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Examiners' Report
June 2014

GCSE Biology 5BI1H 01

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Introduction

This is the second examination in the series since all examinations have gone linear for the new specification.

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.

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, and 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, including the recall and communication of candidates' knowledge of science.

Approximately 35 - 40% of marks are awarded for the application of scientific concepts and skills, including 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 analysis of graphical data continues to be good, with candidates better able to describe a trend and extract data from the graphs/bar charts included in the paper especially at the high end with the final 6 mark question.

The genetics question on the paper was answered extremely well, with the majority of candidates able to draw a correct Punnett square. The emboldened statements which are for higher tier candidates were fairly well understood, but some candidates need to show a more in-depth knowledge of topics such as antibiotic resistance, as well as the topic of eutrophication. That said, it was very pleasing to note that many candidates attained full marks on these more challenging areas.

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 comparison they need to give the comparative - this was particularly evident in the phototropism experiment question.

Question 1 (a) (ii)

In general this was accessed well by candidates but the common misconception was that the fly was able to bite humans to pass on dysentery. Several candidates also believed that dysentery was caused by a virus.

1 mark is given here for the fly landing on food. The incorrect response does not negate all the marks.

(ii) Describe how a housefly can cause a person to become infected with dysentery.

(2)

They suck the blood from the skin and inject the bacteria into the skin to stop it healing over or they have it on them and when they land on food it puts it on there

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Examiner Comments

This candidate has confused the passing on of malaria with the passing on of dysentery. It is important they do not confuse the two. Please note that a mark cannot be given for the fact that the fly is a vector as this is given in the question.

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Examiner Tip

This is a describe question - so the answer needs to be a description of how dysentery is passed on.

This candidate gained both marks for the fly landing on the food and the food then being consumed/eaten. A mark could not be given for the fly passing on the proazoan as in this case the dysentery is bacterial.

(ii) Describe how a housefly can cause a person to become infected with dysentery.

(2)

A housefly can cause a person to become infected with dysentery by sitting on food and the person then eating the infected food. The protozoan for dysentery then gets into the person's body, infecting them with the disease.

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Examiner Comments

This candidate has accessed both marks.

Question 1 (a) (iii)

Several candidates were confused by this question which is specifically about ingesting bacteria so no marks were given for candidates giving very detailed responses about lysozymes and tears as this is not answering the question for bacterial dysentery. There are three marks available for the question so we were expecting the specific term of hydrochloric acid for the first mark point. A mark was awarded for antibodies for those candidates who are studying the disease section of B3 and confused ideas.

This response unfortunately does not achieve any marks as they have not responded specifically to the chemical defence mechanism that would destroy the dysentery bacteria.

(iii) Explain how a chemical defence mechanism of the human body can reduce the chance of dysentery.

(3)

The chemical defence mechanism kills off most of the bacteria by For example it can send white blood cells to fight the bacteria (this only happens if the bacteria is in your blood vains)

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Examiner Comments

No mark was awarded for white blood cells as this is too far away from what is asked by the question.

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Examiner Tip

This is an explanation, so you need to state how the chemical defence mechanism works.

Question 1 (b)

Several candidates confused the fly and the mosquito when referring to animal vectors. Most candidates were able to state that the mosquito pierced the skin of the human for one mark but failed to follow this up with information about the protozoan/plasmodium entering the bloodstream. It was pleasing to note that many candidates recognised that it was the female anopheles that caused malaria.

This response was given 1 mark for the mosquito piercing the skin but no further marks can be awarded.

(b) Explain how the *Anopheles* mosquito can spread the disease malaria.

(2)

By reproducing on water that has been drunk in which is lave will be inside the body. The mosquito lands on a human bites them, drawing out blood thus its saliva Mosq contact with the body and infects that person

(Total for Question 1 = 8 marks)

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Examiner Comments

In this case the candidate needed to follow up on the initial response to ensure that the mark was given for an explanation.

This response does not completely answer the explain question but at this stage of the paper is sufficient for the 2 marks. It would have been better if they could have included how the malaria is then put into the body.

(b) Explain how the *Anopheles* mosquito can spread the disease malaria.

(2)

The Anopheles mosquito is an animal vector that sucks the blood from the human body or other mammals in order to survive. As the mosquito flies to a different person, it pierces the skin, and releases pathogens into the body. These pathogens attack the body, and can cause malaria.

(Total for Question 1 = 8 marks)

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Examiner Comments

This candidate was able to gain both marks for this response in this case the candidate has identified that the mosquito was a vector and that it pierces the skin.

Question 2 (a) (iii)

In this case several candidates got confused when asked the question about the structure that place them in the kingdom plantae, and named all the structures that were visible in the images. Whilst they all have nuclei it is not this that is specific to kingdom plantae.

1 mark awarded for the correct answer.

(iii) Suggest **one** reason why both *Euglena* and *Chlamydomonas* could be placed into the Kingdom Plantae.

(1)

They both have a chloroplast.

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Examiner Comments

Candidate has correctly identified the chloroplast as the link with the kingdom plantae

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Examiner Tip

Be careful to avoid listing things in questions like this as only 1 answer is required so try to hone in on the most important structure.

Question 2 (b) (i)

Candidates struggled with this question. They needed to give an answer that included the definition of the terms heterotrophic and autotrophic and then state how this could result in better survival. Many candidates did not refer to the terms in the answer so it was not clear which word they were explaining and they lost marks as a result of this.

(b) (i) *Euglena* is unusual because it is both heterotrophic and autotrophic.

Explain how this helps *Euglena* to survive.

(3)

This helps the Euglena to survie because it ~~he~~ can produce food and also it can find it. This is also helpful because it doesn't have to find food because it is autotraphic and does photosynethis. This also ~~makes it better adapted~~ can make it better adapted as other species are only one hetrotophic or autotrophic which means if there is no food it will photosynethise and if there is no light it can find food. This makes it better adapted to both these situations.

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Examiner Comments

This candidate has successfully managed to link the type of feeding to what that feeding is for 2 marks.

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Examiner Tip

When given terms in the question it is important that you explain those terms in the answer and do not just write bland statements.

Question 2 (b) (ii)

It was pleasing to note that the candidates are improving in their ability to answer questions regarding the validation of scientific work. There were still some candidates who try to talk about the classification of organisms as a form of validation, which is not the case. Candidates also lost marks here for comments about repeating experiments as there was no initial experiment, it was the discovery of Euglena that was being validated.

(ii) A scientist discovered a new species of *Euglena* in boiling acidic mud in Costa Rica.

Explain how this discovery could be validated by the scientific community.

(2)

- The scientist could present their ideas to a conference where the ones discovery can be discussed
- They can keep a journal to discuss their discovery and allow others to peer reviewd this

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Examiner Comments

This candidate has clearly explained the way in which scientists go about validation of their results. They are able to identify peer review, publication in a scientific journal. Please note it was important that this was published in a scientific journal and not just written down as this would not result in any validation.

(ii) A scientist discovered a new species of *Euglena* in boiling acidic mud in Costa Rica.

Explain how this discovery could be validated by the scientific community.

(2)

they can use characteristics of vertebrates; for example how they feed and breathe

ResultsPlus
Examiner Comments

This candidate did not gain any marks for this as classifying organisms is not a method of validating research.

Question 3 (a) (ii)

This question was rarely answered well. The most popular mark was auxin for 1 mark which was awarded even when the candidates were clearly talking about phototropism in shoots rather than gravitropism in roots. Many candidates confused the root with the shoot and so discussed shaded sides when referring to the shoot. Those candidates who recognised the fact that this was positive gravitropism still confused the elongation response, often discussing elongation on the wrong side of the root or that auxins caused elongation of cells rather than inhibition on the underside of the root. The final point where marks were lost was candidates referring to roots bending in the direction of gravity rather than growing in the direction of gravity.

(ii) Explain how this change in root growth has occurred.

(3)

There was no light so the root could not grow towards the light and since it was dark, it went downwards because of gravity. ~~It is pointing towards the earth like how it is positioned normally roots grow down towards be~~

Roots are underground and grow in the dark so it naturally grows downwards due to gravity

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Examiner Comments

1 mark awarded here for the candidate recognising that the root grew in the direction of gravity.

ResultsPlus
Examiner Tip

Make sure that you can clearly explain the differences between gravitropism and phototropism.

(ii) Explain how this change in root growth has occurred.

(3)

The Auxin is a plant growth hormone that grows in the tips of shoots and roots. It diffuses backwards causing the cells behind the tip to elongate. In this particular root more auxin accumulated in the bottom of the root. The side with more auxin stops growing because in roots unequal auxin distribution inhibits growth. so while the bottom stopped growing the top continued to grow. ~~causing~~ This means the cells at the top elongated. As a result the root grew downwards towards

ResultsPlus
Examiner Comments

The candidate has clearly identified the fact that the root is showing gravitropism and has correctly described this mechanism.

(ii) Explain how this change in root growth has occurred.

(3)

Because the root has not been exposed to sunlight, the chemical reaction for it is to bend away ~~a~~ in a gravitational manor. The root is bending because it is trying to find sunlight in order to photosynthasise and live.

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Examiner Comments

No marks awarded here as the candidate has clearly confused gravitropism and phototropism.

Question 3 (a) (iii)

Most candidates were able to gain the mark for the plant roots uptaking minerals or water but often lost the second mark which is given for anchoring the plant. A few candidates wrote about plants wanting to get food which is not a creditable response.

(iii) Suggest the advantages to the plant of this response.

(2)

This means that when a seed germinates or if a plant is knocked over and removed from the ground the roots will be able to find soil again and the plant will be able to get nutrients from the soil to survive. Also it provides the plant with anchorage in winds etc so it doesn't easily get ripped out of the ground or knocked over.

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Examiner Comments

This candidate has managed to answer the question correctly for 2 marks

Question 3 (b) (i)

This was successfully answered by many students, although some failed to give a clear explanation of what the control was for with many vague responses such as to carry out a fair test - which is not creditable at this stage. A few candidates were confused and referred to controls of variables such as using the same type of plant etc.

(i) Suggest why Rebecca and Andrew set up a control experiment.

(1)

So they can compare their own experiment's results with it.

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Examiner Comments

This is worthy of a mark for the use of comparison with their results

(i) Suggest why Rebecca and Andrew set up a control experiment.

(1)

so they could see what happened over a long period of time.

ResultsPlus
Examiner Comments

This is an example of a response which is too vague to gain credit.

Question 3 (b) (ii)

This question caused candidates some problems. It was generally that the answers lacked precision in reference to the part of the shoot where the auxin was found. Some candidates gained a mark for stating that the auxins were in the tip but very few were able to describe the different action of the hormones in either Andrew's or Becky's plant. There was also confusion between root and shoot which may be due to them confusing this question with the previous one. Several candidates referred to the control experiment which was not required for the answer and although they described the control experiment well, this was not creditworthy as it did not answer the question. It was important here to give the comparison between the two experiments.

(ii) Explain the results of Rebecca's experiment and Andrew's experiment.

(3)

In Rebecca's experiment the black cup stopped the light from getting to the auxins in the tip of the shoot and so they did not elongate a particular side of the shoot and cause only straight growth and bending. Andrew's experiment showed that the auxins could travel through the jelly, cause elongation of cells on one side and cause the shoot to bend.

(Total for Question 3 = 10 marks)

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Examiner Comments

This is a correct response for 3 marks

Question 4 (a) (ii)

The majority of candidates were able to correctly answer this question for two marks. Sweat was acceptable for the water with salts mark and most candidates were able to describe the method of cooling as evaporation.

(ii) Describe the role of the sweat gland in thermoregulation.

(2)

When the body is too hot, the sweat gland produces sweat ~~as~~ because as the sweat evaporates, heat is taken with it so it helps the body cool down. Whereas when the body is too cold, no sweat is produced to reduce heat loss and ~~to~~ help keep the internal conditions constant.

ResultsPlus
Examiner Comments

A correct response for sweat evaporates, cooling the body down

Question 4 (a) (iii)

This question was accessed well overall but a few misconceptions were apparent. Firstly, that candidates referred to a layer of heat being trapped rather than air and also reference to the hair follicle rather than the hair being raised.

(iii) Explain why the muscle attached to the hair follicle is important when a person starts to feel cold.

(2)

this muscle, the erector muscle is important when a person starts to feel cold because is causes the hair to rise up and the skin has a insulation of trapped the air, helping the person to get warm.

ResultsPlus
Examiner Comments

A correct answer with the candidate being awarded 2 marks for the reference to hair rising to trap air which acts as an insulator

Question 4 (c)

It was pleasing to note that more candidates were able to make the link between maintaining a constant temperature and enzyme action, but, as in previous examinations there were a considerable number of less specific answers relating to the body getting too cold or hot and organs shutting down - which was not creditworthy. Candidates still refer to enzymes dying rather than the active site being denatured.

(c) Explain why the temperature of the human body needs to be maintained at 37 °C.

(2)

The temperature needs to be kept at this level in order ~~for~~ ~~enz~~ as enzymes work best ~~at~~ at this temperature and if not, the enzymes will be de natured.

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Examiner Comments

A good example of a correct answer for 2 marks

(c) Explain why the temperature of the human body needs to be maintained at 37 °C.

(2)

The body must maintain at 37°C because if it exceeds or decreases vital organs begin to fail leading to illness or death.

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Examiner Comments

This is an example of the vague answers which were not mark worthy.

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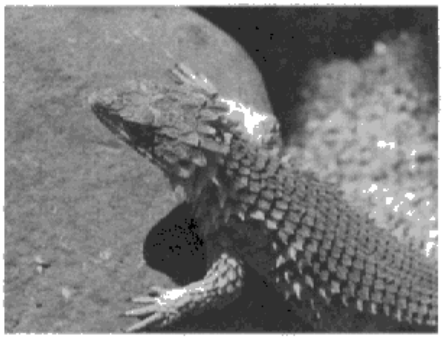
Examiner Tip

Try to be specific in your answers to ensure all possible marks are gained.

Question 4 (d)

Many candidates lost the first marking point for this question as they referred to the reptile being cold-blooded rather than the correct term poikilothermic. As this is a biology paper we expect the candidates to be able to use correct biological terms. Those candidates that answered well were able to recognise the reptile as poikilothermic and that the organisms internal temperature were dependent on the external temperature. Less able candidates were often able to pick up one mark for the sun warming the reptile.

(d) The photograph shows a reptile lying in sunlight.



Explain why reptiles lie in sunlight for long periods of time.

(2)

Because reptiles are poikilothermic and cannot warm themselves up. Therefore they try to ~~retain~~ acquire and retain heat from the sunlight.

(Total for Question 4 = 10 marks)

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Examiner Comments

The candidate has answered this well for 2 marks

Question 5 (a) (i)

This was a fairly simple mathematical response. It was pleasing to note that candidates are getting better at showing their working in order to ensure that, even with the wrong calculation, they may be able to gain one of the two marks available.

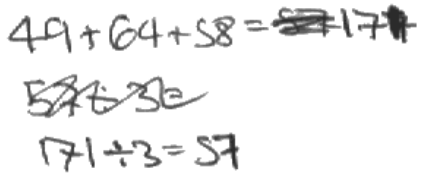
A scientist recorded the nitrate concentrations of the water at site **A** and site **B**.

Her results are shown in the table.

site	nitrate concentration / mg per dm^3			
	sample 1	sample 2	sample 3	mean
A	17	25	18	20
B	49	64	58	

(a) (i) Calculate the mean nitrate concentration found at site **B**.

(2)



answer = 57 mg per dm^3

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A clearly written response for 2 marks with working shown.

Question 5 (a) (ii)

This question was quite discriminating with the more able candidates gaining all four marks and those less able managing 1 or 2 marks. Fertiliser rather than nitrate concentration was a common response which was allowed in the correct context as the question refers to a fertiliser factory. The term eutrophication was mentioned frequently for 1 mark. There were some misconceptions about which plants were affected by the algal bloom and they often did not complete the story as to how oxygen depletion took place - due to respiring microorganisms.

(ii) The scientist observed algae and some dead fish in the river at site **B**.

These were not present at site **A**.

Give an explanation for these observations.

(4)

The explanation for this would have to be eutrophication. Farmers spray fertiliser onto crops containing nitrate and phosphate, when it rains these chemicals ~~to~~ get washed in the nearest river / stream and algae starts to produce rapidly. This prevents sunlight from entering, which prevents photosynthesis, meaning the death and decay of plant. Oxygen levels are now low after decomposition. Oxygen is now used by bacteria & for respiration, oxygen ~~to~~ levels are still low leading to the death of fish.

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Examiner Comments

This candidate clearly understands the process of eutrophication for four marks.

(ii) The scientist observed algae and some dead fish in the river at site **B**.

These were not present at site **A**.

Give an explanation for these observations.

(4)

Because the site B nitrate concentration mean is 57. It's bigger than site A nitrate concentration. And the fertiliser factory between site A and site B. The fertiliser factory pollute the water. So the fish ~~is~~ are die. They don't have oxygen. they can't move. So ~~they are~~ some dead fish in the river at site B.

pollute the air.

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Examiner Comments

This candidate gained 1 mark because they referred to the rise in nitrate concentrations but much more detail of the process that follows this build up are needed for full marks.

Question 5 (b)

This question caused a few misconceptions with many candidates writing about the carbon cycle and talking about global warming rather than living indicators. A lot of candidates also referred back to the previous question on eutrophication talking about algae. There were also some very vague answers related to the use of indicator species such as birds or insects which were too vague to be credit worthy. Those candidates that answered well were able to relate the correct indicator species to the type of pollutant such as black spot fungus on roses being destroyed where there is high levels of sulfur dioxide pollution. Fewer candidates could link the polluted water having low oxygen concentrations.

*(b) Scientists observe living organisms in an environment to assess the level of pollution.

Describe how the level of water pollution and air pollution can be assessed using living organisms.

(6)

Certain organisms like blood worms live in polluted waters only so if scientists see a high concentration of blood worms in the water they know that the water must be polluted but if they see organisms like fresh water larvea they know that the water must not be polluted because they can only survive in none polluted waters.

If scientists see the leaves have black fungus growing on them then that means the the ~~area~~ air in that location is not polluted because that fungus can only survive in ~~clean~~ unpolluted air conditions. If scientists find organisms like lychens they should know that the air in that location is polluted but with lychens it depends because certain colours of lyches and certain species of lychens survive in different amounts of pollution like yellow lychens survive in very heavily polluted areas

(Total for Question 5 = 12 marks)

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Examiner Comments

This candidate has managed to gain four of the six marks available as they have linked the indicator species to the pollution in air and water but have not managed to link both of these successfully to oxygen concentrations and sulfur dioxide concentrations which is needed for the higher marks.

*(b) Scientists observe living organisms in an environment to assess the level of pollution.

Describe how the level of water pollution and air pollution can be assessed using living organisms.

(6)

Air pullution is climate chonge CO_2 in the atmosphere and Sulfer dioxide which contributes to acid rain to knaw if air pollution is present if there is black bacteria on the rose Sulfer dioxide is present and if not then their is no sulfer dioxide present, water pullution such as eutrophication this is when fertilizer is containing nitrate to help the plants grow is spread and then when it rains is washed into lakes, in clean water, Shrimps and is in the water because they can only survive where ther is clean water that has oxygen ~~in it~~ present, otter crimaily such as legworms live in muddy water this is how to find out wether the water is clean.

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Examiner Comments

This candidate was able to describe indicator species without naming any and has made some reference to pollutants for 2 marks

*(b) Scientists observe living organisms in an environment to assess the level of pollution.

Describe how the level of water pollution and air pollution can be assessed using living organisms.

(6)

There are a number of pollution indicators that are also living organisms. When many lichen are found on trees, it shows that the level of air pollution in that area is relatively low as lichen cannot live in acidic environments. Black Spot fungus is a fungus that is put on roses to check air pollution, the Blackspot is killed by sulfur dioxide, so if there is no sulfur dioxide the fungus will be clearly seen, but if there is, then it would not be. Blood worms and sludgeworms are an example of water pollution indicators as they can live in water that has low levels of oxygen, so is polluted. Stonefly can only live in water where there is a lot of oxygen, so if many of them are seen then it shows the water is not heavily polluted.

(Total for Question 5 = 12 marks)

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Examiner Comments

All six marked given here for correct reference to the indicator species correctly linked to their pollutants and type of air or water pollution.

Question 6 (a)

This was generally well answered with candidates able to distinguish the binomial name as consisting of the genus and the species of an organism. Incorrect answers often confused the two and put them in the wrong order or gave a different order of classification such as phylum or kingdom.

State the level of classification for both parts of the binomial name *Rattus norvegicus*.

(2)

Rattus phylum

norvegicus species

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Examiner Comments

Only 1 mark awarded here as candidate has confused genus and phylum.

Question 6 (b)

Most candidates understand the mechanism of mutations causing changes in species and the effect of these on organisms. The most common response seen was that the mutated rats survived to breed and reproduced to pass the mutated gene onto their offspring. There were a few candidates who believed this was about the rats having a new food source in the form of warfarin rather than them being killed by the poison.

(b) Some rats have a mutation which enables them to eat the rat poison Warfarin and survive.

Suggest how the use of Warfarin could lead to an increase in the number of rats with this mutation.

(2)

Warfarin will only kill rats without the mutation. Rats with the mutation of resistance to warfarin will go on to produce offspring that have this mutation, thus increasing the population of rats unaffected by warfarin.

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This is a credit worthy response for 2 marks.

Question 6 (c)

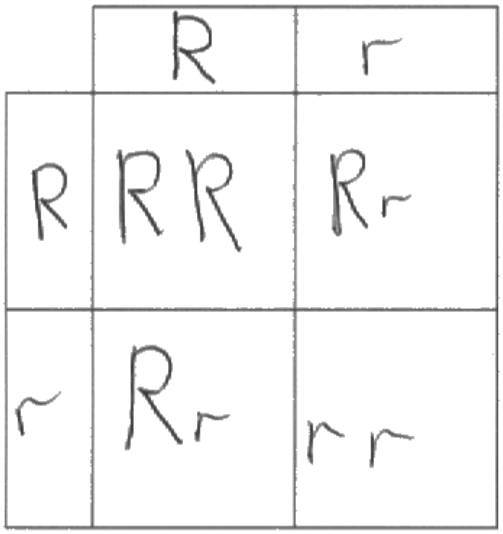
Candidates are getting very good at putting in Punnett squares and the only major confusion was with the gametes put into the Punnett square being incorrect - probably due to candidates not knowing that heterozygous refers to one dominant and one recessive allele.

(c) The allele for Warfarin resistance is recessive.

Complete the Punnett square to show how two rats, both heterozygous for Warfarin resistance, could produce Warfarin resistant offspring.

Use **R** and **r** to show the dominant and recessive alleles.

(2)



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A correct Punnett square for 2 marks

Question 6 (d)

There were a good range of responses for this question with almost all candidates able to access some marks for analysing the information in the graph. Marks were lost for candidates failing to note the effect of antiseptics in killing bacteria or for an explanation of the antibiotic resistance. Some candidates confused antibiotic resistance with a resistance to antiseptics.

Paper Summary

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

- Ensure they have a clear understanding and can compare phototropism and gravitropism.
- Work on their maths skills, particularly when calculating means or reading off graphical data. This is a skill in itself, and is awarded marks accordingly.
- 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 antibiotic resistance was one of the higher tier items.
- It is essential that candidates look to 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 is based around a graph, then information from the graph should be quoted alongside an explanation of the answer, to gain full marks.
- Be careful to look to the command words on the paper especially when a different command word to the norm is asked such as 'evaluate' or 'compare'.

Grade Boundaries

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

http://www.edexcel.com/iwantto/Pages/grade-boundaries.aspx

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