

Examiners' Report  
March 2012

GCSE Biology 5BI1F 01

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March 2012

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## **Introduction**

This is the second time that this paper has been offered. It was generally seen that most candidates understood the drug abuse and disease areas rather than the survival techniques and variation topics.

Within this report are examples of where candidates have been successful and where candidates have answered with clear misconceptions / common errors that teachers should take note of when teaching their candidates in future series.

### Question 1 (a) (i)

A clear specification point that allowed candidates to use simple recall to access the marking point. Unfortunately this was rarely seen yet many variations of the mark scheme answer were acceptable.

1 Sickle cell disease is a genetic disorder caused by recessive alleles.

(a) (i) State the meaning of the word **allele**.

(1)

An allele is a different form of a gene



**ResultsPlus**

**Examiner Comments**

This is a clear lift from the specification point and was pleasing to see when witnessed. Candidates did not have to respond with the word "same" if the word "allele" was not pluralised.

The best answers stated "an allele is a different form of the same gene". This response scored one mark.

1 Sickle cell disease is a genetic disorder caused by recessive alleles.

(a) (i) State the meaning of the word **allele**.

(1)

~~where the~~ where the person is a carrier  
or has the disease



**ResultsPlus**

**Examiner Comments**

Unfortunately, this candidate has failed to recognise that an allele is a varied form of a gene that may cause a disease. A carrier is an invalid point to stress.

## Question 1 (a) (ii)

This question attempted to test the candidates knowledge on cytology and genetics. The candidates should know that, within the nucleus there are chromosomes and genes located on these chromosomes.

Many candidates stated that genes were found in chromosomes and this was credited.

Many candidates also stated that "genes were found in DNA" and again this was also permitted.

(ii) Human characteristics are coded for by genes.

Describe where genes are found inside a human cell.

(2)

genes are found in chromosomes, which are found in the nucleus.



**ResultsPlus**  
Examiner Comments

A very pleasing answer to see with both marking points provided by the candidate.

(ii) Human characteristics are coded for by genes.

Describe where genes are found inside a human cell.

(2)

Human genes are found in the blood which can be found on the inner part of your arm at the bend of the elbow.



**ResultsPlus**  
Examiner Comments

Many candidates responded by stating that genes are found in the blood, specifically the red blood cells. This is clearly not the case.

Specificity is the key for these types of questions.

This example scored no marks.

### Question 1 (b) (i)

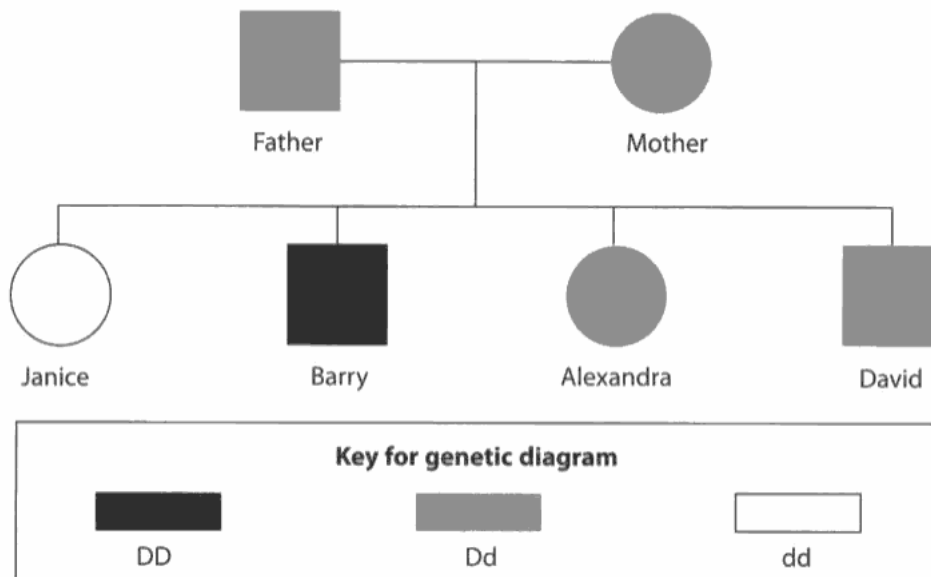
This question aimed to apply the knowledge of genetics and the inheritance of sickle cell disease.

Candidates were expected to recognise that sickle cell disease is caused by inheriting two recessive alleles and that, due to their heterozygous nature, both David and Alexandra were merely carriers for the disease.

Many candidates stated that David and Alexandra were carriers which was pleasing to see.

(b) The diagram shows a family pedigree for the inheritance of sickle cell disease.

The recessive allele for sickle cell disease is (**d**) and the dominant allele is (**D**).



(i) Explain why David and Alexandra do **not** show the symptoms of sickle cell disease.

(2)

because the mother & father were also not showing any symptoms of it either.

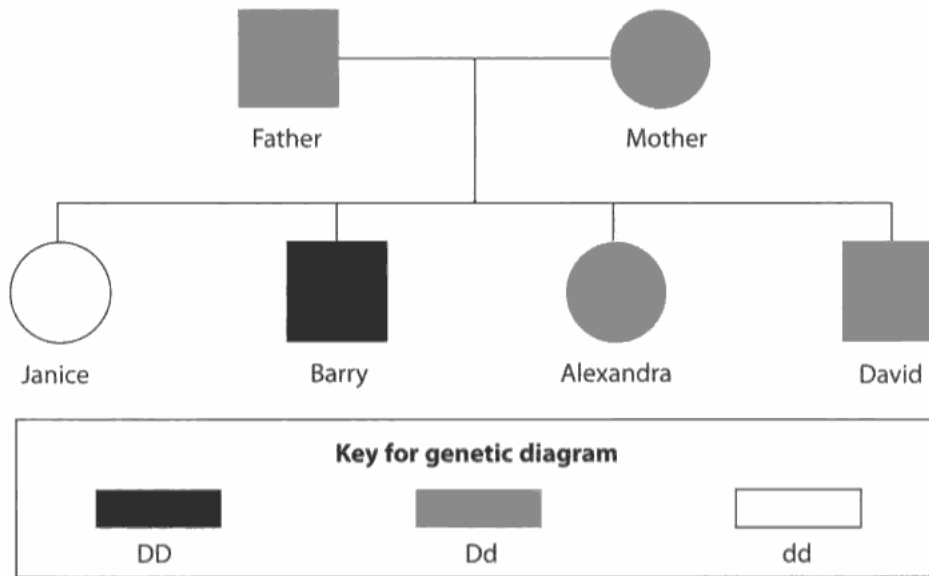


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Examiner Comments

This candidate was not clear enough when it came to stating that the parents and children (David and Alexandra) were the same genotype (heterozygous).

(b) The diagram shows a family pedigree for the inheritance of sickle cell disease.

The recessive allele for sickle cell disease is (**d**) and the dominant allele is (**D**).



(i) Explain why David and Alexandra do **not** show the symptoms of sickle cell disease.

(2)

because there allele is 'Dd'  
they are possibly carriers of  
sickle cell but not sufferers.



**ResultsPlus**  
Examiner Comments

This candidate was more successful with stating that the alleles are Dd (a skill of interpreting the genetic pedigree) and also that David and Alexandra were thus carriers. This scored two marks.

Many candidates failed to stress the genetic allelic combination required to suffer from the disorder.

## Question 1 (b) (ii)

This question was more challenging and asked the candidates to assess why no child could be born to the father and mother if one of them had the genotype DD.

Candidates were expected to recognise that, with the definite probability that any offspring would inherit at least one dominant allele, the offspring could only, at the very least, be a carrier for the disorder. No child could inherit two recessive alleles was another marking point that was not often seen.

(ii) Explain why there would be no children with sickle cell disease if one of the parents had the genotype DD.

(2)

because there won't be two recessive genes to have the disease.  
The other parent has two dominant alleles. If one of the parents have two dominant alleles then their children will have the same.

(Total for Question 1 = 8 marks)



### ResultsPlus Examiner Comments

This candidate has recognised that there will be no offspring that could inherit two recessive alleles.

Even though this candidate has stated that their children will be homozygous dominant, this could have been true if the student has assumed both parents are homozygous dominant so the mark was awarded.

This response scored two marks.

(ii) Explain why there would be no children with sickle cell disease if one of the parents had the genotype DD.

(2)

Because the dominant cell would take over the other recessive parents cell therefore the children would not be born with sickle cell.

(Total for Question 1 = 8 marks)



### ResultsPlus Examiner Comments

Unfortunately no marks could be awarded in this example due to the incorrect science with the use of the word "cell" instead of a genetic term such as allele or gene.

Candidates must be specific in their answers or they risk spoiling credible answers.



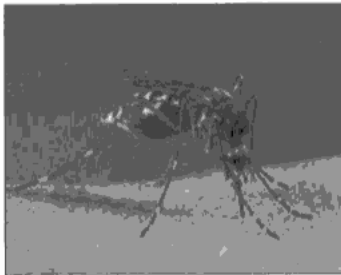
## Question 2 (a) (i)

This question aimed to test the students' recall skill within the context of disease. They were provided with a suitable photograph with a clue in the stem "carry the Plasmodium".

The statement "vector" in any variety was acceptable.

**Disease**

2 (a) The female mosquito can carry the *Plasmodium* protoctist.  
This protoctist causes malaria in humans.  
When the female mosquito breaks the skin of a person the *Plasmodium* is transferred into the blood of that person.



(i) State the name of this type of disease transmission. (1)

Animal vector



**ResultsPlus**  
Examiner Comments

This candidate has mentioned the word vector and has also extended this by stating what type of vector is being employed. A very skilled answer.

## Question 2 (a) (ii)

This question was aimed to test if the candidates knew the difference between vector transmission and the idea of parasitism.

The key words in the stem were "dependent" and "survival in". This should have led the candidates into the idea of organisms needing to live inside other organisms and to feed off of them.

(ii) The survival of the *Plasmodium* is dependent on living in the blood of another species.

This relationship is an example of

(1)

~~They are~~ mutualisms mutualism



**ResultsPlus**

**Examiner Comments**

Candidates were frequently using the word mutualism incorrectly here as they saw the stem reference two organisms. This was an incorrect answer.

(ii) The survival of the *Plasmodium* is dependent on living in the blood of another species.

This relationship is an example of

(1)

~~Parasitism~~ Parasitism



**ResultsPlus**

**Examiner Comments**

This was a common answer. This candidate has clearly made the connection between "another" species and the dependency of the Plasmodium.

## Question 2 (b)

This question aimed to test the candidates knowledge of disease transfer using the Dysentery organisms and the housefly as transmission.

Many candidates stated that houseflies were laying eggs on a surface which was not rewardable.

(b) The housefly can also carry disease causing organisms.

Describe how the housefly spreads disease.

(2)

by landing on your food  
Leaving micro organisms on your food  
~~from~~ from what ever they stood on  
before then you consume the food



**ResultsPlus**  
Examiner Comments

This candidate has made the link between the housefly leaving microorganisms on a surface that has been landed upon and that the transfer of these microorganisms is by the consumption of the contaminated food source.

A pleasing answer scoring the maximum marks available.

(b) The housefly can also carry disease causing organisms.

Describe how the housefly spreads disease.

(2)

it lays it egg and the egg stay when  
~~the~~ the eggs hatch they break through your  
skin.



**ResultsPlus**  
Examiner Comments

Here we see an example of a common misconception from candidates that the housefly will be laying eggs upon a surface or that the housefly will be able to penetrate the human dermis. This is incorrect and the response scored no marks.

## Question 2 (c) (i)

The question here was to direct the candidates into stating one of the main physical barriers to disease that a human possesses. The skin was the most popular correct answer provided, however cilia, mucus, nasal hair and eye lashes were also perfectly acceptable.

Common incorrect answers were stressing the importance of the blood system / immune system.

(c) (i) State **one** physical barrier, in the human body, that helps prevent disease.

(1)

Red blood cells



**ResultsPlus**

**Examiner Comments**

A common answer displaying the common error of stating that the blood system being a physical barrier.

(c) (i) State **one** physical barrier, in the human body, that helps prevent disease.

(1)

one physical barrier is the skin



**ResultsPlus**

**Examiner Comments**

This is a pleasing answer scoring one mark.

## Question 2 (c) (ii)

Question 2 (c) (ii) asked candidates to extend their ideas of barriers to disease and stipulate a chemical barrier with its location. The most popular correct answer seen was stomach acid. Hydrochloric was not required.

(ii) Describe **one** chemical barrier, in the human body, that helps prevent disease.

(2)

The white blood cells prevent disease by fighting off the disease like a little army.



**ResultsPlus**  
Examiner Comments

Once again, a common misconception was that the immune system played a role in the chemical defence of one's body. This was not a credit worthy response.

(ii) Describe **one** chemical barrier, in the human body, that helps prevent disease.

(2)

lysozyme - a chemical in your tears. ~~that~~



**ResultsPlus**  
Examiner Comments

This was another example of a marking point that was seen on a number of occasions. The lysozyme chemical in tears is a perfectly acceptable alternative to stomach acid. Many only scored one mark if they proceeded down this path for stating "tears" or "lysozyme" alone. It was unfortunate they could not go that one step further.

This example scored two marks.

## Question 3 (a) (ii)

Many candidates were able to access both marking points here, merely for stating the answer 8 cm per year; but it is always advisable for candidates to show their calculations fully.

Many candidates were able to calculate the difference between 163 and 99; then used this as the answer.

### Question 3 (a) (iii)

Candidates found the analysis and interpretation of data in a table challenging. The ideal answer would be a comment that the calcium intake whilst in infancy did not affect the height of a 10 year old, yet had an effect between these years up to age 18.

Any correct manipulation of data was credited.

Many candidates merely stated there is an increase in height due to an increase in calcium intake; which is true but a very simple statement.

(iii) Describe the effect of the mass of calcium in the diet of a baby on their height at the age of 10 and 18. (3)

The more ~~you feed~~ calcium you feed your child, the taller it'll be when it's older. The heights are close together at 10 years but on the 18 years results they vary from 156 to 194! 10's lowest is 96 but it <sup>only</sup> goes up to 100.



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Examiner Comments

This candidate has scored the full three marks. They have stated the general point that "the more calcium, the taller one is". However they have also accessed the marking point that states that there is very little variation in heights in the 10 year olds, yet at age 18 there was a large variation.

This also highlights how students will explain their answer in a multitude of ways and be awarded marks.

(iii) Describe the effect of the mass of calcium in the diet of a baby on their height at the age of 10 and 18. (3)

The more calcium in the baby diet from age 10 to age 18 the more you ~~will grow~~ <sup>are likely</sup> to grow.



**ResultsPlus**  
Examiner Comments

Here is an example of where a candidate has only analysed the overall trend in the data provided in the data.

This response scored one mark.

### Question 3 (a) (iv)

Candidates must remember that the answer being sought will not merely feature in the stem of the question; many candidates were stating "genetic variation" as their answer.

(iv) Height can be illustrated by a normal distribution curve.

Give the name of this type of variation.

(1)

genetic



**ResultsPlus**  
Examiner Comments

An example of a candidate who has used the stem of the question in the hope of securing the mark.

No marks were awarded.

### Question 3 (b)

This question, surprisingly, was found challenging by many candidates. This may possibly be due to candidates misreading the question. One mark was awarded for stating genetic variation is due to mutations or changes in the DNA of an individual. The other marking point was for the idea of "independent segregation of homologous chromosomes" - we were not expecting candidates to write this, but the idea of inheritance from both parents was worthy.

(b) Height can be due to environmental and genetic variations.

State **two** causes of genetic variation. (2)

1. the parents Alleles

2. And the genes



**ResultsPlus**  
Examiner Comments

Although this candidate has mentioned "parents alleles" they have not gone on to state that the cause of genetic variation is the inheritance / mixing of these alleles.



**ResultsPlus**  
Examiner Tip

Be specific in your answers.

(b) Height can be due to environmental and genetic variations.

State **two** causes of genetic variation. (2)

1. hight of mother and father that you could inherit the hight of them

2.



**ResultsPlus**  
Examiner Comments

This candidate gained one mark for stating that height (an unnecessary connection) was caused by the inheritance from both parents. A clear understanding of the need for a mixing of genetic material.



## Question 4 (a) (ii)

The question was designed to illicit a response that went further than "there has been an increase in deaths". This was the most common point that was seen. Candidates were expected to state the trend between 1993 and 2009, stating increases, decreases and static sections.

Dates were also required for credible answers.

(ii) Describe the trend shown for alcohol-related deaths in the age range 35–54 years.

(2)

On average the trend that they show goes up every year



**ResultsPlus**  
Examiner Comments

This is an example where a response has only gone as far as stating the overall trend in the data. Candidates should have been aware of the number of marking points available. One mark was awarded.

The question did not ask for the "general" trend.

(ii) Describe the trend shown for alcohol-related deaths in the age range 35–54 years.

(2)

from 1991 the death<sup>rose</sup> slowly till 1994 then rapidly increased till 2003 and has roughly been the same till 2009.



**ResultsPlus**  
Examiner Comments

In this example the candidate has approached the question well with comments on an increase after a certain year and then qualified marking point 3 by stating that the death rate did not rise after 2003 to 2009.

A well answered example scoring two marks.

### Question 4 (a) (iii)

Candidates were asked to suggest a reason why the death rate declined in a certain age range. Many answered this questions well, with common answers suggesting that individuals had become more aware of the dangers of drinking. Just stating "they have stopped drinking" was not acceptable; a reason was required.

(iii) Suggest **one** reason for the reduction in alcohol-related deaths between 2008 and 2009 for 55–74 year olds.

(1)

Because they were all dead



**ResultsPlus**  
Examiner Comments

This is an example that cannot be credited. The candidate has turned around the stem of the question but this is not sufficient for a mark.

(iii) Suggest **one** reason for the reduction in alcohol-related deaths between 2008 and 2009 for 55–74 year olds.

(1)

Because They were the people who use to drink a lot and they now realise the damage that it can do



**ResultsPlus**  
Examiner Comments

In this example, the candidate has stated a clear fact as to why alcohol related deaths have declined. They have made the link between the realisation of drink related dangers.

### Question 4 (b)

This was answered well, with over half the candidates scoring at least one mark of the two available. A common error was stating pancreas as an organ most affected; this may be because candidates have learnt the topic of diabetes and remembered this was an organ.

(b) State the **two** organs in the body most affected by long term alcohol abuse. (2)

1 Liver

2 Brain



**ResultsPlus**  
Examiner Comments

Clearly and simply answered here.

(b) State the **two** organs in the body most affected by long term alcohol abuse. (2)

1 liver

2 bladder



**ResultsPlus**  
Examiner Comments

Candidates provided a range of organs and rather than credit any organ, it was strictly adhered to just the two main organs affected. This example scored one mark for liver.

## Question 4 (c)

(c) Explain the effect that alcohol has on the speed of reactions.

(2)

The speed of reactions will decrease  
~~after~~ after drinking ~~after~~ alcohol as the  
alcohol is a depressant and that slows your  
speed of reaction



**ResultsPlus**  
Examiner Comments

This candidate has clearly understood that alcohol will cause a decrease in the speed of reactions in the human body and also related this with the fact that alcohol is a depressant drug. It was a rare occurrence to see the idea that impulses were slowed in the nervous system.

## Question 4 (d)

Another suggest command word that allowed candidates to express the more ethical issues surrounding alcoholism. Many were able to state that alcoholics would not feel the need / want to drink alcohol if the active purpose was removed. For full marks the answer then needed to state the outcome of this reduction in consumption of alcohol.

(d) A drug has been developed which blocks the 'feel good' effects of drinking alcohol.

Suggest why this may be beneficial to people with alcoholism.

(2)

Because they may want to stop drinking  
as they are aware of the damage, and the reason  
they drink is for the feeling they get out of it but  
with out the feeling they will realise that it is pointless.



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Examiner Comments

"They will realise it is pointless" was regarded here as the "want" to not drink anymore was stipulated. Candidates were able to state the answer in many ways and this is reflected in the mark scheme being easily applied to a variety of answers.

## Question 4 (e)

Candidates were expected to give their own views on the issues of organ transplantations and alcoholics. The ideas of "future damage" were shown, as were the views that "alcoholics should be the last on the list" for organ transplants.

(e) Suggest **one** reason why some people disagree with alcoholics being given organ transplants.

because they get themselves like it & it is their <sup>(1)</sup>  
fault for ending up in the state that they are in.



**ResultsPlus**  
Examiner Comments

Here is a clear example of a candidate stating that due to the abuse of alcohol it would seem unfair that they receive a new organ due to self-inflicted damage.

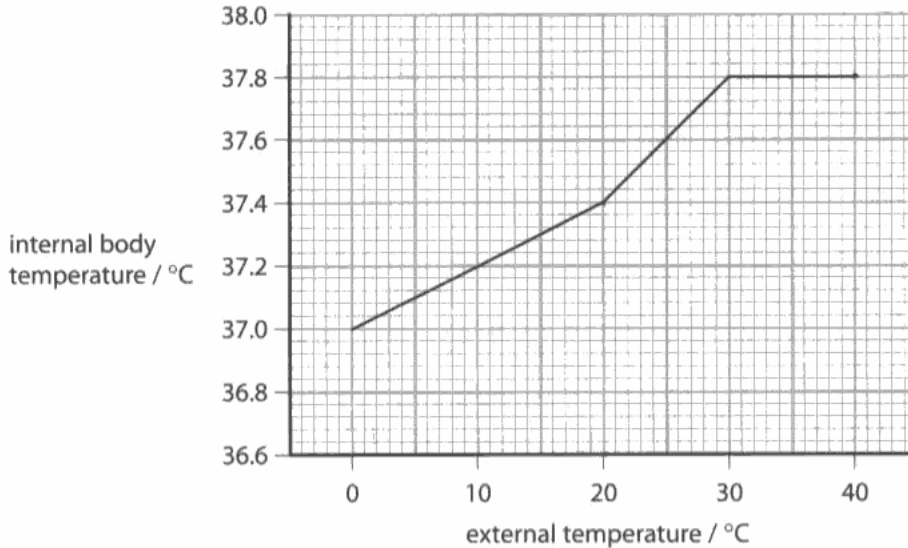
### Question 5 (a) (i)

Candidates were expected to use the data on the graph to calculate the increase in internal body temperature. A relatively simple calculation with 37.4 being subtracted from 37.8 to provide an answer of 0.4 °C.

#### Body temperature

- 5 A scientist investigated the effect of changes in external temperature on a person's internal body temperature.

The graph shows the results of this investigation.



- (a) (i) Calculate the difference in internal body temperature between an external temperature of 20°C and 40°C.

$$\begin{array}{r} 37.8 \\ - 37.4 \\ \hline 00.4 \end{array}$$

$$\begin{array}{r} 37.4 \\ - 37.8 \\ \hline \end{array}$$

(1)

answer = ..... 0.4 ..... °C



**ResultsPlus**  
Examiner Comments

If the correct answer was seen, this was awarded a mark. However, it is always good practice to show your working for calculations.

### Question 5 (a) (ii)

This question was found challenging by many. Candidates were expected to recognise that the optimum internal temperature is 37 °C and any deviation above this would result in enzymes becoming denatured. Chemical reactions would slow or cease above these optima. Dehydration was also credited for one mark as it is a worthy statement about the gain of heat.

(ii) Explain why it is important that body temperature does not rise above 40°C.

If the body temperature ~~does not~~ <sup>rises<sup>(2)</sup></sup> above 40°C it can be vital as its significantly higher than our normal body temperature of 37°C. It needs to stay at 37°C or we can die. ~~it's making~~ our bodies aren't used to any higher or lower temperatures.



**ResultsPlus**

**Examiner Comments**

This candidate has recognised that the optimum temperature of the human body is 37 °C. However they have not gained a second mark because they have not given the biological significance of deviating from this temperature.

(ii) Explain why it is important that body temperature does not rise above 40°C.

(2)

Because you would get hypothermia and you could even die



**ResultsPlus**

**Examiner Comments**

Many candidates simply commented that we would die if the temperature became too hot, and, although this is true it was not credit worthy as it does not answer the question.

## Question 5 (c)

This question was designed to allow students the chance to show their knowledge of how the hair on the skin allows a layer of air to be trapped in order for heat to be lost less frequently. Variation on the syntax "erect" were "stand on end", "stick up" and "raise" and all were acceptable alternatives.

"Trapping heat" was an unacceptable alternative for the insulating air layer that is trapped for marking point 2.

(c) Explain how hair on the skin helps to maintain body temperature in a cold environment.

(2)

The hair on the skin helps by erecting the hairs to trap air which will heat up the body.



**ResultsPlus**  
Examiner Comments

This is a good example of knowledge that the hair will rise to trap air. The idea of heating the body was ignored on this occasion. The answer is clear and concise.

(c) Explain how hair on the skin helps to maintain body temperature in a cold environment.

(2)

The hair ~~block~~ acts as an extra coat of warmth for the body by covering the skin stopping the cold to an extent.



**ResultsPlus**  
Examiner Comments

There is no detail of hair erection or insulation of the trapped air layer so no marks could be awarded.



## Question 5 (d)

The first of the extended writing questions aiming to gauge a student's knowledge of a process, and in this instance how type 1 and type 2 diabetes are controlled. The question was designed for candidates to compare the two methods of control.

Candidates were expected to recognise that type 1 diabetes is controlled through the administration of insulin injections usually into a subcutaneous fat layer. They were also expected to state that type 2 diabetes is controlled by balancing physical exertion with a carefully planned diet.

Candidates need reminding that there are marks available for the ability to spell scientific words correctly and to communicate their ideas in a logical fashion.

\* (d) Blood glucose levels also need to be controlled.

Describe how type 1 diabetes and type 2 diabetes are controlled. (6)

• Type 1 is controlled by insulin which is injected into the bloodstream by a.

• ALSO it helps break sugar which if there's too much sugar the body will store some if needed

• type 2 is controlled by sugar which has been stored.



### ResultsPlus Examiner Comments

This candidate has been able to access level 1 by stating correct facts about only one type of diabetes (type 1).

It is worth noting that to access the higher levels a candidate was required to state a more detailed account of control for both types of diabetes.

### Question 6 (a) (ii)

This question aimed to test the knowledge of mutualism in the relationship of a crocodile bird and the crocodile itself. The photograph was the clue to the answer that the crocodile bird will be feeding and therefore the crocodile will benefit by having food removed from the teeth hence preventing tooth decay.

(ii) Suggest why this relationship is beneficial to the crocodile.

(2)

because the birds cleans the crocodiles mouth and the bird gets food. Also the crocodile can provide protection for the bird



**ResultsPlus**  
Examiner Comments

Answers such as this example were credited if the candidate stated that the crocodile was having the mouth cleaned. However, if a candidate stated that "parasites" or "bacteria" were being removed, this was not awarded.

### Question 6 (b) (i)

This question was designed for simple recall that at the start of most food chains a green plant or a producer would be found. Credit is provided for candidates stating an example of a green plant or the kingdom name plantae.

(b) (i) The crocodile and crocodile bird are members of food chains in a habitat.

State the type of organism that is found at the start of most food chains.

(1)

fish



**ResultsPlus**  
Examiner Comments

This candidate has not read the question correctly and assumed that the answer should relate to the crocodile ideology as seen previously.

## Question 6 (b) (ii)

This was a challenging question that aimed to allow candidates to recognise that a crocodile's biomass would be larger than the number within a pyramid of numbers.

Candidates were expected to draw a pyramid of biomass with the crocodile level being wider than the one already posted for them, and the fish and crocodile level heights being in proportion to one another. The first marking point was testing number versus biomass knowledge and the second marking point was designed to test whether candidates could draw a pyramid accurately.

## Question 6 (c)

The second of the extended writing questions designed to allow students to present their recall of what a parasite is, how it depends on other species and provide examples from their classroom teaching or own knowledge.

Many examples of parasites were cited and the most common were fleas, headlice, tapeworms and mistletoe. Mosquito was seen to be uncredited due to the Plasmodium being the parasite and the mosquito being a vector. This must be remembered by candidates.

\* (c) Using examples, explain how the survival of parasites depends on the presence of other species.

(6)

A parasite feeds parasite depends on other species by the getting enough minerals and food to stay alive so the parasite can feed of it but the ~~organism~~ organism does it feeds of does not get anything in return



**ResultsPlus**

**Examiner Comments**

A good response in terms of describing what a parasite is / how it depends on others. However, this candidate has failed to provide any examples and therefore could not move above level 1, scoring two marks.

## **Paper Summary**

A very pleasing paper in terms of the responses seen. Many candidates were able to access the more simple ideas such as how to calculate the rate of growth or how a housefly can spread disease. The more complex answers requiring analysis of data from a table or graph and how to explain why a biological process was occurring proved more challenging.

Usually when candidates were successful a less scientific answer was provided with less emphasis on scientific terminology and more of a reliance on everyday syntax. This may have restricted the candidates in the extended writing areas of the examination paper.

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