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Examiners' Report
June 2014

GCSE Biology 5BI2F 01

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June 2014

Publications Code UG039972

Introduction

Candidate responses to some of the items showed a noticeable improvement in scientific detail for particular topics compared to the previous series. There appears to be a more thoughtful attempt to use correct terminology in answers where the use of scientific language is analogous to scoring marks. This was particularly evident in the questions that covered topics on respiration, enzymes and digestion. It is unfortunate that some candidates lack adequate ability to communicate information fluently and this lost many of them marks. Although examples of this are given in the individual reports for items, the main offenders tended to repeat the stem of the question adding little further detail to their response, made use of scientific terminology but in the wrong context or gave details that bore little relevance to what the question was asking.

Candidates have proved their aptitude for graphical analysis and data handling in previous series and this examination is no different. Students were able to interpret graphical information well with most being able to express conclusions clearly. It is very pleasing that a much greater percentage of candidates are using data to support conclusions, something that is often omitted despite previous examiners reports highlighting this issue. Extracting specific information from a graph is a distinct skill detached from any subsequent data handling technique and many candidates were rewarded appropriately for their ability to do this.

There were specific topic areas that presented a greater challenge to some students that other areas and in particular, candidates found it difficult to relate their learning to a contextualised theme. It is important that candidates are able to apply their knowledge and understanding in different contexts which helps to develop skills that can be transferred across any form of science learning or career. However, the problem questions centred around A02. This meant that many foundation tier students failed to gain access to the full marks allocated to specific items. This is clearly an issue that should be addressed in the classroom where candidates could be given greater opportunity to broaden their learning in biology to investigate how the factual information they learn is applied in everyday life.

Question 1 (a) (i1)

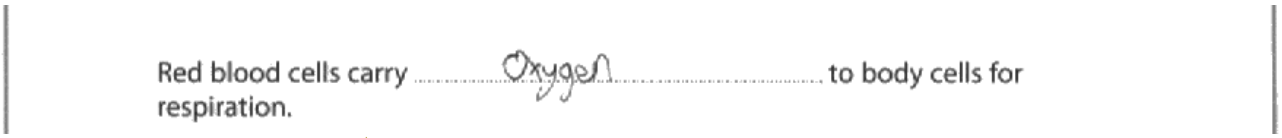
This question tested candidates understanding of the role of various components of blood. The majority of students attempted this item, most often with more success in their first answer than in their second. Consequently most candidates scored one mark out of the two available for this question.

Less able candidates chose any word at random from those given in the box to complete the sentence about red blood cells. In a few cases the word chosen failed to make sense of the sentence.

ResultsPlus
Examiner Comments
In this example, the candidate appears to have chosen a word at random, 'clot', to complete the sentence despite this making the sentence unclear and obviously wrong.

ResultsPlus
Examiner Tip
Students should be encouraged to read these 'fill the gap' questions carefully before selecting an appropriate word to slot into the allotted area in the sentence. They should also be encouraged to read their completed sentence back. This might have helped some candidates to score a further mark for this item.

The vast majority of candidates were successful in choosing 'oxygen' from the box to complete the sentence that described the role of red blood cells.



ResultsPlus
Examiner Comments
This candidate gained one mark for correctly choosing oxygen to complete the sentence.

Of the candidates that were unsuccessful in completing the first sentence in the passage, the majority chose either glucose or carbon dioxide. Although these were very few overall, the less able candidates are clearly unaware of the role of red blood cells.

ResultsPlus
Examiner Comments
This candidate failed to gain a mark for adding glucose to complete the sentence about red blood cells.

Question 1 (a) (i2)

Completion of the second sentence of the passage presented more of a problem to candidates who simply did not know the role of platelets. The vast majority of candidates that failed to score here were under the impression that platelets help to make blood 'flow'. The lack of understanding of the role of platelets is an ongoing issue seen repeatedly across many examination series.

The most common incorrect answer given to complete the second sentence in the passage was 'flow'. Candidates clearly did not choose this because it was the first in the list that 'fit' the sentence so their error must be attributable to a lack of understanding of the role or platelets.


respiration.

Platelets help to make blood flow .

ResultsPlus
Examiner Comments

This candidate was one of many that incorrectly chose 'flow' to complete the sentence describing the role of platelets.

ResultsPlus
Examiner Tip

The blood flows only due to the pumping action of the heart.

More able candidates chose 'clot' to complete the sentence describing the role of platelets.


Platelets help to make blood clot .

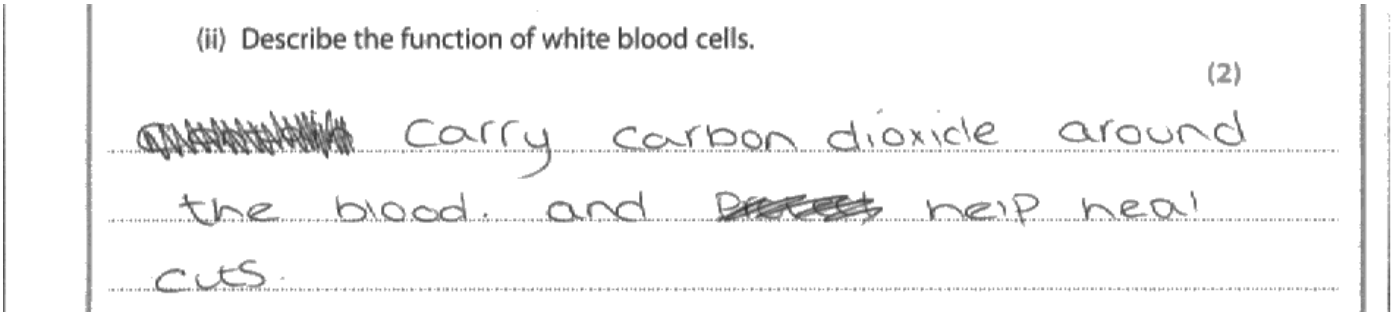
ResultsPlus
Examiner Comments

This response gained one mark for correctly completing the sentence with the word 'clot'.

Question 1 (a) (ii)

The first marking point for this question was by the far the most common awarded. Over half of the candidates were able to give a general role of white blood cells although the terminology used in descriptions was not always preferable. Candidates described the action of white blood cells as 'fighting' or 'killing' infection or disease rather than pathogens which was allowable but not desirable for the first marking point. Very few candidates were able to add further detail to provide information on how white blood cells work to defend the body against disease - antibody/antitoxin production was seen infrequently and their role in phagocytosis seen even less often. Consequently the majority of responses were restricted to just one mark. Incorrect answers varied from white blood cells carrying 'glucose' or 'carbon dioxide' or played a part in 'repairing body tissues'. Some candidates mixed up the primary and secondary responses by stating that white blood cells 'prevent bacteria entering the body' or that 'white blood cells *are* antibodies' rather than produce them.

Many incorrect responses to this question described the role of white blood cells in carbon dioxide transport. Often, candidates confused the role with that of the platelets and provided information on their involvement in 'repair' in some way.


(ii) Describe the function of white blood cells.

(2)

[redacted] carry carbon dioxide around the blood. and [redacted] help heal cuts.

ResultsPlus

Examiner Comments

This response failed to score any marks as the candidate has given no details that match the marking criteria. The role of white blood cells in carrying carbon dioxide was often incorrectly given.

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Examiner Tip

Candidates could use tables or annotated diagrams to learn the roles of the components of the blood. Starter activities such as Taboo help candidates to remember specific details in a fun activity that is more likely to promote learning.

Better candidates were more able to provide responses that covered detail matching all marking points. Although there were few two mark responses overall, C grade students clearly identified the general role of white blood cells and also supported this with information most commonly related to antibody production and less often with a description of phagocytosis.

(ii) Describe the function of white blood cells. (2)

white blood cells are used ~~you~~ to kill pathogen. they can change shape to wrap around and digest them. They produce antibodies to fight against pathogen and produce antitoxins to get rid of toxins in microbes.

ResultsPlus
Examiner Comments

This candidate gained two marks for a thorough response covering all marking points. The term 'engulfs' was very rarely seen in student responses with answers tending to describe the process of phagocytosis.

Candidates scoring one mark for their given response generally gained this for describing the general role of white blood cells in the body rather than their role in the production of antibodies, antitoxins or phagocytosis.

(ii) Describe the function of white blood cells. (2)

white blood cells are used in the human body to fight against disease and other virus like organisms in the body

ResultsPlus
Examiner Comments

This candidate scored one mark for stating that white blood cells 'fight against disease'. Although this terminology is not desirable, the candidates' response strongly implies an understanding of the function of these cells.

ResultsPlus
Examiner Tip

Take care in adding information that might be irrelevant or that might negate any marks awarded. Candidates sometimes feel the need to use all available space for a written answer and this is not always necessary.

Question 1 (b)

One of the most common errors that arose in responses for this question was as a result of candidates not reading the question properly. The expectation was that candidates should focus only on the pressure in arteries but many gave more lengthy accounts of the blood pressure in capillaries and veins. Although many candidates were able to score one mark for their answer, they were hindered in their success by providing information that did not answer the question. Many candidates struggled with their use of English and failed to recognise the fluctuations as a 'pulse', the latter marking point seen very rarely. Better candidates were able to use the term 'fluctuate' although these were very rare with most responses describing the shape of the graph as 'up and down', 'like a wave' or that the pressure 'increases and decreases'. Incorrect descriptions of the fluctuations included 'bouncing', 'jumping' or 'shaking'. Too many responses referred to the pressure 'speeding up' or 'slowing down' which was incorrect and some candidates tried to explain the reasons for the overall decrease in the pressure implying a lack of awareness of the demands of the question.

Candidates who did manage to score two marks tended to describe the shape of the graph rather than the preferred 'shows a pulse' and recognised the overall decrease in pressure as the blood flowed towards the capillaries. Few candidates mentioned the smooth part of the graph prior to the capillaries representing the lack of a pulse.

Many candidates scored one mark for recognising the overall decrease in blood pressure as it flows towards the arteries but failed to mention the fluctuations.

Describe the changes in the pressure of the blood as it flows through the arteries. (2)

The blood pressure is extremely high as it ~~across~~ ~~changes from~~ ~~high~~ pressure to low pressure flows through the arteries, then it begins to get lower.

ResultsPlus
Examiner Comments

This response covers marking point 2 where the candidate has clearly stated that the pressure shows an overall decrease.

ResultsPlus
Examiner Tip

Describe all parts of the graph that are relevant to the question. In this case the fluctuations are difficult to miss and this candidate has lost a mark for describing the 'whole picture' rather than breaking it down to provide a description of discrete sections.

A very large number of candidates gave details linked to the capillaries and veins which deviates from the expectations of the question. As most available space for the written response was taken up with this irrelevant detail, it is likely that some candidates felt what they had written was sufficient despite the information given not actually answering the question.

Describe the changes in the pressure of the blood as it flows through the arteries.

(2)

The pressure gets higher when it ~~gets~~ flows through the arteries, it doesn't have much pressure flowing through veins and capillaries

ResultsPlus

Examiner Comments

This candidate failed to score any marks for their response. This response was typical of many where candidates discussed the blood pressure in capillaries and veins rather than focus on details relevant to the question.

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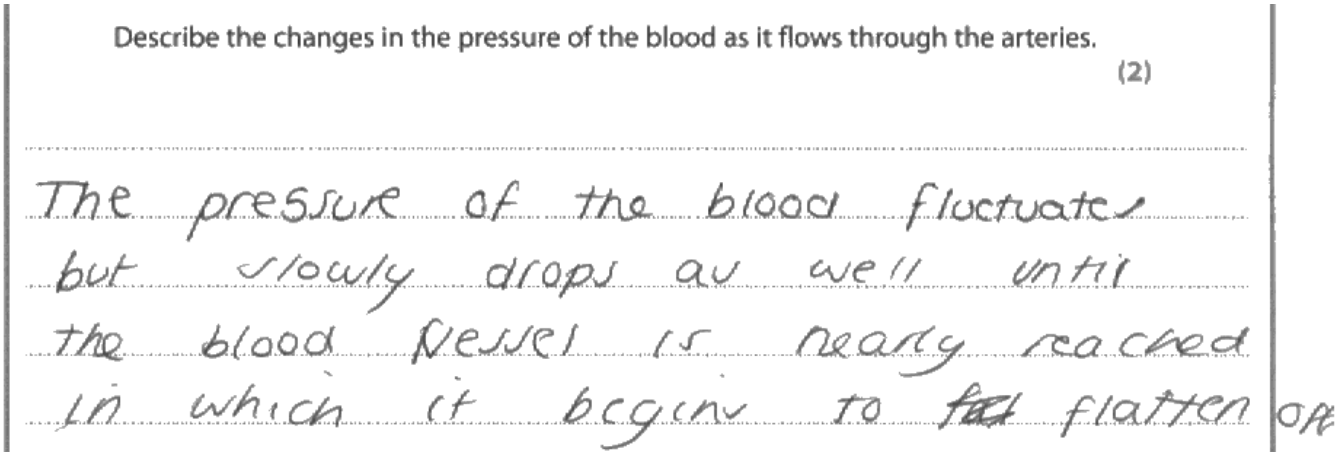
Examiner Tip

Always read questions carefully and structure responses that include only the details required. Refrain from adding information that just fills up space and fails to answer the question.

More able candidates described the change in blood pressure well, with some using good terminology that made their answers very clear. The most common marking points awarded for the 2-mark responses were those providing details on the fluctuations and on the overall decrease in blood pressure.


Describe the changes in the pressure of the blood as it flows through the arteries.

(2)

The pressure of the blood fluctuates but slowly drops as well until the blood vessel is nearly reached in which it begins to flatten OR

ResultsPlus

Examiner Comments

This candidate identified the fluctuations in the blood pressure in the arteries as well as the overall decrease. In addition to this, the detail provided also covers the third marking point as the student has recognised how blood flow 'flattens' as it flows towards the capillaries.

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Examiner Tip

Many candidates failed to use the correct scientific terminology in their answer. In this case, the candidate did not lose marks but for some topics the use of scientific terms in the correct context is essential.

Question 1 (c)

This question highlighted many common misconceptions in students understanding of the heart and its function. There were many references to each side of the heart dealing with different volumes of blood or that one side took blood into the heart with the other side pumping blood out, referring to the right and left sides respectively. Candidates also referred to the 'type' of blood being dealt with by each side of the heart which was not linked to the differences in the thickness of the walls and therefore failed to gain marks. Other responses referred incorrectly to the blood vessels or stated that blood was 'thicker' on one side compared to the other due to being 'oxygenated'. A common omission was stating which side of the heart was being referred to leading to vague answers such as 'one side is thicker than the other because it pumps blood around the body'. Due to the lack of detail in such responses, only one mark was awarded. Candidates that did manage to score 2 marks generally included details about the left side being thicker and linking this to the distance that the blood needs to be pumped.

Many candidates made incorrect references to the blood vessels of the heart which although incorrect, were irrelevant anyway. Details given in some responses made it quite clear that candidates' understanding of the structure and function of the heart is limited.

(c) Explain why the walls of the left and right ventricles of the heart have different thicknesses.

(2)

The left side has more blood coming in through the pulmonary vein so it has to be thicker compared to the right size were blood goes to the rest of the body through the pulmonary artery.

(Total for Question 1 = 8 marks)

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Examiner Comments

This response gained one mark as the candidate has recognised that the wall of the left ventricle is thicker than the right. Although incorrect information has been added linked to other structures in the heart these were irrelevant to the question and did not negate the mark awarded.

ResultsPlus
Examiner Tip

Use annotated diagrams to reinforce details on the structure of the heart. Students can test each other's understanding using paired activities where a labelled diagram of the heart could be drawn as a joint task and then shared with other members of the class for feedback.

It is unfortunate that some candidates missed out completely on marks due to confusing the right side of the heart with the left.

(c) Explain why the walls of the left and right ventricles of the heart have different thicknesses.

(2)

The right side has a greater thickness as it is pushing all around the body. Meanwhile the left side is going to the lungs and transporting oxygen, therefore has a much thinner ~~wall~~ thickness

ResultsPlus
Examiner Comments

This candidate failed to gain marks despite the response being written in good English and containing information that would have gained full marks if the sides of the heart had not been confused.

ResultsPlus
Examiner Tip

When looking at a diagram of the heart on paper, it is back to front. The left side is the right side and vice versa. This is important in questions where you might need to label a diagram of the heart.

Candidates scoring two marks most often linked the different thicknesses of the walls of the right and left ventricles to the difference in the distances that blood needs to be pumped. References to blood pressure were rarely seen.

(c) Explain why the walls of the left and right ventricles of the heart have different thicknesses.

(2)

They have different thicknesses because they have diffrent sized muscles. The ~~left~~ right side had a smaller muscle because it only sends blood to the lungs, however the ~~right~~ left side send blood to the hole body.

ResultsPlus
Examiner Comments

This candidate has identified the right side having less muscle than the left for one mark. The second mark is gained from the description of where each side pumps blood to.

ResultsPlus
Examiner Tip

Do not repeat the question in an answer without adding further detail. Many candidates just stated that the walls have 'different thicknesses because....' and failed to clarify which side was thicker.

Question 2 (a)

The vast majority of candidates were able to carry out a simple subtraction calculation to find out the difference in the number of breaths taken by student Y compared with student X during the 5 minute exercise. Only the least able students were unable to gain a mark here due mostly to a miscalculation in their addition.

The majority of candidates were able to arrive at the correct answer for this simple calculation.

exercise time / minutes	breathing rate / breaths per minute	
	student X	student Y
0 (at rest)	11	12
1	14	17
2	17	24
3	23	27
4	26	32
5	28	35

(a) The breathing rate of student X increased by 17 breaths per minute during the investigation.

Calculate the increase in the breathing rate of student Y from rest to 5 minutes of exercise.

(1)

23 breaths per minute

ResultsPlus
Examiner Comments

This candidate gained one mark for correctly using the information given for Student Y in a subtraction calculation.

ResultsPlus
Examiner Tip

Always check answers that give a figure. If there is time at the end of an examination, go through the workings again to double check that the answer given is correct. It is very easy to miscalculate!

Some candidates failed to arrive at the correct answer which was mainly due to a miscalculation.

exercise time / minutes	breathing rate / breaths per minute	
	student X	student Y
0 (at rest)	11	12
1	14	17
2	17	24
3	23	27
4	26	32
5	28	35

(a) The breathing rate of student X increased by 17 breaths per minute during the investigation.

Calculate the increase in the breathing rate of student Y from rest to 5 minutes of exercise.

(1)

29 breaths per minute

ResultsPlus
Examiner Comments

This response failed to gain a mark for the answer given. There is no working out shown to explain how this particular answer was arrived at.

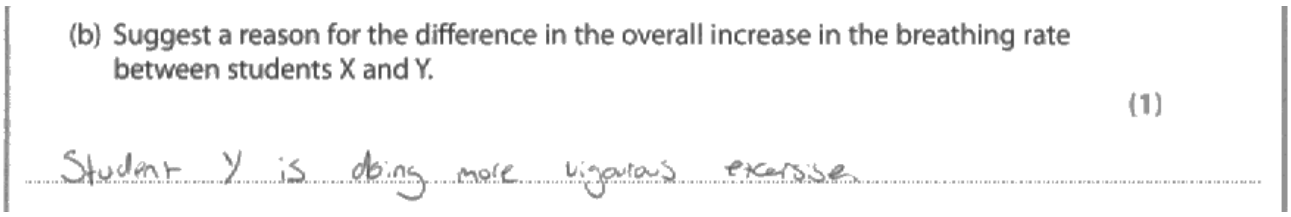
ResultsPlus
Examiner Tip

Always take a calculator into a science exam. There will inevitably be calculations to carry out and simple as some may be, errors occur frequently if a calculator is not used.

Question 2 (b)

This one mark question drew a variety of responses, most of which were successful. The most common correct answer was along the lines of 'student X is fitter' although more often than not students failed to state which student they were referring to. However, these responses still gained the mark. Some candidates made very general references to respiration without mentioning student X or Y and there were several mentions of lactic acid and anaerobic respiration. A frequent incorrect answer included details about one student exercising for longer than the other despite it clearly stating in the stem that each student carried out the exercise for 5 minutes.

The variety of suggestions given by candidates in response to this question was quite diverse with most answers being quite valid and gaining the mark.


(b) Suggest a reason for the difference in the overall increase in the breathing rate between students X and Y.

(1)

Student Y is doing more vigorous exercise

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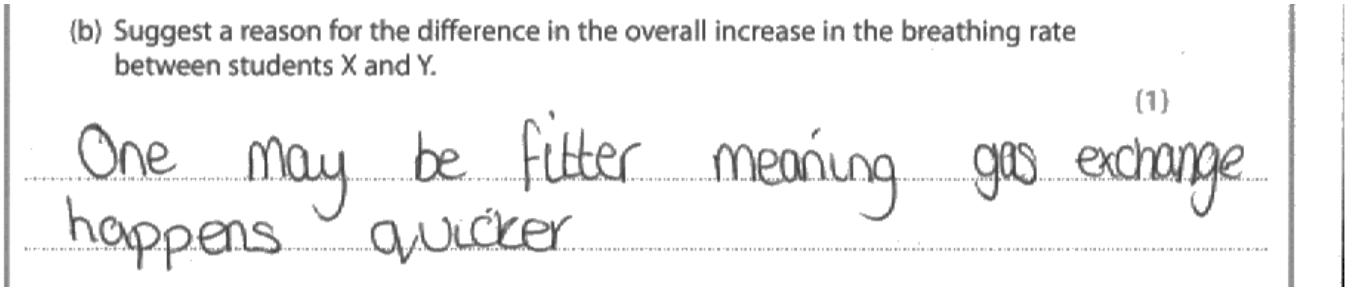
Examiner Comments

Answers referring to the intensity of exercise were frequently seen. This candidate gained one mark for making a valid suggestion to account for the difference in the overall breathing rate between the two students.

Many candidates failed to distinguish between students X and Y in their discussion and although this was not an issue for the most part, some candidates did lose out on this mark as their responses were ambiguous e.g. 'they are fitter'.


(b) Suggest a reason for the difference in the overall increase in the breathing rate between students X and Y.

(1)

One may be fitter meaning gas exchange happens quicker

ResultsPlus
Examiner Comments

This candidate gained one mark for their response despite the information given not stating clearly which student was the more fit. In this case the lack of mention of students X and Y was irrelevant and there was no implication that the details referred to student Y which would have made the answer incorrect.

ResultsPlus
Examiner Tip

Be very clear when answering a question that requires a comparison to be made. Name both parties involved, for example 'Student X is fitter' rather than 'One is fitter...'

Few students failed to score for this particular question although many of those that were unsuccessful seemed to misunderstand the question. Most commonly, candidates gave details such as 'fitter' or 'wasn't working as hard' but linked them to the wrong student.

(b) Suggest a reason for the difference in the overall increase in the breathing rate between students X and Y.

(1)

Student Y was taking more breaths per minute than student X.

ResultsPlus
Examiner Comments

This candidate misinterpreted the question and failed to gain a mark for their response. The details given just repeat in written form what is shown in numbers in the table without giving a reason for the difference in the breathing rate between the two students.

ResultsPlus
Examiner Tip

After reading the question carefully highlight key elements within the question. For example in this case, the words 'suggest', 'difference' and 'breathing rate' could all be highlighted to help candidates focus their answer to gain greater success.

Question 2 (c)

This question was answered either really well or not at all. Many students misinterpreted or misunderstood the question and responded with information about heart rate and the pulse, which could imply some confusion with the previous question on the paper.

Many candidates understood the need for more oxygen and most were able to score at least one mark for stating this in their response. However, few links were made to respiration and the increase in demand for energy - both of these marking points were seen infrequently in answers. More able candidates mentioned carbon dioxide removal but this was rare. Some candidates gave details on anaerobic respiration rather than aerobic and failed to gain any marks for their response.

One mark was most often gained by candidates who were aware of the need for more oxygen during exercise. This was the most common marking point. Many of these candidates also understood that the oxygen was needed by muscles although there was little if any reference to what the oxygen was needed for.

(c) Explain why the breathing rate of the students changed during the exercise.

(2)

They needed more oxygen as their heart ~~blood~~ rate sped up. Their muscles needed a bigger supply of oxygen. Their organs such as heart and brain need a bigger supply of oxygen.

ResultsPlus
Examiner Comments

This candidate scored one mark for recognising that the breathing rate changed during exercise due to the need for more oxygen. A further mark could have been obtained if this candidate explained *why* this oxygen was needed.

ResultsPlus
Examiner Tip

When discussing topics that link heart rate or breathing rate to exercise consideration must be given to *why* changes take place in these systems. Candidates tend to stop once they have described the function of the heart during exercise e.g. pumps blood faster or the function of the lungs e.g. gets more oxygen into the body and fail to mention the purpose of the changes i.e. to provide the reactants for respiration. Candidates should be encouraged to think 'more' - more oxygen/glucose, greater energy demand, greater rate of respiration when learning this topic.

Several references were made to anaerobic respiration, build up of lactic acid and an oxygen debt which were not awarded. Better candidates were able to make the link between more oxygen and respiration for 2 marks.

(c) Explain why the breathing rate of the students changed during the exercise.

(2)

The breathing rate of the students changed during the exercise because they had to take in more oxygen for respiration. (This could be due to oxygen debt.)

ResultsPlus
Examiner Comments

This candidate gained 2 marks for recognising that more oxygen was needed for respiration.

Some students side-tracked in their response to discuss heart rate rather than breathing rate although some gained a mark for including relevant details about oxygen. However, several responses focussed on the heart pumping faster to increase blood flow which was detached from the question.

(c) Explain why the breathing rate of the students changed during the exercise.

(2)

The heart rate increases meaning more oxygen is required during exercise, to do this more blood has to be pumped around the body.

ResultsPlus
Examiner Comments

This response lacks some clarity with details focussing on the heart and blood flow rather than oxygen. However, as the heart is a muscle which does work harder during exercise, the oxygen mark was allowed.

ResultsPlus
Examiner Tip

Many candidates fail to read the question carefully, very often for this topic, which frequently restricts the score that they can achieve. Always decide what the main focus of the question is and base answers around this.

Question 2 (e)

Candidates had a fair understanding that a lack of oxygen caused the build-up of lactic acid although many failed to link this anaerobic respiration. Students failed to gain marks for making statements such as '....because they didn't warm up properly' or 'they didn't stretch enough' - attempting to tackle the question seemingly from a physical education perspective rather than using information learnt in science. Some candidates suggested that oxygen wasn't being *produced* or that the muscles received an inadequate supply of glucose.

The majority of candidates gained one mark for their response, mainly for including correct details about oxygen in their answer. Few added further detail that included anaerobic respiration for a second mark.

(e) The students extended their investigation by exercising for 20 minutes.

During this exercise the students' muscles produced lactic acid, which caused cramp.

Suggest why their muscles produced lactic acid.

(2)

They produced lactic acid because, they weren't getting enough oxygen into there body, So the body was using glucose, and Lactic acid, which causes cramps, telling the body that they need more oxygen.

ResultsPlus
Examiner Comments

The detail in this response implies that the candidate has good understanding of anaerobic respiration but despite the good quality of information provided they have failed to provide adequate detail to gain the second marking point.

ResultsPlus
Examiner Tip

Use the mark allocation to determine how many key points are needed in a response to gain full marks, taking into account that no marks will be awarded for repeating any information taken directly from the question.

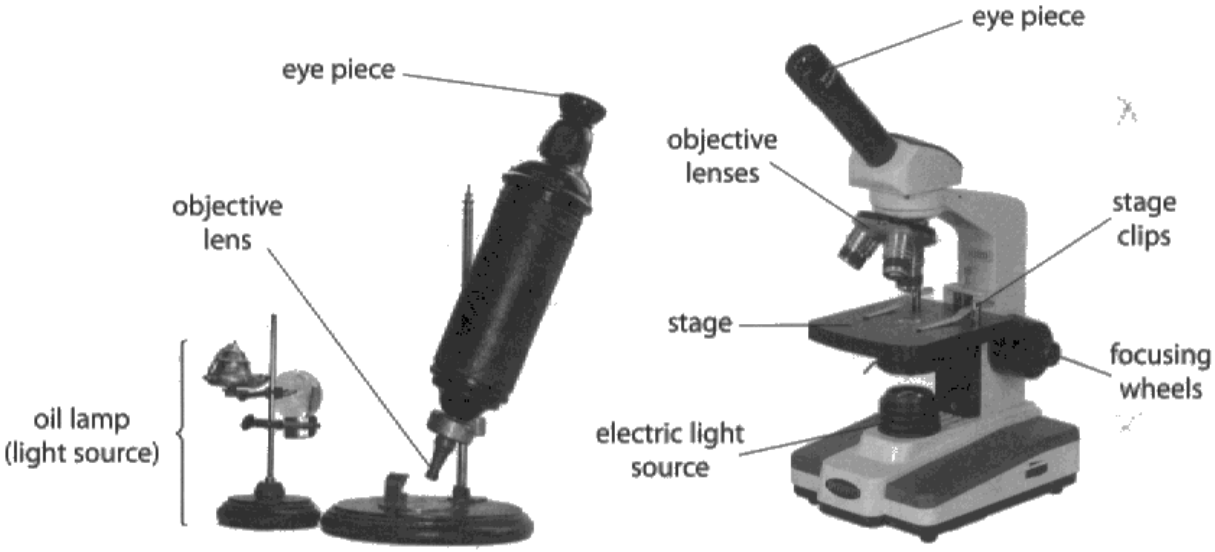
Question 3 (a) (i)

Many answers focused on listing the structures of the modern microscope without linking the structures to how they helped us to see cells in greater detail. Thus, responses frequently gave lists of 'spot the difference' without any accompanying explanation. Where a structure was named it was often with no more information other than the wording in the question - 'allows cells to be seen in greater detail'. A fair number of candidates made reference to a telescope rather than a microscope and the term 'zoom' was used often instead of 'magnify' which was not credited. Candidates that did obtain full marks for their answer most often linked the focusing wheel to a sharper or clearer image and although many mentioned the different objective lenses this was rarely linked to 'greater magnification'.

Many candidates picked off details from the diagram given of a modern microscope, presenting lists of features that were not linked to how they helped us see cells in greater detail. In many cases where a description was linked to a feature the information given was incorrect or just repeated the stem of the question.

Cells

3 The photographs show a 350 year-old light microscope and a modern light microscope.



(a) (i) Suggest how the modern light microscope helps us to see cells in greater detail than the 350 year-old microscope.

Use the photographs to help you.

(2)

First the modern light microscope has a focusing wheels in ~~which~~ which it allows us to focuse on an object. However the 350 year-old microscope dose not have a focusing wheel leaving the resulting image out of focus. Another feature the modern microscope has is an electric

light Source & the oil lamp is a good light Source but it could burn out, unlike the electric light that will not burn out.

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Examiner Comments

This candidate scored one mark for giving a relevant feature of the modern microscope although the accompanying information was not creditworthy. For a further mark, the candidate need to include a description on how the focusing wheel helps us to see cells in greater or likewise for the electric light source.

ResultsPlus
Examiner Tip

Full marks will rarely, if ever, be awarded for just quoting information from a diagram or putting into words what is shown in a table. There is always likely to be an element of analysis or application of scientific understanding and/or knowledge needed to gain full marks.

There were many responses that referred to telescope rather than microscope although this was generally ignored. Other details were credited if appropriately.

(a) (i) Suggest how the modern light microscope helps us to see cells in greater detail than the 350 year-old microscope.

Use the photographs to help you.

(2)

In the modern light telescope, there are a variety of objective lenses that can be used to look into more detail. There is also a focusing wheel which can help look into a ~~detail~~ w cells with better detail. It helps the objective lens to give a clearer view.

ResultsPlus
Examiner Comments

Despite this candidate referring to a telescope, the details given just gained them full marks. These marks were awarded for the objective lens giving a clearer view. This response is an example that is typical of many where candidates insisted on repeating the stem of the question and feeling that this was adequate as a reason why a particular feature helps us to see cells in greater detail.

ResultsPlus
Examiner Tip

Don't repeat the question in a response. This will never gain credit.

Most descriptions accompanying named features of the microscope were along the lines of 'it makes the image more clear'. This does imply some lack of knowledge of the function of various parts of the microscope as very little variation was seen in answers.

(a) (i) Suggest how the modern light microscope helps us to see cells in greater detail than the 350 year-old microscope.

Use the photographs to help you.

(2)

This is because the Modern light microscope allows us to enlarge what we want to see because it's objective lense makes it clear for us. Moreover, it also has stage Stage Clips, an electric light source and focusing wheel to make it easy for us when seeing the image. The stage clips is what keeps the plate in place when we want to enlarge it. This is what the 350 year old light microscope didn't not have.

ResultsPlus
Examiner Comments

This candidate gives a clear description of the role of the stage clips in keeping the specimen stable. This response gained 2 marks.

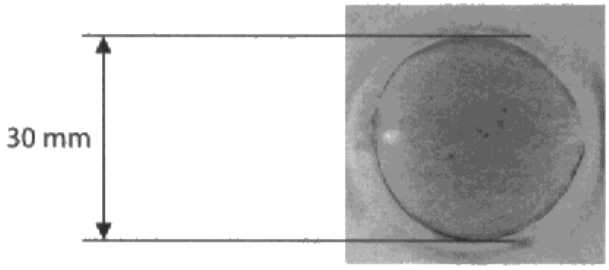
ResultsPlus
Examiner Tip

Use a table to list the features of a microscope along with their function. Practise using a microscope where possible to find out the function of each part.

Question 3 (b) (i)

The majority of candidates' responses to this simple calculation were correct. Some students showed an incorrect calculation in the space provided for their answer and therefore quoted an incorrect final figure. Multiplication calculations i.e. 30 x 0.1 and subtractions i.e. 30 - 0.1 were seen quite often.

Some candidates were confused on how to elucidate the final magnification value and unfortunately failed to gain any marks for their answer. Even though students more often showed their working, and this is to be encouraged, incorrect calculations or values used in the calculation meant that several candidates could not score even one mark.



(i) The magnified animal cell has a diameter of 30 mm.

The actual diameter of the animal cell is 0.1 mm.

Calculate how many times the animal cell has been magnified.

(2)

20 x 0.1 = 10

x 3

30

23 times

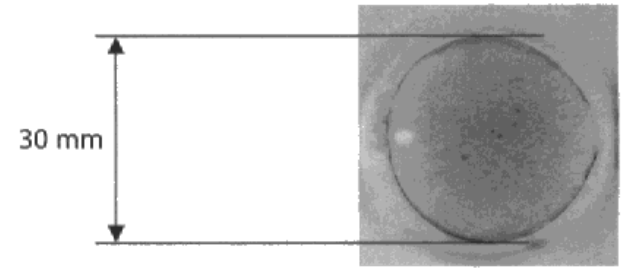
ResultsPlus
Examiner Comments

This response failed to gain any marks. An incorrect calculation is shown as well as an incorrect final answer.

ResultsPlus
Examiner Tip

Always show working out to a calculation. This could gain a mark even if the final answer is incorrect.

The vast majority of candidates were able to use the data given in the question correctly to arrive at the correct magnification of the cell. In many cases working out was also shown.



(i) The magnified animal cell has a diameter of 30 mm.

The actual diameter of the animal cell is 0.1 mm.

Calculate how many times the animal cell has been magnified.

(2)

30 mm ÷ 0.1 mm = 300 mm

300 times

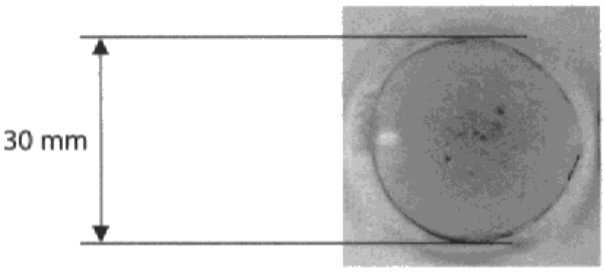
ResultsPlus
Examiner Comments

This candidate gained the full 2 marks for stating a magnification value of 300x. Although the working out is shown, the final figure alone is enough to show that the correct calculation was carried out.

ResultsPlus
Examiner Tip

Show all working out in a data handling question such as this and make sure that it is clearly laid out to avoid losing a mark if the final answer is incorrect.

A fair number of students carried out the wrong calculation either by multiplying or subtracting 0.1 from 30.



(i) The magnified animal cell has a diameter of 30 mm.

The actual diameter of the animal cell is 0.1 mm.

Calculate how many times the animal cell has been magnified.

(2)

30mm x 0.1 =

3 times

ResultsPlus
Examiner Comments

As the workings show this candidate clearly carried out a multiplication calculation rather than a division to arrive at an answer of 3.

Question 3 (b) (ii)

This question was answered well by most candidates who were able to clearly demonstrate their understanding of the function of the nucleus in cells. The majority of candidates were aware that the nucleus 'controlled the activities of the cell' or that it 'contained DNA/ chromosomes'. Some students are still referring to the nucleus as the 'brain of the cell' which does not adequately describe the function of the nucleus and others stated that it contained protons and neutrons implying some confusion with their learning in chemistry. Confusion was also evident in responses that linked the nucleus to functions of other cell components, most commonly the cell membrane where candidates sometimes lost marks for stating that the nucleus 'controls what enters and leaves the cell' . Other candidates that failed to score gave statements such as 'it is involved in reproduction' or 'fertilisation' or that 'it produced glucose'.

Many candidates confused the role of the nucleus with that of the cell membrane stating that the nucleus 'controls what goes in and out of the cell'. This detail was sometimes seen alongside correct detail such as 'contains DNA', although the mark awarded was negated due to the list rule.

(ii) State the function of the nucleus in the animal cell.

(1)

The nucleus decides what is able to come in and out of the cell.

ResultsPlus
Examiner Comments

This candidate failed to score a mark for giving the incorrect function of the nucleus in an animal cell.

ResultsPlus
Examiner Tip

Try to avoid providing more than one piece of information if the question only asks for one point to be made. Making more than one point brings the list rule into play where if one item in the list is wrong then this negates a correct item in the list.

The vast majority of students gained a mark for their answer to this question. This was frequently for 'contains DNA' or variations in this detail as shown in the mark scheme.

(ii) State the function of the nucleus in the animal cell.

(1)

The nucleus contains all the genetic information.

ResultsPlus
Examiner Comments

This candidate gained one mark for giving the correct function of the nucleus - '..... contains genetic information'.

Many answers referred to the nucleus as 'controlling the cell' or 'cell activities'. Some candidates incorrectly stated that 'all chemical reactions take place (in the nucleus)' confusing this with the function of the cytoplasm.

(ii) State the function of the nucleus in the animal cell.

(1)

The nucleus controls the cell activities.

ResultsPlus

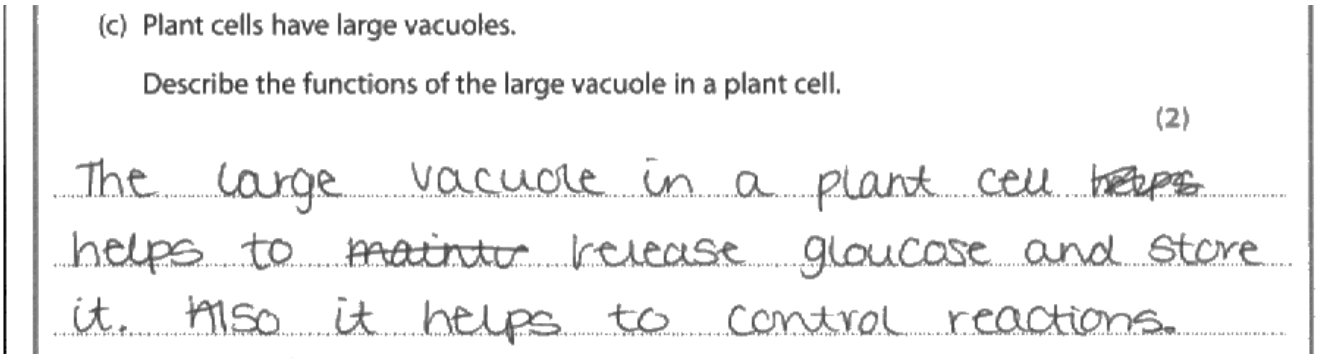
Examiner Comments

This example is typical of the responses made by many candidates. This candidate scored one mark for correctly stating the function of the nucleus in the animal cell.

Question 3 (c)

A large number of candidates lacked the subject knowledge to answer this question but took a 'best guess' approach, referring to the role of other cell organelles mentioned in the paper such as 'controls the activities of the cell' or 'protects the cell from bacteria'. Hence, very few candidates were able to score one mark with even less scoring 2 marks. More often than not students thought the vacuole contained or protected either the chloroplasts or the nucleus. Many responses stated 'this is where the sunlight is stored' or 'this is where photosynthesis takes place'. Some students seemed to mix up the vacuole with the stomata and related their role to gaseous exchange and movement of gases or water. Several candidates were thrown by the use of the term 'large' in the question and strived to think of a function appropriate to a larger than normal vacuole, mainly a larger surface area for the 'absorption of light' or for 'chemical reactions to take place'.

A good number of candidates were aware of one distinct function of the large vacuole in plant cells with one mark responses including information such as 'it contains (cell) sap' or 'supports the cell/plant' or 'stores water'. Very rarely were candidates able to correctly state a second function and the number of candidates scoring 2 marks overall was disappointingly low.



(c) Plant cells have large vacuoles.

Describe the functions of the large vacuole in a plant cell.

(2)

The large vacuole in a plant cell ~~helps~~ helps to ~~maintain~~ release glucose and store it. Also it helps to control reactions.

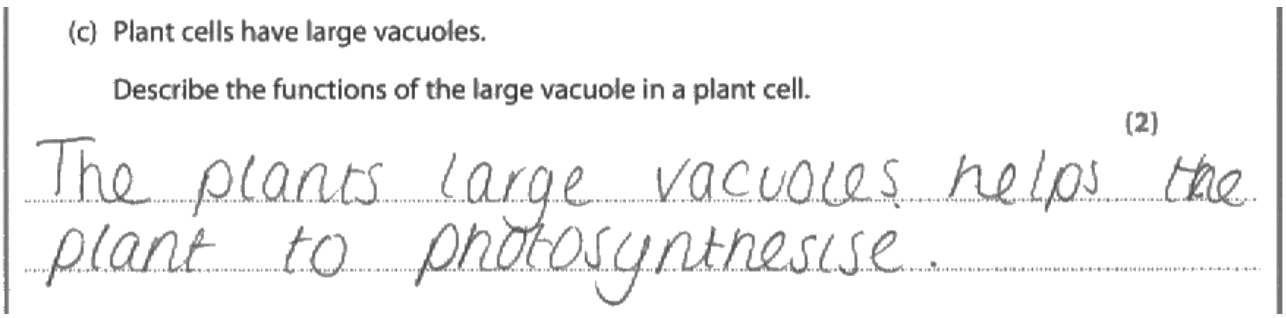
ResultsPlus
Examiner Comments

This response failed to gain any marks as a list of functions was given, one of them being incorrect. This negated the mark that could have been awarded for 'controls reactions'.

ResultsPlus
Examiner Tip

Only give one clear answer if the question asks for this. If more than one answer is given then the list rule applies.

Some of the most common errors seen in responses linked the role of the vacuole to photosynthesis or absorbing light. Many discussed water or minerals 'passing through' the vacuole rather than referring to storage and other responses stated that 'it kills bacteria' or 'is where chemical reactions take place'.



(c) Plant cells have large vacuoles.

Describe the functions of the large vacuole in a plant cell.

(2)

The plants large vacuoles helps the plant to photosynthesise.

ResultsPlus
Examiner Comments

Many responses failed to gain any marks by referring to the role of the vacuole in photosynthesis.

ResultsPlus
Examiner Tip

Many aspects of a biology examination, particularly at foundation level, will require recall of basic facts and the components of cells is one of them. The structure and function of generalised cells can be learnt by drawing and labelling diagrams of the cell types shown in the specification and then extending on this slightly to learn the function of each part.

The most common correct answer included general details about cell sap although many candidates opted for just 'contains sap'. This information was often followed by a description of the makeup of cell sap.

(c) Plant cells have large vacuoles.

Describe the functions of the large vacuole in a plant cell.

(2)

The large vacuole contains cell sap (a sugar / salt solution). It helps photosynthesis occur in a plant.

ResultsPlus
Examiner Comments

This candidate gained 2 marks for correctly stating that the vacuole contains cell sap and for providing a description of this solution. In this case the candidate has also implied a role in photosynthesis and although the vacuole is indirectly involved its inclusion in the response has been ignored rather than used to negate one of the given marking points.

Question 4 (a) (i)

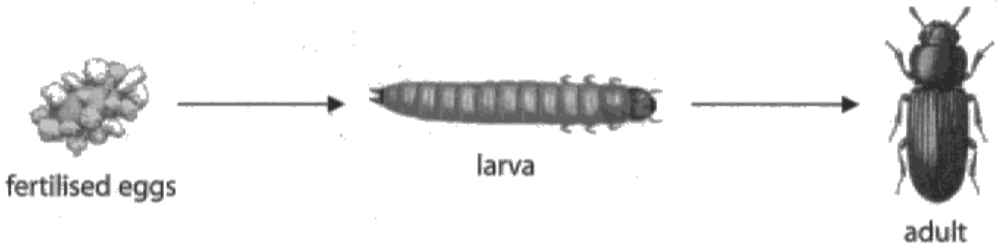
Very few candidates understood how to answer this question and responses were generally weak. Although the principles of fertilisation had been contextualised by the diagram and the information provided on flour beetle, this seemed to throw many students who failed to interpret the question as a basic recall of fertilisation. Very little evidence was shown in responses to suggest even a basic understanding of fertilisation or the types of cells involved in this process with some candidates even unable to link sex cells to sperm and egg cells. The few candidates that did gain marks on this item were aware that the sperm and egg 'fused' or more commonly 'joined' during fertilisation although too many gave weaker, unacceptable alternatives such as the sperm and egg 'meet' or 'come together'. A large number of candidates confused fertilisation with meiosis, perhaps due to the focus on sex cells, and others made reference to determination of sex or gave statements such as 'sex cells are what makes the offspring male or female'. Many candidates referred to chromosome numbers in terms of human genetics i.e. 23 in the sex cells which make 46 chromosomes when they join. There were very few references to haploid/diploid cells and where these were mentioned, they were often muddled. It appeared to be the case that some candidates knew these words were linked to fertilisation although their actual use of the terms in their response implied a significant lack of understanding. A fair number of candidates were aware that a zygote was the product of fertilisation although this was deemed unworthy of credit due to it being another way of describing the fertilised egg, the latter being used in the question. Very few candidates were able to recall that during fertilisation genetic information was 'mixed'.

Many candidates repeated the stem of the question in their response. For example, 'sperm fertilise the egg cell' or 'the sperm and egg produce fertilised eggs'. Other candidates failed to score by making statements such as 'the sperm and egg *meet*' or 'the sperm and egg *come together*'. More detail was required to suggest that the sex cells 'combined'.

Flour beetles

4 Flour beetles are pests. They destroy food produced from crops.

The diagram shows the development of a flour beetle.



(a) (i) Flour beetles produce sex cells.

Describe the role of sex cells in the production of fertilised eggs.

(2)

They produce ~~gametes~~. dyploid zygotes through fertilisation

ResultsPlus
Examiner Comments

This candidate scored one mark for recognising that the fertilised egg was a diploid cell. No mark was awarded for zygote with being just another term used to describe the fertilised egg.

ResultsPlus
Examiner Tip

Do not repeat the stem of the question or use words or terms that just provide an alternative way of saying what is already in the stem.

Many responses were too vague in their detail and failed to score marks for not implying strongly enough that the sex cells combine.

(a) (i) Flour beetles produce sex cells.

Describe the role of sex cells in the production of fertilised eggs.

(2)

when sex cell Sex cells with eggs come together and fertalise to become a fertalised egg.

ResultsPlus
Examiner Comments

This response is typical of many answers that failed to score a mark for being too vague. If the candidate had stated that the sperm and egg join or combine or had used another way of stating that some type of fusion took place then they would have been awarded a mark.

Few candidates were able to score full marks for their response to this question. Details about haploid/diploid cells were generally confused and sometimes given in the wrong context and it was evident that candidates' understanding of this terminology was weak. Some students discussed mitosis or more commonly meiosis and most failed to realise that the genetic information from each of the sex cells combined to form a diploid nucleus.

(a) (i) Flour beetles produce sex cells.

Describe the role of sex cells in the production of fertilised eggs.

(2)

When two gametes combine, they form a new cell which grows on to become a new organism. Also when they combine the resulting cell has the right number of chromosomes (zygotes) which are diploid. A female sex cell is a single ovum (ova) and a male is (sperm).

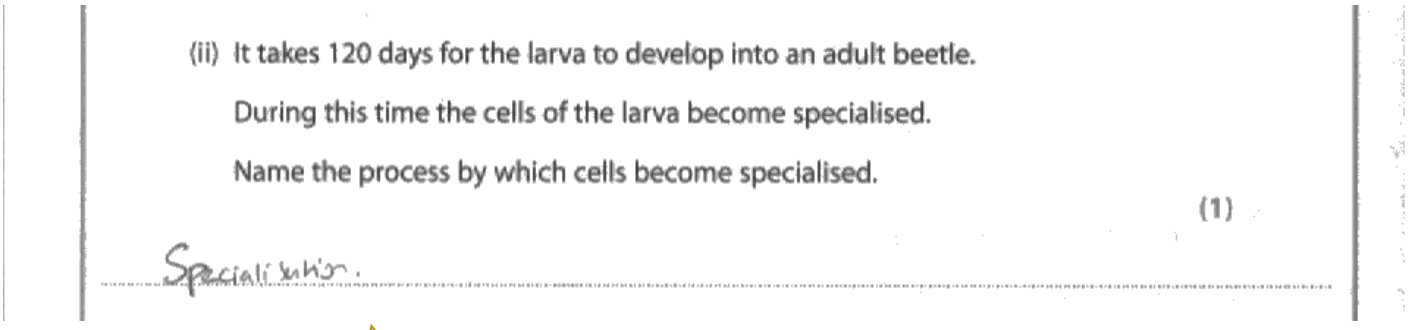
ResultsPlus
Examiner Comments

Full marks were given to this response which states clearly that the gametes combine. The response later goes on to state that a diploid cell is formed.

Question 4 (a) (ii)

This was not a well answered question with only a small number of candidates able to come up with the correct term(s) used to describe the process by which cells become specialised. Many incorrect answers comprising a number of syllables happened to end with 'ion' - transformation, genetic modification, revolution, transcription, evolution, translation and transpiration were just a few. A fair number of candidates gave 'specification' rather than 'specialisation' which was not awarded and the terms 'growth', 'meiosis' and 'mitosis' were common. Of the candidates that were able to score a mark (cell) differentiation was the most common answer.

The term 'specialisation' was the second most common correct answer and although a variation of this term was used in the question, this was deemed to be fair to candidates.



(ii) It takes 120 days for the larva to develop into an adult beetle.

During this time the cells of the larva become specialised.

Name the process by which cells become specialised.

(1)

Specialisation.

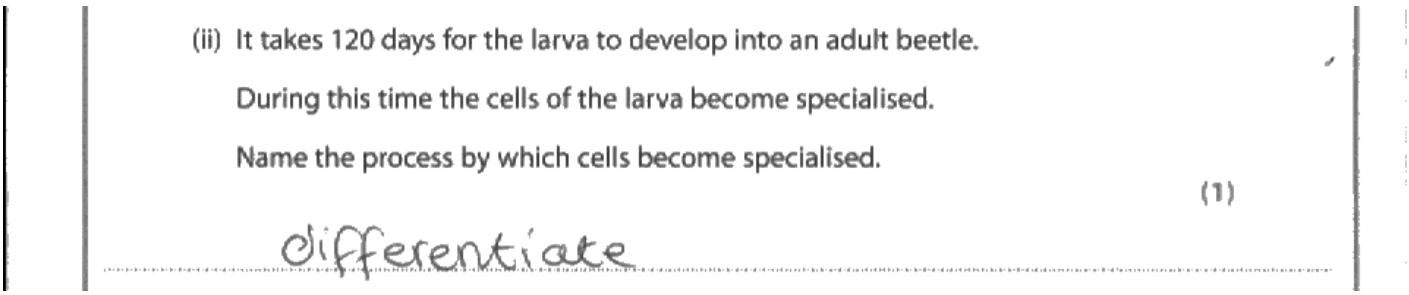
ResultsPlus
Examiner Comments

This response gained one mark for stating 'specialisation' although this was not the preferred answer.

ResultsPlus
Examiner Tip

Be wary of using terms used in the question. In this case, specialisation is a slight variation from the term used in the question and was acceptable although more often than not repeating the stem is unlikely to attract marks.

The most common correct answer was (cell differentiation) or variations of this term. Only the most able candidates were able to gain a mark for stating this.



(ii) It takes 120 days for the larva to develop into an adult beetle.

During this time the cells of the larva become specialised.

Name the process by which cells become specialised.

(1)

differentiate

ResultsPlus
Examiner Comments

This candidate correctly named 'differentiate' as the term used to describe the process by which cells become specialised.

Many candidates were unsure of how to answer this question but frequently came up with incorrect but not unrelated terms such as 'mitosis'.

(ii) It takes 120 days for the larva to develop into an adult beetle.

During this time the cells of the larva become specialised.

Name the process by which cells become specialised.

(1)

mitosis

ResultsPlus
Examiner Comments
Mitosis was probably the most common incorrect answer. This candidate failed to score a mark for naming this process.

'Cell specification' was a frequently seen response that many candidates named as the process by which cells specialise. Although it could be implied that candidates 'were almost there' the term specification means something very different and therefore this answer could not be awarded.

(ii) It takes 120 days for the larva to develop into an adult beetle.

During this time the cells of the larva become specialised.

Name the process by which cells become specialised.

(1)

Cell specification

ResultsPlus
Examiner Comments
This candidate gained no mark for stating 'cell specification'. This was an answer commonly seen.

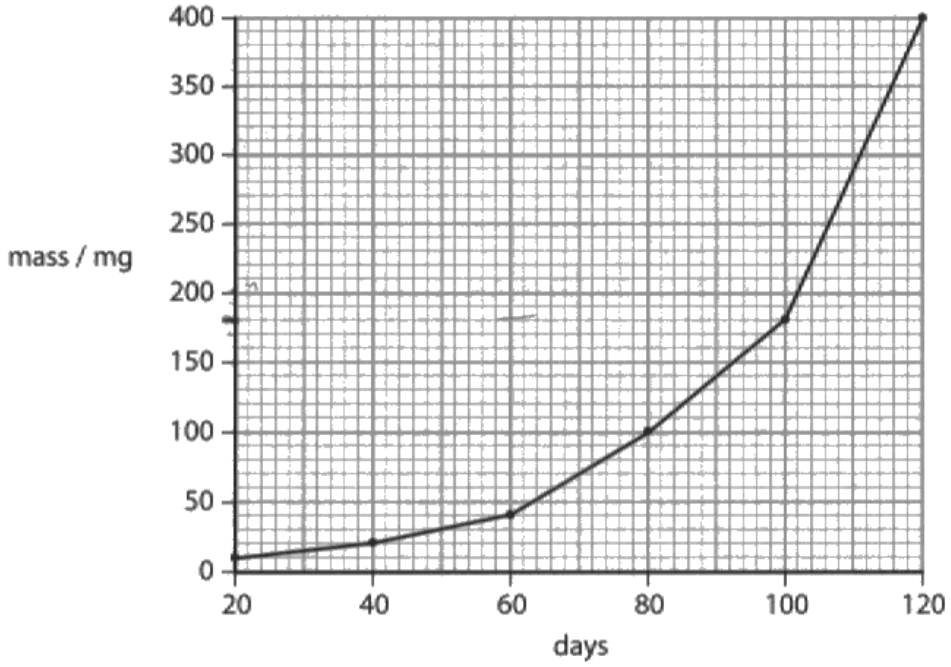
ResultsPlus
Examiner Tip
Scientific words that are spelt incorrectly and happen to mean something different are not credited. Phonetic spelling however, as long as they don't have an alternative meaning, are acceptable in place of the correctly spelt word(s).

Question 4 (b) (i)

Candidates have demonstrated excellent skills in graphical interpretation in previous examination series and continued to do so this time round. The vast majority of candidates were able to correctly extract information from the graph to arrive at a mass of 180mg on day 100. A very small minority of candidates were not able to determine the mass the of the flour beetle on day 100 with some of these mistakenly attempting some form of calculation implying a misinterpretation of the question.

Most candidates carried out this simple interpretation of the graph and correctly determined the mass of the flour beetle on day 100.

(b) The graph shows the mass of a flour beetle larva as it grows.



(i) State the mass of the larva on day 100.

(1)

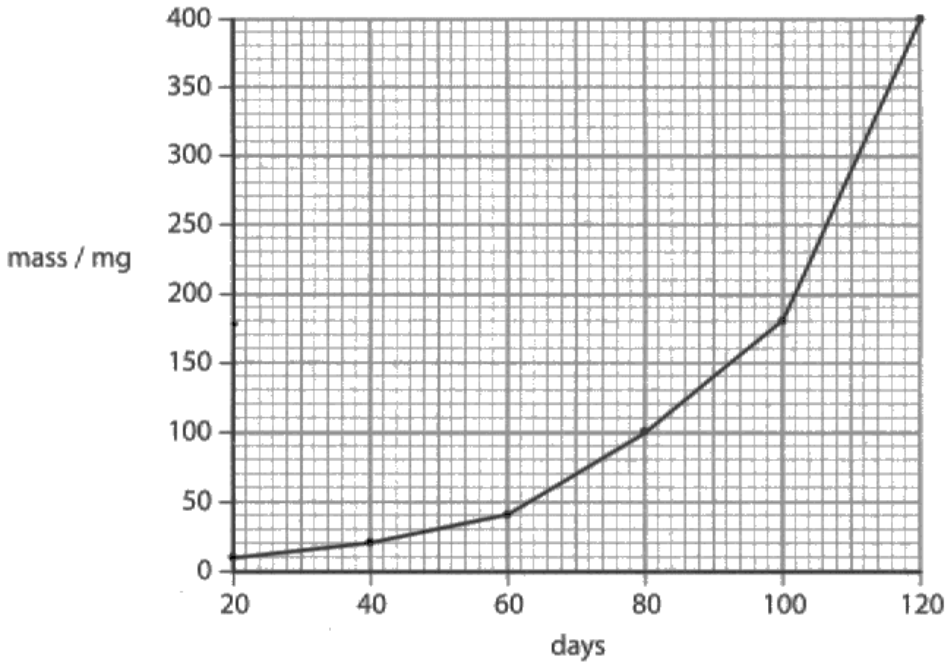
180 mg

ResultsPlus
Examiner Comments

This response was awarded one mark for stating that the mass of the flour beetle on day 100 was 180mg.

Very few candidates got this question wrong but of those that did most were under the impression that some sort of calculation had to be done. This inevitably led to the wrong answer being given.

(b) The graph shows the mass of a flour beetle larva as it grows.



(i) State the mass of the larva on day 100.

180 ÷ 100 = 1·8

(1)

1.8 mg

ResultsPlus

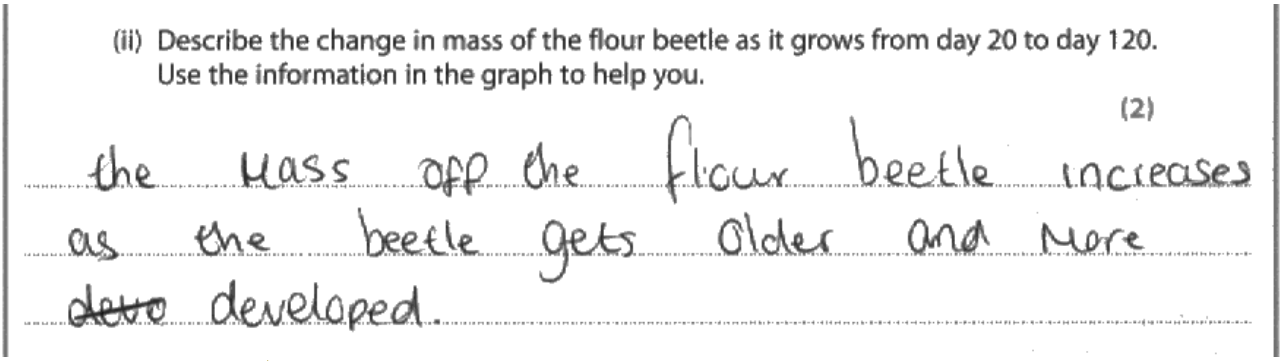
Examiner Comments

This candidate appears to be attempting to calculate the mass of the flour beetle on day 1. Consequently, their incorrect answer of 1.8 mg was not awarded.

Question 4 (b) (ii)

Although many candidates answered this question well, showing their skill in describing the change in the mass of the beetle over the 120 day period, a fair percentage of candidates failed to score by explaining why the mass of the beetle changed. Other incorrect answers focused on the growth of the flour beetle rather than the change in mass and this was also not awarded marks. Most answers that did gain marks used data from the graph to support correct descriptions and this was credited appropriately. In particular, candidates would quote the overall change in mass of 390mg to gain the second marking point but almost as often a range of data was included within each response. Some data was, unfortunately, quoted incorrectly - 'the mass of the beetle doubles every 20 days' was seen frequently so some failed to gain the second marking point.

Few candidates scored just one mark for their answer as most students described the overall mass increase and supported this with data extracted from the graph. Of those that did score one mark, it was most often for stating an increase in mass over the time period shown.


(ii) Describe the change in mass of the flour beetle as it grows from day 20 to day 120.
Use the information in the graph to help you.

(2)

the mass off the flour beetle increases as the beetle gets older and more ~~devo~~ developed.

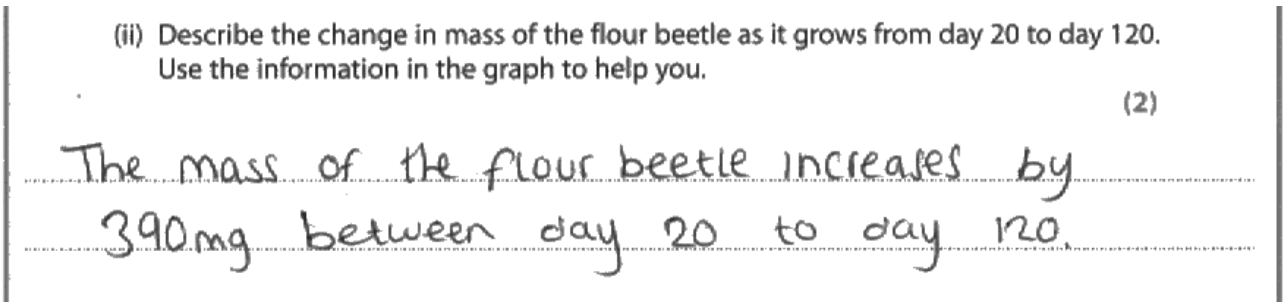
ResultsPlus
Examiner Comments

This candidate failed to support their description of the trend of the graph with data and therefore only scored one mark for recognising that the mass of the flour beetle increases.

ResultsPlus
Examiner Tip

Marks cannot be lost for quoting data from graphs and other sources that are given in examination questions. It is more likely that marks will be lost for not quoting or manipulating data in some way.

More able candidates gave very clear, to the point answers gaining two marks for describing an overall increase and supporting this with correct data from the graph.


(ii) Describe the change in mass of the flour beetle as it grows from day 20 to day 120.
Use the information in the graph to help you.

(2)

The mass of the flour beetle increases by 390mg between day 20 to day 120.

ResultsPlus
Examiner Comments

This response was awarded 2 marks for providing details covering both marking points 1 and 2. The candidate clearly states that the mass increases and has calculated the overall difference in the increase correctly.

Candidates scoring two marks used data in various ways to gain the second marking point. Most candidates calculated the overall increase in mass as 390mg but others recognised a more rapid increase in mass between days 60 to 80 for example which was also valid.

(ii) Describe the change in mass of the flour beetle as it grows from day 20 to day 120. Use the information in the graph to help you.

(2)

The flour beetle's mass increases from 10mg to 400mg from day 20 to day 120.

ResultsPlus
Examiner Comments

The details in this response cover both marking points for 2 marks. An overall increase in mass is stated and correct data extracted from the graph has been used to support the description given.

ResultsPlus
Examiner Tip

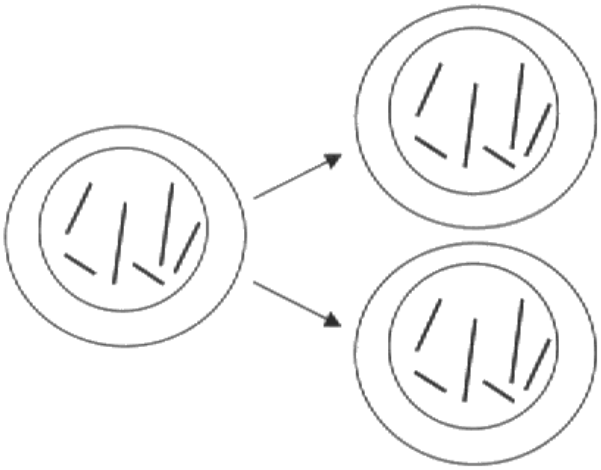
Check any information that you extract from a graph. It is very easy to make simple errors when reading from graphs particularly when determining the scale is prerequisite to manipulating data.

Question 4 (c)

Many candidates were able to interpret the information from the diagram to state simply that '*two* new cells were produced' or 'mitosis' although these were not often seen together. Many candidates answers failed to provide any hint of understanding of the type of cell division shown by the diagram with some stating 'diploid division' or 'meiosis'. Details describing the type of cells formed i.e. *genetically* identical were often omitted with the vast majority of candidates preferring just to state that the new cells formed were 'identical'. This was not enough for the 4th marking point. Similarly, many candidates failed to provide details in their response covering the 2nd marking point - DNA replication was nearly always missed out.

Candidates that gained both marks often recognised the type of cell division shown by the diagram and that two new cells were produced. Candidates often added that the new cells produced were identical although very rarely stated that they genetically identical. This was often an omission that cost some students that had not already achieved full credit one mark.

(c) The diagram shows cell division during growth.



Describe this type of cell division.

(2)

Through the process of mitosis the cell divides into two identical daughter cells.

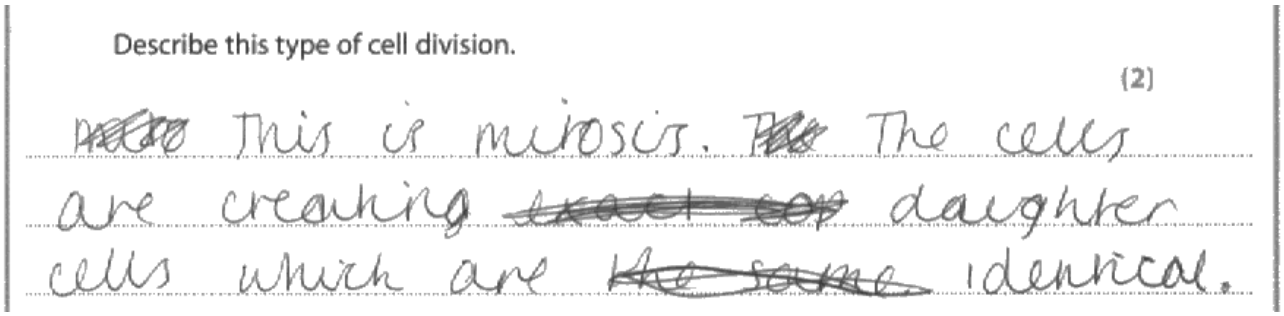
ResultsPlus
Examiner Comments

This candidate correctly identified mitosis as the type of cell division taking place and also that two new cells were produced.

ResultsPlus
Examiner Tip

Remember that mitosis always produces *genetically* identical cells. Stating identical on its own is not enough.

Many candidates could have scored at least one mark by remembering to state that the cells produced by mitosis are *genetically* identical. This was a frequent omission although usually a mark was obtained for using the diagram to state that two new cells were produced.


Describe this type of cell division.

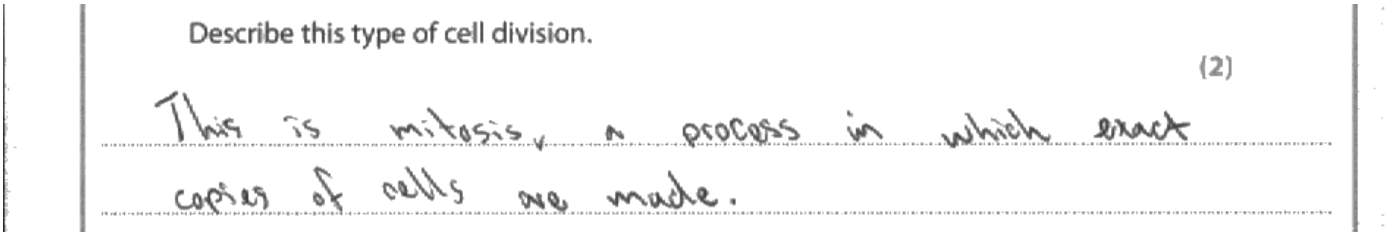
(2)

This is mitosis. The cells are creating daughter cells which are identical.

ResultsPlus
Examiner Comments

This candidate failed to gain a mark by just stating that the cells produced were identical.

Most one mark responses recognised the type of cell division taking place as mitosis but failed to give further information that was creditable.


Describe this type of cell division.

(2)

This is mitosis, a process in which exact copies of cells are made.

ResultsPlus
Examiner Comments

This response gained one mark for stating mitosis. Although the candidate has stated 'exact copies of cells are made' this is not enough for a further mark.

Question 4 (d)

Many general comments were made in response to this question indicating that candidates are less familiar with the reasons for genetically modifying wheat. Responses such as 'better wheat', 'to stop the flour beetle from eating it' and 'to kill the flour beetle' were seen frequently and responses often implied that candidates did not know that flour comes from wheat. Many students thought the question was about artificial selection or cloning and based their answers along these lines or described the process of genetic modification rather than giving a reason for modifying the wheat. There was also some confusion between pesticides and herbicides with a large number of candidates thinking either that they were both the same or that the flour, rather than the wheat, would produce or resist pesticides. Some students thought that the wheat could be genetically modified to improve or increase the yield for the benefit of the beetle and gave responses such as 'so the flour beetle will have more food' or 'there will be more wheat for the beetle to eat'. Many pupils confused wheat with Golden Rice and made references to Vitamin A deficiency although others discussed 'increased nutritional value' which was acceptable for a mark. The question was worded in such a way so that students were not restricted to giving reasons for genetic modification linked only to the flour beetle but many made an attempt to base their answer in this context. By far the most frequently seen correct answer was 'greater yield' or 'grow faster' both of which were credited and references to pesticides and herbicides, although lacking clarity in some cases, often scored a mark.

Candidates scoring one mark generally gained this for understanding that genetic modification can increase the yield of crops. This was the most commonly seen response although any further detail given was usually vague and not worthy of another mark.

(d) Flour beetles eat flour.

Flour can be produced from genetically modified wheat.

Suggest why wheat is genetically modified.

(2)

So that it grows larger and therefore the farmers get a greater yield which gets them more profit.

ResultsPlus
Examiner Comments

This candidate scored one mark for stating that 'farmers get a greater yield'. The information about 'it' growing larger was too vague for credit.

ResultsPlus
Examiner Tip

Read questions carefully and organise a response that details only what is expected. Some candidates described the process of genetic modification rather than gave a reason for genetic modification.

Few candidates scored full marks for their response although of those that did 'greater yield' was inevitably included. The second mark was gained most frequently by stating that the plants 'grow faster' although a variety of information covering most marking points was seen across responses.

(d) Flour beetles eat flour.

Flour can be produced from genetically modified wheat.

Suggest why wheat is genetically modified.

(2)

To increase the ~~green~~ yeild of the plant or ~~flag~~ to be ~~herbicide~~ herbicide, ~~insecticide~~ insecticide and fungicide resistant

ResultsPlus
Examiner Comments

This candidate gained two marks for understanding that genetically modified plants could give a greater yield and that they could resist herbicides.

ResultsPlus
Examiner Tip

Be careful in wording responses that are based on herbicides and pesticides. Genetically modified plants can be herbicide resistant but they are not pesticide resistant. Genetically modified plants can be made to produce pesticides that kill insect pests which can increase yield.

Many responses gave general comments that were too vague to credit. Some of these responses were focused in some way on the flour beetle - genetically modifying wheat to either prevent the flour beetle from eating it (without mentioning pesticides) or so that more could be grown for the flour beetle to eat. Few responses even stated that the wheat could be made to taste better for the beetle.

(d) Flour beetles eat flour.

Flour can be produced from genetically modified wheat.

Suggest why wheat is genetically modified.

(2)

So that it dosent get contaminated by flour beetles and its better quality.

ResultsPlus
Examiner Comments

The information in this response was too vague and failed to meet any of the marking criteria. The candidate could have clarified 'better quality' by stating that the wheat could be modified to have a better nutritional value or to contain more nutrients. The statement 'so that it doesn't get contaminated by flour beetles' would have been better written 'contains pesticides to reduce contamination by flour beetles' which would have gained a mark.

ResultsPlus
Examiner Tip

Students often write 'to improve the quality' in responses to questions on genetic modification. This needs to be clarified with further information before a mark can be awarded. *How* is the quality improved?

Question 5 (a) (i)

Many responses gave information that described the transport of minerals (and water) from the roots to the leaves without hitting any marking points and this often included incorrect references to xylem and phloem vessels. It appears a common misconception amongst candidates who think that the mineral ions are taken in with the water as they are dissolved in solution and so there were many incorrect references to diffusion, osmosis, transpiration and from a high to a low concentration gradient despite the wording of the question. A vast number of candidates stated that the minerals were taken into the roots but failed to demonstrate knowledge of *root hairs* and terminology such as 'the roots suck up....' or 'drink up the water and minerals' were obviously not credited but seen often. There seemed to be some confusion over active transport and osmosis and only the best responses could correctly and clearly describe active transport as the movement from a low concentration to a high concentration. Very few responses included details about active transport requiring energy.

Some candidates recognised that active transport was the process by which minerals were taken into the plant although these were not seen often. It was very rare to see any comment made about the need for energy in these responses and the information given was sometimes accompanied by an incorrect description of active transport - from a high concentration to a low concentration.

Plants

5 (a) (i) A plant is growing in soil with a very low concentration of mineral ions.

Explain how these mineral ions are taken into the plant from the soil.

(2)

They are taken up by the Root by the ~~xylem~~ root, this certain root is called ~~xylem~~ xylem vessels, and this process is called active ~~transport~~ transport

ResultsPlus
Examiner Comments

This response scored only one of the two marks available for naming active transport as the process that transports mineral ions into the plant. The other information given is confused although if the candidate had mentioned 'root hair cells' instead of just 'roots' they may have been awarded a further mark. However, this candidate is clearly confused about the type of cell that takes in the mineral ions as they have named the particular type of root that takes in the mineral ions the 'xylem vessels'.

ResultsPlus
Examiner Tip

Active transport is the only process that transports materials from a low concentration to a high concentration. It is also the only process of transporting materials into or out of cells that requires energy.

Candidates very often stated that diffusion was the process that transported mineral ions into the plant despite the question stating clearly that the concentration of the minerals in the soil was very low. Some of these answers were clearly written and would have been correct if the concentration of minerals in the soil was higher in the soil than in the plant showing some good understanding of this process.

Plants

5 (a) (i) A plant is growing in soil with a very low concentration of mineral ions.

Explain how these mineral ions are taken into the plant from the soil.

(2)

The minerals are taken in by diffusion across a partially permeable membrane. It moves from a low concentration in the soil to a higher concentration in the plant.

ResultsPlus
Examiner Comments

This response failed to gain marks as it discusses diffusion rather than active transport.

ResultsPlus
Examiner Tip

Read the question carefully. All information in a question is given for a purpose - to help formulate a response that meets the marking criteria. In this particular case, the candidate has overlooked the opening sentence which states that the plant is growing in soil with a very low concentration of minerals.

Many candidates failed to gain one mark for omitting root *hairs* although most understood that this was the area that absorbed the minerals. 'Roots' on its own was insufficient for a mark.

Plants

5 (a) (i) A plant is growing in soil with a very low concentration of mineral ions.

Explain how these mineral ions are taken into the plant from the soil.

(2)

when water is absorbed by the plants roots, minerals dissolved in the water are absorbed too.

ResultsPlus
Examiner Comments

This candidate failed to gain a mark for their response although if they had mentioned 'root hairs' rather than just 'roots' they would have been credited. This response was typical of many that were seen.

ResultsPlus
Examiner Tip

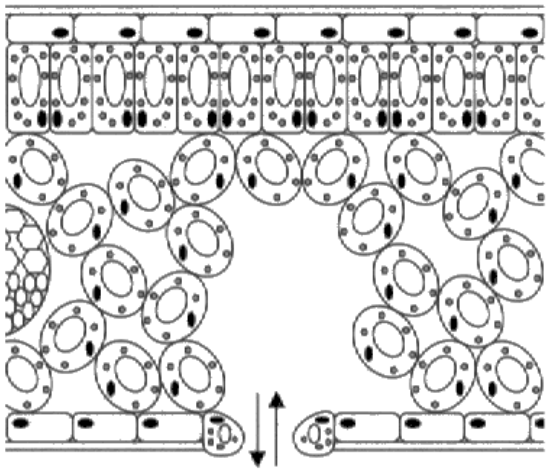
The main roots of the plant are not the main site for mineral ions to enter - these contain the xylem and phloem vessels that have a different job. The root hair cells found on the main roots are responsible for actively transporting mineral ions into the plant, which then travel through the xylem and phloem vessels to the leaves.

Question 5 (b)

The average mark scored by candidates for the first of the extended answer questions was 2. Students were handicapped by the fact that so few of them could remember the name stomata (preferring to call them 'holes' or 'gaps') or indeed any other plant structure. Many tried hard to use information from the diagram to structure their response but for the most part the details given lacked the scientific information needed to gain marks and instead gave a list of the structures shown on the diagram with incorrect and irrelevant information. For example, 'the leaf has spaces in it' or 'gases go into/out of the leaf through holes at the bottom'. Some candidates discussed cells 'moving out of the way' to make room for gases or that 'stomata absorbed the sunlight' whereas others gave irrelevant information that stressed the importance of oxygen for humans. There clearly are a significant number of candidates that have no idea about gaseous exchange in a plant - some even mentioned the use of ventricles! Names of gases were often missing, or the direction of movement of gases was omitted or reversed. Photosynthesis was not often mentioned but there were several descriptions of carbon dioxide and oxygen diffusing or gases correctly linked to respiration and photosynthesis but with no reference to any structures. This limited these responses to Level 1. Most of the responses were awarded the QWC mark regardless of the level awarded although the quality of handwriting in some cases was particularly poor which made some answers very difficult to read.

Less able candidates found this question particularly challenging and had difficulty in expressing any knowledge that reflected the demands of the question. Although most candidates did make use of the diagram given, the functions of the structures that candidates managed to derive from the diagram were most often incorrect and superficial.

*(b) The diagram shows a section through a leaf.

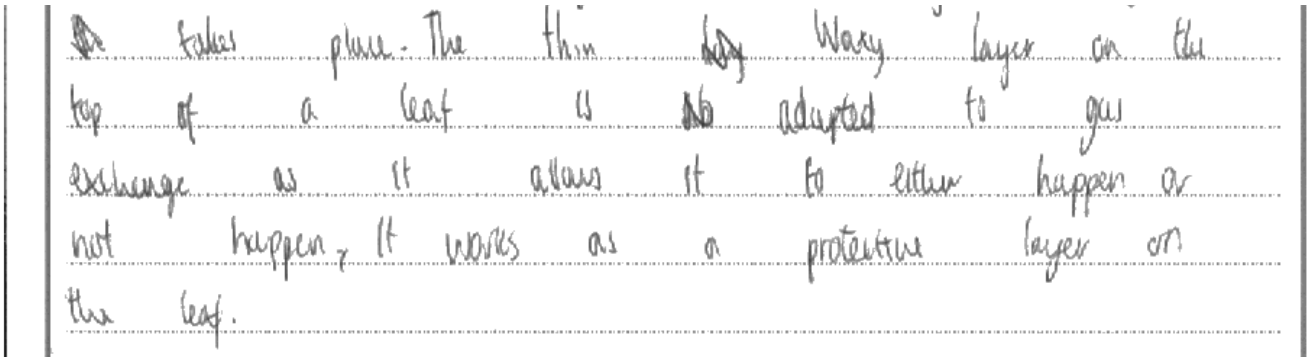


gas exchange

Explain how leaves are adapted for gas exchange.

(6)

Leaves are adapted for gas exchange as they have small holes to allow gases in and out of the leaf and also allow liquids and nutrients into the leaf. Also leaves are adapted to gas exchange as the cells in the leaf change as the gas exchange



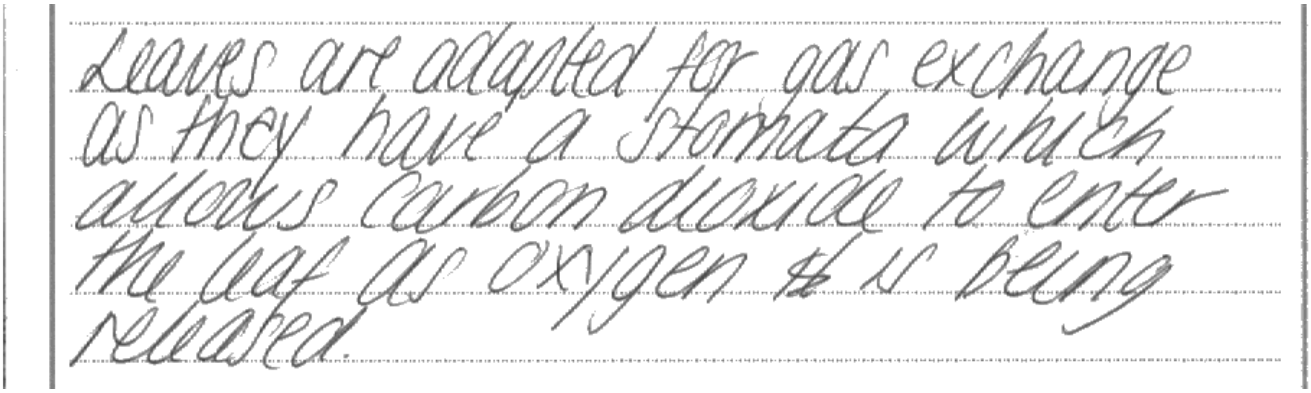
ResultsPlus
Examiner Comments

The details given by this candidate were ambiguous with no correct factual information that was worth any marks. The use of the term 'holes' as opposed to stomata is unfortunate - had the candidate used scientific terminology here then this would have moved the response into the level 1 marking criteria. There is no reference to any of the gases involved in gas exchange and, even without naming stomata, their mention would have indicated some knowledge of the exchange of gases that could have been credited. The information given regarding nutrients and liquids implies strongly that this candidate lacks key knowledge on leaf structure and unaware of the roles of the key components. Similarly, the details provided on the waxy layer are insignificant in this case although stating that this layer has a 'protective' role would be unlikely to gain marks even if the role of the waxy cuticle was applicable as there is no further scientific detail to justify what is meant by 'protection'.

ResultsPlus
Examiner Tip

There are many component structures in a leaf but not all are involved in gas exchange. Focus answers only the key structures that play a role in the exchange of gases and use correct scientific terminology whenever possible. Use of 'lazy' terms such as holes or gaps as an alternative for stomata, for example, will not be credited.

Few candidates were able to provide details to meet the level 2 criteria. This was mainly due to the lack of use of correct terminology although it is very apparent that a vast majority of students just do not know the structure of the leaf or the function of its component parts. Of the candidates that managed to give a level 2 response most failed to provide detail that extended beyond the names of the gases involved and the stomata and if further information was given it was seemingly just to fill up the space allocated for the response.



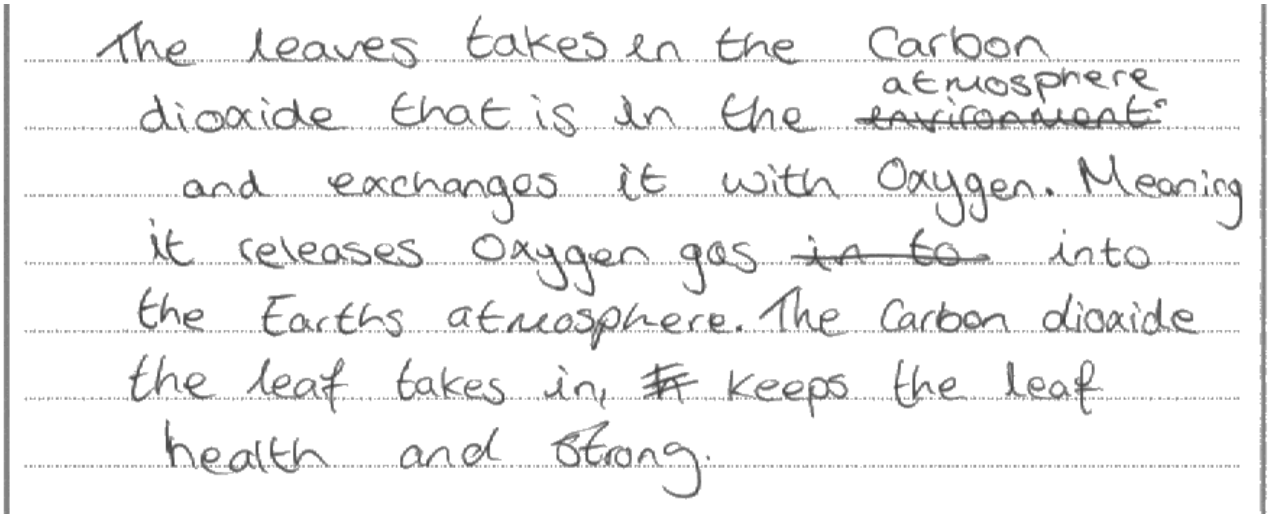
ResultsPlus
Examiner Comments

This is a very succinct answer that focuses only on the stomata and gases involved in gas exchange. Had the candidate given details of another structure, along with its function this would have met the criteria for level 3.

ResultsPlus
Examiner Tip

Although the mark scheme for extended answers is generic, with the points listed giving just an indication of the content of the response, providing minimum information is risky! Six-mark questions are demanding but good scientific knowledge must be demonstrated to gain top marks with more detail than the 'minimum' expected.

Candidates that gave a level 1 response most often named one or two structures found in the leaf without linking these to their role in gas exchange but some were able to name the gases involved. In some cases, good descriptions of how the gases moved in and out of the leaf were given but no structures were mentioned which limited the score given mostly to 2 marks.


The leaves takes in the Carbon dioxide that is in the ~~environment~~ atmosphere and exchanges it with Oxygen. Meaning it releases Oxygen gas ~~in to~~ into the Earths atmosphere. The Carbon dioxide the leaf takes in, ~~#~~ keeps the leaf health and Strong.

ResultsPlus
Examiner Comments

This response names the gases involved in gas exchange for 2 marks although fails to link these to stomata, restricting the response to the level 1 marking criteria.

Question 5 (c) (i)

This question expected candidates to extract information from the graph in order to state the maximum volume of oxygen given off by the plant in one minute. Most candidates did this well although it is unclear how some candidates arrived at an incorrect answer as random figures were quoted in answers that were not credited.

The vast majority of candidates were able to score the mark for correctly determining the volume of oxygen given off by the plant in one minute. Of the few candidates that were not able to score a mark on this question it was unclear how they arrived at the incorrect answer.

(i) State the maximum volume of oxygen produced in one minute by this plant.

(1)

50 cm³

ResultsPlus
Examiner Comments

This candidate failed to score a mark for their response. It is unclear how they arrived at a maximum volume of 50 cm^3 as neither the Y or X axis shows this figure.

ResultsPlus
Examiner Tip

Don't assume that questions involving the use of graphs require some form of calculation to be carried out. For some questions, straightforward reading from one of the scales is all that is expected.

Most candidates were able to correctly read from the Y axis scale to determine the maximum volume of oxygen given off from the plant in one minute.

(i) State the maximum volume of oxygen produced in one minute by this plant.

(1)

14 cm³

ResultsPlus
Examiner Comments

This response scored one mark for stating that 14 cm^3 was the maximum volume of oxygen given off by the plant after one minute.

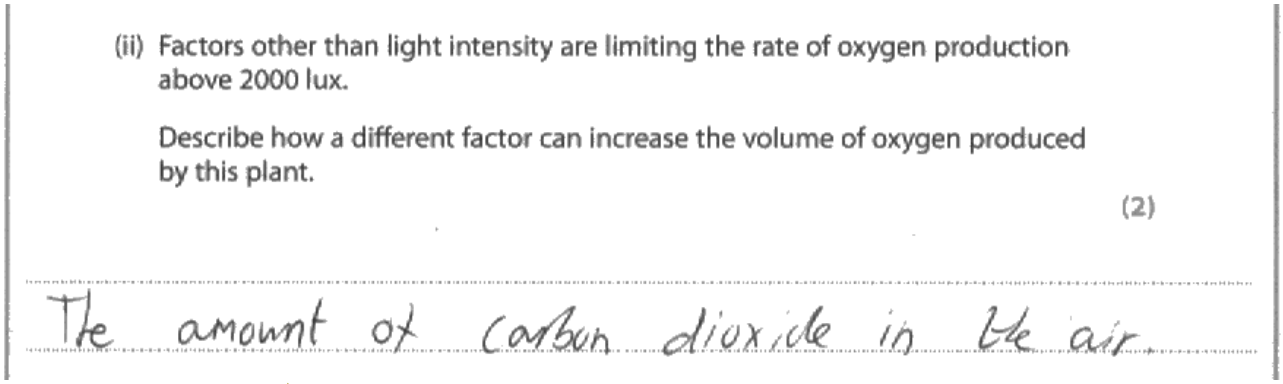
ResultsPlus
Examiner Tip

Make sure that any scale shown on a graph is worked out before attempting to answer questions like this.

Question 5 (c) (ii)

Although the graph was interpreted well, many candidates failed to read the question properly and named light as a factor that would increase the amount of oxygen released by the plant. This is despite the question clearly requesting a limiting factor *other than* light. These responses were a basic repeat of the question stem. If candidates were able to name a factor other than light then it was rare that further detail was provided to describe *how* this factor could increase the amount of oxygen produced so very few obtained 2 marks for their response A range of limiting factors were given for one mark with heat often used as an alternative for temperature the latter being the most common response for 1 mark. Some that did name temperature as a limiting factor went on to state that if temperature was too high then enzymes would denature. Other correct suggestions covered the range given in the mark scheme although wrong answers included factors such as pH or factors that could not be changed such as leaf size.

A surprising number of candidates only named a factor for one mark, without indicating how the factor should be changed i.e. increased for the second mark. Most commonly temperature was given in the response although carbon dioxide and water were also frequently seen.



(ii) Factors other than light intensity are limiting the rate of oxygen production above 2000 lux.

Describe how a different factor can increase the volume of oxygen produced by this plant.

(2)

The amount of carbon dioxide in the air.

ResultsPlus
Examiner Comments

This candidate failed to obtain full marks for their incomplete answer. Although carbon dioxide has been named as a limiting factor for one mark, there is no information on how this factor needs to change in order to increase the amount of oxygen produced by the plant.

ResultsPlus
Examiner Tip

Always be aware of the mark allocation for a question and ensure that the details provided in a response include at least the same number of key points as the number of marks.

The second marking point was infrequently seen with candidates making statements such as 'temperature will increase the amount of oxygen released'. This limited most responses to one mark as candidates failed to state how the named factor could increase oxygen production. Candidates that did score full marks usually added just one more word to their answer - 'more' to gain a further mark on top of that obtained for correctly naming a limiting factor.

(ii) Factors other than light intensity are limiting the rate of oxygen production above 2000 lux.

Describe how a different factor can increase the volume of oxygen produced by this plant.

(2)

By giving plant more water and more of sunlight which increase rate of growth of the plant and the bigger the plant more oxyen release

ResultsPlus
Examiner Comments

This candidate gained full marks for their response simply by stating *more* water would increase the rate of oxygen production.

ResultsPlus
Examiner Tip

It is really important to understand what the key words in a question are asking you to do. In the case of this question *describe how* was overlooked in many responses which limited most answers to one mark.

It was unfortunate that many candidates failed to read the whole question carefully and just repeated the question stem in their answer. Light was often incorrectly named as the 'other' factor that would increase oxygen production despite the wording of the actual question giving instructions to name a factor other than light intensity. This error was the main reason for candidates failing to score for this question.

(ii) Factors other than light intensity are limiting the rate of oxygen production above 2000 lux.

Describe how a different factor can increase the volume of oxygen produced by this plant.

(2)

The environment of the plant can effect the volume of oxygen produced ~~by this plant~~, for example if there is enough sun light then the lvx will increase

(Total for Question 5 = 12 marks)

ResultsPlus
Examiner Comments

This candidate has given sunlight as the named factor other than light that would increase the rate of oxygen production. Sunlight and light are the same thing so no marks were scored here.

ResultsPlus
Examiner Tip

Do not repeat the stem of the question in answers. This shows no understanding at all and will not be credited in examinations.

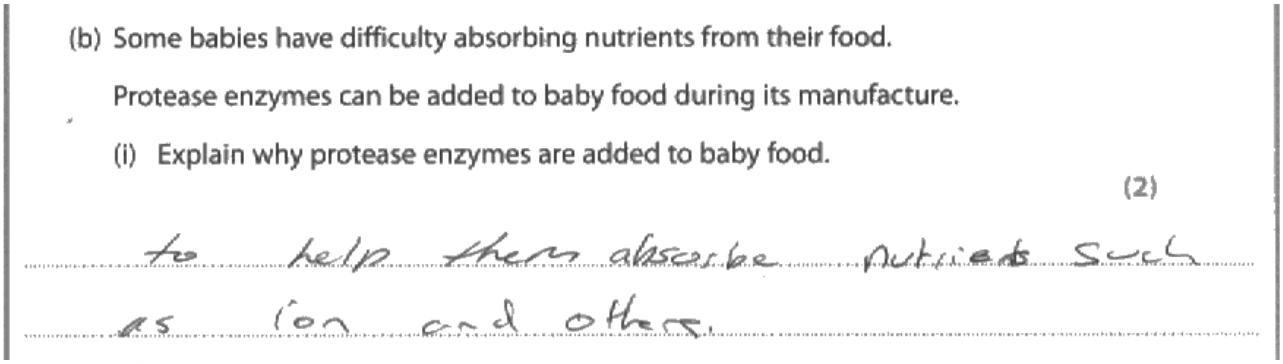
Question 6 (a) (i)

This question was a simply 'shape-matching' exercise where candidates were expected to link the enzyme with its substrate. The purpose of this question was to direct students thought processes to information related to enzymes and substrate specificity prior to tackling the extended answer question at the end of the this section of the paper. The vast majority of candidates successfully matched the enzyme with its substrate for one mark. Those that were unsuccessful generally opted for the third substrate shown in the diagram which on first glance appears complementary but fails to match the enzyme completely. Candidates that took a little longer to study the diagrams were more likely to be awarded a mark.

Question 6 (b) (i)

This appeared to be another question where the stem was repeated frequently in responses. Many students failed to score on this question as their responses missed the marking points even though they appeared to have some knowledge of the subject being tested. Some candidates seemed to know very little if anything about protease and protein digestion and this meant that full marks were very rarely seen for answers. Common incorrect or non-creditworthy responses included details such as 'to kill bacteria', 'protease gives us protein', 'makes food easier to absorb' or 'to make food easier to swallow/digest'. Other students thought that protease was added to make food soft or stated that the protease enhanced protein levels in food. Many candidates spoke generically about 'nutrients' with very few giving details on protein digestion. A small number of candidates identified that protein was present in the food or that proteases break down proteins and some linked this to growth in the baby. However, Candidates that did give responses along these lines tended to state that 'protease breaks down food making it easier to absorb nutrients' which was a basic reword of the question stem.

Many candidates either repeated the whole stem of the question i.e. 'protease helps the baby to absorb nutrients' or partly reworded it mostly by stating '.....helps to absorb nutrients' along with other non-creditworthy information. The most obvious marking point (marking point 1) was rarely awarded with marking point 2 being seen most often in responses. A large number of students, however, failed to link the protease enzyme with protein digestion and instead skimmed over information on protein digestion that was sometimes indicative of some understanding but did not contain the factual information required for a mark.



(b) Some babies have difficulty absorbing nutrients from their food.

Protease enzymes can be added to baby food during its manufacture.

(i) Explain why protease enzymes are added to baby food.

(2)

to help them absorbe nutrients such as ion and others.

ResultsPlus

Examiner Comments

This response partly repeats the stem of the question - 'to absorb nutrients...' If this information had been clarified with the correct type of nutrient i.e. amino acids then this response would have been worth one mark. The information given about absorbing 'ions' is irrelevant in this context.

ResultsPlus
Examiner Tip

Usually a question based on enzymes requires a response that includes details about substrates. The name of the substrate for a particular enzyme is very similar to the name of the enzyme itself - proteases digest proteins, carbohydrases digest carbohydrates and lipases digest lipids (or fats).

The content of one-mark answers was variable with students generally gaining a mark for mentioning either proteins (in food or that they were digested by protease) or growth. Rarely were two marks gained where candidates were able to link two marking points i.e. proteins in food are digested by protease or proteins are needed for growth.

(b) Some babies have difficulty absorbing nutrients from their food.

Protease enzymes can be added to baby food during its manufacture.

(i) Explain why protease enzymes are added to baby food.

(2)

Protease enzymes are added to baby food so that they get the nutrients that they need to be able to develop and grow.

ResultsPlus
Examiner Comments

This candidate produced a one-mark response for recognising that the nutrients in the baby food were needed for growth. Had they clarified 'nutrients' and stated 'proteins' instead then this response could have gained full marks.

ResultsPlus
Examiner Tip

Add relevant detail to answers where possible rather than using words that are in the question. In this case what type of nutrient is being referred to? Make sure that nutrients mentioned are linked to the food type hinted at in the question.

The most common two-mark answer referred to proteins and their importance in growth although responses that gained full marks were very infrequent. Most candidates failed to make the link between protease and proteins.

(b) Some babies have difficulty absorbing nutrients from their food.

Protease enzymes can be added to baby food during its manufacture.

(i) Explain why protease enzymes are added to baby food.

(2)

protease are added to food to help digest protein for the baby so it can help with bone growth.

ResultsPlus

Examiner Comments

This response clearly links the need for protein in growth. The candidate has read the question carefully and understood the relationship between the protease and protein for full marks.

Question 6 (b) (ii)

The answers to this question were significantly more successful than the previous and overall showed a good standard of understanding on how temperature affects enzyme activity. Many pupils could use the word 'denature' correctly although a fair number were unable to link this to a change in shape of the active site for marking point 2 and the consequent inability for the enzyme to bind onto its substrate (marking point 3). As always with questions of this nature, there were many irrelevant references to enzymes or proteases working best at body temperature or 37°C and although enzymes are more often taught in the context of the human body candidates should be made aware that different types of enzymes found in other locations have other optimum temperatures. This may deter them from persistently referring to body temperature in questions based on this topic when it is unnecessary and not mark yielding. Most one-mark responses were focused on enzyme activity and how this was reduced at temperatures higher than 40°C although these failed to add further creditworthy detail. Some candidates included information on enzymes denaturing and the best candidates gave good descriptions of how higher temperatures could lead to changes in the active site and the subsequent consequences for the reaction taking place.

It is a very common misconception that enzymes are living 'organisms'. Many candidates at foundation tier refer to enzymes *dying* or *reproducing* which is incorrect and many lost marks by basing their response along these lines. Other incorrect responses included details that linked a higher temperature with an increased rate of reaction and although this is true up until a certain point the context of the question in this particular case, negated answers of this nature.

(ii) A baby food is manufactured at 35 °C.

Higher temperatures affect the protease enzymes in baby food.

Explain how enzymes are affected by temperatures above 40 °C.

(2)

Enzymes can die if theyre stored at the wrong temperature.

ResultsPlus
Examiner Comments

This response is typical of many answers that failed to score a mark. Enzymes are chemicals and therefore non-living although this type of answer comes up time and time again across different examination series.

ResultsPlus
Examiner Tip

Never state that enzymes 'die' in a response. This is scientifically incorrect. Enzymes fail to function as their shape changes. This shape change prevents the enzyme from binding with its substrate. Without this binding taking place there will be no reaction.

There were some good explanations of how the enzyme's active site fits with the substrate or strong inferences to this although some candidates referred to the lock and key model without explanation. Where candidates did show understanding of how temperature affects the enzyme responses most commonly made use of the term 'denature' along with information how this event would affect the rate of reaction.

(ii) A baby food is manufactured at 35 °C.

Higher temperatures affect the protease enzymes in baby food.

Explain how enzymes are affected by temperatures above 40 °C.

(2)

if the temperture is over 40°C the enzymes get denatured and loses it's shape, so the substrates won't fit in and the reaction won't happen

ResultsPlus
Examiner Comments

This is a good 2-mark response that covers several marking points. The candidate has a good understanding of how temperatures above 40°C would affect the enzyme and the reaction that it catalyses.

ResultsPlus
Examiner Tip

When an enzyme denatures it just means that its shape has changed. It is worthwhile mentioning both of these points in an answer to questions like this, as well as the consequences on the rate at which a chemical reaction takes place as it implies an understanding of what denaturing actually means.

Where candidates did incorrectly make reference to the 'death' of enzymes this was sometimes in conjunction with correct information related to the rate of reaction. This suggested a limited knowledge of how temperature affects enzymes although more intricate details such as shape change and the effects on substrate binding were inevitably omitted.

(ii) A baby food is manufactured at 35 °C.

Higher temperatures affect the protease enzymes in baby food.

Explain how enzymes are affected by temperatures above 40 °C.

(2)

The enzymes are affected because they don't die but they de-nature which is the term when a enzyme becomes a no longer enzyme. Enzymes can't survive in temperatures over 35°C.

ResultsPlus
Examiner Comments

This candidate incorrect gives details related to enzymes 'dying' which was ignored but then correct uses the term 'denature' to describe the effect of higher temperatures on the enzyme. This earned the response one mark overall.

Question 6 (c)

The last of the 6-mark questions appeared more popular with candidates than the previous where double the number students were able to access the level 2 criteria. Roughly the same number of candidates gave a level 1 answer compared to the previous extended answer question although fewer students were able to achieve level 3. With limited understanding shown in the preceding questions it was anticipated that the final of the extended answer questions would pose a challenge to candidates at this tier. Responses varied tremendously; a few showed good understanding of enzymes in the digestive system with a minority gaining 6 marks and most showing a very limited understanding of the function and location of carbohydrases and lipases. Some students that were awarded 0 marks had written wonderful descriptions of the digestive system and what the different food groups are needed for but hadn't actually answered the question that was being asked. Likewise, some students just forgot to link specific enzymes to food types making statements such as 'enzymes break down carbohydrates into sugar'. Many candidates made mistakes in matching enzymes with their correct substrate, product(s) or location and others gave descriptions of protein digestion in their answer despite the question requesting details of only carbohydrase and lipase. On several occasions students were under the impression that carbohydrase was responsible for breaking down amylase or that carbohydrates and/or fats turn into carbohydrase and/or lipase. There were many references to incorrect locations where enzymes were found with the stomach being the most common location mentioned for either of the enzymes. Facts about lipase were generally less well known than the facts about carbohydrase; in this case lipase was linked frequently to protein or carbohydrate digestion and to amino acids and sugars rather than the digestion of fat to fatty acids and glycerol. Many candidates referred to the intestines as opposed to *small* intestines and as this failed to distinguish between the small and large intestine information given in this respect was ignored. Reference was also made to carbohydrases and lipases being made in the pancreas with no further details to suggest that they were released into the small intestine to carry out their function in digestion.

The majority of candidates were at least able to access the level 1 criteria with the significant majority of these also gaining the QWC mark. Less able candidates tended to include irrelevant details about the digestive system in their response, such as peristalsis or the presence of stomach acid and it was unlikely that these candidates gave correct details on the locations at which the enzymes were found. Most 2-mark responses gained credit for naming the correct substrate for each of the enzymes along with some including details on the digestive products i.e. sugars, fatty acids and glycerol.

*(c) Describe the action of carbohydrase and lipase enzymes in different parts of the digestive system.

(6)

Carbohydrase enzyme helps to break down carbohydrates into sugars, whilst lipase enzymes helps to break down fat into energy. ~~These~~ The sugars broken down by carbohydrase would then ~~goes~~ go through the small intestines due to the ~~fact~~ small fact that the small intestines allows substances going through them. Then eventually, they would end up being in the blood and they would get carried around by ~~red~~ white blood cells.

ResultsPlus
Examiner Comments

This candidate could have gained a further two marks (moving it into level 2) if they had stated the location at which carbohydrase digests carbohydrates to sugars. As it stands, this response gains two marks for linking the enzyme to its substrate and to the products released from carbohydrate digestion. There is further detail on the action of lipase and although the enzyme is linked to its correct substrate the named production of fat digestion, energy, is incorrect. This candidate has clearly confused the role of fat in the body with the product of fat digestion.

ResultsPlus
Examiner Tip

This question has two main aspects to it; one is to describe the *action* of the enzymes and the other is to name the *location* at which the enzymes carry out their action. Structure responses so that information about one enzyme (its action and its location) is dealt with before moving on to discuss details about the other.

Most level 2 responses were very close to obtaining a level 3 but it was usually the information on lipase that was the hindrance. Candidates are most certainly more familiar with the action of carbohydrase than they are with lipase and for many the details provided were enough to credit them with 4 marks. Again, nearly all level 2 candidates were awarded the QWC mark.

*(c) Describe the action of carbohydrase and lipase enzymes in different parts of the digestive system.

(6)

Carbohydrase are found in mouth. They helps to convert the ~~car~~ food containing Carbohydrate into glucose releasing energy. Lipase enzymes are found in stomach of our body. It helps to converts fats into fatty acids and glycerol. It absorbs fat from the food.

ResultsPlus
Examiner Comments

This candidate provides enough information about carbohydrase to obtain 4 marks for their answer. They have given details of carbohydrase linked to its substrate, the correct location at which carbohydrate digestion takes place and the correct products released from the breakdown of carbohydrate. Unfortunately this response did not qualify for 6 marks as the location at which lipase carries out digestion of fats is not the stomach as suggested here by the candidate. If the location had been correct, then this would have been a level 3 response.

Several responses gave information about enzymes that was correct but that was not relevant to the question. Candidates referred to the lock and key hypothesis frequently without showing any understanding of what this process inferred and many references were made to digestion taking place in the stomach, particularly in relation to the breakdown of fats by lipase. Other details about the digestion system given include details about stomach acid and how nutrients needed to be small enough to pass into the blood. Some candidates referred to assimilation and gave information, usually correct, on the function of the digestive products in the body.

*(c) Describe the action of carbohydrase and lipase enzymes in different parts of the digestive system.

(6)

carbohydrase, this is the enzme that breaks down carbohdiates it ~~does~~ does thwis bey using the lock and key thery. Lipase is the enzyme that breaks down fat this also uses the lock and ~~key~~ key to break down substrate. The enzymes can be found in the stomach where partnered with stomach acid break down food before they get digested.

ResultsPlus
Examiner Comments

This candidate was able to successfully link each enzyme to their substrate for two marks. There is further detail provided on that is linked to the digestive system but does not relate to the question in this case. This response is a clear level 1.

ResultsPlus
Examiner Tip

Try not to deviate away from the topic of the question just to fill space on an examination paper. Leave time in an examination to think about forming an answer based only on the subject dictated by the question and if necessary, jot down notes on the back of the examination paper to refer to if you have to come back to a question later on.

Paper Summary

The main challenge for candidates sitting this paper was subject knowledge and refraining from repeating the question stem in many cases. There are clear pockets of misconception in a variety of areas that are challenging students and this is particularly noticeable in responses for the extended answer questions. Very few candidates seem to have retained adequate information to successfully answer either of the 6-mark questions and the lack of knowledge is very apparent in the answers given which were often ambiguous in their content and very vague in many cases. At foundation level, candidates need more practise at writing extended answers, not just for the 6 mark questions but also for those allocated from 2 marks upwards. An awareness of the mark allocation for a question and also for avoiding a repeat of the question stem in responses may help candidates to focus their thoughts more on the subject content and submit more succinct answers that focus only on the subject of the question. Candidates have, on the whole, shown good skill at interpretation and performed fairly well on the questions where graphical analysis was expected. Where candidates came down on these questions it was more linked to a lack of underlying subject knowledge rather than reading incorrectly from the graphs or tables of information given. The topic of plants seems to be an area of biology, particularly for this examination series, that presented more problems than other areas of science. Candidates' knowledge and understanding of plant cells and plant structure and function seemed particularly limited and this lost them many marks across the paper where several questions were based on or around this topic. Foundation tier candidates also appear to struggle with contextualised questions which are designed to meet the AO2 criteria. Many seem unaware that despite the concept the scientific principles underlying the concept are the same - no information other than what they should have learnt during their studies is expected and this is the case for all questions within an examination paper. Finally, candidates clearly need intensive practise at recognising the demands of particular styles of questions and a thorough awareness of the expectations set out by the 'command words' in a question. A significant number of students gave responses very loosely linked, if linked at all, to the topic being tested with too many just repeating the question stem. Highlighting key words in a question or discussing the responses set out in this report with the students may provide the first step in helping candidates to recognise their own errors in the responses that they make to examination questions.

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