Examiners' Report
June 2016

GCSE Biology 5BI1H 01

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Introduction

The aim of the paper is to test the candidates' knowledge across the specification. The paper is designed to enable as many specification points as possible to be assessed, thus enabling the candidates to be able to communicate their scientific knowledge across a range of topic areas. In addition, the candidates are also expected to be able to apply the knowledge they have gained to new situations.

Both quantitative and qualitative data is included for candidates to interpret and evaluate. Mathematical skills such as the calculation of means are included to ensure that candidates are able to deal with data effectively.

Approximately 35 – 40% of the marks are awarded for assessment objectives which include the recall and communication of candidates' knowledge of science.

Approximately 35 – 40% of marks are awarded for the application of scientific concepts and skills which include those in practical and other contexts.

Approximately 25-28% of marks are awarded for the ability of the candidates to analyse and evaluate evidence, and make reasoned judgements based on scientific evidence.

The paper was designed to test this range of skills, and it is pleasing to note that candidates are improving in their ability to communicate science effectively. This was particularly evident in the 6 mark questions, which are now attempted well, with the vast majority of candidates scoring marks on this style of question.

The genetics question on the paper was answered extremely well, with the majority of candidates able to complete a correct genetic diagram. It was pleasing to note that many candidates were able to apply their knowledge of the transmission of malaria but linking the abundance of the allele for sickle cell in the context of malaria caused some issues. More able candidates did link this effectively to the idea of natural selection.

There are still issues with vasoconstriction where misconceptions about blood vessels moving were seen regularly.

Candidates showed a good understanding of the role of glycogen in blood glucose regulation which was pleasing.

The role of bacteria in the nitrogen cycle caused some issues for candidates and it is essential that they can apply the type of bacteria to its role in the nitrogen cycle.

The paper was well accessed across all of the mark ranges, showing that candidates were well prepared for the paper. Marks were often lost due to the candidate misreading the question and therefore going down the wrong path. This could be addressed by candidates highlighting the key words in the question, to focus their attention.

The command words also are important and, in particular, if a candidate is asked to explain something they need to give a scientific reason in their explanation and when asked for a description they need to take a step by step approach to answering the question.

The inclusion of the 6 mark questions to test the Quality of Written Communication, and the ability of candidates to communicate science effectively is steadily improving.

Question 1 (a) (ii)

This question was generally answered well with most candidates gaining the first mark for sweat evaporating from the skin, which cools you down. There were various ways of talking about how this reduced the temperature of the body by removing the heat for the second mark.

(ii) Explain how sweat glands can help the human body to cool down.

(2)

Sweat glands secrete sweat when the body is above 37°c. This evaporates, taking body heat away into the environment.

ResultsPlus
Examiner Comments

This illustrates a correct answer for 2 marks. 1 for sweat evaporating and 1 for heat energy being removed.

ResultsPlus
Examiner Tip

This is an explain question and so the scientific detail of sweat evaporating is necessary for the marks.

Question 1 (b)

Candidates are still a little confused regarding vasoconstriction. The blood vessels near the surface of the skin constrict (become narrower) so blood vessels carry less blood near the surface of the skin or there is less blood flow near the surface of the skin. There is a common misconception that blood vessels move up and down below the skin.

(b) Blood vessels in the skin help to regulate body temperature.

Explain how blood vessels reduce the amount of heat lost from the body.

(3)

Blood vessels trap in heat they vasoconstrict (dilate) so the blood is flowen in the body and the heat is lost into the surronding so the body temperature cools down.

ResultsPlus
Examiner Comments

This response contains conflicting statements as the response refers to both constriction and dilation which are opposites, so no marks can be awarded. Nothing further is creditable.

ResultsPlus
Examiner Tip

Remember to check the response after you have written it to ensure that you are not writing a confusing response.

Question 1 (c)

The key point here was the part of the brain involved and in this case it was the hypothalamus which detected a change in the temperature. Marks were also awarded for the idea of receiving or sending information to the hypothalamus from receptors/effectors.

(c) Body temperature can vary.

   Describe how the brain is involved in thermoregulation.

   (2)

   The brain has a thermostat with detects it
   coda the temperature.

ResultsPlus
Examiner Comments

This response was not awarded any marks as there is no mention of the hypothalamus and a thermostat is not accurate as far as thermoregulation is concerned.

ResultsPlus
Examiner Tip

Try to use scientific terms whenever possible in your responses.

Question 2 (a)

The majority of candidates were able to give a correct value for this answer although a common error was to give evening snack as a response. As this is not a time it could not be awarded a mark. Both 24 hr clock and am/pm answers were awarded the marks.

Question 2 (b)

The knowledge shown of the role of glycogen in the regulation of blood glucose levels was particularly impressive here. This is a linked response where the candidates needed to show the causation between the increase in blood glucose levels and the increase in glycogen stored in the liver. Marks were generally lost when confusing glycogen and glucagon or the role of the liver and the pancreas in this process.

(b) Explain why glycogen levels in the liver increase after a meal.

(4)

after eating a meal glucose is released into your blood, from the meal you just ate.
If blood sugars get too high the glycogen levels increase, glycogen will decrease blood sugar levels.

ResultsPlus
Examiner Comments

Blood glucose levels rise after a meal is a marking point so this response is credited with 1 mark.

ResultsPlus
Examiner Tip

Try to complete the whole story when answering an extended writing piece like this 4 mark question.

Question 2 (c)

For this question, the candidates had to combine separate pieces of information, in the first instance what the effect of type 2 diabetes would be – raised blood glucose levels as the liver/muscle cells are resistant to insulin and so glucose remains in the blood. Secondly what the effect of this would be on glycogen levels – in this case there would be less glucose stored as glycogen and so glycogen levels would be lower. The majority of candidates were able to identify the lower glycogen levels but often could not relate this to the effect of type 2 diabetes.

Question 3 (a) (ii)

Candidates have a generally good understanding about phototropism and many responses gained all three marks as they were able to identify the hormone responsible as auxin and describe its action on the shaded side of the shoot causing cell elongation. Some candidates did not read the question carefully and talked about different shoots in the diagram.

(ii) Explain how shoot A and shoot D show this growth response.

(3)

Auxin is releyed and goes to - the side in the shade and causes the cells to elongate/grow faster causing it to bend to the light

ResultsPlus
Examiner Comments

This is an example of a clear and accurate response for all three marks.

Question 3 (a) (iii)

Several candidates had problems interpreting the information for this question with many referring to the incorrect shoot. A correct response stated that the shoot tip was covered which meant that no light could get to the tip of the shoot, (the tip is important as light is getting to the remainder of the shoot) as this is where the auxins are.

(iii) Explain why shoot C did not respond in the same way as shoot A and shoot D.

(2)

the shoot staid straight and did not bend towards the light this was because the cap is black and no sunlight can get to the tip, the tip is where the auxins grow so that it cant bend.

ResultsPlus
Examiner Comments

Both marks were awarded here for a clear and accurate response.

Question 3 (b)

This question did cause some problems for candidates who did not understand how selective weed killers work. They work on broad leaf plants causing the plants to have accelerated growth resulting in too much cell elongation and therefore a lack of support for the weed thus killing it. Many candidates thought that the auxin had an effect on stunting root growth probably due to auxins inhibiting cell elongation on the underside of a root thus causing the gavitropic responses of the roots.

(b) Auxins can be used as a selective weed killer.

Explain how auxins kill weeds.

(2)

farmers use artificial auxins to spray on the weeds/ big-leaved plants which overgrow and die whilst the small-~~leafe~~ leaved plants are unaffected.

ResultsPlus
Examiner Comments

A clear and accurate response for 2 marks.

Question 3 (c)

The majority of candidates were able to gain at least one mark for this question. Responses worthy of a mark include producing seedless fruit, rooting powders or fruit ripening. Acting as selective weed killers was also an acceptable answer. The most common mistake was that plant hormones act as fertilisers.

(c) State two commercial applications of plant hormones.

(2)

1 Seedless Fruits

2 Rooting Powder

ResultsPlus
Examiner Comments

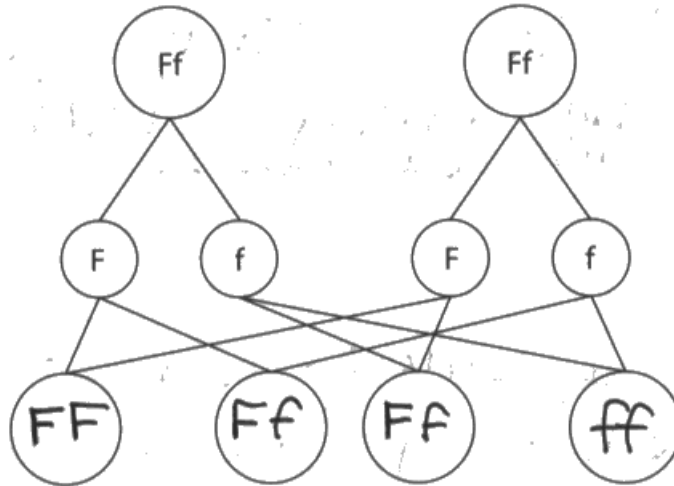Two marks awarded for 2 correct commercial applications.

Question 4 (b) (i)

Generally, candidates accessed this question well. They were able to complete this genetic diagram as well as they do Punnett squares.

(b) (i) Sickle cell disease is a recessive genetic disorder.

Complete the genetic diagram to show the possible genotypes from two heterozygous parents.

(2)

A good example of a correctly completed genetic diagram.

Question 4 (b) (ii)

This response required the percentage probability that the offspring would be carrier. In this case it was 50%.

Question 4 (d) (i)

Most candidates were able to recognise that mosquitoes are animal vectors for malaria. The second mark was awarded for either the idea of piercing the skin or for the plasmodium protozoan.

(d) People with an allele for sickle cell disease are less likely to have malaria.

   (i) Describe how malaria is transmitted.

(2)

Malaria is mainly transmitted through the mosquito vector. Once bitten, the disease ~~travels~~ then enters your blood stream.

ResultsPlus
Examiner Comments

Two marks awarded here for recognising the mosquito as the vector. Bitten is acceptable for piercing the skin.

Question 4 (d) (ii)

To answer this question the candidates had to explain why the prevalence of sickle cell is higher in areas where malaria is present. This is a natural selection idea that those people with malaria do not live long enough to reproduce but those people who carry the sickle cell allele do; thus passing this on so the number of people with sickle cell increases.

(ii) Explain why the percentage of people with sickle cell disease is higher in countries where malaria is present than in countries where malaria is not present.

(3)

Malaria can result in death and since people with sickle cell disease are more likely not to get it they are less likely to die. This results in more of the genes for sickle cell disease being past on than for normal red blood cells for, in this case, sickle cell disease is a beneficial characteristic and this is an example of natural selection

(Total for Question 4 = 10 marks)

ResultsPlus
Examiner Comments

This candidate has correctly identified that this question was about natural selection and scored two marks.

Question 5 (a) (i)

This is a typical data driven question where candidates had to describe the effects shown in the table. When answering any data question it is vital that candidates are specific.

In this example it is not just fertiliser which increases growth but that as the concentration of fertiliser increased so did the height of the plants. The second mark was awarded for some manipulation of data from the table to exemplify this.

(a) (i) Using information from the table, describe the effect of nitrate fertiliser on the growth of these plants.

(2)

The more nitrate fertiliser is added the height of the mean of the plant increases. It is Hormone powder makes the plant grow taller.

ResultsPlus
Examiner Comments

This is a clear response for 1 mark.

Question 5 (a) (ii)

Many candidates were able to calculate the difference in growth as 26 but did not then calculate this as a weekly growth of 4.5.

(ii) Calculate the difference in growth per week for the plants watered with solutions containing 0.1 g and 0.5 g of nitrate fertiliser.

(3)

$$\frac{32}{3} = 10.6 \qquad \frac{32}{4} = 8 \qquad \begin{array}{r} 14.5 \\ -8 \\ \hline 6.5 \end{array}$$

$$\frac{58}{4} = 14.5$$

6.5 .... mm per week

ResultsPlus
Examiner Comments

All three marks awarded here and the candidate has shown the working.

Question 5 (a) (iii)

Many candidates were unable to access this question with several stating auxin instead of protein.

Question 5 (b)

Candidates generally either answered this very well or did not know the roles of bacteria in the nitrogen cycle. They needed to name the bacteria and state the role in order to gain a level 3 for 6 marks. The bacteria include decomposers, nitrifying, nitrogen fixing and denitrifying.

*(b) Describe the roles of bacteria in the nitrogen cycle.

(6)

Nitrogen-fixing bacteria are found in the root nodules of legumes. They convert nitrogen into ammonia, which is used by the legumes.

Nitrifying bacteria

Denitrifying bacteria convert nitrates back into nitrogen.
Nitrates → nitrites
Nitrites → nitrogen
This type of bacteria can be found in herbivores that eat nitrate-containing plants. After they die, this is when the denitrifying bacteria do their job, and release nitrogen back into the atmosphere.

Question 6 (a) (iii)

Several candidates talked about the characteristics of the organism here rather than the cells. Some candidates were also confused as to the characteristics of the fungi cells stating no nucleus or cell wall.

(iii) Describe the main characteristics of the cells of organisms in the kingdom Fungi.

fungi- Multicelluar, have Cell walls, no Chlorophyll

(2)

fungi have a are multicellular, have a cell wall but no chlorophyll.

ResultsPlus
Examiner Comments

A good answer for 2 marks – for no chlorophyll and has cell walls.

Question 6 (a) (iv)

It was pleasing to note the number of candidates who were able to identify fungi as saprophytic feeders that perform extracellular digestion or exemplified feeding on dead or decaying organisms.

Question 6 (b)

The majority of candidates were able to access this question at level 1 or 2 and many candidates gave a good explanation including the idea that organisms show variation and compete for resources resulting in survival of the fittest and that there is a gradual change over generations. Several candidates related this to specific organisms, in particular giraffes.

*(b) Explain Darwin's theory of evolution by natural selection.

(6)

Most species overproduce for their environment meaning that there are too many for the environment to cope with. Due to inheritance and mutations there is variation within the species, some of the individuals will have advantageous adaptations which makes it more likely for them to survive to adulthood and therefore reproduce While those without advantageous adaptations are less likely to survive so won't be able to reproduce, meaning that the percentage of organisms with the advantageous adaptations will increase. This process over many generations is called evolution.

ResultsPlus
Examiner Comments

This is a good answer for level 2. In order to gain level 3, competition for resources needs to be included.

Paper Summary

Based on their performance on this paper, candidates are offered the following advice:

- Ensure they have a clear understanding of vasodilation and vasoconstriction and do not refer to blood vessels moving.

- Work on their maths skills, remembering to answer the question - in this case growth rate was asked for weekly. In addition to this they must always show their working in order to maximise marks.

- Ensure that they have a detailed understanding of the higher tier topics, as these tend to be the areas where the higher marks are allocated, and are often discriminators for the higher grades – in this case the topic of the nitrogen cycle and Darwin's theory of evolution.

- It is essential that candidates look at the number of marks allocated to the question, and answer the question with the relevant number of points. If the question is allocated 3 marks, then the candidate needs to make 3 separate points.

- Candidates should work on the way in which they answer the 6 mark questions. If the question asks for the role of bacteria in the nitrogen cycle, information on the effect of lightning is not relevant.

- Be careful to look at the command words on the paper especially with the command word 'explain' – here, you must base your answer on scientific principals and not just a list of stages.

Grade Boundaries

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