

Examiners' Report
June 2015

GCSE Biology 5BI3F 01

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Introduction

This paper included a range of question styles including multiple choice, missing words, short answer and longer 6-mark questions. The longer questions were designed to test candidates' ability to write and communicate scientific ideas and tested their quality of written communication.

Areas of unit three that were covered included behaviour, pest resistance, reproduction, the kidney, human evolution, food production and the global population. Many areas of the specification were addressed well by candidates, however there are still some that require more thought and deeper learning in order to be able to access the full range of marks available.

This report identifies areas of strength and weakness shown by the majority of candidates, and also tries to highlight possible misconceptions that could be addressed by both teachers and pupils as an aid to teaching and revision in preparation for forthcoming examinations.

Question 1 (a) (i)

This question tested observation skills and almost all candidates successfully filled in the correct value from the table.

Question 1 (a) (ii)

In this question, candidates were asked to describe the behaviour shown in the table. Most students did this well, with information given about the specific colour preference. Quite a few students gave more generalised descriptions where no colours were referred to. Several students attempted to explain the results and so scored zero.

(ii) Describe the effect of spot colour on the behaviour of the gull chick.

(2)

They will associate the spot with their parent figure and follow them.



ResultsPlus Examiner Comments

In this response, the candidate has started to explain the reason for a preference but has not described the results. This therefore scores no marks.



ResultsPlus Examiner Tip

Always read the stem of the question very carefully. Look out for the command words such as 'describe' and 'explain'.

(ii) Describe the effect of spot colour on the behaviour of the gull chick.

(2)

The darker the colour the more times the chick will peck at it. This could be due to the spot being more obvious.



ResultsPlus Examiner Comments

This candidate has given a simple description of the results of the investigation but has not identified specific colours and has not included any figures. They would have scored 1 mark for this answer.



ResultsPlus Examiner Tip

When a question includes data in the form of a table or graph and it asks for a description, it is always a good idea to add a reference to the figures as part of the description.

(ii) Describe the effect of spot colour on the behaviour of the gull chick.

The chick pecked mainly (2)
at the black spot, half as much
on the grey spot and only
3 times on the beak with no spot



ResultsPlus

Examiner Comments

This candidate has described the data, with reference to specific spots and with some use of data. This would score full marks.

Question 1 (a) (iv)

The majority of candidates correctly suggested that the new gull with a red spot would attract more pecks. A surprising number thought that this gull would be treated differently because it was plastic - missing the fact that all of the gull heads were plastic as stated in the introduction to the question.

(iv) Live adult gulls have a red spot on their beaks.

The investigation was repeated but an additional plastic gull was included. This gull had a red spot painted on its beak.

Suggest how this might affect the results of the investigation.

(1)

The gull is not real so it wont be a
fair investigation



ResultsPlus Examiner Comments

Quite a few candidates assumed that because the gull was plastic it would be treated differently to the other test gulls (which were also plastic, as stated in the stem of the question).



ResultsPlus Examiner Tip

Ensure you read the stem of the question carefully. The information given at the very start of a question may well apply to all later parts of that question.

(iv) Live adult gulls have a red spot on their beaks.

The investigation was repeated but an additional plastic gull was included. This gull had a red spot painted on its beak.

Suggest how this might affect the results of the investigation.

(1)

The chick may peck at this one the
most rather than the others.



ResultsPlus Examiner Comments

Here a simple description of how the results might be affected (i.e. more pecks) was sufficient for the mark, although some went on to give a reason.

Question 1 (b)

This question asked students to suggest reasons for particular behaviour shown by gulls, namely the stealing of food from people on beaches. Most candidates scored at least one on this question for identifying that the gulls had a need for food (to feed young, for example). Fewer candidates linked this with the type of behaviour, with some referring back to the innate behaviour shown by the chicks in the previous question.

(b) In some seaside towns adult gulls are becoming a problem because they steal food from people on the beach.

Suggest why adult gulls are showing this behaviour.

(2)

because they might be getting food for
these chicks so they can feed them and
that it gives the chick food and protection
which increases its rate of survival to a
adult bird.



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Examiner Comments

A typical response for 1 mark - here the need for the food has been identified but no reason for the behaviour is mentioned in terms of learning or habituation to humans.

Question 2 (a) (i)

This was one of the calculation questions on the paper in which candidates were asked to work out a simple percentage value. It was answered well by the vast majority of candidates, but there were a few who found mathematical calculation challenging. In this case, merely selecting the correct numbers from the table was sufficient to gain one of the two marks, highlighting the importance of including working when answering these questions.

potato variety	number of potatoes harvested	number of potatoes affected by powdery scab disease	percentage affected by powdery scab disease (%)
Charlotte	200	2	1
Pentland Javelin	350	140	40

- (a) (i) Calculate the percentage of Pentland Javelin potatoes affected by powdery scab disease.

(2)

~~140/350~~

~~140/350~~

$$\frac{140}{350} \times 100 =$$

40 %



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Examiner Comments

A typical answer, showing working.

Question 2 (a) (ii)

Most candidates answered this question correctly, with a reference to the low number of potatoes affected by the disease.

Question 2 (a) (iii)

Most candidates understood why the farmer might select the potato that was more prone to disease (with greater yield), but a few candidates made reference to the cost of buying or growing the potatoes.

Question 2 (c)

This question asked candidates to give a reason for the differences in pest damage seen in the two varieties - a simple reference to the specification statement on plant defence against disease. A large number of candidates referred to the immune system - with answers that included antibodies and lymphocytes. Some interesting answers included reference to different soil type or growing conditions, but as the stem of the question stated that the two varieties were grown in the same area, these answers could not be accepted.

Question 2 (d)

Here, moving on from the production of potatoes as a food source and fungal diseases, candidates were asked for one advantage of using mycoprotein as a food source. Some candidates identified the nutritional benefits of mycoprotein while others chose the flexibility in growth using fermentors as the benefits. A small number of candidates assumed that the mycoprotein was in some way related to the powdery scab disease.

(d) Powdery scab disease is caused by a fungus.

The fungus *Fusarium* is used to produce mycoprotein.

Explain **one** advantage of using mycoprotein as a food source.

(2)

Mycoprotein does not have saturated fat where as red meat does. this can cause heart disease so it is an advantage because you don't get heart disease.



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Examiner Comments

Here the candidate has given a reasonable nutritional characteristic together with a health benefit.

(d) Powdery scab disease is caused by a fungus.

The fungus *Fusarium* is used to produce mycoprotein.

Explain **one** advantage of using mycoprotein as a food source.

(2)

the fungus will make the potatoes immune to the disease as they are being treated with a fungus.



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Examiner Comments

The candidate has confused the mycobacterium with some aspect of the disease in the previous part of the question.

Question 3 (b)

This question on reproduction asked students to identify the reaction that takes place at the cell membrane immediately after one sperm cell has entered. Most students gained one mark for referring to blocking the entry of a second sperm, but far fewer went on to mention that this was caused by changes in the cell membrane.

(b) During ovulation an egg is released.

Explain the changes to an egg immediately after a sperm enters it.

(2)

The egg is fertilised when it meets
the sperm which becomes an
embryo



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Examiner Comments

No reference is made to blocking other sperm or changes to the membrane so no marks could be scored here.

(b) During ovulation an egg is released.

Explain the changes to an egg immediately after a sperm enters it.

(2)

The cell membrane of the egg is adapted
so that it immediately changes
and doesn't allow anymore sperm
to enter.



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Examiner Comments

In this case the candidate has mentioned changes to the cell membrane and also the fact that this prevents further sperm from entering.

Question 3 (c)

Candidates were asked for one feature of a sperm cell - and in this case to explain that feature. An example was given to prompt candidates (tail for motility). Most candidates did well, but some did not give an explanation, whilst others named two or more features for which they did not get more than one mark. Some candidates referred to mitochondria 'making' energy - if possible they should be encouraged to use terms such as the 'release' of energy rather than its creation.

(c) A sperm has a tail for motility.

Explain **one** other feature of a sperm cell.

(2)

The sperm has a lot of mitochondria to ~~help~~ give it energy to get to the egg.



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Examiner Comments

Here the candidate has identified a feature of the sperm and linked it to a function.

(c) A sperm has a tail for motility.

Explain **one** other feature of a sperm cell.

(2)

They have a acrosomes to get an energy to swim



ResultsPlus
Examiner Comments

Some candidates just gave a feature with no explanation, or gave an incorrect explanation.

Question 3 (d) (i)

This was reasonably well answered by the majority, but the production of urea is an area that quite a few candidates found challenging.

Question 3 (d) (ii)

This question focused on the reabsorption of glucose with candidates gaining marks for correctly using the term 'reabsorption' and also for identifying where the glucose was going (back into the blood). Very few candidates suggested where this process was taking place.

(ii) Glucose is filtered from the blood but is not normally present in urine.

Explain what happens in the nephron to make sure that glucose is not present in urine.

(2)

IT IS A USEFULL SUBSTANCE AND
THEREFORE REABSORBED, INTO THE
BLOOD. IT IS ORIGINALY SQUEEZED OUT OF
THE BLOOD IN THE NEPHRON BEFORE
BEING REABSORBED



ResultsPlus
Examiner Comments

This candidate has used the correct terminology ('reabsorbed') and also given the direction for reabsorption. A few candidates identified convoluted tubules but one misconception was that glucose was too large to pass through the glomerulus.

Question 4 (b)

This is another area of the specification that has been tested before - namely the estimation of the age of stone tools. It was disappointing then to see many poor answers with vague answers, or answers referring to the carbon dating of the rock that the tools were made from, rather than of associated artefacts. The most common correct answers described the use of sedimentary layers or looking at the design and complexity of the stone tools.

Question 4 (c)

The majority of candidates correctly answered 'millions' but quite a few could not identify the fossils as Ardi.

Question 4 (d)

This question tested the candidates understanding of early human migration across the globe and asked for a suggestion as to how humans may have crossed the Bering Strait. The responses were generally very good, with many candidates describing the effect an ice age may have had on the gap and the theory of ice bridges across the sea.

Question 4 (e)

This was a very well answered question with most candidates coming up with two methods of communication. Some candidates lost a mark for giving two types of communication that were essentially the same, such as 'facial expressions' and 'body language'.

Question 5 (a) (i)

This question tested the candidates' understanding of lactase treatment of milk. Generally this was not a well answered question, with a large number of candidates thinking that the lactase was there to sterilise the milk and kill bacteria. Some candidates also thought that lactase reduced the sugar content, while several continued to mix up the word lactase with lactose.

(a) (i) Explain why milk is treated with lactase.

(2)

To kill any bacteria in the milk
so it is drinkable



ResultsPlus Examiner Comments

This response is typical of many - where candidates associate lactase treatment with killing or reducing microorganisms present in the milk.

(a) (i) Explain why milk is treated with lactase.

(2)

milk is treated with lactase to
convert the lactase in the milk into
~~lactose~~ and glucose so that it is
lactose free to suit lactose intolerant
people. ↓



ResultsPlus Examiner Comments

Despite a mistake being made (lactase instead of lactose), this candidate has answered the question well enough to score 2 marks; for the idea of lactose being removed (lactose-free milk) and for a reference to lactose intolerance.



ResultsPlus Examiner Tip

Be careful with the spelling of scientific terms, in particular those that are similar such as lactose and lactase. Make sure that the word is also legible, as illegible or ambiguous key words will not be credited.

Question 5 (a) (ii)

A well answered question with many candidates getting one of the two marks, and some scoring for both.

(ii) The lactase enzyme stays in the alginate beads.

Suggest why this is an advantage.

(2)

IT STOPS THE LACTASE ENZYME FROM
ENTERING THE MILK AND THEREFORE
CAN BE REUSED



ResultsPlus
Examiner Comments

This response is sufficient for 2 marks - the candidate having described both marking points (the idea of the enzyme not contaminating the milk and the idea of the enzyme being re-useable).

(ii) The lactase enzyme stays in the alginate beads.

Suggest why this is an advantage.

(2)

o it is immobilised
o can be used again.



ResultsPlus
Examiner Comments

This is a typical response for one mark, where the candidate has identified that the lactase can be re-used.



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Examiner Tip

Look at the number of marks available on each question - a two-mark question will almost certainly require two relevant facts in the answer.

Question 5 (b)

Candidates appear to find this topic very challenging. A large number are getting sucrose mixed up with isomerase and give answers that refer to increased sweetness. Still more get sucrose and sucrose confused and a few refer to sucrose killing microbes.

(b) Invertase is another enzyme used in food production.

Describe the use of invertase in the production of sweets.

(2)

Invertase turns sucrose into fructose and glucose, this is good as it gives soft centered sweets. These can be tastier and have better texture.



ResultsPlus
Examiner Comments

This is a good answer for two marks, with the candidate telling us that sucrose is being broken down and that sucrose is used in the production of soft-centred sweet, for example.

(b) Invertase is another enzyme used in food production.

Describe the use of invertase in the production of sweets.

(2)

invertase breaks down sucrose to glucose and fructose. Fructose is more sweet than sugars so you will use a little.



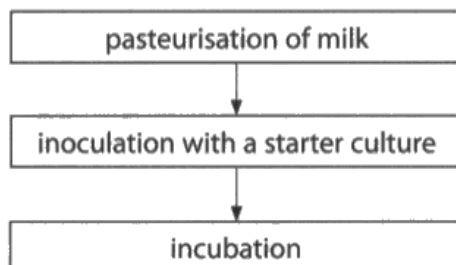
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Examiner Comments

It was common to see candidates mistaking sucrose for isomerase and making reference to an increased sweetness, reduced cost and diet foods.

Question 5 (c)

This was the first of the six-mark QWC questions in which the candidates' ability to write clear scientific answers is tested. In this case a large proportion of candidates lacked a basic understanding of the process of yogurt production, despite this being a common area to be tested and several prompts being given. Examiners were looking for some detail from all three of the areas listed in the question. Very few candidates appeared to understand what inoculation meant.

(c) The diagram shows some of the stages in the production of yogurt.



Describe these stages in the production of yogurt.

In your answer include references to microorganisms.

(6)

The pasteurisation of the milk is where all the pathogens are killed. The inoculation with a starter culture is where the milk is curdled and the incubation is where the milk is left to set in an optimum temperature. This will allow the milk to ferment and create the yogurt.



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Examiner Comments

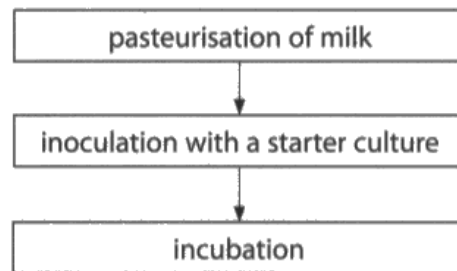
Here the candidate has shown some understanding of pasteurisation and has mentioned an optimum temperature during incubation, but has no valid description of inoculation, so fails to gain full marks. 4 marks.



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Examiner Tip

The QWC marks or quality of written communication are awarded for correct use of scientific terms and a coherent description that is grammatically correct.

*(c) The diagram shows some of the stages in the production of yogurt.



Describe these stages in the production of yogurt.

In your answer include references to microorganisms.

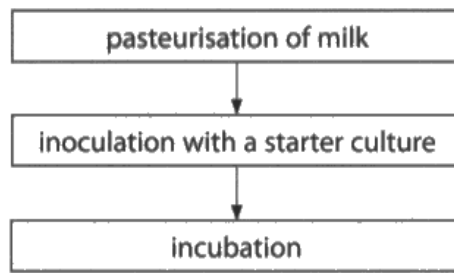
The milk is pasteurised to get rid of the microorganisms in the milk because it can cause illnesses if it's not pasteurised. (6)



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Examiner Comments

This candidate has described pasteurisation but nothing else, so only achieves level 1. The quality of written communication is adequate so 2 marks would be awarded.

*(c) The diagram shows some of the stages in the production of yogurt.



- Stop micro-organisms grow

Describe these stages in the production of yogurt.

In your answer include references to microorganisms.

(6)

The pasteurisation of milk is when you heat up the milk at 70°C for about 20 seconds in order to get rid of micro-organisms growing.

Inoculation with a starter culture means that when you join milk with another micro-organism in a 'fermenter' to try and increase the number of micro-organisms present.

Incubation is when it is put in a place where conditions are best for the micro-organisms to grow such as temperature, oxygen and nutrients.



ResultsPlus Examiner Comments

This response covers all aspects of yoghurt production, although not in great detail. The candidate has included some correct information about pasteurisation and incubation, and has also shown an understanding of what is meant by inoculation. Full marks awarded.

Question 6 (a) (ii)

This question asked candidates to give two advantages of using biofuels instead of fossil fuels. The examiners were looking for two ideas - that of biofuels being renewable, and that they are carbon-neutral. Both of these could be described rather than named and candidates generally did well - with many getting the mark for renewable. Fewer candidates seemed familiar with the concept of carbon neutral, with many saying that biofuels did not release carbon dioxide at all.

(ii) Describe **two** advantages of using biofuel instead of fossil fuels.

(2)

They are a renewable resource and do not produce carbon monoxide emissions.



ResultsPlus Examiner Comments

This candidate has made one correct statement about biofuels being a renewable resource but like many responses seen, they assume that burning biofuels produces no carbon emissions. Using the term 'carbon-neutral' or a more complete explanation would be required for the second mark.

(ii) Describe **two** advantages of using biofuel instead of fossil fuels.

(2)

One is that the biofuel plants are very expensive to build. And if they are control properly they can become extremely dangerous.



ResultsPlus Examiner Comments

Here the candidate has scored no marks, referring to expense of biofuel production. Generally it is best to avoid mention of costs when answering questions in a biology examination.

(ii) Describe **two** advantages of using biofuel instead of fossil fuels.

(2)

~~Renewable~~ Sustainable it could
be used again and again

Carbon neutral - Does not release
added carbon dioxide



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Examiner Comments

A simple answer that just about gains both marks.

Question 6 (b)

This question tested the specification statement on global food security, but was not well answered by candidates. Most responses were simple statements that scored for saying that the demand for food would be greater. Few candidates linked this with lower food production, and even fewer with the reasons for reduced food production (e.g. alternative land use such as biofuel production and housing).

(b) Explain how an increasing human population has led to problems in food supply in some areas of the world.

(3)

An increasing human population requires more homes to help as shelter which means there is less land for agricultural purposes, therefore there is a higher rate of consumption than production.



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Examiner Comments

This is a reasonable answer in which the candidate has identified three key points - that there will be an increased demand for food, which isn't matched by production of food, and finally a reason for reduced production (less land due to housing).

(b) Explain how an increasing human population has led to problems in food supply in some areas of the world.

(3)

we can't grow enough food fast enough to keep up with everyone.



ResultsPlus
Examiner Comments

This is an example of a fairly typical response that gained just one mark for a relatively simple statement (not enough food production).

Question 6 (c)

This second six-mark question was testing candidates' knowledge on three areas of the specification and was also marked for quality of written communication. The areas that candidates needed to describe were the development of new plant varieties (including selective breeding), GM crops, and management of pests. The last two were reasonably well described, but development of new varieties of plants was weak, with few candidates linking new varieties with selective breeding or any named advantage (other than producing more varieties).

*(c) Explain how the development of new plant varieties, the genetic modification of plants and the successful management of pests can be used to increase food production. (6)

If we genetically modify plant's, it mean's more plant's survive, as we can add BT toxin, which is poisonous to insect's. We can also develop new plant variatie's, by only planting the seed's of the biggest plant's, this mean's, more food is harvested from one plant. We can also manage pest's by using pesticide's, to kill them, which mean's more food survive, or we can do crop rotation's. We can also use GM, to make plant's more resistant, meaning more survive, which mean's more food.



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Examiner Comments

This candidate has covered all three areas mentioned in the stem of the question. Each has some basic information and the QWC is adequate in this case. Interestingly the candidate has also mentioned crop rotation, which was seen quite frequently, but rarely described in a meaningful context. Full marks awarded.

* (c) Explain how the development of new plant varieties, the genetic modification of plants and the successful management of pests can be used to increase food production. (6)

There is conventional breeding in which farmers select breeding the highly yield crops and cross breeding the crops. Also, crops are genetically modified to increase the yields for example Purple Tomatoes are modified to have flavonoids which are good for cancer cured.

There is pests management control farmers use less pesticides to spray on plants. Farmers use the microorganism bacteria to modify as a vector to modify the herbicides resistance crops. The put a desired gene for herbicide resistant into a plasmid bacteria and it will infested the embryo of the plant. The galls will have make the plants have grow with herbicides resistance which will improve the yields.



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Examiner Comments

Another reasonably good answer in which the candidate has just covered all three areas and in sufficient detail to gain a level 3 (6 marks as QWC is fine in this instance).

* (c) Explain how the development of new plant varieties, the genetic modification of plants and the successful management of pests can be used to increase food production.

(6)

The more genetically modified plants there is the ~~more~~ the easier is for farms and it grows much faster. It is cheaper to use, therefore farms don't have to spend too much money for good plants and therefore prices are lowered for customers. The other thing is the genetically modified plants ~~that~~ are not effected by pests and other things they are a ~~very~~ ~~small~~ amount to those things.



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Examiner Comments

This is an example of a fairly typical level 1 answer (for 2 marks) in which the candidate has either just described one of the three methods or has simply repeated the phrases in the question without expanding on the detail.



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Examiner Tip

No marks will be awarded for repeating words or phrases that are in the stem of the question.

Paper Summary

Based on the performance of candidates taking this paper, some broad recommendations can be made:

- All areas of the specification must be covered during teaching and revision, as any specification statement could be tested on any examination.
- All topics must be learned in sufficient depth.
- Answers should be structured carefully with a view to the number of marks available (e.g. two facts or statements are unlikely to gain full marks on a 3-mark question).
- Candidates should pay particular attention to the 6-mark questions that test quality of written communication, thinking carefully about how the full 6-marks might be awarded based on the question stem.
- As always, candidates should read the questions carefully and look for the command words such as 'describe' and 'explain' as these will require very different responses.
- When carrying out mathematical calculations, candidates should always show working.

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