.2.

This item was well answered, with the majority of candidates scoring here. It was pleasing to see some candidates annotating the temperature line and giving responses of 37.4(oC). 37.40C is, of course, a textbook figure, and was not readable from the diagram supplied showing that candidates used learned information to assist their interpretation of Figure 4.

(c) Figure 4 shows the responses to body temperatures that are too cold or too warm.

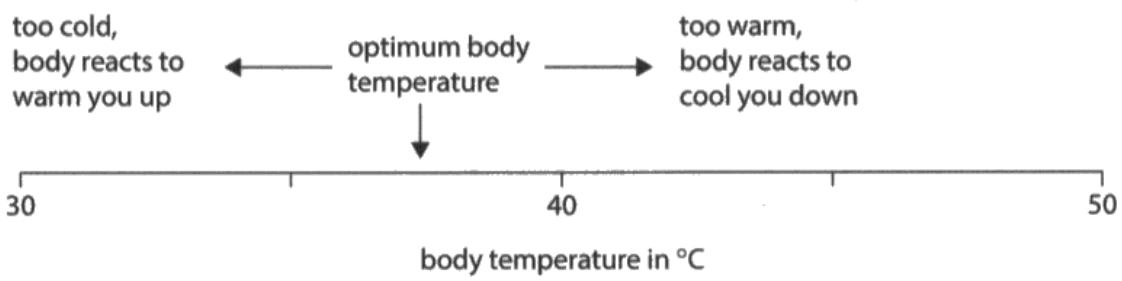


Figure 4

(i) State the optimum body temperature as shown in Figure 4.

(1)

37.5 °C

ResultsPlus
Examiner Comments

The arrow is pointing halfway between the 35 and the 40 o C lines and so 37.5 o C is a well judged correct response.

ResultsPlus
Examiner Tip

Although this answer is correct, it may have helped to write 35 on the mark halfway between 30 o C and 40 o C which would have added more certainty that the correct temperature is 37.5 o C.

(c) Figure 4 shows the responses to body temperatures that are too cold or too warm.

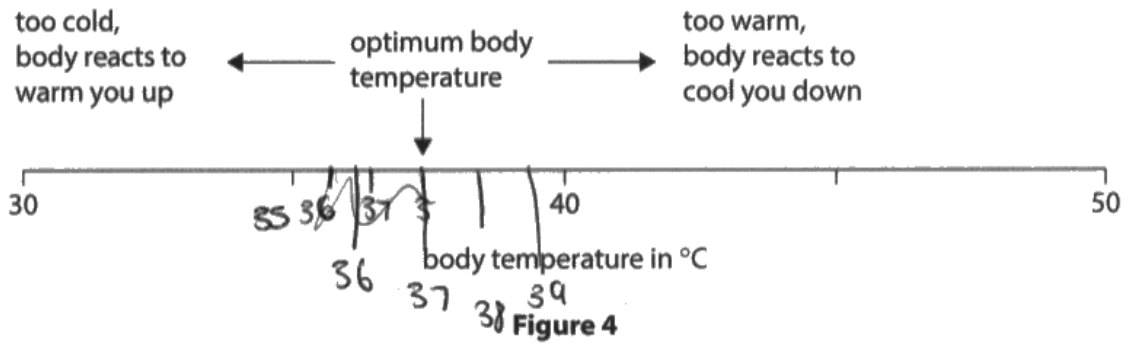


Figure 4

(i) State the optimum body temperature as shown in Figure 4.

(1)

movement ... particles ... 37 °C

ResultsPlus
Examiner Comments

Rather than just estimate the temperature indicated by the arrow, this candidate has drawn equally spaced lines to help them make a more accurate estimate of body temperature.

ResultsPlus
Examiner Tip

Whenever you are asked to estimate a number from a scale, including on a graph, use a ruler to draw in a line / lines to make it easier to make a more accurate reading.

Question 3(c)ii

Candidates were required to state two factors that affect the rate of diffusion of gases into and out of cells, which tested AO1.2. It was not surprising that as the context of question 3 was women, the examples, where given, tended to be human cells, mainly alveolar cells and red blood cells. There were no marks for using a cell, although those that did tend to give a more complete / detailed answer as presumably the context helped them ordering their thoughts. This is a useful technique and candidates may benefit from being prompted when tackling general questions on general processes to be asked to think of a context where the process would happen and then

pose the question about the process as going from abstract to concrete often simplifies the task.

The rubric for this item states 'Temperature affects...' and 'State **two** other factors that...'

As a result, this candidate does not gain credit for temperature.

Concentration, by itself, also does not receive credit as it is a concentration gradient/ difference in concentration inside compared to outside the cell that will make a difference to the rate of diffusion. 'Increasing the concentration outside the cells' should have gained credit as it implies that the concentration inside the cell is kept constant and so will change the concentration gradient.

(ii) Temperature affects the rate of diffusion of gases into and out of cells.

State **two** other factors that affect the rate of diffusion.

1 temperature

2 concentration

ResultsPlus
Examiner Comments

It was thought that many candidates knew a creditable response, eg 'the idea of changing the concentration gradient' but lacked the skill to express it in a creditable format to gain marks. When preparing candidates for their examinations this could be addressed with a session of looking at an 'almost' creditable answer - and then looking at it and thinking why doesn't this get credit, concommitant to: 'OK so how do we improve it to make it creditable.'

ResultsPlus
Examiner Tip

When talking about a process, eg diffusion, osmosis, heat loss, think about the definition of the process - here the concept is about the flow of particles moving from a high to low concentration and it is that difference which is important in the rate of the process occurring. Then base your response on those thoughts.

Question 4(a)

This 'fill the gaps' using words from the box type item tested AO1.2 and can be answered/worked out in several ways. Firstly know the correct answer and fill the gaps in accordingly. Secondly, cross out the words that are definitely wrong: eg 'the nitrogen compounds in plants include...' cannot have the answer 'animals' - which just doesn't make sense, this means that when you do chose an answer it may well be choosing a word from a choice of 3, rather than a choice from 6.

Question 4(b)i

To score on this item, which tested AO2.1, candidates were required to calculate the mass of nitrates from human-made fertiliser used by crops in 2020. Here there is only one pie chart, but if there is more write something on the diagram to show which part you are using. Then complete your calculation, then think, is the answer reasonable - here the total is 180 million tonnes. Some candidates gave an answer of more than that, eg 300 million tonnes being used by 'human made fertiliser.' Look at the pie chart, the total is 180 million tonnes, the light grey shaded area for human-made fertiliser is just over half of the pie chart so the answer should be just over half of the of 180 million tonnes.

Think before you transfer your answer to the answer line.

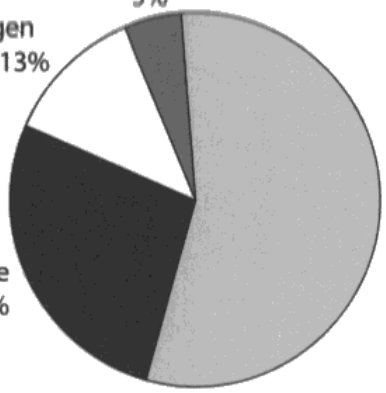
Has the question asked you to, for example, give your answer to eg two significant figures? To the nearest whole number? Or are units stated on the answer line?'. Here the answer line has units of 'million tonnes'. Make sure you take this into account when you write your answer on the dotted line.

This item requires candidates to calculate the amount of human made fertiliser correctly by multiplying the total amount 180 million tonnes of fertiliser by 0.55 (55%) to get the answer of 99 000 000 (tonnes).

(b) 180 million tonnes of nitrates were used by crops growing on farms in the UK in 2020.

Figure 6 shows the different sources of nitrates used by the crops.

180,000,000
× 0.13
=
23,400,000



180,000,000
× 0.55
=
99,000,000

180,000,000
× 0.27
=
48,600,000

Figure 6

(i) Calculate the mass of nitrates from human-made fertiliser that was used by crops in 2020.

(2)

9,000,000 + 23,400,000 + 48,600,000
+ 99,000,000

180,000,000

99,000,000 million tonnes

ResultsPlus
Examiner Comments

This candidate has calculated the amount of human made fertiliser correctly by multiplying the total amount 180 million tonnes of fertiliser by 0.55 (55%), to get the answer of 99 000 000 (tonnes). However, they have not looked at the units on the answer line which is in 'millions' so writing 99 000 000 with the million given on the answer line means that their answer is 99 million million and so they do not gain the final available mark for this item.

ResultsPlus
Examiner Tip

Check all the information given in the question. Underline key points to help reinforce them and finally check details so that you adjust your total accordingly. Quickly have a look back to CHECK the stem of the question and what is written on the ANSWER LINE. Think - is my answer reasonable?

An excellent response that gains both marks available.

(b) 180 million tonnes of nitrates were used by crops growing on farms in the UK in 2020.

Figure 6 shows the different sources of nitrates used by the crops.

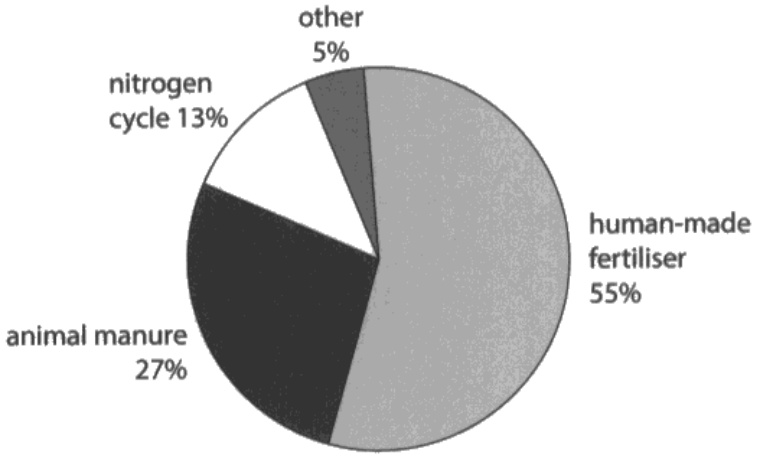


Figure 6

(i) Calculate the mass of nitrates from human-made fertiliser that was used by crops in 2020.

(2)

55% of 180

0.55 × 180 = 99 million tonnes

99 million tonnes

ResultsPlus
Examiner Comments

See above.

Question 4(b)ii

This item tested AO2.1 with candidates stating eutrophication, thus gaining the available mark. Insufficient responses included more general sorts of pollution which were deemed too general for credit as eutrophication is a stated word in the specification statement 9.9c.

(ii) Some of the nitrates spread on fields as fertiliser get into lakes.

Name the type of pollution caused by the build-up of nitrates in lakes.

water pollution.

ResultsPlus
Examiner Comments

As eutrophication is a specific type of pollution stated in the specification, water pollution and nitrate pollution etc were deemed insufficient for credit.

Question 4(c)i

To gain the available marks, candidates need to count the number of algal species L and M in the sample from lake Z , and plot the abundance of each type of algae onto a bar chart (AO2.2).

This was readily accessible and no 'blank' responses were seen. Many candidates did not have / use a ruler and although they were not penalised if the sides of the bars were not straight a significant number lost the mark because the top of at least one of the 'bar' crossed over the +/- tolerance of 1/2 of 1 small square.

Two good, accurately drawn, creditworthy bars. Two marks awarded.

(c) A student investigated how the concentration of nitrate affected the types of algae growing in three lakes.

Figure 7 shows microscope images of the algae in 1 mm^3 of water, and the concentrations of nitrate ions in each lake.

	lake X	lake Y	lake Z
microscopic view showing algae in 1 mm^3 of lake water			
concentration of nitrate ions in mols per dm^3	2	5	8

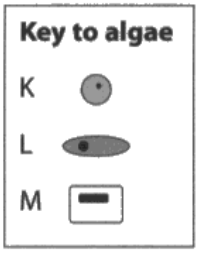


Figure 7

(i) Figure 8 shows a bar chart for the algae in lakes X, Y and Z.

Complete the bar chart for algae L and algae M in lake Z.

(2)

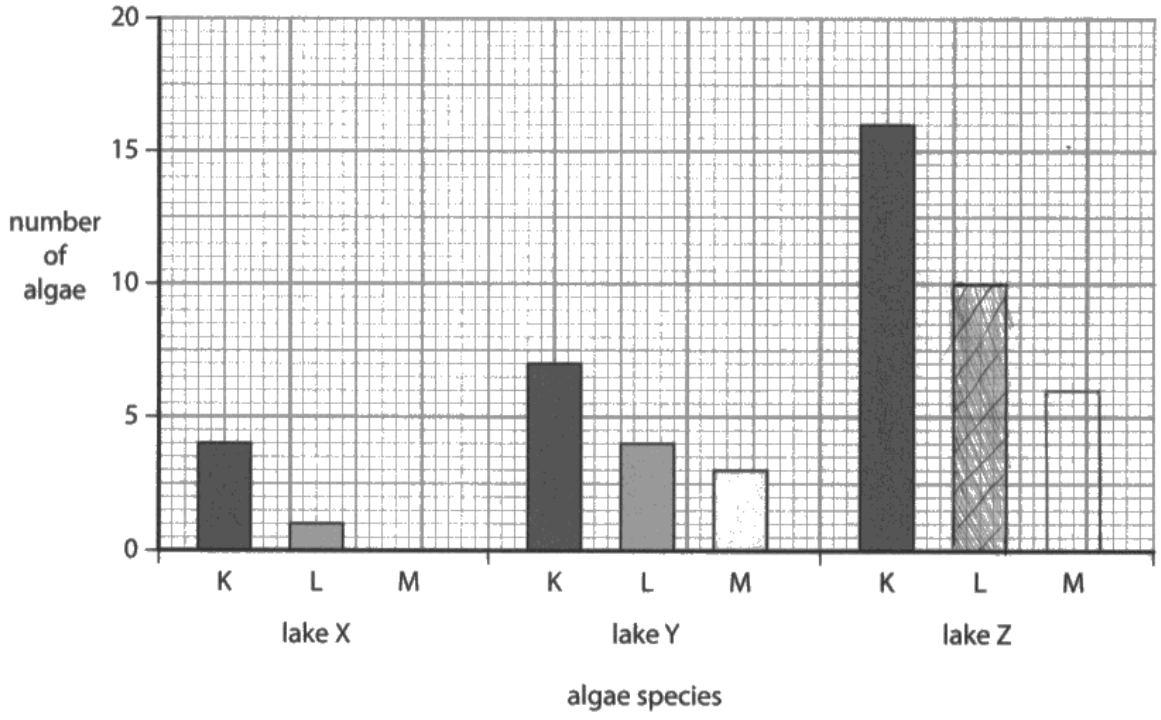


Figure 8

ResultsPlus
Examiner Comments

One reason why this is clearly creditable is that the candidate used a ruler, with a sharp pencil to draw the line for the top of each bar.

ResultsPlus
Examiner Tip

Take care to present your work as accurately as possible, use a ruler, a sharp pencil and check that the drawn line is exactly where it is supposed to be.

Question 4(c)ii

This item tested AO3.1. To gain credit for 4cii candidates had to state two conclusions about the relationship between the nitrate concentration and the algae in three lakes. The majority of candidates gained MP1: the easier relationship that as nitrate ion concentration increases, the number of algae/algal cells increases. Fewer got the harder mark, that as the nitrate concentration increases, the number of types of algae also increases. The latter was harder as the relationship is not so clear. A significant number of candidates gained their second mark by giving a relationship for a particular species of algae, for example, species mn cannot grow in nitrate concentrations less than eg 3 mols per dm3. The question asks for a relationship, so just saying, for example, species m was not found in lake X was insufficient for the mark available.

Only one mark is awarded here as the second statement is just the reverse way of saying the first statement. This is not an uncommon type of response seen in examination answers.

(ii) State **two** conclusions about the relationship between nitrate concentration and the algae in these lakes.

(2)

1 The more algae, the higher the nitrate concentration is

2 The less algae, the less the nitrate concentration is

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

When asked to make two statements about a relationship, make sure that when you make your second statement, it is not just the opposite way of saying the same thing - eg 'A is bigger than B' is the same as saying 'B is smaller than A'.

This response gains both marks available by satisfying marking points 1 and 3 (in Additional Guidance), the latter being seen much more rarely than MPs 1 and 2.

(ii) State **two** conclusions about the relationship between nitrate concentration and the algae in these lakes.

(2)

1 the higher the nitrate concentration the higher the number of algae

2 algae M doesn't appear until minimum 3mols/dm^3

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

The second conclusion may not be correct, it may be that algal species M needs a nitrate concentration of 4, or 5 mols per dm 3. However, as far as the idea goes, this is creditable.

Question 5(a)

Drawing diagrams from microscopic views/images is a part of topic 1 statement 1.6 which is a core practical and addresses AO1.2. We do not expect perfect biological diagrams from foundation candidates. For credit candidates had to show the rough shape (thin/elongated oval, pointed or round at the ends) of the stoma. and the shape of the two guard cells shown as two cells. For some candidates the answer of 'two separate cells' was awarded generously due to the scanning of images and only faint lines could be seen. We were not insisting on the two cells being separated by two different lines; however, we did see some excellent diagrams showing not only the shape of the two cells but also some of the internal structures as well with some showing the cell wall as two lines. No textbook diagrams were seen, possibly because this was not the standard palisade cell that the candidates are more familiar with compared to highly specialised ones like guard cells.

All three marks are awarded for these responses.

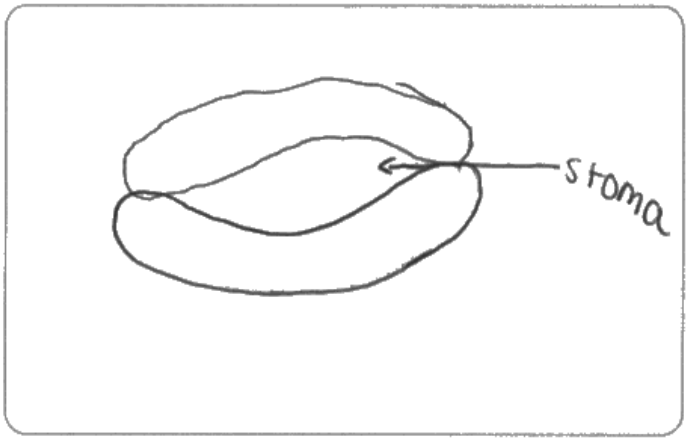
5 (a) Figure 9 shows a stoma on the lower epidermis of a leaf as seen using a light microscope.

(Source: © Dew_gdragon/Shutterstock)

Figure 9

(i) Draw the stoma and two cells around it in the box.

(2)



(ii) Give the name of the two cells around the stoma.

(1)

~~wax~~ guard cells

ResultsPlus
Examiner Comments

The diagram is a little stylised but the stoma is a good shape for the one in Figure 9 with the two guard cells shown as separate cells and roughly the correct shape.

ResultsPlus
Examiner Tip

When drawing cells from a microscopic image, try to include some of the internal structures, eg the small round structures are probably chloroplasts - this is a leaf cell which is photosynthetic. The large structure in roughly the centre of the guard cell is a nucleus.

Question 5(b)i

Item 5bi is a straight recall question testing AO 1.2, asking candidates to recall the term 'auxin'. This was less well answered than many of the other items. This is not surprising as this is a specialist term which is only likely to have been met a couple of times over the length of the course.

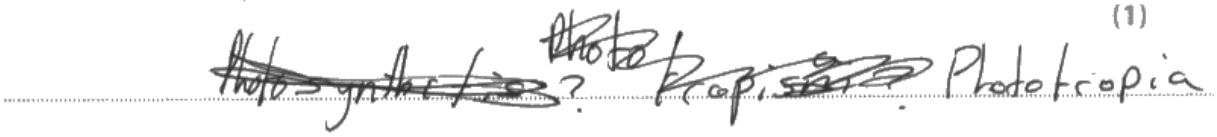
It is suggested that candidates make a list with the meaning function of each key word in the specification. Many items in the examination require this basic recall, some as the creditworthy answer, some as part of a longer creditworthy response.

This candidate has made several attempts, including phototropism, as their answer, before settling on phototropia.

(b) A student observed that a plant in a room had grown towards the light.

(i) Name the plant hormone that causes the plant to grow towards the light.

(1)



ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

Make sure that you know all the key words and their meanings so that you can use them to gaining marks in the examination. Make flash cards, tables with word and meaning columns, test each other on the words, play pelmanism/matching games to learn technical/scientific terms.

Question 5(b)ii

Testing AO1.2, this item required candidates to recall the name of the process phototropism. Phonetic spellings were credited, but words like photosynthesis did not as it is another process.

This item required candidates to recall the type of tropism that occurs when plants grow towards light.

(ii) Name the type of tropism that causes the plant to grow towards the light.

ResultsPlus
Examiner Comments

Lighttropic is a good guess, and the candidate is right to have an educated guess, but the correct answer to gain the mark is phototropic.

ResultsPlus
Examiner Tip

Always attempt an examination question as you have nothing to lose, but even better than that is to learn all the key, biological terms in the specification. Every GCSE science paper will have marks available for knowing what scientific terms mean. Ask your teacher for a list of the key words and then write what each one means by it and get a friend to ask you each one until you know them all.

(ii) Name the type of tropism that causes the plant to grow towards the light.

photosynthesis

ResultsPlus
Examiner Comments

This was an incorrect answer.

ResultsPlus
Examiner Tip

Learn the terms and processes named in the specification. There are several ways to do this, one that is effective for many candidates is to write the word / term and what the word means / how it is used. Then get someone to test you on those terms until you know them off by heart.

Question 5(c)i

Candidates had to make some relatively simple comparisons regarding the length and density of root hair cells for plant A (that grows in 'wet' soil) with those of plant B (which grows in dry soil) to gain the AO1.2 targeted item. The data was presented in tabular form. The differences in length and density were quite clear and it is no surprise that candidates found this task accessible with the majority scoring well. Where candidates did not gain credit was often because they did not specify which plant they were talking about for 'longer' / 'more' (per mm2).

The length and density of roots were for two plants, a xerophyte and a water loving plant, were presented in tabular form. Candidates had to compare the root length and density per mm2 for each type of plant to gain credit. This was an accessible item with the majority of candidates scoring well with the relatively common error of just quoting data from the table.

(c) Figure 10 compares the root hair cells of two plants.

Plant A is adapted to growing in wet soil.

Plant B is adapted to growing in dry soil.

	soil condition	mean length of root hair cells in µm	mean number of root hair cells per 1 mm² of root surface
plant A	wet	221	40
plant B	dry	458	92

Figure 10

(i) Compare the root hair cells of Plant A with the root hair cells of plant B.

(2)

Plant A has a mean length of 221 µm and 40 root hair cells per 1 mm² of root surface. However, Plant B has a mean length of 458 µm and 92 root hair cells per 1 mm² of root surface.

ResultsPlus
Examiner Comments

This candidate has just restated the information given in the table without actually comparing the two pairs of statistics regarding root hair length and density per mm 2. No marks awarded.

ResultsPlus
Examiner Tip

When asked for a comparison, make sure that you do not just restate data or observations. Use phrases such as 'longer' and 'more dense' (per mm 2), 'hotter', 'faster' to express a comparison. Also make sure that you do not just make the same point in reverse, eg A has shorter roots than B and B has longer roots than A.

Question 5(c)ii

Another comparison item, but this time it tested AO2.1 and required candidates to state how the differences in leaf structure helped plant B (a xerophyte) survive in dry soil. Candidates found this item very accessible with the majority gaining credit. Common responses compared the number of stomata, the number of layers in the upper / lower epidermis, the number / size of air spaces or cells in the spongy mesophyll and the thickness of the cuticle. This was an observation question; however, many candidates also completed the idea behind the question by stating how the adaptation helped plant B survive in dry soils / environments. Some candidates did not gain credit as they did not specify which plant they were talking about for each quality.

This item required candidates to state two differences shown in the leaf cross section for plant B (grows in dry soil) with that of plant A (grows in wet soil) which would help plant B survive in a dry environment.

The cross sections were labelled so that the differences were the focus and not the recall of names of the layers of a leaf. This item scored well with the majority of candidates gaining credit for stating differences in cuticle thickness, number of upper epidermal cells, and number of stomata in the lower epidermis, with a smaller number stating that the air spaces in plant B were smaller.

Although not required, it was good to see that many candidates qualified their identified differences with a statement about how each one would help plant B survive in a dry environmet, eg there are less stomata so the plant will lose less water when it is hot.

(ii) Figure 11 shows sections of a leaf from plant A and a leaf from plant B.

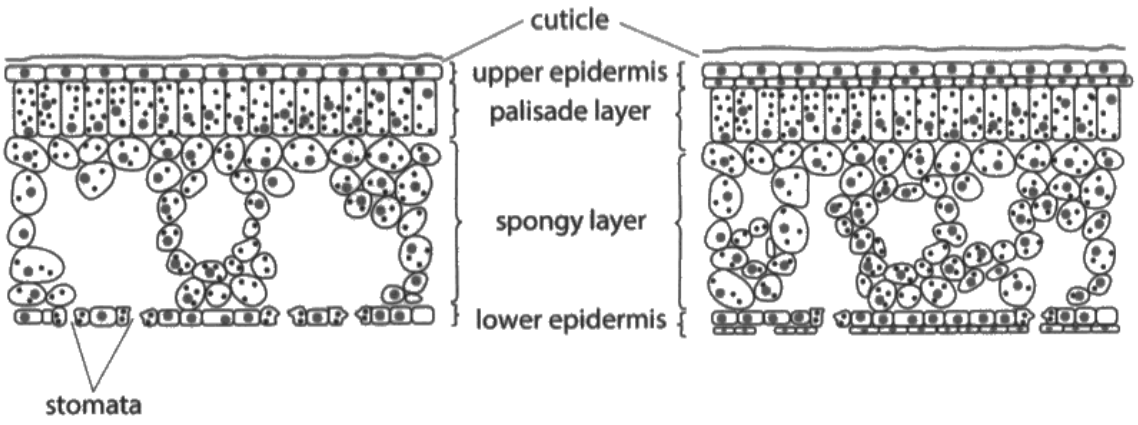


Figure 11

State **two** differences in the leaf structure shown in Figure 11 that help plant B to survive in a dry environment.

(2)

1 Plant B's spreadout is more spread out

2 plant B has less stomates

ResultsPlus
Examiner Comments

Common errors including saying that the epidermal cells were larger / thicker in plant B and general statements such as plant B is more compact.

ResultsPlus
Examiner Tip

When comparing two qualities, make sure that your comments are a) meaningful and b) specific. What does 'more spread out' mean (student comment 1) and to which parts is 'more spread out' referring? Also, make sure that the comments are about the correct diagram, here it is plant B that has less stomata than plant A.

Question 6(a)i-ii

To score the available mark for the AO1.1 6ai item, candidates had to measure the thickness of the left ventricle wall at the position marked with a line, labelled T-U on Figure 12. The length of T-U was 5mm but because candidate rulers are not always that accurate, a +/- 1 mm was allowed, ie a range between 4 and 6mm was creditable.

mm was written on the line, however, if a candidate measured the thickness in cm, the mark could still be awarded as long as they stated eg 0.5cm. The vast majority of candidates scored here.

To score on 6aii, candidates had to describe how deoxygenated blood leaves the right side of the heart to become oxygenated.

The creditable steps were: the right ventricle/the heart contracts, but here we would credit the right ventricle pushes/pumps blood through/up the Pulmonary artery to the lungs to absorb oxygen. Please note that as it 'becomes oxygenated' was in the stem of the questions, so just stating to 'become oxygenated/ is oxygenated' was not creditworthy. The mark scheme says : absorbs oxygen (by diffusion). The diffusion was bracketed as practically no response seen included it.

The candidate does not score for giving the thickness of the ventricle wall as 0.5 as they haven't stated cm.

6 Figure 12 shows the structure of the human heart and the direction of blood flow.

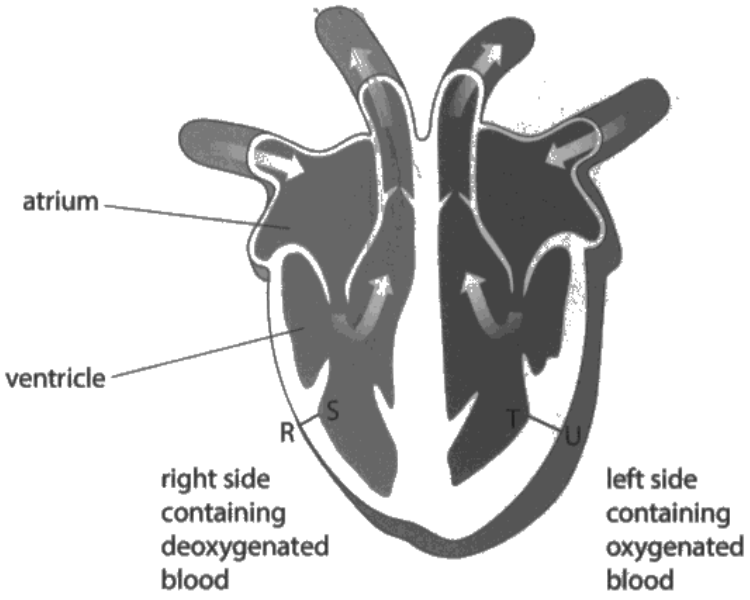


Figure 12

(a) (i) Measure the thickness of the left ventricle wall between points T and U.

(1)

T–U = 0.5 mm

(ii) Describe how deoxygenated blood leaves the right side of the heart and becomes oxygenated.

(2)

It exits through the aorta and enters the lungs where it becomes oxygenated

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

Always look on the answer line when numerical answers are required to make sure that the units are the same as the ones used when measuring. Here 0.5 is centimetres, but the units on the line states mm. 'Aorta' is incorrect for the artery leaving the right side of the heart. The diagram clearly has 'right side' and 'left side' labelled. 'Becomes oxygenated' is not creditworthy as this merely restates the stem of the question.

Question 6(b)

Candidates were asked to state the number of valves (2) in the right side of the heart as shown in Figure 12 which is a AO1.1 targeted item.

Some candidates counted the 'flaps' of the valves thus stating 4 as their response.

However, the majority of candidates gained the mark for correctly stating 2 (valves).

It was nice to see candidates labelling the valves with their full names, eg aortic, semi-lunar and tricuspid.

(b) Figure 12 shows the valves that stop blood from flowing in the wrong direction.

State the number of valves in the right side of the human heart shown in Figure 12.

4

ResultsPlus
Examiner Comments

The candidate appears to have written the correct answer of 2 here, and then changed it to 4 thus losing the available mark. This error was seen several times. There were more examples of creditworthy responses being changed, thus losing a mark, than the other around.

ResultsPlus
Examiner Tip

Only change an answer if you are really sure that your first thoughts are incorrect.

Question 6(c)

Candidates are asked to describe what happens when the left ventricle contracts, an AO1.1 task.

The diagram of the heart at the start of Q6 has the left side labelled. The right atrium and ventricle are labelled so candidates should be able to work out which is the left ventricle, if they don't already know which chamber it is.

As for 6 aii, credit was given for the heart pumps/pushes blood/blood is put under pressure.

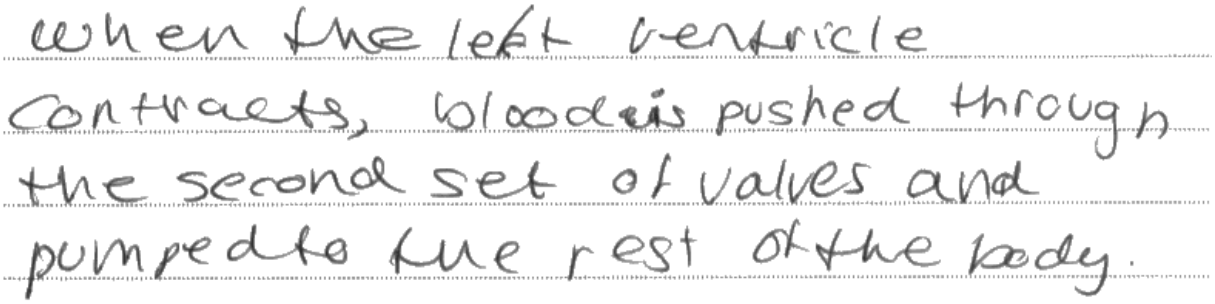
Candidates are expected to know which blood vessel is the aorta and to where the aorta takes blood but are not expected to know the names of the valves. Therefore stating that blood goes through a valve/correctly named valves is credited, followed by: into / through the aorta, to the body (organs). The question is about what happens to the blood so there is no mark for any reference to substances that leave/enter the blood in any organ.

There were some excellent detailed responses seen which scored full marks, however most scored 1 or 2 marks for 'through the aorta' and 'to the body/ body organs/ amed body organs being regulalry seen for two marks. Candidates that only scored one mark on this item tended to state 'to the body'.

(c) The heart is part of the circulatory system.

Describe what happens to the blood when the left ventricle contracts.

(3)



ResultsPlus
Examiner Comments

The aortic valve is the second valve for the blood to go through on its journey through the heart MP2 and is pumped MP1 to the body.

ResultsPlus
Examiner Tip

Keep it simple. This response covers three of the four marking points succinctly for all three available marks. There is no need to elaborate.

See below.

(c) The heart is part of the circulatory system.

Describe what happens to the blood when the left ventricle contracts.

(3)

When the left ventricle contracts the blood gets pumped through the aorta through to the whole body where oxygen is needed to working muscles

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

Keep your answers simple. This response gains all 3 available marks with only naming the aorta a technical detail.

Question 6(d)i

Candidates were presented with a table showing a diagram of and naming an artery, a capillary and an unnamed drawing of a cross section of a vein. The candidates had to name the vein (AO2.1), or state a named vein to score the available mark.

This was a high scoring item with the majority of responses seen being correct.

See below.

(d) Figure 13 shows information about three types of blood vessel.

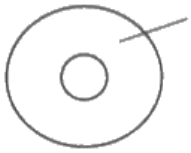
blood vessel	A	B	C
type of blood vessel	artery	capillary	?
cross-section of blood vessel			

Figure 13

(i) State the type of blood vessel shown as C in Figure 13.

(1)

aorta

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

The Aorta is a specific artery and so is unlikely to be creditworthy. Arteries, veins and capillaries are specified as the three types of blood vessel that should be studied.

Question 6(d)ii

Figure 13 showed a cross section of a capillary with no labels. However, candidates could compare it to the artery (with 'thick muscular wall' labelled, and also to the vein with thin muscular wall labelled) thus testing AO2.1. The capillary wall was shown as thinner than the vein.

6d(ii) asked candidates to describe how the structure of a capillary helps gas exchange in the lungs.

There were no marks for details about gas exchange.

Most responses seen scored 1 mark for stating capillaries have a thin wall/a wall one cell thick or by saying that the capillary has a large surface area (without the 'to volume ratio') although

excellent responses were seen that encompassed at least three of the four marking points stated in the mark scheme.

(ii) Describe how the structure of a capillary helps gas exchange in the lungs.

(2)

Capillaries are one cell thick which makes ~~allows~~ gas exchange really quick because they have a short distance to go.

ResultsPlus
Examiner Comments

A good response gaining both marks available with only a few omissions, for example by being more specific eg the capillary wall is just one cell thick.

ResultsPlus
Examiner Tip

Try not to use words like 'they'. Here the candidate writes, because 'they' have a short distance to go. What does 'they' mean? The capillaries or the gases?

Question 7(b)

A straightforward AO1.1 recall question asking candidates to name the substance (although we accepted more than one) that is broken down to make urea.

Proteins was the most common correct answer regularly seen with amino acids also seen. Ammonia was not seen at all.

The commonest incorrect response seen was urine.

Urethra is a poor choice as candidates should know that is a structure, even if they are not sure which one.

(b) Name the substance that is broken down to produce urea.

ResultsPlus
Examiner Comments

The item asks candidates to name the substance, not name the structure, so it was disappointing that urethra and ureter were seen regularly as an answer to item 7b. Urethra was not an uncommon incorrect answer seen, although ureter was not seen at all.

ResultsPlus
Examiner Tip

It is good to 'have a go' when you don't know the correct answer immediately. However, if the question asks for 'a substance', don't name a structure.

Question 7(c)i

Item 7ci tested AO2.1 and required candidates to complete the sentences describing the procedure used in kidney dialysis. The majority of candidates scored the first 'box' mark diffusion, but only a minority of candidates wrote 'blood' to complete the final statement, with the majority writing 'urine' presumably because the box included the word urea in its statement.

This item was a description of dialysis split into four statements. The first three mention blood and the third box actually states that urea moves from the blood into the dialysis fluid. So the

missing word in the final statement must be 'blood' although patient/vein were also creditable though very rarely seen.

(c) The kidneys are part of the urinary system.

People with kidney disease can be treated by dialysis or by having a kidney transplant.

(i) Figure 14 shows some stages of the process of dialysis.

Complete boxes 3 and 4 by writing the missing details of the process of dialysis.

(2)

1. The patient's blood is taken out of a vein and transferred to the dialysis machine.

2. In the machine, the blood flows through a porous tube, surrounded by dialysis fluid.

3. Urea moves from the blood into the dialysis fluid by ~~act~~ diffusion.

4. This lowers the concentration of urea in the blood.

Figure 14

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

When presented with a 'story' of a procedure or technique, look for the key parts of each step. It may be, as is the case here, that the answer is being presented to you and you simply have to find it.

Question 7(c)ii

Question 7(d)

7d tested AO1 and required candidates to name and describe the role of the main parts of the urinary system shown in figure 15.

Candidates were presented with a diagram showing W (the kidney), X (the ureter), Y (the bladder) and (Z) the urethra.

The level awarded was determined by how many functions of W, X, Y and Z were described, with the mark within each level being determined by the degree to which W, X, Y and Z were named.

Candidates found this an accessible item with almost all being able to say that Y was where urine was stored with a large proportion of these being able to also state that Z took the urine to outside the body. A significant tranche of candidates wrongly stated that the kidney made urea and few knew the name of X the ureter, with a few more being able to name the urethra.

Some excellent, detailed answers were seen including one candidate's work which explained the role of the different parts of the nephron including the loop of Henle at a good GCSE+ level.

This item starts off well with the role and name of organ W and describes the function of the kidney in more depth than is required. However, the candidate fails to address the other names or roles of the other organs so only level one, two marks awarded.

*(d) Figure 15 shows the human urinary system.

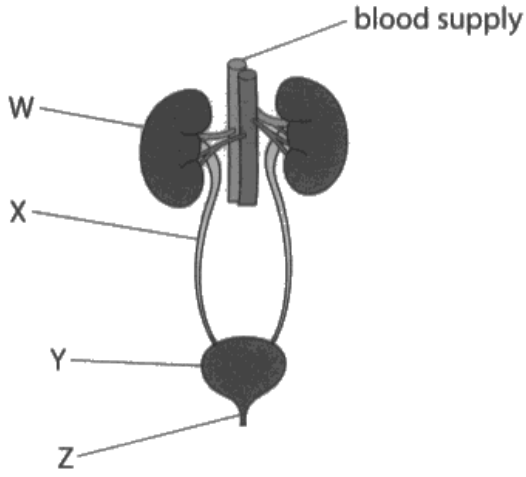


Figure 15

Describe the roles of parts W, X, Y and Z in making urine and removing the urine from the body.

Name parts W, X, Y and Z in your answer.

(6)

Part W is the Kidneys. The Kidneys filter out waste from the body (such as urea) and transform it into urine to be excreted. The Kidneys also filter out useful products (such as water) that can be used by the body.

Part Y is the bladder. This is how urine leaves the body.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

The instruction is to describe the roles of W, X, Y and Z. Don't get bogged down on one of these four parts of the urinary system as this will limit your final mark for this item as you have only addressed 1/4 of the task.

This is a good account of three of the parts W, Y, and Z of the urinary system along with their names which satisfies the criteria for being awarded the full six marks for this item.

*(d) Figure 15 shows the human urinary system.

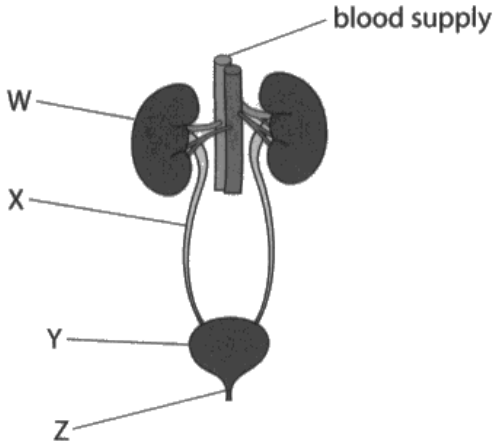


Figure 15

Describe the roles of parts W, X, Y and Z in making urine and removing the urine from the body.

Name parts W, X, Y and Z in your answer.

(6)

W is the kidney which removes waste like urea and impurities from the blood. Y is the bladder which stores urine until it can be removed from the body. Z is the urethra which is where the urine is disposed from.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

Keep your work simple, addressing the key points, and ensuring that you have covered the areas required. Here the candidate could have made the leap to describing X as the tube that takes urine from W to Y, but full marks have been awarded.

Question 8(a)

8a tested AO1.1 and required candidates to explain why running increases a person's heart rate. This item was answered well by many candidates. Where marks were lost it was often because of poor expression with many not including the idea of blood being pumped faster with more oxygen/respiration/energy being required. More only had to be written once, so more oxygen for respiration scored both MP 2 and 3. Most candidates that scored both marks available hit marking points 2 and 3. Some excellent answers were seen that covered all marking points listed in the mark scheme. The most common error seen was candidates saying that more blood is pumped around the body which is incorrect and they needed to say more blood per second, which was rarely seen, or more easily blood is pumped around the body or more blood per second is pumped (to the muscles). A few candidates wrote that the heart beats faster when you exercise to remove the extra carbon dioxide produced from respiration which of course is scientifically more correct showing a high level of understanding of this physiological process.

This candidate shows a common error in answering this question, linking the need for more oxygen to making more blood rather than moving the blood faster to deliver more oxygen / remove more carbon dioxide.

8 (a) Explain why a person's heart rate increases when they are running compared with when they are at rest.

(2)

When a person is running increased heart rate happens to produce enough blood to go around the body. As when a person is running lactic acid appears in the muscle and more blood is needed

ResultsPlus
Examiner Comments

This is an 'explain' question so candidates need to think about what happens and why. Using the word(s) 'because' or 'so that' is one way to help answer the question. For example start with: 'The heart race increases because...' and then you are more likely to say because your muscles need more oxygen which is gained by the heart pumping faster pushing blood around your body faster.

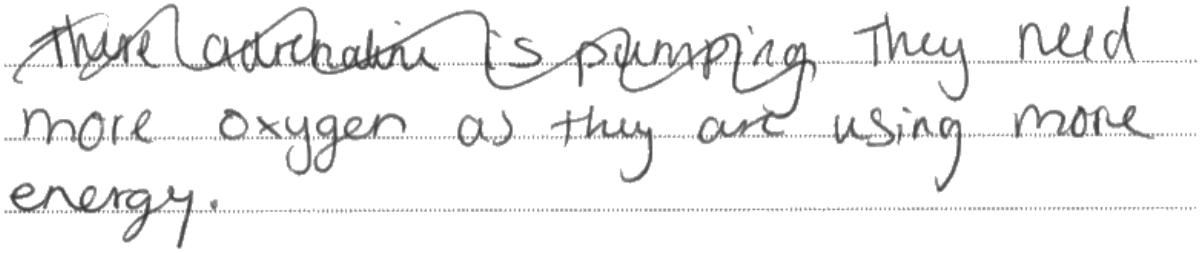
ResultsPlus
Examiner Tip

When answering a question about heart rate and exercise think what is needed in the cells

in larger 'amounts', state these and then describe how they will be supplied to the cells/tissues.

8 (a) Explain why a person's heart rate increases when they are running compared with when they are at rest.

(2)



ResultsPlus
Examiner Comments

This candidate gets both available marks by answering the question by what is needed, more oxygen so that more energy can be used.

ResultsPlus
Examiner Tip

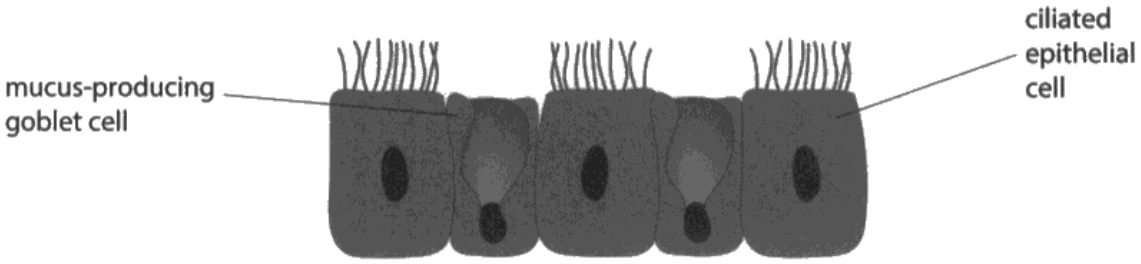
'Explain' questions are often best answered by using the words 'because/as' in your response - here this works well with because more oxygen is needed, as they are using more energy.

Question 8(b)

This 'describe' item tests AO2.1 and requires candidates to describe how pathogens are removed from airways. A diagram of cilliated epithelial and goblet cells was supplied as stimulus material. Candidates understood the processes but lost marks as they confused the roles of the cells/structures, with many saying the pathogens are caught in/by the hairs. Few candidates finished the 'story' by explaining what happens to the pathogens in the mucus after being trapped with many talking about the cells carry the pathogens up the airways rather than referring to the cillia wafting/moving the pathogens (in the mucus).

This AO2.1 target question requires candidates to say that pathogens are trapped in the mucus, and that the mucus is moved/wafted by the cilia (we would accept hairs for cillia) up to the throat or equivalent description of what happens to the mucus.

(b) Figure 16 shows a diagram of mucus-producing goblet cells and ciliated epithelial cells in the airways of the lungs.



(Source: © K.K.T Madhusanka/Shutterstock)

Figure 16

Describe how pathogens are removed from the airways by ciliated epithelial cells.

(2)

the cilia (hairs) trap the pathogen in the mucus and waft it out up the throat or out of the nose.

ResultsPlus
Examiner Comments

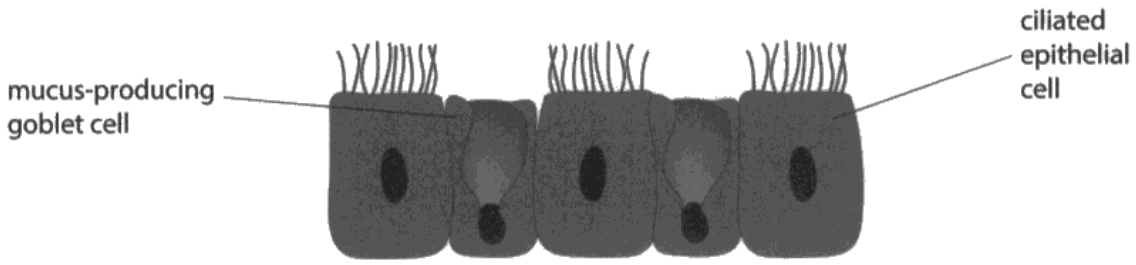
A slightly confused answer but there was enough correct to award both marks available. Up the throat/out of the nose was sufficient to award MP3, although here MP1 and 2 have already been awarded.

ResultsPlus
Examiner Tip

The label on the diagram/question introduction tells you what the goblet cells produce: mucus. This is therefore important and needs to be incorporated into your response.

A full account covering all three marking points, gaining both marks available.

(b) Figure 16 shows a diagram of mucus-producing goblet cells and ciliated epithelial cells in the airways of the lungs.



(Source: © K.K.T Madhusanka/Shutterstock)

Figure 16

Describe how pathogens are removed from the airways by ciliated epithelial cells.

(2)

Pathogens are trapped in the ~~ciliated~~ ~~epithelial cells~~ mucas and then transported by the ciliated epithelial cells out back into the mouth where they are ~~either~~ swallowed ~~or spat~~ ~~regurgitated~~ ~~spat back out~~

ResultsPlus
Examiner Comments

See above.

Question 8(c)

This item again addressed AO2.1 and required candidates to explain how aerobic respiration provides energy for running.

A significant number of candidates misunderstood the question and answered it in the same way as 8a, explaining why the heart rate increases when running.

This item is not why, but how, and so in other words, 'describe' aerobic repiration is required. Some candidates that scored both marks wrote out in full the aerobic respiration although we also credited a correct respiration equation. A significant number of candidates scored 1 mark here by saying aerobic respiration uses oxygen and glucose to supply them with energy. Very few stated that the process is an exothermic one but a small percentage of responses did gain a mark by referring to the process occurring in mitochondria.

A succinct and full account of aerobic respiration.

(c) During a race, athletes respire aerobically and anaerobically.

Figure 17 shows an athlete after a race.

(Source: © voronaman/Shutterstock)

Figure 17

Explain how aerobic respiration provides energy for running.

(2)

Aerobic respiration uses glucose and oxygen to make water and Carbon dioxide which Creates energy for running.

ResultsPlus
Examiner Comments

See above and below.

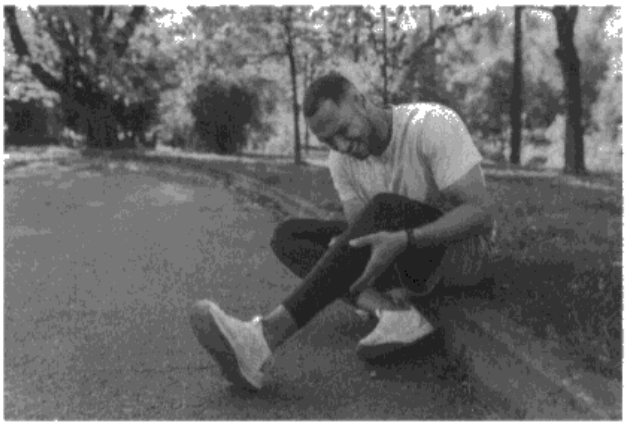
ResultsPlus
Examiner Tip

The key words in the stem of the question here are aerobic respiration. Once these are recognised, the points made here are relatively easy to write down, gaining both available marks.

This is a good answer but key points are left out, for example 'glucose and oxygen' instead of just 'oxygen' are required for MP1. Mp2 is not addressed and the reference to anaerobic respiration is irrelevant.

(c) During a race, athletes respire aerobically and anaerobically.

Figure 17 shows an athlete after a race.



(Source: © voronaman/Shutterstock)

Figure 17

Explain how aerobic respiration provides energy for running.

(2)

aerobic respiration provides energy for running by ~~providing oxygen to the muscles for~~ using oxygen to respir rather than ~~vosit~~ respiring anaerobicly using lactic acid.

ResultsPlus
Examiner Comments

See above.

Question 8(d)iii

This item continues the questions on the respirometer shown in figure 18. Candidates had to work out how the movement of the drop of coloured liquid would be affected if two maggots had

been used instead of the four stated in figure 18.

Candidates clearly understood the question and found it accessible as many answers were seen that gained the marks for saying that the drop would move more slowly with the majority of these stating that two maggots would not respire as fast as 4 maggots.

Many candidates also stated that the drop would move half the distance along the scale/would only move 5 mm instead of the ten that was moved with four maggots.

A comprehensive answer not just stating that the drop of coloured liquid would move slower but correctly calculated where it would end up on the scale (half the distance that the drop moved when there were four maggots in the tube).

(iii) The investigation was repeated with two maggots.

Explain how the movement of the drop of coloured liquid would be affected if the investigation was repeated using fewer maggots.

(2)

It wouldn't go up as fast it would of gone to 25mm instead of 30mm because there was less maggots.

ResultsPlus
Examiner Comments

This item tested A03.2ab. If you are given data on something that will change because of a change in the experimental procedure, use that information to calculate not just what the change will be but quantify how big the change will be.

ResultsPlus
Examiner Tip

This is an 'explain' item so as there are two marks available here, make sure that you extend your answer beyond what will happen with some detail, for example how much will the different condition change the result. Here half the maggots = half the respiration = half the distance travelled by the drop of liquid.

Question 8(d)i-ii

Candidates were presented with a diagram of a respirometer with four maggots in a stoppered large test tube separated from some soda lime by a wire mesh.

Item 8di, assessing AO2.2, asked candidates to state the reason why the soda lime was present. This was well answered by most candidates stating that the soda lime would absorb the carbon dioxide (from respiration) produced by the maggots. This is a good indicator that the majority of candidates had witnessed/carried out this core practical.

8dii, also testing AO2.2, required the candidates to calculate and draw on the diagram the position of the drop of liquid after five minutes. The candidates were told that the drop of liquid moved at a mean rate of 2mm per minute.

Evidence of either the drop of liquid being drawn in the correct position, or a calculation, or both, showed that candidates could access the concept and calculate how far the drop of liquid would move. However, there seemed to be a strong correlation where almost all those candidates that could state the function of the soda lime also indicated the position of the bubble correctly, whereas only about one third of candidates who could not state the function of soda lime in this investigation tended to be able to also gain the drawing the bubble mark.

A few candidates moved the drop of liquid the wrong way thus losing the available mark, however most responses seen moved it to the 30mm mark on the scale. Some candidates still lost this mark as they drew the back of the droplet on 30, instead of on the front of the droplet. Some candidates also lost the mark as they drew very long drops without paying attention to where the front should be moved even though a calculation showed that they had worked out correctly that the drop of liquid should move 10mm towards the maggots. The question asked for the position of the bubble to be shown so an arrow, for example, pointing straight down at the 30 mm mark on the scale was also given credit.

(d) The rate of respiration of maggots was investigated using the equipment shown in Figure 18.

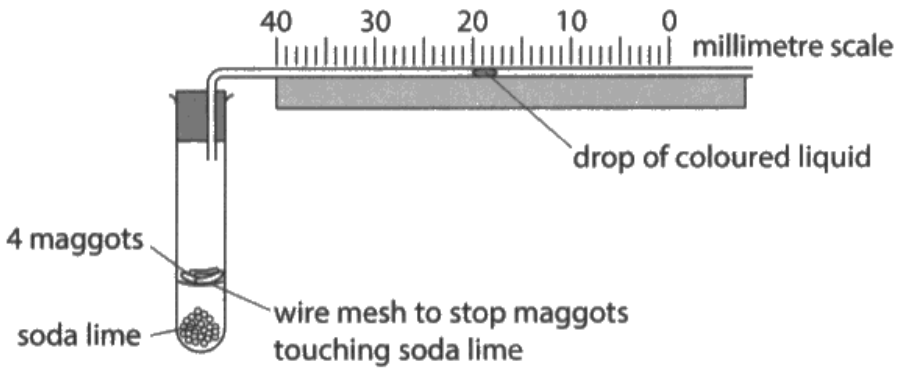


Figure 18

(i) State the reason why the soda lime is placed in the test tube.

(1)

to add colour to the liquid

(ii) The drop of liquid in Figure 18 is at 20 mm.

The drop of coloured liquid moved at a mean rate of 2 mm per minute.

Draw, on Figure 19, the new position of the bubble after the five minutes.

(1)

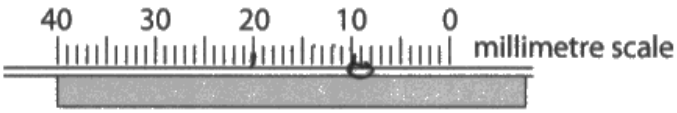


Figure 19

ResultsPlus
Examiner Comments

This candidate appears to have correctly calculated that the drop of liquid would move 10mm but they have moved it the wrong way, presumably not realising that the soda lime would absorb the carbon dioxide produced by the maggots, thus reducing the volume of gas inside the test tube.

ResultsPlus
Examiner Tip

If given a task where something, in this case a drop of coloured liquid, is moving, and you are asked to show the new position of the drop, make sure that the drop does not change in size.

Question 8(d)iv

Item 8div tested AO3.3a and required candidates to state an improvement that would make the results of the maggot respiration investigation more reliable. The full answer would be to repeat the investigation (several times) along with either compare the results to see if they confirmed each other or and then calculate a mean. The minimum creditable was just to repeat the investigation, which has one of the follow up procedures implied. However, a significant minority did extend their 'repeat' mainly with 'and then calculate a mean'.

(iv) State **one** way this investigation can be improved to obtain more reliable results.

Repeating the test multiple times

ResultsPlus
Examiner Comments

This response is better than just stating repeat the test, as with two results that are very different do not help in saying which result is correct. However multiple times allows you to make a judgement to discard any outliers.

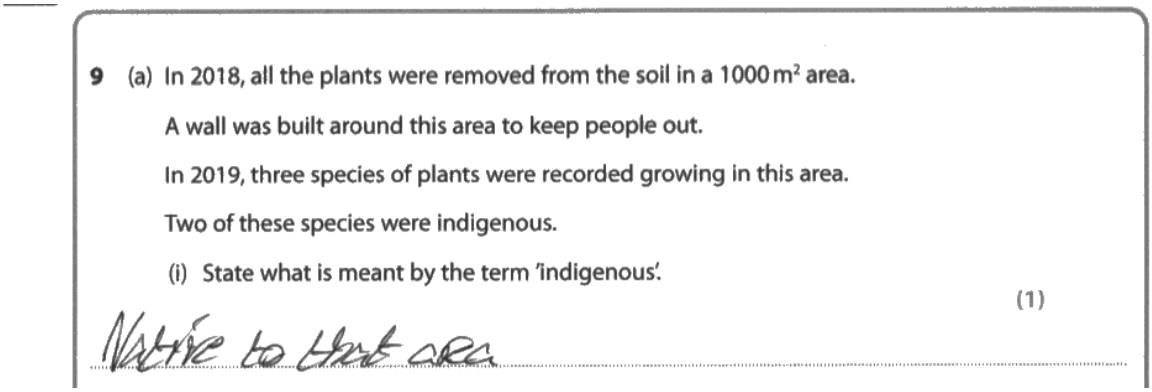
ResultsPlus
Examiner Tip

When you repeat an investigation to get more results, state what you will do with the results. Either calculate an average/mean or compare the results to see how much they agree with each other.

Question 9(a)i

This recall item comes under AO1.1. A variety of responses were seen for this item with many giving the answer for non-indigenous. A variety of ways of expressing the answer were credited including: always grown there, found there naturally, and native to the area.

See below.



9 (a) In 2018, all the plants were removed from the soil in a 1000 m² area.

A wall was built around this area to keep people out.

In 2019, three species of plants were recorded growing in this area.

Two of these species were indigenous.

(i) State what is meat by the term 'indigenous'.

(1)

Native to that area

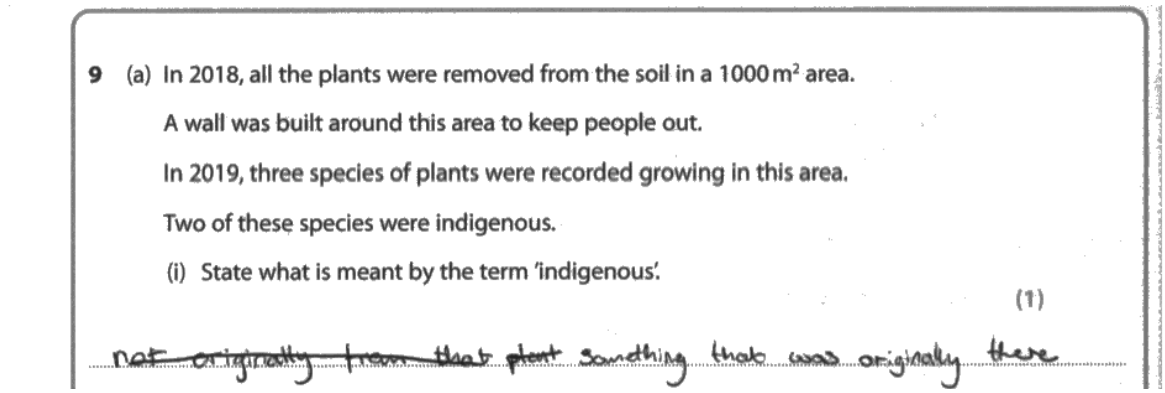
ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

Non-indigenous is a specified word used in the specification - Topic 9, point 9.9. Make sure that you know what each of the key words in each topic means as some will be used in the examination and you will be expected to know at least a little about them.

See below.



9 (a) In 2018, all the plants were removed from the soil in a 1000 m² area.

A wall was built around this area to keep people out.

In 2019, three species of plants were recorded growing in this area.

Two of these species were indigenous.

(i) State what is meant by the term 'indigenous'.

(1)

not originally from that plant something that was originally there

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

A significant number of candidates had problems expressing themselves with this response, being close to one that is just creditable. Stating a plant or an organism, instead of 'something', would have made this mark more definite but is close enough to be clear what the candidate means and is just on the creditable side of responses.

Question 9(a)ii

A02.2 was being assessed with this item. Here we were looking for more than just saying use a square or use a box, or occasioally use a hoop. Quadrat would be the desired answer with a stated size, eg 1/2 or 1 m2 quadrat. This was seen quite frequently and it was pleasing to see candidates stating not just the quadrat size but also stating the use of a gridded quadrat. Belt transect was seen occasionally but most of these also expanded on 'belt transect' to state how to create one using a quadrat. A very few candidates used a line transect which was creditable, particularly if how it was used was clear and 'would work'.

A grid was creditable here, particularly if the size, eg 1m2 was stated or detail, eg a metal grid, as seen here. Although a quadrat was the answer that was most commonly seen often with the size, usually 1m/1m2 and then 1/2m although if a 1/2m2 was given, it was still credited.

(ii) Name **one** piece of equipment that could be used to sample the number of indigenous plants in this area.

(1)

A mental grid

ResultsPlus
Examiner Comments

See above.

(ii) Name **one** piece of equipment that could be used to sample the number of indigenous plants in this area.

Quartile

ResultsPlus
Examiner Comments

Quartile was not credited here as a misspelling of quadrat as 'quartile' means something different.

Question 9(b)i

Item 9bi, assessing AO2.1, required candidates to state that the trend for plant species C from 2019 t0 2023 was 'increasing'.

Candidates understood the task and the majority of responses seen showed that they could work out that the trend was 'increasing'.

A correct response gaining the available mark.

(i) State the trend shown by the data in Figure 20 for plant species C from 2019 to 2023.

(1)

It increases rapidly.

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

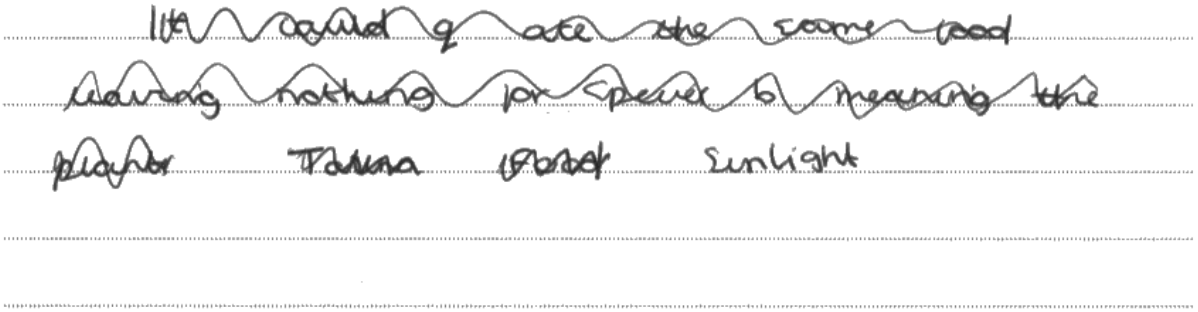
If asked a question like this, keep it simple, in this case it increases, it goes up will suffice, but if the trend changes, eg increases slowly and then increases quickly, make sure you say where the change in speed of increase occurs. If several marks are available for this task, make sure you quote data from the source.

Question 9(b)iii

9biii, testing assessment objective AO3.3, required candidates to explain one way that species C could have outcompeted species B. An open ended item like this has several possible creditable responses. As it is an explain item, the two marks will be for a statement supported by a reason. The most popular answer seemed to be that species C grew faster/taller/bigger/grew bigger leaves/longer roots, for the first mark, with the second mark being awarded for a correct way that the property of plant species C would outcompete species B. The most common reason for the grow taller/grow bigger leaves idea was that the large leaves would overshadow plant B.

(iii) Explain **one** way that this species could have out-competed species B.

(2)



ResultsPlus
Examiner Comments

If sunlight had not been written in, we would have tried to read the crossed out work and treated it as the candidate's response. Sunlight is not an explanation and so no marks are awarded here.

ResultsPlus
Examiner Tip

Whenever you write an answer, ask yourself, 'Does this answer the question?' The word sunlight can not 'explain' a way that species B could have outcompeted species B. Therefore change/extend your response so that it at least could answer the task set.

Question 9(b)iv

9biv again assesses AO 3.2 requiring candidates to explain how species H could have moved into the walled area being studied. This was well answered with methods for colonisation stated including: blown in by the wind, carried in by animals/named animals, eg squirrels or bees, and roots growing under the wall around the plot. It was pleasing to see that there were few blank responses for the entire paper, and very few blank responses for this item.

Maybe the most common of correct responses for this item, with 'carried in by animals' coming a close second.

(iv) Give **one** way that species H could have moved into the area.

(1)

ResultsPlus
Examiner Comments

This is a response that is not stated as something that candidates should be taught, although many will when they study specification point 9.9 (non-indigenous species) It was pleasing to see so many creditable responses.

ResultsPlus
Examiner Tip

If an item asks something that you have not directly studied, use your life experiences to answer it successfully. Here, a creditworthy response could be from direct experience, a pet covered in hooked/sticky seeds for example or from something seen on television, for example.

Question 9(c)

This item, testing AO1.2 required candidates to plan an investigation to find the number of the types of plants shown in the stimulus material where four plant species on rough pasture were identified.

This was a '6 marker' extended response item which means that some credit is given for how the response is structured. The task for 9c was to plan an investigation to estimate the number of the four named species growing in a field that had an area of 1000 square metres. A list of indicative content can be found in the mark scheme for this paper.

Guidance regarding the application of assigning which of the three level tiers 1, 2 and 3, as well as the mark awarded within the tier, are also available in the mark scheme. The level was driven by how complete, workable and detailed the plan was, with the mark within the level based on the detail used in the method as well as the detail of the calculation for the number of the named plants in the field.

Some impressive responses were seen with excellent detail on how to place quadrats randomly, when to count/not count if a plant was 'inside' the quadrat and how to calculate an estimate of the numbers of each plant in the field. Candidates were told that the field had an area of 1000m2 and so responses using 1m2 quadrats were used and then the averages multiplied by 100, or 10m2 quadrats were used with totals multiplied by 100, showing a high level of understanding for that part of the process. Repeat with eg 10 quadrats was stated by a notable number of candidates which gained them credit.

Some candidates did not gain credit for level 2 or 3 if they used squares instead of quadrats placed, instead of randomly placing quadrats within a grid based on coordinates generated by a random number generator; recording plants instead of recording the number of the different types of plants/species of plant in the quadrat, with many naming the four named plants shown in figure 21. Those candidates who did state the size of the quadrat tended to gain credit by then using the numbers of the plants within the quadrat and multiplying them up to the size of the field. A few just said multiply by the field size whereas a significant number of candidates exemplified their calculations with 'made up' figures.

This response starts well with 50 quadrats being used - using the scientific name for a 'sampling square' gains credit as well using 50 as this will give greater validity to their final numbers of the plants compared to those candidates who simply placed the quadrat once.

This is a simple but workable plan. Some candidates included extra detail, for example a few used an identification chart to identify the plants whilst some stated that you should be sure you could tell which plant (shown in figure 21) was which. 50 implies repeating the process, and the reason why this did not gain all 6 marks was as it lacks detail, in particular how to multiply the numbers in each quadrat 'up' to find the number of each plant species in the 1000m2 field.

*(c) Figure 21 shows some plants growing in a small area of a 1000 m² field.

Figure 21

Devise a plan to estimate the number of named plant species growing in this field.

(6)

- use 50 Quadrats
- use a random number generator to randomly place Quadrats
- count the number of named plant species in each Quadrat.
- then divide the number of Quadrats by the area of the field
- time that number by the number of total species
- this will create an estimate

(Total for Question 9 = 13 marks)

ResultsPlus
Examiner Comments

Seee above and below.

ResultsPlus
Examiner Tip

This task was to devise a plan. It is good to write your plan as numbered/dashed/bullet points, as this makes it easier to read through and helps you to think clearly and see if you have missed out any stages of your plan.

This response is just that little bit more detailed than the 5 mark example given although certain parts are the same. In particular the detail used to calculate the number of each species is more comprehensive than the example that gains 5 marks. Here the candidate starts with a 1m2 quadrat and work out a mean for 1m2 as well as then multiplying their answers by 1000 (the area in m2 of the field). Creating a grid of the entire field and choosing 4 at random and show repeats is less strong than the 5 mark example, but still uses 'random'.

*(c) Figure 21 shows some plants growing in a small area of a 1000 m² field.

Figure 21

Devise a plan to estimate the number of named plant species growing in this field.

(6)

Create a ~~large~~ grid of the entire field, with one square being 1 m² by 1m. ~~Record~~ Choose four squares at random and ~~count~~ record the number of each plant in ~~each~~ each square. ~~Gather~~ Calculate the mean number of the plant species, ~~every plant~~ by adding each recorded named plant ~~and~~ together and dividing them individually by four. Then, once you have the mean of each of the four species', multiply these numbers by 1000. This will give you the estimated amount of ~~found~~ each named plant species in the field.

(Total for Question 9 = 13 marks)

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

The task is to devise a plan. Make sure that the plan is workable, ie include all stages - number or bullet point the stages to help you be logical but also so that you don't miss any important stages out. Try to use good technical words, for example, here the candidate says to calculate a mean. Lastly, if you are given data in the stem of the question, make sure that you refer to it in your account.

The candidate has written an account but has missed out technical terms and details, although they have include a diagram of a 'grid' quadrat to make it clearer as to what equipment is going to be used.

*(c) Figure 21 shows some plants growing in a small area of a 1000 m^2 field.

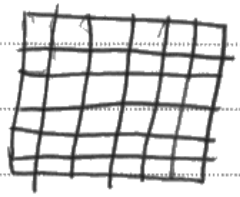
Figure 21

Devise a plan to estimate the number of named plant species growing in this field.

(6)

- you can take one section by using a grid and count how many there is.
- Then by using each species you can do the amount divided by the area to find out how many grids there are.
- Then once you have found out how many grid would fit in the area.
- Just do area multiplied by number of grids.

Example of grid:



the real grid will be much bigger than this.

(Total for Question 9 = 13 marks)

ResultsPlus
Examiner Comments

See above and below.

ResultsPlus
Examiner Tip

If you are going to say eg 'the real quadrat will be larger than this...' state the size eg 1/2 metre quadrat, that is going to be used. Make sure that your account is clear, for example be clearer and more specific. The last sentence here "Just do area multiplied by the number of grids" is not very useful, but would be better if 'the area' was specified, the area of the quadrat, the field, the total area surveyed? However excellent points here include: Use of bullet points. This helps you organise your thoughts and is more likely to make your plan more logical. Use of diagram - it doesn't matter too much that it is a sketch (use a ruler), the diagram does its job and makes it clear that we are going to use a gridded quadrat. Lastly be more specific - you can take one section - specify what you mean by this, how you are going to take it, and if possible state its size.

Question 10(a)

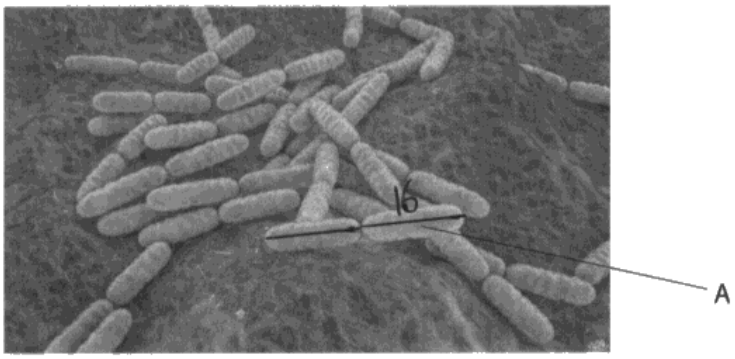
Candidates were required to measure the length (in millimetres) of the bacterium labelled A to gain the first available mark. 15mm (/-1mm) gained this mark. A small but significant number of candidates gave the length as 3mm which is the width of the bacterium in question. One answer seen gave the length as 31mm. this candidate could have measured bacterium A and its neighbour. A measurement of 1.5cm (/- 0.1) was allowed for this first mark as long as cm was stated with the figure.

The second available mark was awarded for correctly dividing their length by the magnification (which was given in the stem of the question) (x) 18 000.

The final mark was for expressing this in standard form (working scientifically 4f and maths skill 1b in the appendix in the specification). Please note that this is not in conflict with bullet point 4 in the use of mathematics at the end of topic 4 as candidates are not being asked to calculate using standard form.

This item tested AO2.1

10 (a) Figure 22 shows a type of bacteria (*Lactobacillus acidophilus*) that is found in cow's milk.



(Source: © Kateryna Kon/Shutterstock)

Figure 22

The magnification of this image is ×18000.

Measure the length of the bacterium labelled A.

Use your measurement to calculate the actual length of this bacterium in millimetres.

Give your answer in standard form.

(3)

$16 \div 18000 = 0.0008$

8×10^{-4}

8×10^{-4} mm

ResultsPlus
Examiner Comments

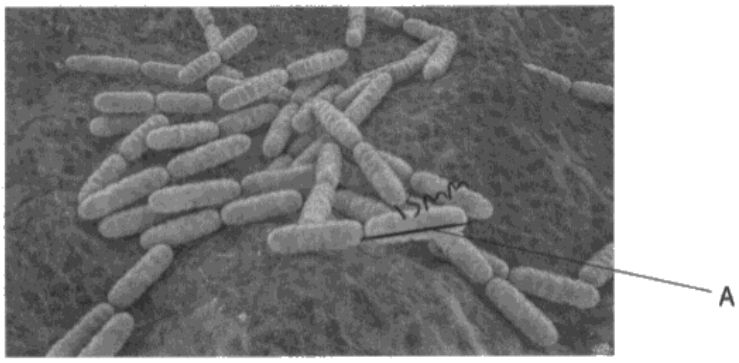
This only gains 2 of the 3 available marks as standard form should be given to 1 decimal point. Here it should be 8.3 X 10 -4

ResultsPlus
Examiner Tip

Candidates are often asked to give their mathematical answers in standard form (usually towards the end of the paper), to eg 3 significant figures / 2 decimal places so ensure that you can use these mathematical conventions correctly. Whenever you write a mathematical answer, think does this answer sound reasonable. If your answer is that the bacterium is X centimetres or even kilometres long - ask yourself if the answer is reasonable. We know, and are told that, the view is magnified so the actual bacteria must be significantly smaller than the ones shown in Figure 22.

A good answer showing the working clearly and how the calculator number has been adapted to answer the question to gain all 3 marks available.

10 (a) Figure 22 shows a type of bacteria (*Lactobacillus acidophilus*) that is found in cow's milk.



(Source: © Kateryna Kon/Shutterstock)

Figure 22

The magnification of this image is ×18 000.

Measure the length of the bacterium labelled A.

Use your measurement to calculate the actual length of this bacterium in millimetres.

Give your answer in standard form.

(3)

15mm × 18,000 = 27,0000

2.7 × 10^5

8.3 × 10^-4

mm

15mm / 18,000 = 1/1200 = 8.333333333 × 10^-4

= 8.3 × 10^-4

See above and below.

Set your calculation out as practiced in science and mathematics lessons as there are marks for the answer, but also for the working. If they have made a mistake at the end, as here, if 3.8 X 10 -4 had been written down the candidate could still have gained marks for clearly showing their mathematical workings.

Question 10(b)i

Question 10(b)ii

This is a standard pH / enzyme graph and variations on it have been used several times before, in previous examinations. This skill tests A03.1a and the marks are relatively easy to gain if you follow the basic rules of splitting the changes up into their parts. Here the growth rate of _Staphylococcus aureus_increases and decreases. For this part of the paper, that is too simple to gain credit. All that is needed to take this from no marks to 2 is to state the salient pH figures from figure 23. See the example below.

(ii) Describe the relationship between pH and the growth of *Staphylococcus aureus*, as shown in Figure 23.

(2)

that the pH ~~[illegible]~~ rapidly increased at pH 5 and hit the optimum at pH 7 and rapidly decreased at 8.5.

ResultsPlus
Examiner Comments

Most candidates had a good attempt at describing the changes in enzyme activity with pH. However, some candidates dropped a mark or both marks because they did not use figures, so it goes up and down was considered too vague for credit. We credited the optimum pH is pH 7 for one mark if nothing else was written, as this implies that the rate increases to that pH and then decreases after. We credited using 'neutral' for pH7.

ResultsPlus
Examiner Tip

When you look at the graph showing growth rate (figure 23), it is clear that the rate increases and decreases. No marks for stating that though. So instead of saying the growth rate (and always take the units from the axis label) in arbitrary units goes up and down, quote figures from the graph as shown by this candidate - increases from pH 5 (we would accept5.0 / 5.1), up to pH7 (highest point on the curve) and decreases from pH7 to pH8.5.

(ii) Describe the relationship between pH and the growth of *Staphylococcus aureus*, as shown in Figure 23.

(2)

As the pH increases the growth of Staphylococcus aureus increases

ResultsPlus
Examiner Comments

This was considered too basic and too general for credit for this stage in the paper which target levels 4 / 5. The statement made by the candidate is only true from pH 5 to 7, after which it decreases.

ResultsPlus
Examiner Tip

When asked to describe a trend shown in a table, or a graph, a) quote figures from the table/graph b) split the trend up if it changes, quoting the turning points shown in the data. Calculated differences can also gain credit when answering items like this, although in this example differences would not have been suitable to the task.

Question 10(c)ii

This data interpretation item, testing AO3.2ab, asked candidates to describe the changes in the pH of the milk at 30oC from 0 hours to 72 hours shown in figure 24. A few candidates used the data for the wrong temperature, most using 40oC. These candidates still mainly scored the 'decrease' mark, but not MP2 which was gained by stating the start and end pH (from 6.6 to 4.8) or by subtracting the last from the first pH (1.8). This item tended to be well answered by the majority of responses seen, with most candidates attempting this item, gaining both marks.

See below.

(ii) Describe the changes in the pH of the milk at 30 °C from 0 hours to 72 hours, as shown in Figure 24.

(2)

every 24 hours the pH level decreases

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

There are two marks to be gained here so after correctly gainingMP1, make your response more useful and scientific by using figures from the table to show the size of the decrease.

See below.

(ii) Describe the changes in the pH of the milk at 30 °C from 0 hours to 72 hours, as shown in Figure 24.

(2)

At 30°c, the milk started at a pH of 6.6. After the first 24 ~~hrs~~ hours, it dropped 0.8 of a pH to 5.8. After day 2, it dropped to pH 5 and at the end of the investigation, after 72 hours, it dropped to 4.9. We can see that the pH continuously declined throughout the investigation.

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

A very full response gaining both marks. This description is excellent and gains the extra mark for being specific about how much the pH has decreased. However, if you are short of time, with only a few minutes left, state the fact that the pH decreases, to gain the first mark and then quote the range, or do a quick subtraction sum on your calculator and write that down to indicate the magnitude of the change in pH. Either of these will gain you the second mark available.

Question 10(c)iii

This item, testing AO2, required the candidates to calculate the rate of decay, was split into two steps. The first was to calculate the change in pH (from data given in the table shown in figure 24). The majority of candidates scored this mark. Candidates were also given the equation: rate of decay = change in pH/time taken, and reminded that time taken was 72 hours. There was a transferred error scored by a significant number of candidates who miscalculated the change in pH, but then correctly divided this incorrect number by 72.

(iii) Calculate the rate of decay of the milk at 20 °C for the 72 hours of this investigation.

Use the equation:

$$\text{rate of decay} = \frac{\text{change in pH}}{\text{time taken}}$$

(2)

6.6 - 4.8 = 1.8

$\frac{1.8}{72} = 0.025$

0.025 change in pH per hour

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

ResultsPlus
Examiner Comments

Here the candidate has incorrectly calculated the change in pH as 1.8 (through using the change of pH for 30 o C instead of 20 o C as instructed), but scored one mark, as they have correctly divided their incorrect change in pH by 72.

ResultsPlus
Examiner Tip

The calculation questions are some of the easiest questions on which to score. So always attempt them. The data required is almost always given, but take care that if extracting the data from a table or graph that you use the correct figures. Here you are instructed to use the pH change for 20 o C. To help ensure that you are using the correct data - mark the 20 o C line on the table, eg with a star, although this good practice was also seen using an arrow in this examination series.

See below.

(iii) Calculate the rate of decay of the milk at 20 °C for the 72 hours of this investigation.

Use the equation:

$$\text{rate of decay} = \frac{\text{change in pH}}{\text{time taken}}$$

$6.6 - 5.2 = 1.4$

$\frac{1.4}{72}$

(2)

0.0194 change in pH per hour

(Total for Question 10 = 11 marks)

TOTAL FOR PAPER = 100 MARKS

ResultsPlus
Examiner Comments

See below.

ResultsPlus
Examiner Tip

This calculation does not specify how many decimal places to use, however 1.4/72 gives an answer of 0.0194 recurring. Here we would expect the candidate to use reasonable discretion and give their answer to 3 or 4 decimal places, the latter shown by this candidate who scores both available marks.

Paper Summary

Based on their performance on this paper, candidates should:

Ensure that they read the question carefully and follow the instructions given, for example if the instruction is to name one hormone do not write two as if one is right and one wrong, or no credit will be given.

If a task is to complete a **word** equation, we will credit symbols equations but the symbols have to be correct eg we did not credit CO2 for CO_2 in item 2a so don't take the risk and write carbon dioxide.

Recognise that 'describe' requires candidates to give an account of something or to compare or say how information in a diagram, a table or graph, changes.

Remember when describing a trend in a graph, refer to data at key points where changes occur.

Recognise that the word 'explain' means additional scientific information is needed that is linked to the answer, giving a justification or a reason.

Highlight / Underline the key information given in the stem of the question to help construct your answer but avoid just repeating the information given.

Learn the **key words** from the specification points and use them in your responses. Many short answer, and multiple choice questions require key words. Longer answers also credit the use of technical words, using the word quadrat in 9c instead of 'square' counted as detail which could change a mark of 3 to 4.

Spend more time practising the different types of calculations that are set eg rates and percentages, significant figures,etc. A full list of the types of mathematical skills expected is listed in appendix 1 in the specification.

Develop their practical skills/knowledge to ensure they can answer questions in detail on all the practical activities outlined in the specification, including planning an investigation.

Check the number of marks given for the question and ensure that they have included enough facts to match the marks available.

When tackling the extended answers (3+marks) think about the structure of the answer before starting to write and ensure/check that all parts of the question have been addressed

Grade boundaries

Grade boundaries for this, and all other papers, can be found on the website on this link: https://qualifications.pearson.com/en/support/support-topics/results-certification/grade-boundaries.html

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