

# Examiners' Report November 2012

## GCSE Biology 5BI1H 01

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## Introduction

This assessment is the fourth examination for B1 from the new specification and follows the same format as the other examinations. There is a series of six questions where the demand is increased within the question and throughout the paper. The first parts of each question should be accessed by all candidates. There are two 6-mark questions on the paper, which are designed to be accessed by all candidates at some level. The 6-mark questions are marked using a generic marking grid and spelling, grammar and clarity of writing are taken into account in these questions.

In this paper we are looking for a candidate's understanding of the Biology and also their ability to apply that knowledge to a number of different situations.

Candidates answering Q1 had a good understanding of the process of evolution and speciation, although many lost marks because they did not directly answer the question. It was pleasing to note that many candidates are now aware of how scientists validate their work with the use of journals and peer review.

Q2 was based on the nitrogen cycle and the effects of the overuse of fertilisers. Candidates had a good grasp of this subject and, in particular, of the process of eutrophication. Less well understood were the roles of soil bacteria in the nitrogen cycle, with many candidates confusing the different soil bacteria. A tip here is to make sure that the candidates are focusing on the question asked; this was very specific in asking about soil bacteria providing nitrates for the plants.

Q3 showed evidence of some good mathematical skills in calculating percentages and many candidates are now showing their working, which can gain them credit even if the answer calculated is incorrect. A good knowledge of the effect of alcohol on the body was shown, although several candidates did not pick up on the fact that we were looking for the long-term effects. The discussion question on organ transplants for alcoholics provoked some interesting responses. It is useful to note that, when discussing ethics, both sides of the argument should be expressed for full marks.

Q4 discriminated well between the grades, with more able candidates giving a full description of thermoregulation, while less able candidates gained some credit for their knowledge of the mechanism of sweating or the role of body hair in thermoregulation.

Q5 was very well answered, with many candidates comfortable with the genetics topic and confident in producing Punnett squares and percentage probabilities. Where this could be improved is by ensuring that they can explain these outcomes effectively, using the common genetic terms correctly. Candidates lost marks on the symptoms of cystic fibrosis; again this was due to not focusing on the question asked. This question was specific in asking about the reasons for weight loss in CF sufferers but many candidates focused on mucus in the lungs, which did not answer the question.

Q6 related to the roles of nerves and hormones in the human body. The treatments for diabetes were very well understood, with a large proportion of candidates gaining full marks for this question. For the reflex arc, most candidates were able to access this at some level and many were able to give a full description of the reflex arc, including the roles of synapses and the myelin sheath, which was commendable.

Emphasis should be focused on the fact that all questions should be accessible to all candidates at some level and so candidates should be encouraged to read and respond to the whole paper. Calculations should always have the working shown as credit can be gained for the working if it is correct. Finally, candidates may find it helpful to underline key words in the question to focus their thoughts on the actual question being asked rather than a broad outline of a topic.

## Question 1(a)(ii)

This question needed the candidate to relate a seen structure of the Pompeii worm to its ability to survive in extreme heat. The question was of a 'suggest' type so candidates were not expected to have studied Pompeii worms in detail but to have some knowledge of extreme environments, such as hydrothermal vents.

Candidates lost marks on this question by not being specific about the structures they could see and the adaptations that enable the worm to live in the hydrothermal vent. Although knowledge of the Pompeii worm was not expected, how an adaptation might benefit it was.

Suggest a feature that helps to protect the Pompeii worm from the extreme heat.

(1)

Being small in size.



**ResultsPlus**  
examiner comment

Note the candidate does not make reference to how this adaptation could benefit the Pompeii worm in extreme heat so no marks were awarded.

Suggest a feature that helps to protect the Pompeii worm from the extreme heat.

(1)

thick.  
its ~~off~~ outer layer of skin and the  
strands that come off of it.



**ResultsPlus**  
examiner comment

In this case the candidate has just managed to gain the mark as they have mentioned thick skin; this is enough for an adaptation for survival in a hydrothermal vent. Many candidates just put 'skin' or 'hair' but they needed to explain how this would have an effect for a mark.

Suggest a feature that helps to protect the Pompeii worm from the extreme heat.

(1)

no eyes and they use  
chemosynthesis.



**ResultsPlus**  
examiner comment

Although the candidate has managed to state some functions of the Pompeii worm, this is not what the question is asking. In this case, although it is good knowledge that the Pompeii worm uses chemosynthesis to gain nutrients, this does not explain an adaptation to extreme temperatures as asked for in the question.



**ResultsPlus**  
examiner tip

Ensure the candidate reads the question and highlights the appropriate information to ensure they remain focused on the question that is asked, and are not tempted to put down all they know about a subject without answering the question.

### Question 1(a)(iii)

This question is testing the 'How Science works' section of the qualification but it also directly relates to a specification statement and therefore should be required teaching. Candidates were split on this question between those who gained the marks readily and those who went off on a classification tangent. The responses below illustrate this point.

(iii) Pompeii worms were discovered by French marine biologists in the early 1980s.

Explain how these biologists may have validated the evidence for the discovery of the Pompeii worms.

(2)

The evidence could be validated by other scientists reading their work and repeating the experiments. From scientific journals, by peer-reviewing the work to check it was done to the highest standard, and by discussing and showing new evidence at scientific conferences.



**ResultsPlus**  
examiner comment

This candidate has accessed both marks successfully. They have referred to both the use of scientific journals to publish findings and the peer review process, which has earned them the marks. Marks could also be awarded for mentioning scientific conferences or even sending other scientists to corroborate the claims.

(iii) Pompeii worms were discovered by French marine biologists in the early 1980s.

Explain how these biologists may have validated the evidence for the discovery of the Pompeii worms.

They would of validated this by <sup>checking</sup> ~~checking~~ <sup>(2)</sup> the worm isnt a hybrid once they validate that they then have to find a class and what species, and kindom it would be in.



**ResultsPlus**  
examiner comment

This candidate, like many, got side-tracked onto the classification of an organism as a way of validating the evidence. This is not what the question was asking; the classification of an organism would not validate the discovery. As a result this candidate did not gain any marks on this question.



**ResultsPlus**  
examiner tip

Ensure when answering any question that the candidate responds to the actual question asked and does not rely upon the overall flow of the whole question to dictate their response.

## Question 1(b)(i)

Many candidates gave responses that showed understanding of the process of evolution but did not actually answer the question being asked.

(b) Variation in a population enables evolution to occur.

(i) Explain, using Darwin's theory of evolution, how variation can lead to a species evolving.

(2)

variation is differences in a species, this can make an ~~sp~~ organism adapt in different ways and passing genes on to their offspring, over time the species will evolve.



**ResultsPlus**  
examiner comment

Darwin's theory of evolution is outlined in detail in the specification and therefore candidates need to be able to relate this theory to a given question. This candidate has explained evolution in terms of the organism passing on genes to their offspring but it does not answer the whole question so only 1 mark can be awarded.



**ResultsPlus**  
examiner tip

Candidates need to ensure that they read the whole question and do not just focus on the first few words.

(b) Variation in a population enables evolution to occur.

(i) Explain, using Darwin's theory of evolution, how variation can lead to a species evolving.

(2)

Because everyone has different characteristics, species adapt to their environment, therefore it evolves.



**ResultsPlus**  
examiner comment

This candidate has given a vague response and so has not gained any of the marks available. The candidate also implies that the organism adapts to the environment; this is untrue – the organism may have characteristics that make it better adapted or less well adapted to an environment but it does not change its characteristics to the change in environment.

## Question 1(b)(ii)

The candidates who understood speciation answered this question well but many candidates still believe that this formation of a new species occurs spontaneously when an organism changes its environment. Candidates who extended this type of answer gained no marks for the idea.

(ii) Evolution can lead to speciation.  
Describe what is meant by the term **speciation**. (2)

specification is where a creature or animal has a specific feature that can adapt to their environment

(Total for Question 1 = 8 marks)



### ResultsPlus examiner comment

This candidate has implied that the animal can adapt to the environment they are in. This is untrue; animals have characteristics that make them more likely to survive in an environment but they do not grow extra legs because they are needed. No marks were awarded for this response.

(ii) Evolution can lead to speciation.  
Describe what is meant by the term **speciation**. (2)

Speciation occurs when a species becomes isolated (geographically) and develop advantageous characteristics to help them survive in their corresponding environment. Due to different environmental conditions and climates the species adapt differently and their offspring will be so different that they would not be able to interbreed.

(Total for Question 1 = 8 marks)



### ResultsPlus examiner comment

This candidate was aware that geographical isolation can lead to speciation and gained 1 mark for this. They also gained 1 mark for recognising that the organisms that develop into a new species are no longer able to breed with the original species. They did not get credited for 'develop advantageous characteristics' as this implies that this happened on entering the environment. We do not penalise candidates so the candidate still gained the 2 marks for the question.

## Question 2(a)(ii)

Candidates were generally very clear about how eutrophication occurs, although several did try to include the result of eutrophication, starting with the algal bloom and continuing. This was not credited with marks but it did not negate any marking points. Candidates do need to focus on the main thrust of the question and not get side-tracked into spending a lot of time answering the question they would like to have been asked.

(ii) Suggest how farming can lead to a build-up of nutrients in the lake.

(2)

Farming using too much fertiliser, which then gets washed away down to lakes and rivers can increase the build-up of nutrients in the lake.



**ResultsPlus**  
examiner comment

This answer gave the response required for both marking points. The overuse of fertiliser resulting in this washing into the water courses was credited.

(ii) Suggest how farming can lead to a build-up of nutrients in the lake.

(2)

Farmers use weed killers, which are often washed up by rain and then carried out to a lake/river, resulting in a build up of nutrients.



**ResultsPlus**  
examiner comment

The candidate gained the second mark here for the substances being washed into rivers etc but could not be given a mark for nutrients as this was in the stem of the question. We were looking specifically for the overuse of fertilisers or named fertilisers for the mark.

## Question 2(a)(iii)

Overall, candidates were able to recognise that plants grew more if they were provided with nitrates. There were a few instances where candidates referred to plants growing; this was not credited with the mark as plants grow anyway. A comparative was needed here to gain the mark. A mark was also given for the fact that plants make proteins for growth.

(ii) State the effects of nitrates on plant growth. (1)

~~As~~ Nitrates help living organisms build proteins



**ResultsPlus**  
examiner comment

The question specifically asked for the effect of nitrates on plant growth, which was that it was increased. We did allow this answer for a marking point as the candidate showed good biological knowledge that plants use nitrates to make proteins, which increases plant growth.

(iii) State the effects of nitrates on plant growth. (1)

they do not grow as well/healthy.



**ResultsPlus**  
examiner comment

Some candidates related nitrates to a reduction in plant growth but, while we accept that the **overuse** of nitrates can cause problems with plant growth, this was not the question asked so no marks were awarded here.

## Question 2(b)(i)

Candidates accessed this question well with the majority gaining 1 or 2 marks. The naming of the bacteria was clear but sometimes the action of these bacteria was misunderstood. The mark scheme requires the linking of the marking points so a candidate could only gain subsequent marks if they were linked with the information they had previously given.

(b) (i) Nitrates can be produced by soil bacteria.

Explain how soil bacteria produce nitrates.

(3)

The soil bacteria extracts nitrates from the air  
then breaks it down until nitrates are left  
the plants then take nitrates in for them to  
grow.



**ResultsPlus**

**examiner comment**

This candidate has misunderstood the nitrogen cycle and, in particular, the role of soil bacteria in producing nitrates for the plant. Please note that the question was specific in asking about soil bacteria in the production of nitrates. If a candidate mentioned denitrifying bacteria or lightning, they were not credited, although, equally, they were not penalised if they did include this information.

(b) (i) Nitrates can be produced by soil bacteria.

Explain how soil bacteria produce nitrates.

(3)

Nitrogen fixing bacteria turns atmospheric nitrogen into nitrates in the soil. Nitrifying bacteria turns ammonia into nitrate. Ammonia came from when decomposer bacteria turned decomposition of urea and dead and plant animal into bacteria.



**ResultsPlus**  
examiner comment

This is a clear response to the question, accessing all three marking points.

### Question 2(b)(ii)

Candidates often confused denitrifying and nitrifying bacteria and their roles. Nitrate fixing bacteria was also a common, incorrect response.

(ii) Name **one** type of bacteria that reduce the nitrate content of soil. *and then back into the air.*

*Nitrogen-fixing bacteria*

(Total for Question 2 = 8 marks)



**ResultsPlus**  
examiner comment

This is an incorrect response; the candidate has confused denitrifying bacteria and nitrogen fixing bacteria.

### Question 3(a)(ii)

Candidates had to recognise that height was a continuous variable; continuous data was acceptable. Some candidates tried to describe the graph and others confused continuous with discontinuous.

(ii) State the type of variation, shown in the graph, that results in a normal distribution curve. (1)

*Continuous*



**ResultsPlus**  
examiner comment

Correct answer for 1 mark.

(ii) State the type of variation, shown in the graph, that results in a normal distribution curve. (1)

*continuous discontinuous.*



**ResultsPlus**  
examiner comment

This candidate has confused continuous data and discontinuous. Height is continuous because it varies over a range. Something like eye colour or blood group would be discontinuous.

### Question 3(a)(iii)

This was a very simple percentage calculation, which was generally completed well. Please ensure that all working is shown, as a mark can be awarded for the correct procedure even with the incorrect outcome.

(iii) Calculate the percentage of people with a body temperature of 37.5 °C. (2)

60 people  
18 people

$$18 \div 3 = 6$$
$$6 \times 5 = 30$$

÷ 3, × 5

answer = 30%



**ResultsPlus**  
examiner comment

This is a clear response for 2 marks. Please note that the candidate has shown the working; this means that even if the calculation had not been done correctly the candidate could still have gained one of the 2 marks.

(iii) Calculate the percentage of people with a body temperature of 37.5 °C. (2)

answer = 11%



**ResultsPlus**  
examiner comment

This candidate could not gain credit for anything as the response is incorrect and no working is shown.

### Question 3(b)(i)

There was an even spread of marks for this question with a fairly large proportion of candidates gaining all 4 marks. Candidates need to be specific about heat loss and not just make vague references to thermoregulation for the marks.

(b) A person with a body temperature of  $37.9\text{ }^{\circ}\text{C}$  had a body temperature of  $37.5\text{ }^{\circ}\text{C}$  one hour later.

(i) Explain how thermoregulation causes this reduction in body temperature. (4)

it is possible they have sweated in that time, causing evaporation which cools ~~the~~ you down.



**ResultsPlus**  
examiner comment

This candidate scored 2 marks. They recognised that the body produces sweat and identified the method of heat loss, which is the evaporation of the sweat from the surface of the skin.



**ResultsPlus**  
examiner tip

Try to look at the marks awarded for the question and in the case of general questions, such as this one, remember that the marks are awarded on a point by point basis so here 4 points on cooling the body down are required for 4 marks.

(b) A person with a body temperature of  $37.9^{\circ}\text{C}$  had a body temperature of  $37.5^{\circ}\text{C}$  one hour later.

(i) Explain how thermoregulation causes this reduction in body temperature.

(4)

The body's sweat glands ~~produce~~ <sup>secrete</sup> sweat, the sweat then evaporates on the surface of the skin which cools down the skin. The blood vessels nearer to the skin's surface carries more blood through them, allowing the heat from the blood to leave the body through the skin which makes the skin warm, the skin is cooled down by sweat, the hairs on the body remain flat.



**ResultsPlus**  
examiner comment

This is an excellent, detailed response. This candidate gained all 4 marks.

(b) A person with a body temperature of  $37.9^{\circ}\text{C}$  had a body temperature of  $37.5^{\circ}\text{C}$  one hour later.

(i) Explain how thermoregulation causes this reduction in body temperature.

(4)

Thermoregulation causes reduction in the body temperature because when the body gets to hot something is released to cool down the blood cells.



**ResultsPlus**  
examiner comment

This candidate failed to gain any credit as the references are vague and no mechanism of heat loss is explained.

### Question 3(b)(ii)

For this question, candidates had to apply their knowledge of thermoregulation in relation to body temperature rise. Several candidates continued talking about how to reduce temperature, which did not gain any marks.

(ii) Explain how exercise can cause body temperature to increase. (2)

When a person exercises they move around more so the heart starts pumping blood around the body quicker and the heart rate increases.

(Total for Question 3 = 10 marks)



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examiner comment

Several candidates referred to the increased movement of blood but we were asking for muscle movement leading to heat being released by respiration. No marks were awarded for increased blood flow as this was not qualified by how this raises body temperature.

(ii) Explain how exercise can cause body temperature to increase. (2)

Friction can take place.  
The muscles work harder which causes the body temperature to rise.

(Total for Question 3 = 10 marks)



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examiner comment

This candidate gained both marks as they mentioned the muscles moving and related this to friction converting chemical energy to heat.

### Question 4(a)(ii)

Candidates often lost marks here due to the fact that they did not give the range of time when the defect was likely to occur from the data in the table.

### Question 4(b)(i)

Marking points 1 and 2 were most often awarded for the 'chemical' substance that 'had an effect on the body'. The majority of candidates achieved one mark here.

(b) (i) Alcohol is a drug.  
Define the term **drug**.

A drug is a chemical <sup>(2)</sup> substance that changes the way the body work or the how the brain thinks.



**ResultsPlus**  
examiner comment

This is a clear response, which addressed the first two marking points. A good answer.

(b) (i) Alcohol is a drug.  
Define the term **drug**.

a drug is a liquid or a solid that seriously hurts your body's functions which can cause serious problems <sup>(2)</sup>



**ResultsPlus**  
examiner comment

This candidate did not give a definition of the term 'drug' but went along the way of giving only adverse effects of drugs and therefore was not credited with a mark.

### Question 4(b)(ii)

Several candidates referred to the general effects of a depressant – making you sad – rather than the effects of depressants on the nervous system. Candidates often confused an increase in reaction times and a decrease in reaction times, causing them to lose marks, as they stated that alcohol decreases reaction times rather than increases. The better candidates were able to relate this to the action of alcohol on the neurotransmitters at the synapse.

### Question 4(c)(i)

This question was answered very well, with many candidates aware of cirrhosis of the liver, albeit with many different spellings of 'cirrhosis'. Those who were unable to come up with cirrhosis were still able to gain a mark for liver damage or brain damage.

(c) (i) Describe a long-term effect of alcohol abuse. (2)

A long term effect of alcohol abuse could be ~~liver~~ liver damage. This is because alcohol stop the liver from working.



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examiner comment

This is fine for 1 mark. To gain the second mark the candidate would have had to link this to a specific disease eg cirrhosis.

(c) (i) Describe a long-term effect of alcohol abuse. (2)

damage to the organs, extremely poorly or even death



**ResultsPlus**  
examiner comment

This candidate has not been specific enough in the response. The question asked for a description of a long-term effect and this answer is too vague.

## Question 4(c)(ii)

Ethics questions often elicit many different responses and, because of this, it is difficult to provide a tight mark scheme but candidates needed to have the idea of alcoholics causing their own liver failure and thus they may continue to damage a new organ if they have one implanted. They could also have gone down the route that alcoholism is a disease and therefore the alcoholic is a victim and should be entitled to the transplant. In a discussion-style question, the candidate should give both sides of the argument.

(ii) Discuss the ethics of allowing alcoholics to have an organ transplant.

(2)

All people should have the right to new organs but if the reason for needing the transplant was their own fault eg smoking and drinking then some people would argue that they will just do it again.

(Total for Question 4 = 10 marks)



**ResultsPlus**  
examiner comment

In this case, the candidate gave both sides of the argument, with everyone having a right to life but also noting that the organ failure was self-inflicted. 2 marks were awarded here.

## Question 5(a)(ii)

Many candidates saw the term cystic fibrosis and went on to describe the build-up of mucus in the lungs without reading the next, and most important, part of the question. Several candidates mentioned malnutrition as a symptom but did not describe how the malnutrition came about. Those candidates who did well usually mentioned the fact that enzymes were not able to be released from the pancreas and therefore the digestion of food was reduced.

(ii) Explain why a person with cystic fibrosis (CF) may lose body mass.

(2)

~~The~~ Because there is a lot of thick mucus blocking the air passages meaning that oxygen cannot ~~enter~~ enter the blood in its much quantities. This means your body will lose some weight.



**ResultsPlus**  
examiner comment

This was a common mistake made by candidates but the question specifically asks about a loss in body mass. In this case we wanted the information that cystic fibrosis does not only affect the lungs but also the digestive system, blocking the release of enzymes from the pancreas and causing reduced digestion and absorption.

(ii) Explain why a person with cystic fibrosis (CF) may lose body mass.

(2)

A person with cystic fibrosis won't be able to get all the nutrients they need because mucus ~~fills~~ fills up the digestive system which means the ~~food~~ in the intestines won't ~~get~~ be able to absorb the nutrients from the food.



**ResultsPlus**  
examiner comment

This candidate recognised the fact that mucus blocks the digestive system, reducing the amount of absorption through the intestine wall; 2 marks were awarded.

## Question 5(b)(i)

Candidates are now able to describe this term effectively: there were more references to alleles than to genes, which is creditable. Several candidates referred to carriers being heterozygous; they are, but this is not a definition of the term.

(i) State what is meant by the term **heterozygous**.

(1)

a carrier of cystic fibrosis not a  
subject



**ResultsPlus**

**examiner comment**

This was a common wrong answer; the question asks what the term heterozygous means, which is a person who has one dominant and one recessive allele for a specific characteristic. Although a carrier of a genetic disorder would be heterozygous, this is not a definition of the term.

(i) State what is meant by the term **heterozygous**.

(1)

The term heterozygous means when one  
allele is dominant and the other allele is recessive.



**ResultsPlus**

**examiner comment**

This is a correct response for the mark. Several candidates referred to genes instead of alleles and did not gain credit.

### **Question 5(c)**

Overall this question was answered well, with most candidates able to draw a correct Punnett square or genetic diagram. Frequently the description of the inheritance was less well answered and this put candidates into band 2 with a maximum of 4 marks. The question also asked for percentage outcomes, which were generally calculated correctly and explained. Common mistakes were references to genes instead of alleles, a mix-up with homozygous and heterozygous and, in some cases, candidates using letters for alleles that could not be interpreted as lower- or upper-case letters.

\* (c) Sickle cell disease is another genetic disorder caused by a recessive allele (d).

Explain the inheritance of sickle cell disease in a family with a heterozygous father and a homozygous recessive mother.

You should use a genetic diagram or Punnett square and percentage outcomes in addition to your explanation.

(6)

	S	s
S	Ss	sS
s	Ss	ss

Sufferer = 50%

Carrier = 50%

Neither = 0%

If the mother and father have 4 children it is very likely two will be carriers of sickle cell and the other two will be sufferers of sickle cell. It is impossible for to have a child together without sickle cell because the mother and father must have at least one dominant allele however the mother has two recessive. If the father was homozygous recessive all these children would have sickle cell, however if he was homozygous dominant all of these children would be carriers of sickle cell.



**ResultsPlus**  
examiner comment

This candidate answered the question fully and effectively. The Punnett square is clear and the letters easy to distinguish. Percentage outcomes are correctly allocated and the Punnett square explained in detail. The candidate gained all 6 marks here.



**ResultsPlus**  
examiner tip

Candidates should ensure that they address all parts of the 6-mark question in order to access all the marks.

\*c) Sickle cell disease is another genetic disorder caused by a recessive allele (**d**).

Explain the inheritance of sickle cell disease in a family with a heterozygous father and a homozygous recessive mother.

You should use a genetic diagram or Punnett square and percentage outcomes in addition to your explanation.

(6)

	D	d	
d	Dd	dd	= 50%
d	Dd	dd	1/2



**ResultsPlus**  
examiner comment

As the candidate did not answer the question, which was to explain the inheritance, they could only access mark band 1. 2 marks were awarded here for the correct Punnett square. The percentage outcome was also not explained so no credit could be given as we did not know what it referred to.

## Question 6(a)(ii)

(ii) Explain how Type 1 diabetes can be controlled.

Type 1 ~~be~~ diabetes can be controlled by eating<sup>(3)</sup> healthily or injecting insulin into the body. By injecting insulin the glucose level of the person will go down.



**ResultsPlus**  
examiner comment

This candidate explained the treatment for Type 1 diabetes effectively, with injection of insulin and also a healthy diet to control blood glucose levels, for full marks.

(ii) Explain how Type 1 diabetes can be controlled.

If someone has type 1 diabetes then this means that their body isn't producing enough glucose. By eating something sweet/sugary can rise their glucose level and they would have to control this by minding what they eat or drink. (3)



**ResultsPlus**  
examiner comment

This candidate had the misconception that diabetics need more glucose rather than controlling their glucose levels. They did go on to say that the glucose levels needed to be controlled so credit was given for this.

## Question 6(b)

This calculation was answered well but common errors were not putting the height into metres and also not squaring the height before doing the calculation. Candidates must get into the habit of showing their working as they can gain credit for correct calculations even if the answer is incorrect.

(b) Adrian is 180 cm tall and has a mass of 120 kg.

A person who has a high Body Mass Index (BMI) is more likely to develop Type 2 diabetes.

Calculate Adrian's BMI using the equation.

$$\text{BMI} = \frac{\text{mass in kilograms}}{(\text{height in metres})^2}$$

$$\text{bmi} = \frac{120}{1.8}$$

(2)

answer = 66.6666667



**ResultsPlus**  
examiner comment

This was a common error; the candidate did not square the height before doing the calculation. They did carry out their calculation correctly though and showed the working so 1 mark was awarded.

## Question 6(c)

Most candidates were able to access this question at some level, with a majority being able to name the neurones involved, but sometimes candidates muddled the order. The role of the synapse was well understood and several candidates were able to explain the role of the myelin sheath in insulating the impulse. Many candidates were also able to explain how impulses travel along neurones and the role of neurotransmitters across the synapse.

\* (c) Body movement is controlled by nerve impulses.

Explain how impulses are transmitted in a reflex arc to prevent a person from injuring themselves.

(6)

The ~~sensory~~ body has pricked its finger on a pin the sensory neurone carries it up the arm where it meets the synapse the electrical impulse is turned into a chemical which then travels over the synapse which then continues to the relay neuron it then meets a synapse again and the process is completed again it then moves to the motor neuron which travels down the arm to the effector. This happens so our body can tell us it hurts and we will stop before more pain.

(Total for Question 6 = 12 marks)

is made.

TOTAL FOR PAPER = 60 MARKS



**ResultsPlus**  
examiner comment

This is a good, clear response. The candidate included clear detail about the path of the reflex arc and also the role of the synapse. The method of travel along neurones as electrical signals was also given, putting the candidate into band 3. Spelling, grammar and the clarity of writing are good so 6 marks were awarded.

\*(c) Body movement is controlled by nerve impulses.

Explain how impulses are transmitted in a reflex arc to prevent a person from injuring themselves.

(6)

Nerve impulses are sent when for example you put your hand on a hot pan. The stimulus tells a number of other the neurones then a number of other components until it reaches the CNS - the central nervous system. It then goes to the motor neurone which proceeds to the relay neurone and finally reaches the effector which removes the hand away from the hot pan to prevent the person from further injuring the hand.

(Total for Question 6 = 12 marks)

S → N → CNS → R →

→ E  
TOTAL FOR PAPER = 60 MARKS



**ResultsPlus**  
examiner comment

This candidate has put in some detail about the reflex arc but some of this is muddled and out of order so this response goes into mark band 1. The answer is well written and spelling and grammar are correct so 2 marks are awarded.

## Summary

In order to improve their performance candidates should:

- read all the questions carefully and look for the key words in the questions to ensure they are answering the question being asked
- show all their working in mathematical questions to maximise their likelihood of gaining some credit
- attempt all questions throughout the paper; move on if there is a question they do not understand
- ensure they use a letter that looks very different in lower case and upper case to clearly show the gametes and offspring when completing genetic diagrams
- try to distinguish between alleles and genes: for each gene there are 2 alleles, which may be different (heterozygous) or the same (homozygous)
- use the number of marks awarded for the questions to focus the mind on the number of points that need to be made
- when asked to discuss a topic, ensure that at least two different points of view are made.

## Grade boundaries

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

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