

# **GCSE Biology/ Science**

## **5BI 1H/01 (Higher Tier)**

### **Support Materials**

**Top 10 Tips from the Principal Examiner for B1 and exemplar materials for the six-marker questions from the November 2011 session**

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# Top 10 Tips from the Principal Examiner for Biology 5BI1H (Higher Tier)

1. **Interpretation of graphs** – candidates should use scientific language to describe graphs, terms such as normal distribution curve, discontinuous data or continuous data are useful. It is also important to use data from the graph to illustrate their answer.
2. **Mathematical skills** - calculation of percentages is an important skill as is the calculation of means and ability to use equations including changing the subject of an equation. The calculation of ratios and probabilities especially with reference to genetic information is also important.
3. Candidates should follow closely the **command words** for answering questions. An example of this was to 'describe **one**' method of temperature regulation. Two marks were awarded one for the method and one for a description of how it results in the raising or lowering of body temperature. Candidates should avoid listing several answers in cases such as this.
4. Candidates need to recognise the build-up of nitrates in the environment as **eutrophication**; they also need to know the consequences of eutrophication in an aquatic environment in detail as stated in specification point 3.22.
5. **Mutualism** is an important part of the specification: often questions about nitrogen fixing bacteria are asked in contexts such as mutualism or pollution and even in questions related to the nitrogen cycle. Candidates need to be able to apply their knowledge to different areas.
6. With **genetics** questions it is very important to be specific in the responses. When referring to a genetic disorder it is vital that the allele for the disorder is noted not a general reference to genes or just carriers. Candidates also need to use the correct scientific terminology such as heterozygous, homozygous etc.
7. For the question on **temperature regulation**, the processes vasodilation and vasoconstriction need to be able to be clearly explained in detail.
8. Candidates need to **focus their answers** on the specific questions asked. For example, in explaining the **process of evolution** candidates often related their answers to taller species rather than the process of evolution. Learning the stages of variation, over-production, survival of the fittest, advantageous characteristics inherited genetically causing gradual change may indeed help.
9. The process of **temperature regulation** as part of a negative feedback mechanism is very important as is a clear understanding of **vasoconstriction and vasodilation** with explanations of how these contribute to temperature regulation and why it is important, specifically with reference to hormones.
10. A clear understanding of the **carbon cycle** must be able to be applied to different organisms. When describing a cycle it is vital that the whole cycle is described so methods of the removal of carbon dioxide as well as the addition of carbon dioxide to the atmosphere are vital to attain all the marks available.

## Exemplar Materials for Question 5(b)

### Sample A

2 marks

This candidate has made some vague references to people breathing out carbon dioxide and trees taking it in but there is no reference to photosynthesis or respiration so this is a limited description. There is a reference to cars producing carbon dioxide but again no explanation. This is therefore placed into marking band one. There is a fairly good level of spelling, punctuation and grammar but limited use of scientific terminology. This puts this candidate at the top of marking band one with 2 marks overall.

\*(b) Carbon is present in a wide variety of compounds in the carbon cycle.

Describe how carbon is cycled in the environment.

(6)

Through people breathing <sup>out</sup> carbon dioxide and trees taking it in. Also by factories and machines that produce massive amounts of carbon monoxide and carbon dioxide and ~~the~~ releasing it into the atmosphere. Cars also produce massive amounts of carbon and constantly release huge amounts of carbon.

## Sample B

3 marks

This candidate has mentioned plants photosynthesising and carbon dioxide going back into the atmosphere through vehicles but in general this is a simple description. There are some wrong science references about animal 'poo'. As there is a clear example of a method of adding carbon dioxide to the atmosphere and removing it this puts it into marking band two. There is some incorrect science so this cannot be classified showing evidence of clarity so this candidate is awarded 3 marks overall.

\*(b) Carbon is present in a wide variety of compounds in the carbon cycle.

Describe how carbon is cycled in the environment.

(6)

carbon is cycled by the environment and it starts off in the air. next plants photosynthesise which takes some carbon away. Animals poo which releases more carbon in to the air. After that factories and vehicles give carbon off also which pollutes the air leaving a carbon cycle that has been going on for many years and will continue to for many years also.

## Sample C

3 marks

Both respiration and photosynthesis are mentioned correctly as method of removing or returning carbon dioxide to the atmosphere. This response is therefore placed in mark band two. No detail is given and no other information of further ways in which carbon dioxide is stated, so the candidate remains in mark band two. Carbon dioxide is referred to as  $\text{CO}_2$  and the language does not flow well. Grammar is limited and sentence construction could be improved so the candidate is placed at the bottom of band two and is awarded 3 marks.

\*(b) Carbon is present in a wide variety of compounds in the carbon cycle.

Describe how carbon is cycled in the environment.

(6)

$\text{CO}_2$  in the atmosphere ~~is~~ is used by plants to photosynthesis. Some is let of by respiration. When a animal eats the plants they ~~let~~ ~~is~~  $\text{CO}_2$  of by respiration, decay and urine. This all releases  $\text{CO}_2$  back into the air to do the carbon cycle again.

## Sample D

6 marks

A detailed description of several methods of returning and removing of carbon dioxide from and to the atmosphere covering a significant number of the points indicated in the indicative content. The comment about plants breathing is ignored as we do not negatively mark. This puts the response into mark band three. The candidate's response is clear and they have made good use of scientific terminology with a coherent flow to the answer. Spelling, punctuation and grammar are used to good effect. The candidate is awarded 6 marks. Please note that not all the information given in the indicative content needs to be included to gain maximum marks.

\*(b) Carbon is present in a wide variety of compounds in the carbon cycle.

Describe how carbon is cycled in the environment.

(6)

THE Carbon is in the atmosphere and the plants absorb it and breath it out as oxygen. The animals then breath in the oxygen through their lungs and produce  $\text{CO}_2$ . However ~~the~~ animals will eat plants and some of the  $\text{CO}_2$  in the plant will become part of the animal. When the animal is then eaten by another animal the carbon is passed on again. When that animal dies over time the animal will decompose into the ground. The humans will then dig up the fossil fuels and use them to power electrical devices releasing the  $\text{CO}_2$  into the atmosphere or the plants will reabsorb this and the whole cycle will restart.

(Total for Question 5 = 12 marks)

## Exemplar Materials for Question 6(d)

### Sample A

6 marks

This candidate has accessed marking band three of the generic marking grid. The reason for this is they have given a detailed description of the processes of vasodilation and vasoconstriction and have included the method of heat loss by radiation as well as a reference to this being a negative feedback mechanism. The answer has a coherent flow with no errors and the correct use of scientific terminology is impressive. 6 marks were awarded to this candidate.

**\*(d) Explain how changes in the volume of blood going through the skin help to maintain body temperature.**

**(6)**

Changes in the volume of blood through the skin help maintain body temperature. When the body gets too hot, the blood vessels near the surface of the skin expand. This is called vasodilation. It causes more blood to flow near the skin surface and increases the amount of heat lost through radiation. This cools the body ~~down~~<sup>down</sup>. When the body gets too cold, the blood vessels constrict, letting less blood flow through them near the skin surface. As a result of this, less heat is lost through the skin, warming the body up. This process is called vasoconstriction. Both processes work together to maintain a steady state within the body. They are also examples of negative feedback: when one process starts the other process stops.

**(Total for Question 6 = 12 marks)**

**TOTAL FOR PAPER = 60 MARKS**



## Sample B

4 marks

This candidate has given a good but not detailed description of vasodilation and vasoconstriction. There is no method given of how this raises or reduces temperature as no method of heat loss is given. The candidate has not mentioned that this is an example of a negative feedback mechanism so the candidate is placed in band two on the generic marking grid. The answer flows well and the use of scientific terminology is clear and accurate. The candidate was awarded 4 marks for this question.

\*d) Explain how changes in the volume of blood going through the skin help to maintain body temperature.

(6)

Firstly, when the body temperature increases ~~the~~ vasodilation occurs. This is the widening of the blood vessels which allow them to go closer to the surface. Vasodilation decreases body temperature as more heat can be released, due to the blood vessels carrying more blood and closer to the surface. However when body temperature ~~decreases~~ decreases the blood vessels go narrow, this is called vasoconstriction. Vasoconstriction allows less blood to flow and further away from the surface. This conserves heat as it allows less heat to be released by blood vessels. Body temperatures change to normal after each process.

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(Total for Question 6 = 12 marks)

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TOTAL FOR PAPER = 60 MARKS

## Sample C

5 marks

This candidate has been placed into band three on the generic marking grid. The reasons for this are that the response is sufficiently detailed regarding the mechanism of vasodilation and vasoconstriction. The candidate has also explained the method of heat loss by radiation and referred to the mechanism as a negative feedback mechanism. There is some misspelling of scientific terminology and some minor errors in the overall prose, for this reason the candidate was awarded 5 marks.

\*(d) Explain how changes in the volume of blood going through the skin help to maintain body temperature.

(6)

~~When your too hot~~  
When your too hot, your brain (hypothalamous) receives negative feedback, ~~and then sends a~~ ~~message~~ it then sends a message to your dermis and you: sweat alot more, when the sweat ~~is~~ evaporates heat is radiated off. Your blood vessels dilate, this is vasodilation and your vessels come closer to the skin so more heat is transferred to your surroundings, ~~heat~~ ~~erector~~ erector muscles relax and hair lies flat. When your cold, the message sent to your dermis by the ~~to~~ hypothalamous is to heat up, so hairs erect to trap a layer of hair, little - no sweat is produced and blood vessels constrict, this

(Total for Question 6 = 12 marks)

~~This~~ is vasoconstriction blood vessels stay tight to reduce heat loss. You then go back to body temperature.

TOTAL FOR PAPER = 60 MARKS

## Sample D

4 marks

This candidate gives a simple definition of vasodilation and vasoconstriction including correct references to how each method helps with temperature regulation. The detail about blood vessels or the method of heat retention or loss is missing so this response is placed into marking band two. Scientific terms are used correctly and there is evidence of good use of spelling and grammar, and the answer has a coherent flow. The candidate is awarded 4 marks overall.

\*(d) Explain how changes in the volume of blood going through the skin help to maintain body temperature.

(6)

Changes in the volume of blood help.  
Vasoconstriction occurs when you are too cold. The hairs on your arms relax, and the blood stays away from the surface of your skin to trap heat in. When you are too hot, you vasodilate. The erector muscles make your hairs stand up, and the blood rushes to the surface to release as much heat as it can, and as quickly as it can.