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Examiners' Report
June 2023

Int GCSE Human Biology 4HB1 02

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Introduction

There were several aspects to this paper that presented a challenge to a number of candidates although the overall performance of candidates was commendable. Many demonstrated a good understanding of the fundamentals of human biology and, in numerous areas of the specification, a strong grasp of key topics. Question 4, for example, was accessible to candidates of all grades, in particular Q04(a)(ii) where nearly 95% of the cohort confirmed that aerobic respiration was shown by the equation. In contrast, answers to Q04(a)(iv) were less successful and candidates working below a grade 4 struggled to name the molecule used to transfer energy in a cell. An improvement was noticed in candidate's ability to apply their knowledge and understanding of practical work and, in particular, mathematical skills. For example, just over three quarters of candidates were able to score at least four marks for writing a practical method for Q05(b)(ii) and for Q02(a) and Q02(c), both calculations that required analysis of data, the vast majority of candidates achieved full marks. Many responses were able to explain functions of various body systems with clarity and accuracy. Q05(b)(i) allowed over two thirds of the cohort to gain three or four marks to demonstrate proficiency in understanding why the pulse rate changes during exercise. Strong candidates effectively applied their knowledge to develop detailed answers to extended answer questions and although full marks were not always obtained, their appropriate use of key terminology reflected a fair understanding in topics such as controlling blood sugar levels, genetic mutation and inheritance patterns. In contrast, weaker responses lacked the depth required to demonstrate full comprehension and understanding in these areas.

There were several areas on the paper that contextualised topics and many candidates, including those working at higher levels, struggled with this. There were many occasions where a deeper level of thinking was necessary in order to generate a successful response and in some cases candidates were challenged in bringing together their knowledge of different areas of the specification in order to provide responses that demonstrated some proficiency. This was evident in the responses seen for several questions. Examples of this included Q03(c)(iii) where candidates tried hard to link their understanding of water regulation to the symptoms of diabetes but gained few marks for their attempts. Responses to Q07(a)(i) were a little disappointing. Just over half of the cohort scored less than full marks for this question with most of this group scoring one mark. This is a topic that has been tested numerous times and in various ways in previous examinations series so this result was unexpected. Errors in identifying the parts of the tooth were random with no one part standing as one that candidates were most tripped up on.

Question 1

Marks awarded to candidate responses for this question varied greatly. A fair number of candidates lost marks for their spelling of urethra despite the term clearly given to them in the question. A common error was confusing ureter for urethra and due to variations in spelling, with some terms given appearing to be a mixture of both, it was decided that the correct answer for the fifth box in the table had to be spelled correctly. Epididymis was a popular, albeit incorrect, answer that was given for the site of sperm production or the place that produces the fluid part of sperm and many candidates gave uterus as the site of fertilisation. Despite errors in some responses, a good number of candidates were able to score full marks for correctly matching structures to their functions in the reproductive systems.

The most common errors that were seen for this question included inserting the correct structure to give the site of where sperm is deposited during intercourse and also naming the tube that produces sperm.

1 The box lists structures that may be found in the human body.

epididymis	oviduct	prostate	testis	
uterus	ureter	urethra	vagina	vulva

Complete the table using words from the box to give the missing information.

(6)

Description	Structure
produces sperm	epididymis
site of fertilisation	vagina
site where sperm is deposited during intercourse	testis
place where zygote implants	uterus
tube that carries sperm and urine	~~urethra~~ oviduct
produces the fluid part of semen	prostate

ResultsPlus
Examiner Comments

This response scored two marks. The candidate was only able to correctly identify the structure where the zygote implants and the structure that produces the fluid part of sperm.

ResultsPlus
Examiner Tip

Diagrams of the male and female reproductive systems often occur in examinations along with questions expecting knowledge of the functions of each part. Practice labelling diagrams and drawing tables to describe the function of parts during revision schedules.

Epididymis was a popular answer that was randomly placed in the table by candidates that were unable to gain full marks for this question.

1 The box lists structures that may be found in the human body.

epididymis	oviduct	prostate	testis	
uterus	ureter	urethra	vagina	vulva

Complete the table using words from the box to give the missing information.

(6)

Description	Structure
produces sperm	Testis
site of fertilisation	Uterus.
site where sperm is deposited during intercourse	urethra
place where zygote implants	Vagina.
tube that carries sperm and urine	Prostate
produces the fluid part of semen	Epididymis

ResultsPlus
Examiner Comments

This candidate scored one mark for understanding that the testes produce sperm. In this particular response, like many others, epididymis was named as the structure that produces the fluid part of the sperm.

ResultsPlus
Examiner Tip

Colour-coding diagrams to highlight the main parts of the reproductive systems can help to visualise information more clearly. This could reinforce memory and help recall during examinations

It was decided to insist on the correct spelling for urethra. Many candidates confused this structure with the ureter. The spelling of urethra was sometimes a combination of these two structures posing an issue for examiners in whether or not to award.

1 The box lists structures that may be found in the human body.

epididymis	oviduct	prostate	testis	
uterus	ureter	urethra	vagina	vulva

Complete the table using words from the box to give the missing information.

(6)

Description	Structure
produces sperm	testis
site of fertilisation	~~uterus~~ oviduct
site where sperm is deposited during intercourse	vagina
place where zygote implants	uterus
tube that carries sperm and urine	ureter
produces the fluid part of semen	prostate

ResultsPlus
Examiner Comments

This candidate lost one mark for stating that the ureter was the tube that carried sperm and urine.

ResultsPlus
Examiner Tip

Spellings are sometimes important in human biology exams. Another example would be mitosis and meiosis, the spelling of which are often interweaved which causes confusion when trying to assess. Learn the spelling of key words.

Question 2 (a)

Several candidates lost a mark for failing to give their answer to 2 significant figures. This was either an oversight, where the question had been overlooked, or a general inability to demonstrate this mathematical concept. Two marks were allocated for ecf for this calculation but some candidates lost these marks for not showing their working out to the calculation where the final answer given was incorrect.

Question 2 (b)

More candidates scored two marks rather than the three marks that were allocated to this question. The main reason for this was candidates omitting to state what piece of equipment they would use to carry out the reaction in. A good number of candidates included the correct reagent in their response and similarly the vast number were aware that a positive reaction would result in a purple/lilac colour. Few responses were seen that included the use of iodine or Benedict's solution to test for the protein and this was often coupled with the wrong colour change being given. In some cases, Biuret solution was the chosen chemical but the candidates gave an incorrect colour change.

Question 2 (c)

Candidates were less successful at obtaining full marks for this calculation than they were for the calculation given for Q02(a). Some candidates rounded their final answer of 6.25 down to 6 and those that scored below two marks often failed to carry out a division calculation for an ecf mark. Like Q02(a) there were several responses that failed to show any working out and these candidates lost the ecf mark that might have been gained if this information was not missing.

Question 2 (d)

The majority of candidates gained at least 2 marks for giving a response that identified calcium and vitamin D as components of yoghurt that were of benefit to bone development. Similarly many responses linked the presence of vitamin D to calcium absorption and identified the role of calcium in strengthening bone. There were some answers that tended to repeat the stem of the question. For example, calcium or vitamin D helps with bone development was commonly seen and although credited for recognising the importance of calcium and vitamin D, a further mark could not be awarded for a valid reason why these components were important for bone development. A number of responses failed to acknowledge that calcium was stored in bone or that it was needed to help form compact bone. There were many references to protein although this information tended to be linked to muscle rather than bone development. Candidate performance overall for this question was disappointing. Only a quarter of candidates were able to achieve full marks.

Question 3 (a)

Responses from a number of candidates lacked coherence and clarity and it was clear that they had difficulty putting into words the difference between a condition and a disease. However a good number of responses gained one mark but there were too many that were limited to this score. In so many words, candidates often stated that diabetes could not be transferred from one person to another but many missed out information on pathogens.

Question 3 (b)(i)

A good proportion of candidates were able to successfully complete the initial stages of this calculation although many were caught out by failing to recognise the impact of the 'million' on the answer line. Candidates that gave their answer as 500 000 and placed this on the answer line lost a mark. Others made the same error by writing 1 250 000 on the answer line. There were a number of occasions when these two figures were not placed on the number line but left in the space for working out. Although this should not be encouraged as it could confuse final answers with other data, in this case it was allowed and the values credited accordingly. Despite these errors made in responses and other errors in miscalculations, most candidates did particularly well with over 55% of responses gaining the full three marks.

Question 3 (b)(ii)

Similar errors were made in candidate responses to this question as were made Q03(b)(i). Many candidates carried out the calculation correctly, although a lesser number than the previous question, but then placed an answer of 500 000 on an answer line where the units given were million. This meant that candidates could not get a mark for their final answer.

Question 3 (c)(i)

This question, asking candidates to name the main sugar carried by the blood, presented very little difficulty to the vast majority of candidates. Over 90% of the cohort achieved the mark. A random range of answers was given from candidates that were unsuccessful in their response such as insulin, protein and sucrose amongst others.

Question 3 (c)(ii)

Candidates other than those working at the highest grades found this question challenging. Less than a third of candidates scored full marks. Answers tended to be too general in that they were not focussed specifically on the eye or the ear. Nerve damage was very rarely seen in responses and there were several candidates that merely rewrote the relevant sentences from the passage. Many others made vague references to why diabetes might cause problems to develop with eyesight or hearing, a few of which were credited. A minority of candidates demonstrated some sound knowledge and were able to apply their understanding to how fluid changes in diabetics could affect the eye and or the ear but it was unfortunate that most of the candidates failed to gain any marks for this question.

Only one fifth of candidates were able to gain full marks for the answer. This was a challenging question for all but the highest performers as candidates struggled to apply their understanding of osmosis in this particular context.

(ii) **Suggest why some people with diabetes may develop problems with their eyesight and hearing. (lines 8 to 10)**

(2)

Diabetes may cause damage to blood vessels connected to the eye and the ~~bear~~ ear.
Can affect the level of fluid in the eye and the ear.

ResultsPlus
Examiner Comments

This candidate scored two marks for stating that blood vessels in the eye and ear would be damaged and for also understanding that diabetes would affect the amount of fluid in the eye.

ResultsPlus
Examiner Tip

There will always be questions in an examination that are presented in an unfamiliar context. You just need to think about the underlying science and apply your understanding in the same way as you would in a more familiar context.

One mark answers rarely deviated away from information that referred to fluid changes in the eye.

(ii) Suggest why some people with diabetes may develop problems with their eyesight and hearing. (lines 8 to 10)

(2)

diabetes may damage the level of fluid in the eye like aqueous humour and vitrous humour ~~of~~ causing eyesight problems and changing the shape of the eye . and changing the level of fluid in the inner ear causing problems with balance and hearing

ResultsPlus
Examiner Comments

This candidate has referred to the changes in the level of fluid in both the eye and the ear and how this might damage these organs. This response gained one mark.

ResultsPlus
Examiner Tip

The movement of water into or out of the eye or ear is by osmosis due to concentration differences. Movement of water, gases or solutes is often tested in some way in examinations so it would be a good idea to understand how the method of transport for each works.

The wording of some responses was unfortunate and vague which cost candidates marks.

(ii) Suggest why some people with diabetes may develop problems with their eyesight and hearing. (lines 8 to 10)

(2)

- As not enough blood carrying oxygen and nutrient reaching these parts
- So less aerobic respiration carried out and energy released to do their function

ResultsPlus
Examiner Comments

This candidate failed to gain any marks for not referring to the eye and/or ear. Had this response made reference to any of these structures they would have been awarded one mark.

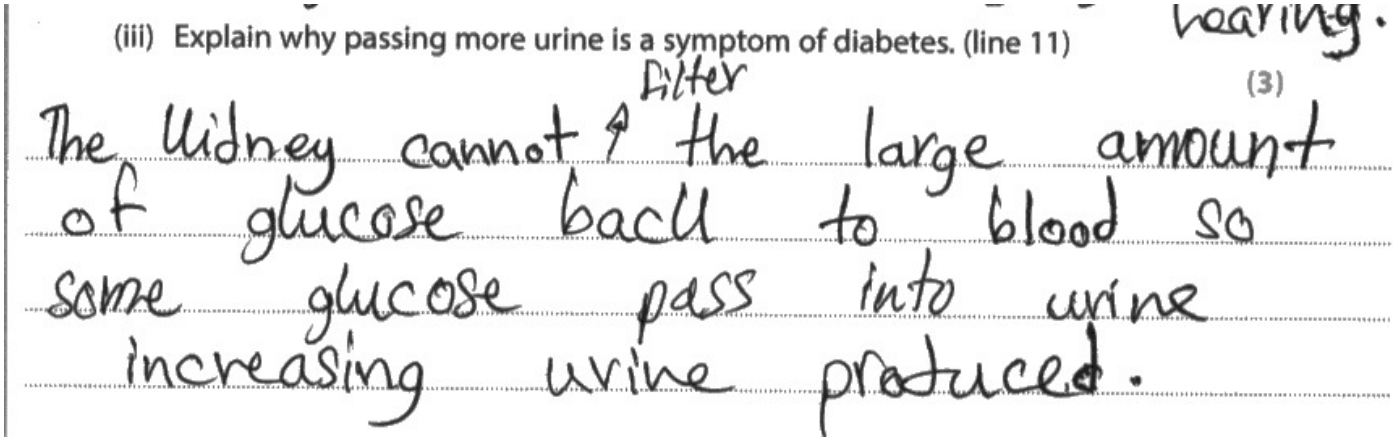
ResultsPlus
Examiner Tip

Adding relevant detail to answers is important although it is also important to remember not to include information that does not relate directly to the question. This wastes precious time in exams and does not gain marks.

Question 3 (c)(iii)

This was a particularly low-scoring question with an exceptionally low number of candidates scoring top marks. Those that discussed osmotic changes mostly mentioned water moving into and out of cells into the blood or described water movement in the body rather than into the filtrate. Most candidates did make a link with the kidney as the location in their answers. Marks were awarded mainly for candidates stating that glucose would be found in urine or that less water would be reabsorbed. On this theme, however, discussions were extended to provide irrelevant information on the action of ADH. Over half of the cohort gained zero marks for their responses, with one mark answers claiming the highest percentage of candidates that did gain a score.

Of the candidates that did gain marks, the percentage of one mark responses was greater than those scoring two or three marks. The most common error was not referring to water movement in the kidney and this cost candidates many marks.



(iii) Explain why passing more urine is a symptom of diabetes. (line 11)

(3)

The kidney cannot filter the large amount of glucose back to blood so some glucose pass into urine increasing urine produced.

ResultsPlus
Examiner Comments

One mark was awarded to this candidate who was able state that glucose would be found in urine.

ResultsPlus
Examiner Tip

Applying knowledge and understanding can be tricky in some contexts. As part of a revision schedules it is worthwhile to use a range of revision resources, such as videos and flash cards, to revisit information and to help reinforce and refresh understanding.

There were many candidates that scored zero for their response as they did not refer to the kidney in their answer. Most explanations focussed on water movement in the body and these were too vague to award. However, there were very few blank answer lines as candidates made a good attempt at giving an answer.

(iii) Explain why passing more urine is a symptom of diabetes. (line 11)

(3)

~~To be~~ To be able to excrete the excess glucose out of the ~~blood~~ body and regulate its level in the ~~bod~~ blood as the body is unable to ~~reg~~ produce insulin or react it with the glucose and turn in to glycogen to be able to store it as an insoluble polysacherick in the liver.

ResultsPlus
Examiner Comments

This candidate's response touches on gaining a mark but they have not stated clearly that the glucose would be excreted in urine. Most of the information given is irrelevant.

ResultsPlus
Examiner Tip

Prepare for examinations by drawing up a revision schedule well in advance and add topics to the schedule to ensure your revision covers as much of the specification as possible.

Some information that candidates included in their response was lifted straight from the passage without any changes made. Candidates working at the lower grades really struggled to apply any creditable knowledge to their answer.

(iii) Explain why passing more urine is a symptom of diabetes. (line 11)

(3)

because the pancreas isnt ~~prodo~~ getting enough glucose to produce inculin. Cause diabetes can damage blood vessels and affect the level of fluid in the body.

ResultsPlus
Examiner Comments

Although this candidate has made an attempt to answer the question there is no detail in their response that could be awarded. Parts of the response are identical to information in the passage.

ResultsPlus
Examiner Tip

Rewording the exam question or copying information written by the exam board and using this in an answer will not be given any marks.

Question 4 (a)(i)

It was interesting that a fair number of candidates struggled to give the correct word equation for aerobic respiration. It may have been possible that the wording of the question where candidates were asked to name one type of respiration threw them a little. There were a variety of different placements in responses for glucose, carbon dioxide and water and, at times, random gases such a nitrogen were seen as an alternative to carbon dioxide. As the question clearly asked for a word equation attempts at symbol equations were not awarded. Energy or ATP also appeared to be a substitute for any of the other substances, although it was only found on the right hand side of the equation. Overall, around a quarter of candidates scored either zero or just one mark.

Candidates working at around a Level 4 upwards did not find completing the word equation a challenge and used their knowledge to gain full marks.

4 (a) (i) Complete the word equation for one type of respiration.

(2)

oxygen + glucose → carbon dioxide + water

ResultsPlus
Examiner Comments

This candidate scored full marks for correctly completing the equation.

ResultsPlus
Examiner Tip

Do not be tempted to give symbol equations if the question asks for a word equation. It is very likely to be marked wrong.

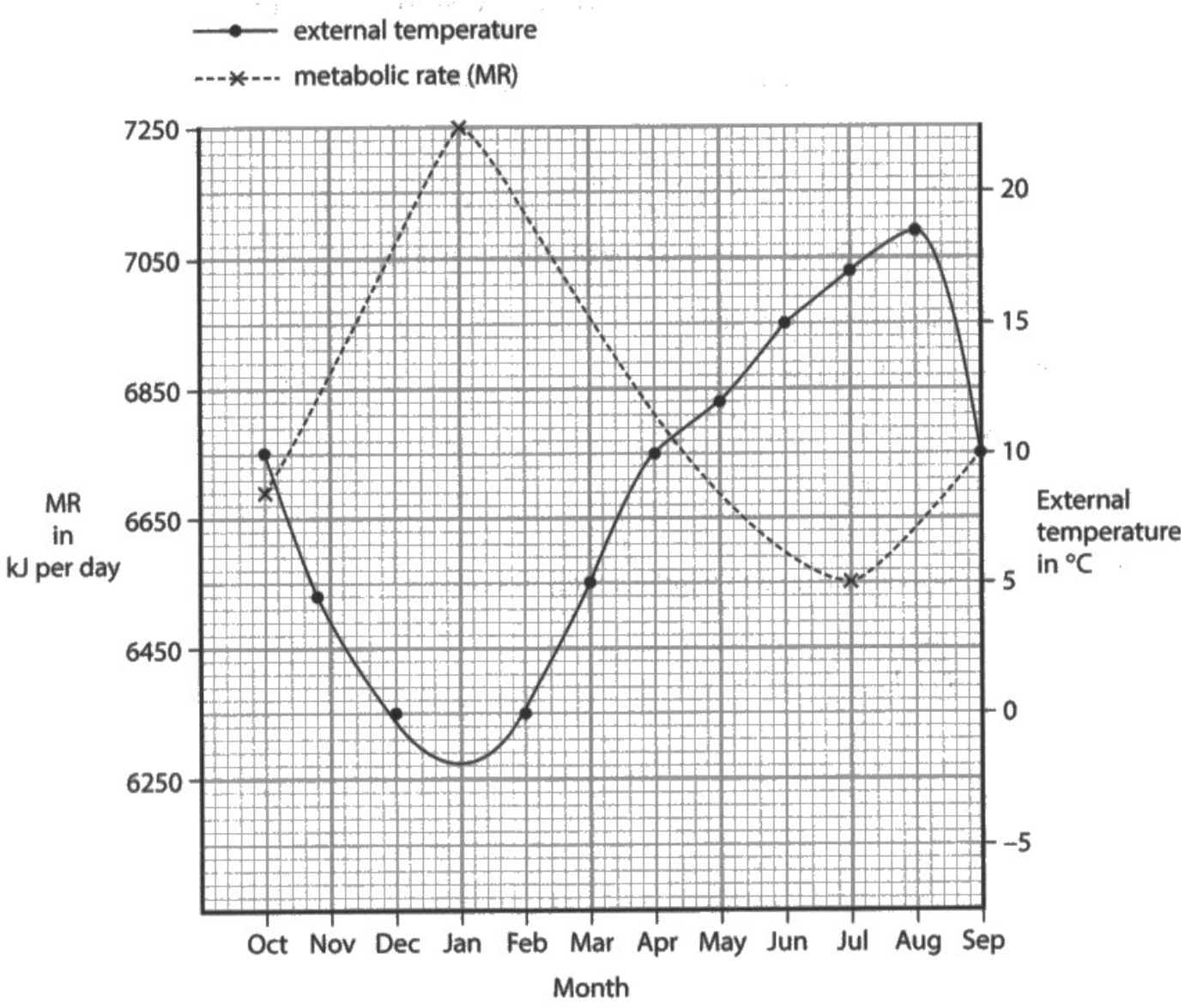
Question 4 (b)(i)

Candidates understanding of practical terminology was tested here as was their understanding of practical procedures and skills in analysis. A large proportion of candidates appeared familiar with the term reliability and answered the question well, giving a full description of how the investigation could be made more reliable. Repeat and mean/average provided candidates with a very easy way to secure two marks, although surprisingly there were a fair number that were unaware of this. This could possibly have been due to the topic being tested and the context that it was being tested in. It has not been presented in this way before. Several candidates stated that age or gender, amongst other suggestions, should be the same, missing the point of reliability and seemingly focussing on control variables.

Most candidates understood the meaning of the term reliability and were aware of how to improve aspects of the investigation in order to ensure this.

(b) An investigation was carried out to see how a person's metabolic rate (MR) and the external temperature change at different times in one year.

The graph shows the results of the investigation for one person.



(i) Describe how the investigation could be made more reliable.

(2)

Repeat experiment and calculate mean to spot anomalies.

Use wider ranges of external temperature (use ~~for~~ external temperatures above 20°C).

Use narrower intervals of time, measure metabolic rate each week instead ~~of~~ of each month.

ResultsPlus
Examiner Comments

This candidate was particularly detailed in their response but achieved two marks in the first line of their answer. Although some interesting alternatives to improve reliability were given these would have not solved the intended issue.

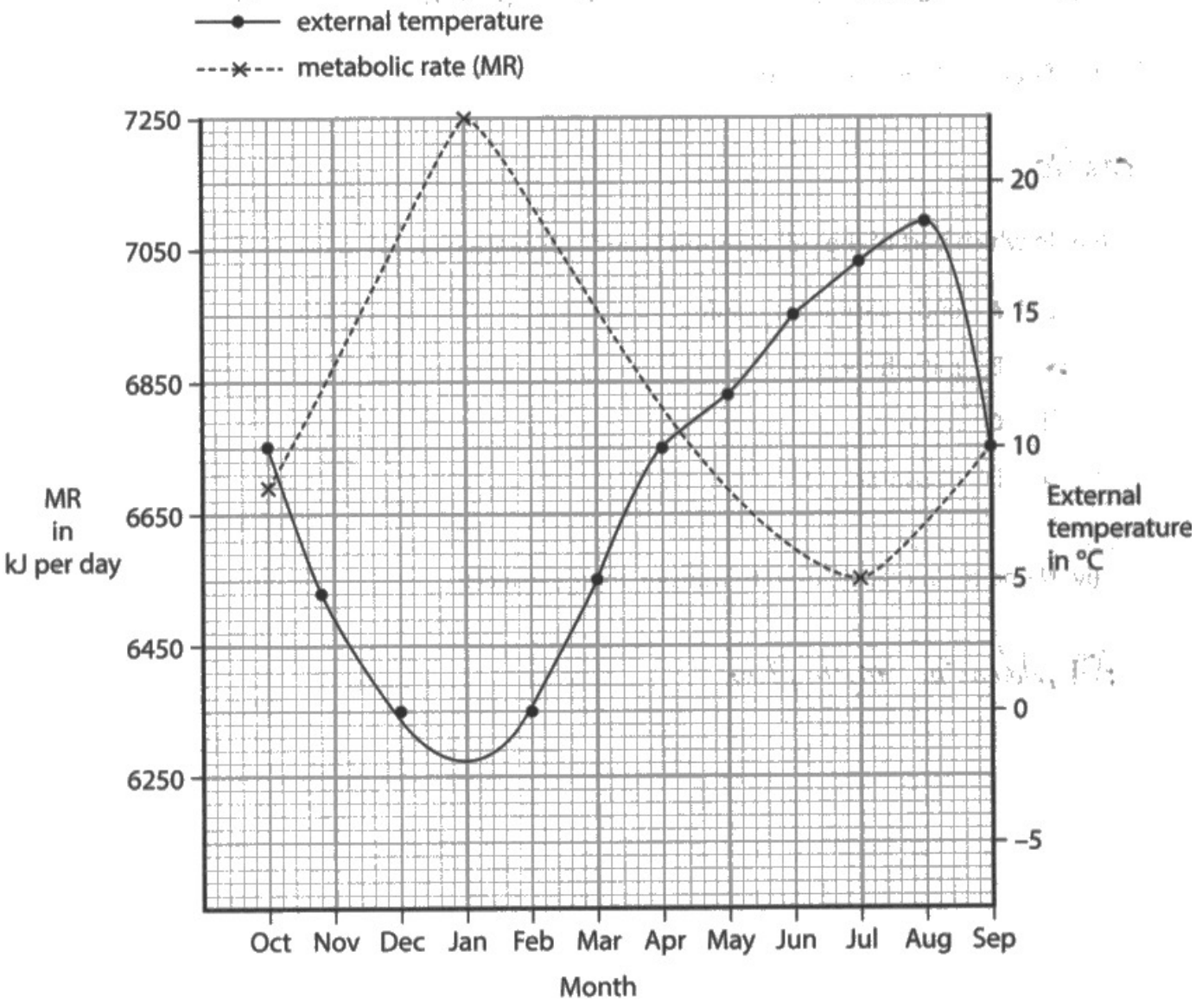
ResultsPlus
Examiner Tip

The terminology used in examinations will always be tested. It is important that you have an understanding of them and are able to apply this to exam questions.

There were several responses that seemed focussed on control variables. Some of these responses did achieve at least one mark although the inclusion of this extra detail implied a lack of understanding of what a control variable actually is.

(b) An investigation was carried out to see how a person's metabolic rate (MR) and the external temperature change at different times in one year.

The graph shows the results of the investigation for one person.



(i) Describe how the investigation could be made more reliable.

(2)

Same diet of the person. Same person with same age, mass, gender.
Repeating the experiment

ResultsPlus
Examiner Comments

One mark was obtained for this response which mentions to repeat the investigation. The remainder of the response gives control variables.

ResultsPlus
Examiner Tip

It is important to be able to differentiate between the different variables that are applied to investigations.

Question 4 (b)(ii)

Most candidates scored highly on this question with over 80% being awarded full marks. An ecf was applied to this questions and candidates scoring one mark were generally given this. An exceptionally small percentage of candidates failed to score.

The most common reason for candidates gaining an ecf mark was misreading values from the graph and using these in a calculation.

(ii) Determine the difference between the maximum metabolic rate and minimum metabolic rate.

(2)

Max = 7250 MR in kJ per day
min = 6350 MR in kJ per day.
7250 - 6350 = 900

difference = 900 kJ per day

ResultsPlus
Examiner Comments

Although this candidate has correctly identified the maximum metabolic rate they have not been able to determine the correct minimum metabolic rate from the graph. However they have used these in a calculation to arrive at a correct value from their calculation. One mark was awarded for ecf.

There were very few examples of candidates gaining one mark due to a miscalculation. One mark answers were most often gained due to an ecf.

(ii) Determine the difference between the maximum metabolic rate and minimum metabolic rate.

(2)

7250 - 6650

difference = 600 kJ per day

ResultsPlus
Examiner Comments

This candidate scored one mark as they have subtracted the correct figures which is the first marking point but for some reason has arrived at the wrong answer.

ResultsPlus
Examiner Tip

Where appropriate, use a calculator in examinations and do the calculation twice, using this to check that you have the right answer.

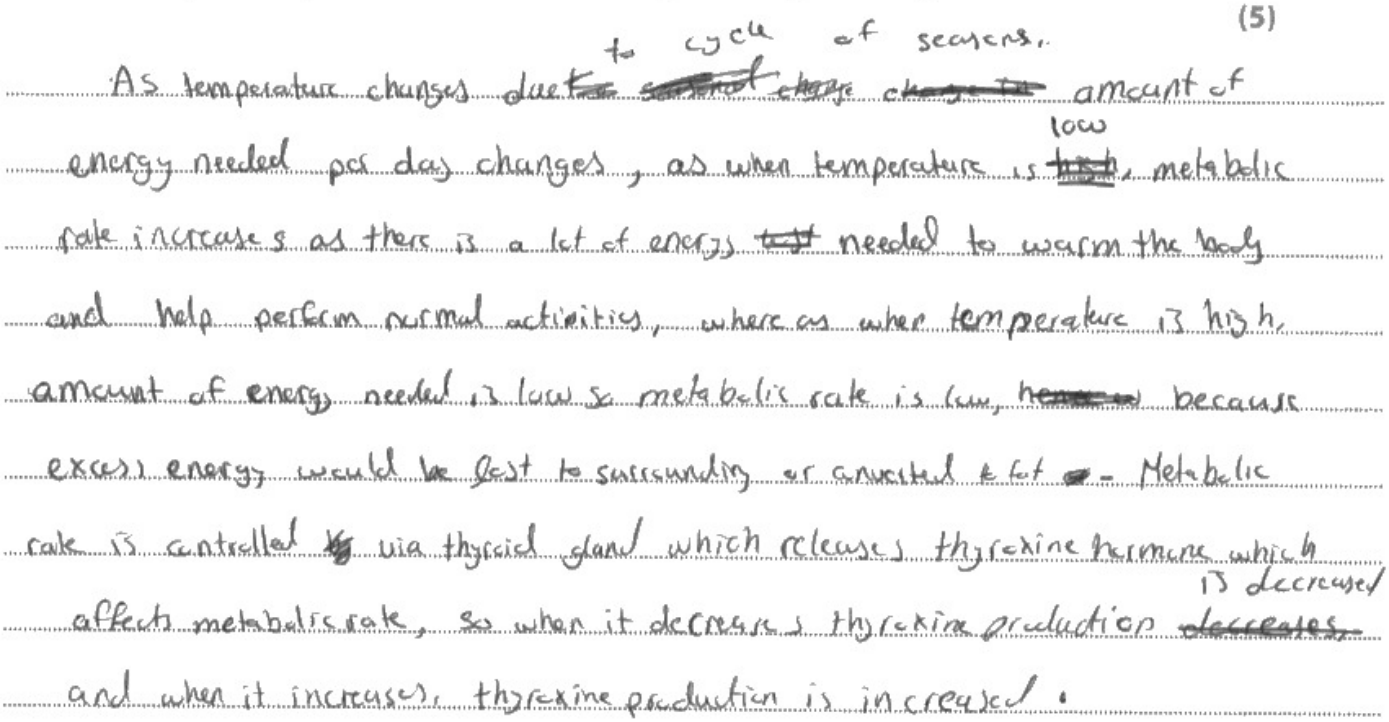
Question 4 (b)(iii)

This question demanded quite an in depth understanding of the term metabolic rate for candidates to be able to provide the necessary details to gain marks but many did this. There were some very detailed responses that included good information. However, there were an exceptionally few five mark answers. Some responses lacked clarity and confused information and some misread the graph to state that metabolic rate increases as temperature increases. This often meant that candidates struggled to explain why metabolic rate changed with temperature. There were several responses that tried to explain how metabolic rate was regulated by hormones rather than answering 'why' it changed. This cost candidates numerous marks. Similarly, many answers attempted to explain why metabolic rate changed with temperature by including information about enzymes and how they are affected by temperature. Again, these were not awarded.

Three mark answers were (marginally) the most common. These marks were often achieved by responses that covered marking points 1, 3 and 4 although some variations were seen.

(iii) Explain why the metabolic rate changes throughout the year.

(5)



ResultsPlus
Examiner Comments

The detail given in this response awarded the candidate three marks. They have correctly described how the metabolic rate changes with a decrease in temperature for one mark and stated that more energy is needed to warm the body for a further two marks.

ResultsPlus
Examiner Tip

Misreading information from a graph is a common error made by candidates in examinations. Make sure that you double-check what you first concluded when carrying out this type of analysis.

One mark answers occurred as frequently as responses awarded more or less marks with the exception of five mark responses which were rare.

(iii) Explain why the metabolic rate changes throughout the year.

(5)

The relationship between the external temperature and the metabolic rate is an inverse relationship as the temperature increases the metabolic reaction decreases and as temperature decreases the MR increases overall high temperature cause enzymes to work less and could cause enzymes to denature therefore high temperature causes a decrease in MR while lowering the temperature causes the enzyme to work better at a more suitable rate therefore cause the metabolic rate to increase at the optimum temperature the enzymes work best any more could cause enzymes to denature but a little bit less than the optimum could cause enzymes to have a low activity but they would still work.

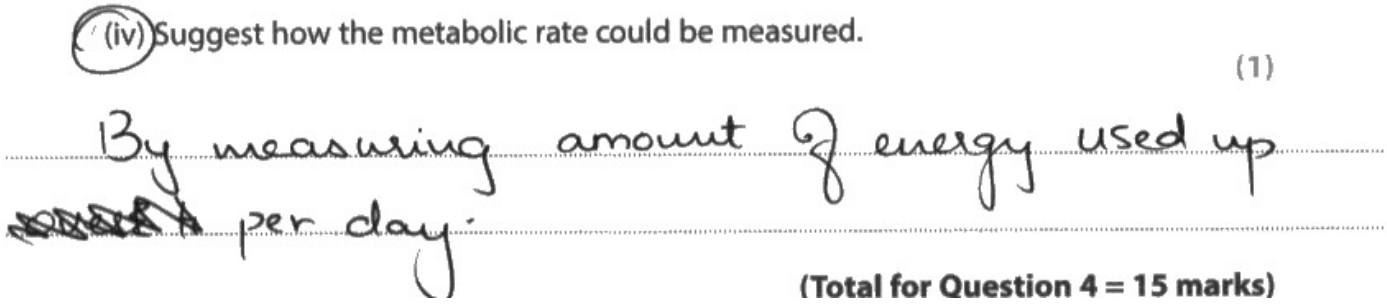
ResultsPlus
Examiner Comments

This candidate has written a fair amount of work although obtained just one mark for correctly identifying how the metabolic rate changes with an increase (or a decrease) in temperature. The remainder of the answer on enzymes was not awarded.

Question 4 (b)(iv)

Despite being just a one mark question candidates were significantly challenged by it. Only just over 7% of candidates achieved the mark. There were numerous answers that focussed on measuring heat or food and some candidates mentioned the use of a Smartwatch. Other responses stated that the amount of sweat produced could be measured and further incorrect answers included measuring pulse or heart rate.

The vast majority of candidates struggled to come up with ideas for this question and therefore the variation in answers, in an attempt to suggest how metabolic rate could be measured, was huge.


(iv) Suggest how the metabolic rate could be measured.

(1)

By measuring amount of energy used up per day.

(Total for Question 4 = 15 marks)

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Examiner Comments

This candidate made a reasonable guess at how metabolic rate could be measured although their idea would be difficult to put into place. This response did not gain a mark.

There were several suggestions of measuring the amount of energy used but this would not be a viable way to measure metabolic rate.

(iv) Suggest how the metabolic rate could be measured.

(1)

by amounts of energy used by a person
by a smart watch

ResultsPlus
Examiner Comments

The use of a smartwatch to measure the amount of energy used did not gain a mark.

One mark answers were rare but the most common was to measure the amount of carbon dioxide produced. Uptake of oxygen was less frequently seen as was the amount of glucose used.

(iv) Suggest how the metabolic rate could be measured.

(1)

- measure energy produced per hour
- measure carbon dioxide produced per hour

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Examiner Comments

This was one of the few responses that was awarded a mark for stating that metabolic rate could be measured by the amount of carbon dioxide produced.

Question 5 (a)

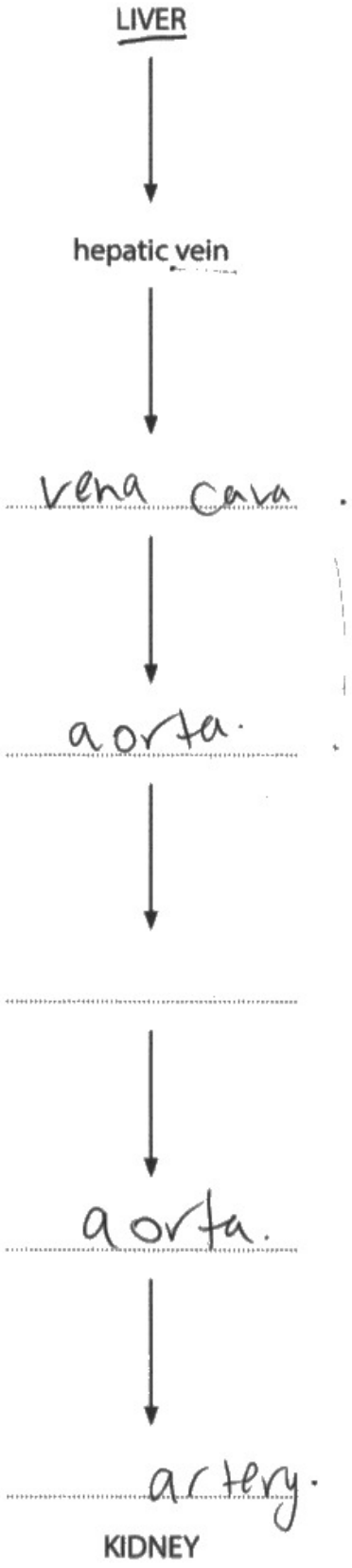
Assessment of responses for this question seemed almost to be an all or nothing situation. Candidates either gained full marks or zero with little in between. Less than 50% of responses gained full marks and there certainly seemed to be a lot of guesswork at play in responses scoring lower than four marks. This is clearly an unfamiliar area of the specification for candidates, some who even struggled to name blood vessels and so just left answer spaces blank. The order that vessels were placed in was completely random in some cases although some of these picked up a mark to two. Aorta was a popular choice for many candidates, some of whom used it more than once in their answer. Candidates were a little more familiar with the blood vessels associated with the kidney so the renal vein was seen fairly frequently and often placed correctly.

Some candidates were lucky in their guesswork and managed to score some marks by placing one or two of the vessels in their correct places on the flow diagram.

5 (a) A red blood cell travelling from the liver to the kidney passes through six different arteries and veins.

Complete the flow chart by naming these blood vessels in order. The first one has been done for you.

(5)



ResultsPlus
Examiner Comments

This candidate scored two marks for placing the vena cava in its correct position and also the aorta lower down in the diagram. This response was typical of many that used the aorta more than once.

ResultsPlus
Examiner Tip

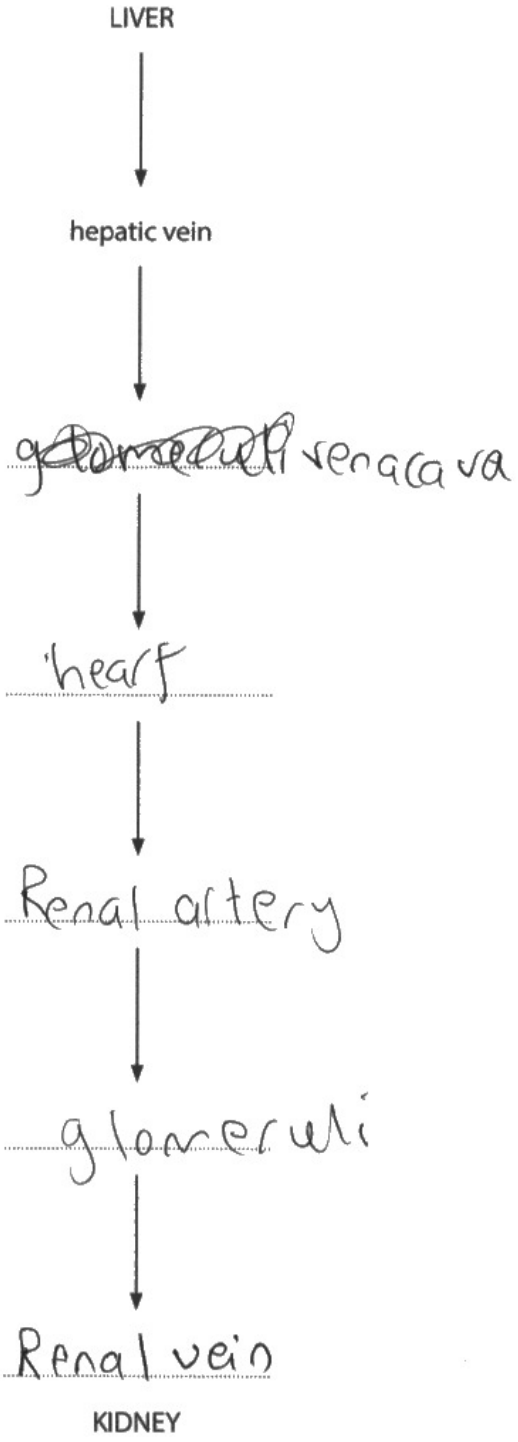
It is always best to guess than leave out answers in questions structured in this way. A good guess could gain a mark or two.

Vena cava was a popular first choice for many candidates who obtained one mark. Several candidates had trouble naming blood vessels so either left spaces blank or inserted random body structures onto the answer lines.

5 (a) A red blood cell travelling from the liver to the kidney passes through six different arteries and veins.

Complete the flow chart by naming these blood vessels in order. The first one has been done for you.

(5)



ResultsPlus
Examiner Comments

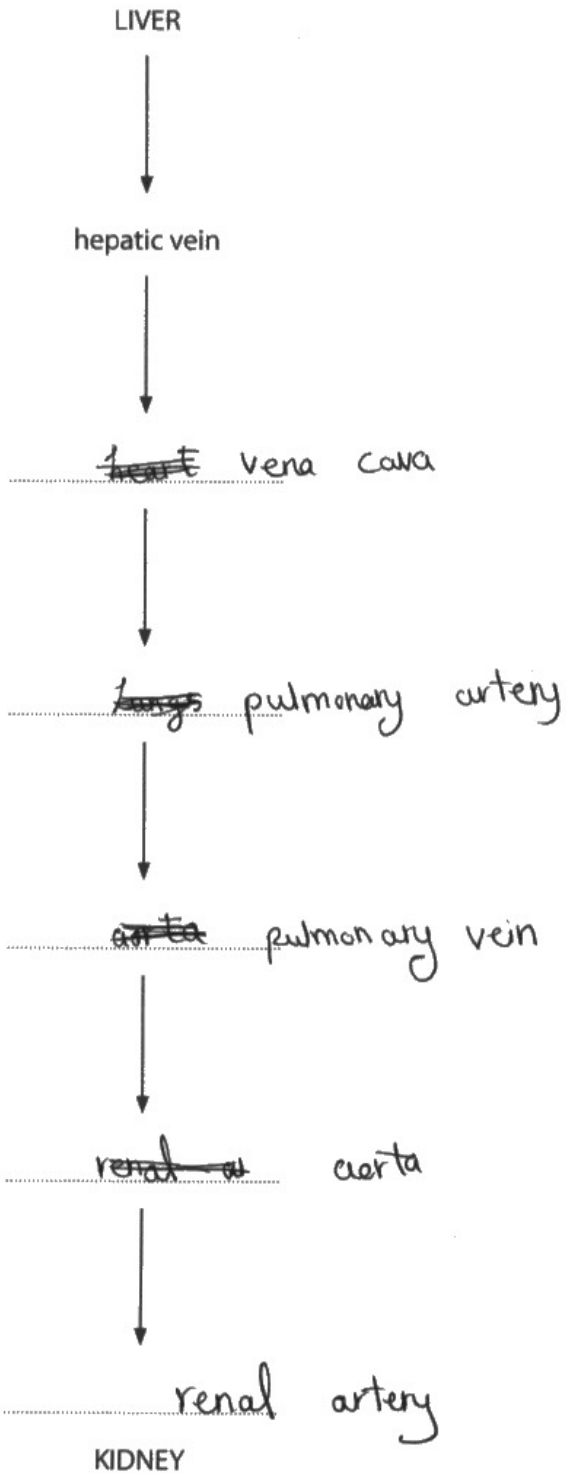
This candidate scored one mark for inserting vena cava in its correct place. The others were obviously not creditable.

Candidates working at grade 4 and above were mostly able to order the blood vessels correctly.

5 (a) A red blood cell travelling from the liver to the kidney passes through six different arteries and veins.

Complete the flow chart by naming these blood vessels in order. The first one has been done for you.

(5)



ResultsPlus
Examiner Comments

This response was awarded six marks for ordering the blood vessels correctly.

Question 5 (b)(i)

It was pleasing to see so many answers that secured good marks with the majority of candidates gaining the maximum. Many answers were clear, logically set out and comprehensive. Candidates were aware that the pulse rate increased as the time spent exercising increased and that the oxygen demand increased due to an increased rate of respiration. Some responses did not emphasise enough that 'more' of everything was needed as exercise continued; more oxygen/energy/glucose or greater blood flow/ increased rate of respiration and so on. There were many candidates that provided considerable detail of the pulse rate with each change in the gradient on the graph which was unnecessary. In doing this they failed to provide very little, if any explanation of why this happened. This cost marks. Very few candidates included information about waiting for the pulse rate to return to normal between each exercise so this marking point was not often awarded. Similarly, the removal of carbon dioxide or to reduce build-up of lactic acid were not seen often in answers and some candidates included more in depth information by adding Level 3 details such as the role of the SAN, again unnecessary. There were several descriptions rather than explanations of the graph which were not awarded.

More candidates scored four marks than any other mark. Responses were clearly written covering details that mostly included marking points 1, 3 and 4 although few of the better candidates also described how an increased blood flow helped to remove carbon dioxide.

(i) Explain the change in pulse rate recorded by the student.

(4)

as time spent exercising in seconds increases from 0 seconds to 100 seconds, pulse rate increases from 71·25 beats per minute to 140 beats per minute, as by more time, muscles contract more for longer time, so needs more energy for longer time, so heart rate kept increased for longer time, to pump more oxygenated blood and glucose to muscles for longer time for aerobic respiration, to release energy for muscles contractions and movement, so more Oxygen delievered to muscles for longer time, and more carbon dioxide produced for longer time, so heart rate also increases to remove it, so pressure exerted by blood on artries increases

ResultsPlus
Examiner Comments

This candidate began their response, as many did, by describing how the pulse rate increased as time spent exercising increased. This achieved the first marking point. They have also identified that more energy is needed and that the heart pumps more oxygenated blood. They have also included details about aerobic respiration and although they have not mentioned that the rate increased this was implied throughout the passage. This response also includes information about carbon dioxide being removed. This was a good four mark answer.

ResultsPlus
Examiner Tip

An 'explain' question will always mean that you will need to use your knowledge and understanding to include scientific detail in your answer.

The content of many two mark answers did not focus fully on explaining why the pulse rate changes. The information provided indicated, in most cases, a lack of understanding and in some cases a description was given rather than an explanation.

(i) Explain the change in pulse rate recorded by the student.

(4)

The pulse rate increases as more time is spent exercising; although not ~~as~~ at a steady rate. This is due to the body losing energy and adjusting to the situation. The pulse rate increases due to the heart pumping more blood throughout the ~~body~~ whole body to the organs to ~~help~~ function. The pulse rate reaches constant at the end due to the body being finally able to adjust.

ResultsPlus
Examiner Comments

This candidate gained one mark for stating that as the time spent exercising increased, so did the pulse rate. A further mark was obtained for the information given on the heart pumping more blood.

ResultsPlus
Examiner Tip

Graphs do not always focus on changes in pulse or heart rate during exercise. Breathing rate is also tested so it is good to understand why this changes during exercise too.

Marking points 1, 3 and 4 were the most commonly seen in responses although this varied, at times, with three mark responses where marking point 1 was omitted and replaced frequently with information that referred to increased blood flow.

(i) Explain the change in pulse rate recorded by the student.

(4)

In the first 20 seconds, pulse rate increases rapidly. In the following 70 seconds the rate of increase is reduced. After 90 seconds of exercising, the pulse rate in bet becomes constant at 140 bpm. So, it can be concluded that, upto 90 seconds, the pa pulse rate in beats per minute is directly proportional to the time spent exercising in seconds. This is because, the more time the student spends exercising the more energy he needs which requires greater rate of respiration which again requires increased gas exchange. As a result, pulse rate in bpm increases.

ResultsPlus
Examiner Comments

This candidate has the idea that the pulse rate increases as time spent exercising increases for marking point 1. The response also includes relevant details on energy demand and aerobic respiration. This answer received three marks in total.

ResultsPlus
Examiner Tip

When analysing data from graphs always ensure you study the graph carefully. Make sure you are confident that you have read the scales properly and understand what each axis is showing.

Candidates that were unsuccessful in their response and failed to gain marks still managed to talk around the topic being tested with some just barely missing a mark.

(i) Explain the change in pulse rate recorded by the student.

(4)

As we exercise heart beats get faster. As continuous ~~mom~~ movements are being made. Our body swifts from respiring aerobic ~~anarobic~~ to ~~respirg~~ respiring ~~aerobic~~ anarobically ~~respiration~~. This continues the pulse rate to be high.

ResultsPlus
Examiner Comments

This candidates response was not credited. Although they have mentioned aerobic respiration it is in the wrong context so cannot be awarded.

ResultsPlus
Examiner Tip

Read through responses to make sure they answer the question being asked.

Question 5 (b)(ii)

This question was designed to test candidates understanding of practical methods. Most candidates made a really good attempt at designing a method, many of which covered several marking points from the mark scheme. Although there was detail common to many candidates that was omitted, such as allowing the pulse rate to return to normal after exercise or taking a resting pulse, overall performance by candidates was good with most gaining at least four marks. Candidates showed a good awareness of control variables with age, gender and same exercise most frequently seen. Candidates working at the lower grades struggled to provide the detail needed to gain any more than three marks. Many of these responses were structured poorly and it was often the case that even starting an exercise was omitted from the information given.

Approximately one quarter of candidates managed to secure six marks in their answer. Answers were mostly set out in a logical stepwise pattern that highlighted key information clearly.

(ii) Describe how the student could carry out the investigation.

(6)

Get 10 studets, same body mass, age and gender. And measure their heart rate by placing the index and middle finger on carotid artery on neck and count number of impules felt by pulsations in 30 seconds then multiply by 2 to get heart rate per minute. Do this while students are at rest, and get mean of all of their heart rates for reliability. Make them excercise same intensity of excercise for some time ~~of 10 seconds~~ of 10 seconds then repeat procedure to measure their heart rate, ~~Repeat~~ then make them rest till heart rate is back to normal and make them excercise same type of excercise and intesity for 20 seconds and measure heart rate and get mean / record. Repeat the procedure but with 30s, 40s, 50s, 60s, 70s, 80s, 90s, 100s of excercise that should be same intensity. Measure time by stopwatch, control temperature by AC, humidity by humidifier you could measure heart rate by ECG, count number of peaks in trace in a minute. Remove anomalous results from mean for reliability. **(Total for Question 5 = 15 marks)**

Repeat with all 10 studets.

ResultsPlus
Examiner Comments

This response begins with describing control variables for marking point 7 and then continues to gain marking points 1 and 2 stating how the resting pulse rate can be measured. Marking points 3 and 6 are then covered with detailed information on the exercise carried out and then repeating. For the sixth mark, the candidate includes measuring the pulse rate after exercise.

In this case the candidate has used the term heart rate rather than pulse rate. This was deemed acceptable although not preferable.

ResultsPlus
Examiner Tip

When writing a practical method, there is no reason why this cannot be written in numbered steps. Sometimes this makes an answer to questions of this sort much more clear.

(ii) Describe how the student could carry out the investigation.

(6)

The student could gather
- 5 student - measuring resting heart rate
- compare resting heart rate
- Exercise for 5 minutes
- Measure Rised heart rate after
- compare and find the average
- Releat after a couple of days as heart rate could already be Rised for other reasons.

ResultsPlus
Examiner Comments

This four mark response was brief but the details provided were adequate in awarding marking points 1, 3, 4 and 6

Very small pieces of extra detail could have helped some candidates gain extra marks if they took time at the end of the examination to read through their work, particularly the extended answers.

(ii) Describe how the student could carry out the investigation.

(6)

Students can Carry Out this investigation by doing a excersise for 1 minute, such as a light jog. As soon as that is complete they measure the pulse per^10second by holding and ~~press~~ pressing on their wrist. This will calculate how the excersise effects the pulse in beats per ^0second. The person can place it on a ~~dotted~~ graph to show the increase rate of pulses after 1 minute.

ResultsPlus
Examiner Comments

The candidate describes how they carry out an exercise and measure the pulse rate. However, they begin to say how to measure pulse rate but have not said what they need to press on their wrist. The response was awarded two marks.

ResultsPlus
Examiner Tip

If there is time left at the end of the examination, use this to read through your work carefully and make any necessary changes. It is surprising the errors that you might spot that can easily be corrected.

Question 6 (a)(i)

It was evident that many candidates had a good grasp of this part of the syllabus and many responses gave excellent detail. Thorough understanding was demonstrated in responses that frequently covered all marking points and more, with further information provided, although not credited but generally correct, on transcription and translation. Many candidates gave comprehensive information on the different types of gene mutation through to how each affected the final protein made. The majority of candidates were awarded four marks for their responses, although many obtained at least two marks. There were a fair number of responses that failed to score. Candidates working at grade 3 or below struggled to link genetic mutation with sickle cell anaemia and, therefore, were unable to form an educated response that included key details.

The marking point most commonly missed by candidates described the effect of mutation on the sequencing of amino acids in a protein. Candidates also occasionally failed to mention that a mutation was a change in the base sequence of DNA or a gene.

6 Sickle cell anaemia is an inherited condition. It is caused by a mutation of the gene that controls the production of haemoglobin.

This condition is caused by a recessive allele.

(a) (i) Explain how a mutation can cause a condition such as sickle cell anaemia.

(4)

- due to random sudden change in the DNA base sequence of the gene coding for haemoglobin production, the faulty allele is recessive, so the mutation occur when the person has homozygous recessive alleles and not carrier
- so this cause change in sequence of amino acid in the polypeptide chain.
- so abnormal function and structure of haemoglobin cell

ResultsPlus
Examiner Comments

This response gives clear details that refer to a change in the base sequence of a gene for two marks. It goes on further to state later in the response that the mutation will cause a change in the amino acid sequence which gained another mark. This response was awarded three marks overall.

ResultsPlus
Examiner Tip

Remember that mutations do not always have a bad effect on an individual, particularly those that only affect one codon. It is always a good idea to have an understanding of why different types of mutations affect an individual in the way that they do.

Candidates working at lower grades mostly understood that a mutation affected the final protein made although missed out information on why this happened.

6 Sickle cell anaemia is an inherited condition. It is caused by a mutation of the gene that controls the production of haemoglobin.

This condition is caused by a recessive allele.

(a) (i) Explain how a mutation can cause a condition such as sickle cell anaemia.

(4)

- gene responsible for production of haemoglobin has mutation
- diffrenet protien is produced
- different blood cell with different charctristics are produced

ResultsPlus
Examiner Comments

This candidate scored one mark for stating that the mutation would result in a different protein which covered the final marking point. No other detail provided could be credited.

ResultsPlus
Examiner Tip

Always state in answers to questions linked to mutations that the base sequence of DNA is altered and that this changes the sequence of amino acids in some way.

Responses gaining four marks were thorough and usually provided more detail than was necessary for the marks.

6 Sickle cell anaemia is an inherited condition. It is caused by a mutation of the gene that controls the production of haemoglobin.

This condition is caused by a recessive allele.

(a) (i) Explain how a mutation can cause a condition such as sickle cell anaemia.

(4)

Mutation is a random spontaneous change in base sequence of a gene leading to a new allele formed of sickel cell anemia due to base substitution, so on transcription diffrent mRNA carries diffrent codon, so on translation diffrent tRNA carrying diffrent anticodon complementary to changed codon and carrying diffrent amino acids. So diffrent sequence of amino acids in proteins, so diffrent 3-D shape of protin leading to production of a functionless protein and causing change in phenotype as for sickel cell ~~anemia~~ anemia, Red blood cell becomes sickel in shape

ResultsPlus
Examiner Comments

The first two marking points are covered very early on in the response. The details given about mRNA and tRNA were unnecessary in this instance, although later in the passage the candidate discusses how a change in the sequence of amino acid alters the 3D shape of the final protein made. This is a strong four mark response.

ResultsPlus
Examiner Tip

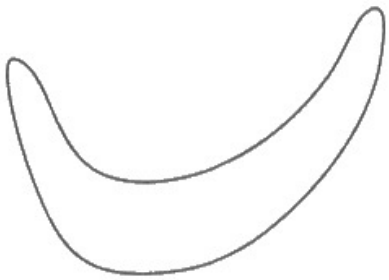
Some questions may ask you to identify the type of mutation that has occurred from a diagram. Make sure that you are able to describe this and how it will affect the final product.

Question 6 (a)(ii)

This question again gave candidates the opportunity to achieve a good score. The percentage of candidates scoring full marks, however, was greater than it was for Q06(a)(i) and the percentage of candidates failing to score significantly less. Some candidates had problems with describing the shape of the sickle cell and this was an aspect of the topic being tested that did not score particularly well. However, responses referred frequently to the implications of sickle cells on the body and gave some good detail in answers. This detail often included references to less oxygen but a fair number of candidates failed to link this to less aerobic respiration. Candidates tended to overlook the fact that a different type of haemoglobin was produced and there were infrequent mentions of a reduced surface area. It was quite common for candidates to mention that cells had a reduced surface area to volume ratio which implies some misunderstanding of this concept. Other candidates referred to anaerobic respiration in their answers due to a lack of oxygen which negated the respiration mark.

Responses from candidates who managed to obtain one mark tended to focus either on less oxygen being carried or made some referral to the changed shape of the cell.

(ii) In low oxygen concentrations the red blood cells of someone with sickle cell anaemia become like the cell shown in the diagram.



Explain why a person who has the sickle cell condition often feels tired.

(5)

the cell becomes less capable of carrying haemoglobin due to low surface area which binds with oxygen to ferry travel to the whole body and provides body with oxygen

ResultsPlus
Examiner Comments

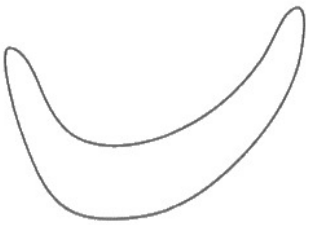
This candidate scored one mark for identifying that the sickle cell would have a reduced surface area. Although they have referred to oxygen the detail given is vague and does not imply strongly enough that less oxygen would be carried.

ResultsPlus
Examiner Tip

Quite often candidates mention a fact in an exam and then fail to elaborate. It is important to think about why, for example, a reduced surface area in red blood cells affects other body cells.

Marking point 2 was the most commonly missed marking point overall, even with candidates that scored top marks for their answer. Five mark answers came across fluently and included well-structured information.

(ii) In low oxygen concentrations the red blood cells of someone with sickle cell anaemia become like the cell shown in the diagram.



Explain why a person who has the sickle cell condition often feels tired.

(5)

Because sickle cells have small surface area that carries less oxygen to body cells ~~the they often sickle cells often~~ unlike biconcave red blood cells that have higher surface area. Sickle cells often stick together blocking capillaries, so reduces O_2 and blood supply to body cells and tissues. Less oxygen so less aerobic respiration and less energy released, increasing sense of fatigue.

ResultsPlus
Examiner Comments

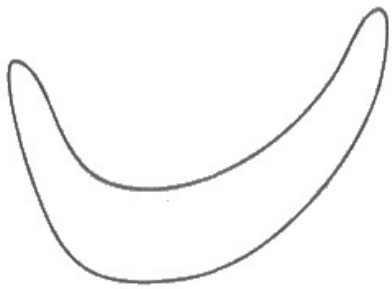
This is a good five mark response that identifies the sickle cell as having a reduced surface area. It mentions that this would result in less oxygen being carried and also describes how these cells block capillaries – information that was infrequently seen in other responses. Detail is given on the effects on aerobic respiration and energy release.

ResultsPlus
Examiner Tip

Make sure you know the difference between reduced surface area and surface area to volume ratio.

Most candidates recognised that the sickle cell would carry less oxygen and some would take this further to discuss the effect that this would have on body cells to make a person feel tired.

(ii) In low oxygen concentrations the red blood cells of someone with sickle cell anaemia become like the cell shown in the diagram.



Explain why a person who has the sickle cell condition often feels tired.

(5)

- as there is less space for oxygen to be carried by haemoglobine
- so less oxygen reaches body organs
- less aerobic respiration
- more anerobic respiration occurs
- laitic acid is produced
- denaturing enzymes

ResultsPlus
Examiner Comments

This response refers to anaerobic respiration which, in this case, was ignored. This was because the candidate clearly linked the effect of a lack of oxygen to aerobic respiration earlier in the response.

Question 6 (b)

Some candidates really struggled to express their biological knowledge for this question which unfortunately resulted in the majority of candidates receiving no marks. There were common errors in responses across the cohort, including those linked to genetic diagrams that some candidates used to help with their explanations. Most genetic diagrams tended to be in the form of Punnett squares which were mostly inadequately labelled and which left the child with sickle cell unidentified. It was often the case where candidates overlooked the fact that the woman had to be heterozygous with a genotype of Hh and many candidates failed to state that one recessive allele must come from the father. There were frequent diagrams and discussions that focussed on how sickle-cell was a sex-linked disorder. These did not achieve any marks at all.

Less able candidates often gave the genotype of the child with sickle cell anaemia or the genotypes of the man. They would very infrequently give details that implied a recessive allele was inherited from the man.

(b) A woman, heterozygous for sickle cell anaemia, and a man of unknown genotype for sickle cell anaemia have a child. The child is born with sickle cell anaemia.

Explain the possible genotypes of the man.

Use H to represent the allele for unaffected haemoglobin and h to represent the allele for sickle haemoglobin.

(4)

The man's genotype may be hh having ~~the disease~~ Condition the possibility of their child to have the condition is 0.5 which is generally high. He can also be Hh which gives a 1/4 possibility of the child having the condition.

ResultsPlus
Examiner Comments

This response gained one mark for identifying the possible genotypes of the man.

ResultsPlus
Examiner Tip

It is always important to understand what is expected of you in an exam. Command words such as explain and also the mark allocation are two aspects of a question that should always be fully understood. They can guide you in what is expected of you in an examination.

Diagrams or explanations that referred to sickle cell anaemia being sex-linked were not awarded.

(b) A woman, heterozygous for sickle cell anaemia, and a man of unknown genotype for sickle cell anaemia have a child. The child is born with sickle cell anaemia.

Explain the possible genotypes of the man.

Use H to represent the allele for unaffected haemoglobin and h to represent the allele for sickle haemoglobin.

(4)

- The man has the recessive allele $X^h Y$
parents genotype $X^h Y$ $X^H X^h$
gametes (h) (H) (h)
offspring genotype Hh hh
- The child born with sickle cell because they inherited the diseased X from both ~~Bare~~ parents.
- If the mother was the only one diseased, the born child wouldn't have inherited the condition, because it is a recessive allele

ResultsPlus
Examiner Comments

This candidate has shown sickle-cell anaemia carried on the sex chromosomes so failed to achieve a score. This is unfortunate as they have clearly referred to the genotype of the woman being Hh.

ResultsPlus
Examiner Tip

If a genetic disorder is sex-linked it will more often than not state that it is in the question. This is always the case if the disorder named in the question is not named in the specification. Otherwise, never assume that it is sex-linked.

It was quite often the case that candidates failed to identify the actual genotype of the woman as being Hh. Perhaps this was because the information given in the question stated that the woman was heterozygous for sickle cell anaemia. This cost a fair number of candidates a mark.

(b) A woman, heterozygous for sickle cell anaemia, and a man of unknown genotype for sickle cell anaemia have a child. The child is born with sickle cell anaemia.

Explain the possible genotypes of the man.

Use H to represent the allele for unaffected haemoglobin and h to represent the allele for sickle haemoglobin.

(4)

The man genotypes could be Hh or hh, so the child may have sickle cell anaemia, so that a recessive gene from the mother and one from the father the make homozygos recessive child

ResultsPlus
Examiner Comments

This is a three mark response. The candidate has identified the possible genotypes of the man and the child with sickle cell anaemia. They have also stated that one recessive allele is inherited from the man. No information has been provided on the woman's genotype.

ResultsPlus
Examiner Tip

It is always useful to draw a genetic diagram that clearly shows the genotypes of parents and children to support any written information. Diagrams, if correct, can help to gain marks.

Question 7 (a)(ii)

Very few candidates managed to score the full three marks for their response to this question. Most scored one mark. The part where decay occurred most often was frequently misidentified, with a variety of answers given from pulp to root. Numerous candidates just quoted molars. There were few responses that identified the tooth as having ridges or crevices and often the wording of responses for the final marking point was too vague to award.

Most candidates made an attempt at stating which part of the tooth was more prone to decay. It was not a marking point that was often missed but it was one which candidates frequently got wrong.

(ii) Explain where decay in the tooth is most likely to occur.

(3)

- molars
- as they have ridges so food can get stuck
- can't reach it by toothbrush

ResultsPlus Examiner Comments

This candidate achieved two out of the three marks available. They have identified that the tooth had ridges and that food becomes stuck in these. For the first marking point, it appears that the candidate has misread the question to ask what type of tooth is most likely to decay rather than what part of the tooth.

ResultsPlus Examiner Tip

Misreading a question will limit the amount of marks given to a response.

Some answers did correctly identify the part of the tooth that was more likely to decay than others but failed to provide any further creditable information.

(ii) Explain where decay in the tooth is most likely to occur.

(3)

Enamel as it is the outer layer of the tooth that cover all the Parts of the tooth that are exposed to the food and air. Also because the enamel is the hardest layer, so bacteria try to enter to the dentine from many Parts.

ResultsPlus
Examiner Comments

This one mark response identified enamel as the part of the tooth most likely to decay. The remainder of the response goes into vague detail that did not gain any further mark.

There were many responses that described how the tooth was hard to reach with a toothbrush which was not what was expected from the third marking point. This marking point specifically states that the trapped food would be harder to remove.

(ii) Explain where decay in the tooth is most likely to occur.

(3)

premolar and molars
Found at very back of jaw so hard
for toothbrush to reach them
They have many cervices so trapping
as larger surface area
more food remains, so higher propaibility
for decay by lactic acid

ResultsPlus
Examiner Comments

This is another example of a response that has not identified the part of the tooth more prone to decay but has instead given the type of tooth. This cost the candidate one mark. However, they have gained two marks overall. The first mark was given for stating that the tooth had crevices. The second mark was awarded for stating that food got trapped in these.

ResultsPlus
Examiner Tip

Similar questions tend to come up time and again in examinations. However, the response that you give to a similar question in a new examination may need to differ depending on how the question is worded. Take care to read all information very carefully.

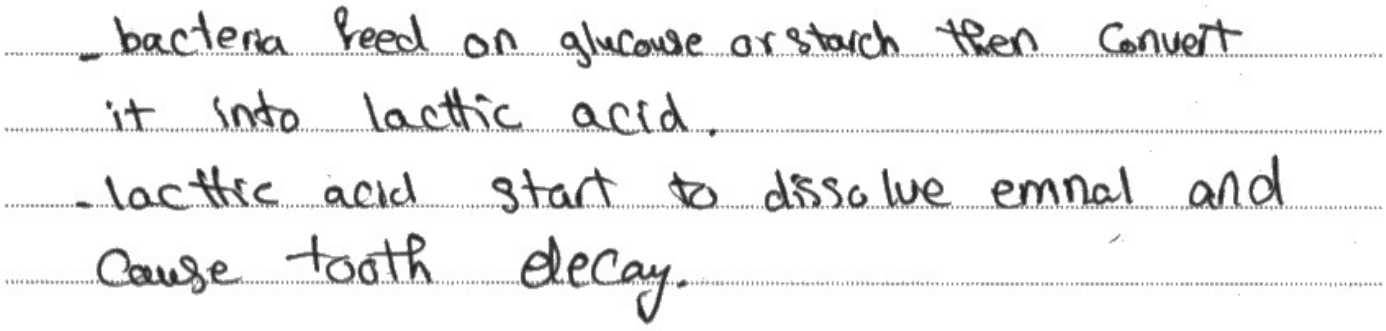
Question 7 (b)

Although this question was, on the whole, fairly well answered there was a fair spread of marks across the cohort. Most candidates appeared familiar with the process of tooth decay although some failed to go into specific detail that limited the marks awarded. It was rare to see details in candidate responses about aerobic respiration and how this is what bacteria used the food for, although a good number of candidates were aware that bacteria produced acid that dissolved enamel. There were several answers that included incorrect information about dental plaque itself producing the acid. Although nearly a third of candidates were awarded full marks, a fifth of the cohort failed to gain any.

Most candidates discussed how bacteria feed on food left in teeth and that enamel was dissolved by the acid they produced. In many instances candidates were naming the type of acid produced by the bacteria.

(b) Explain the role of bacteria in the process of tooth decay.

(4)



ResultsPlus Examiner Comments

This response gained three marks and missed out on the fourth for not including details about respiration. This candidate has described how bacteria feed on sugar and produce lactic acid which covers the first and third marking points and for the third mark has stated that the enamel is dissolved.

ResultsPlus Examiner Tip

Like animal cells bacteria in the mouth carry out aerobic respiration to survive. It would be a good idea to remember this information for future examinations.

Responses that gained four marks obviously covered all four marking points but some were more difficult to assess than others due to the way the response was structured. In most cases they were clear and concise, sometimes gaining the four marks in just a couple of well-constructed sentences.

(b) Explain the role of bacteria in the process of tooth decay.

(4)

bactera live in mouth and feed on food remains on teeth. bacteria Respire anaerobically and produce acid that dissolves enamel and dentine layer causing plaque then plaque moves to root of tooth where nerves are causing pain.

ResultsPlus
Examiner Comments

This response is very concise and covers all four marking points in the first three lines.

ResultsPlus
Examiner Tip

Remember that bacteria do not produce plaque and this should not be stated in an exam. Bacteria are found in plaque and so is the food that they use to respire.

Question 7 (c)

Nearly half of the candidates failed to gain a mark for their response to this question. Most went off track with their answers, stating that the baby needed to build up levels of calcium in its system before teeth could form or to help in the development of bones. There was little reference in responses to the fact that babies do not eat solid food and descriptions, at times, of how a baby only has a liquid diet were vague. Few candidates realised that teeth could hurt the mother although there was little suggestion of this in responses. Interestingly several candidates mentioned that the baby would hurt itself. Just under 4% of the cohort were able to achieve full marks so this question was clearly a challenge to candidates working below the very top grades.

There were many responses that referred to strengthening bones being a priority over teeth and that the calcium obtained for this to happen came from milk. Responses occasionally seemed to skim the surface of information that was needed for a marking point without actually hitting the point.

(c) Babies are usually born without teeth. The teeth develop many months after birth.

Explain why the teeth do not develop until many months after birth.

(3)

Because the babies only feed on milk so it doesn't need teeth yet and to strengthen the other important body bones first

ResultsPlus Examiner Comments

This candidate achieved one mark for describing how the baby only feeds on milk. Information has also been given on bones which was irrelevant to the question.

ResultsPlus Examiner Tip

There are some topics tested in such a way that you cannot revise for them. The questions testing these topics are really testing how deep your understanding of the topic is and whether you can apply your understanding in a range of different situations

There were a multitude of responses that gave the impression candidates had locked onto the idea that there was not enough calcium in the body of a baby and that it took time to build up levels before teeth could develop.

(c) Babies are usually born without teeth. The teeth develop many months after birth.

Explain why the teeth do not develop until many months after birth.

(3)

Teeth develops when babies receive adequate supply of calcium and vitamin D which can be provided by placenta and baby gets it after many months after birth. Moreover, the gums of infants are not strong enough to hold teeth

ResultsPlus
Examiner Comments

The information provided in the initial part of this response was seen in many responses. This candidate was not awarded any marks.

It was rare to see a three mark response. It was only the very top candidates that received this score.

(c) Babies are usually born without teeth. The teeth develop many months after birth.

Explain why the teeth do not develop until many months after birth.

(3)

* ~~to~~ AS babies don't eat any hard food only soft
* Also to not harm the mother ~~due to~~ during Breast feeding and not be to Painful
* Also babies only drink milk not eat so they doesn't need to crush, grind or bit food.

ResultsPlus
Examiner Comments

This response describes how babies do not eat solid food and expands on this statement later by stating that they don't need to grind or crush food. This information was credited with marking point 3. The candidate has recognised that teeth may hurt the mother for marking point 1 and finally for marking point 2 the response clearly states that babies only drink milk.

Question 7 (d)

There were many generalised responses for this question such as 'mouthwash kills bacteria' without stating which component of the mouthwash did this. There were also statements that mentioned both sodium fluoride and alcohol as well as the overall actions of mouthwash but then did not specify which component carried out which function. For example, 'contains sodium fluoride and alcohol that kills bacteria and strengthens enamel'. These were not awarded. Similarly, answers such as 'sodium fluoride strengthens teeth' were not awarded as enamel had not been specified. More able candidates gave more constructive answers which meant that just over one fifth of the cohort were able to gain full marks. However, it was disappointing that large percentages of the cohort were awarded zero marks.

The content of responses that received a mark for one mark answers varied. One of the most common was that alcohol kills bacteria although there were occasionally others that were creditable.

(d) Dentists recommend using a mouthwash morning and night to reduce dental decay.

One type of mouthwash contains alcohol and sodium fluoride.

Explain how this mouthwash could help to reduce dental decay.

(2)

fluoride reduce ~~the~~ neturlise the acidity of mouth that ~~ere~~result of bacteria o clean the teeth and keeps the teath and the gum healthy

ResultsPlus
Examiner Comments

Although the candidate has just mentioned fluoride rather than sodium fluoride this was not penalised. This response was given one mark for fluoride neutralises acidity.

ResultsPlus
Examiner Tip

Sometimes there is a clue in the question to help with your answer. Here, the question has purposely highlighted that mouthwash reduces dental decay and that it contains sodium fluoride and alcohol. If you understand how dental decay is caused then you might just be able to use the information given to figure out how sodium fluoride and alcohol might do this.

Many responses generalised information. Candidates were not specific in stating, for example, whether it was alcohol or sodium fluoride that killed bacteria.

(d) Dentists recommend using a mouthwash morning and night to reduce dental decay.

One type of mouthwash contains alcohol and sodium fluoride.

Explain how this mouthwash could help to reduce dental decay.

(2)

Removes bacteria in mouth as alchol and sodium fluoride could damage the bacteria and denature their respiratory enzymes so they don't respire and die, and could remove food remains bacteria don't have glucose to respire so don't respire and don't release lactate so enamel not dissolved and decay prevented

ResultsPlus
Examiner Comments

Although this candidate has stated that bacteria are killed they have not specified whether it is sodium fluoride or alcohol that causes this. The response was not given a mark.

ResultsPlus
Examiner Tip

Try to think a little deeper about what you write for an answer – if both sodium fluoride and alcohol killed bacteria then why add both of them to mouthwash? The two components must do different things to prevent tooth decay. This principle could apply to many different exam questions.

The few candidates that managed to score full marks tended to state, for the second marking point, that sodium fluoride strengthens enamel. Its function in neutralising acid came up infrequently in responses.

(d) Dentists recommend using a mouthwash morning and night to reduce dental decay.

One type of mouthwash contains alcohol and sodium fluoride.

Explain how this mouthwash could help to reduce dental decay.

(2)

alchol to kill bacteria in mouth and sodium floride is needed for strengthing the enamel.

ResultsPlus
Examiner Comments

This candidate received two marks for linking the correct component of mouthwash to its correct function.

Paper Summary

Based on their performance on this paper, candidates should:

- Remember their sentence structure and fluidity. There was lack of cohesiveness and clarity in some responses. Some candidates were unable to tie various aspects of the specification together to form a response that gained more than a mark or two, particularly in extended answer questions. Practice is needed in doing this so that candidates are able to bring together ideas that demonstrate their knowledge in their writing. Some responses lacked structure and were written in a fashion that led to confusion.
- Apply their knowledge. There were cases where candidates struggled to apply knowledge and understanding to unfamiliar contexts.
- Practice past papers, where possible, and focus on questions that require candidates to make links or to analyse data or to apply knowledge in very contextualised questions. Many candidates lost marks for not annotating their genetic diagrams fully and this has been an issue year upon year.
- Get as much practice as possible in mathematical areas so that their confidence in answering questions that expect these skills is sound. Many candidates lost a mark for not converting values into significant figures and it appeared that some were unsure of how to carry out this mathematical concept. Some candidates seemed to think that only the numbers after the decimal point in a value counted as significant figures whilst others had issues in rounding numbers.
- Read the question carefully. It was very evident that some candidates overlooked key parts of a question.
- Use scientific terminology. Some candidates failed to use this and some used it in the wrong context. Candidates could keep a glossary on key words for each topic covered and periodically revisit this and practice putting them into meaningful sentences.

Grade boundaries

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

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