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Examiners' Report
January 2013

GCE Biology 6BI04 01

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January 2013

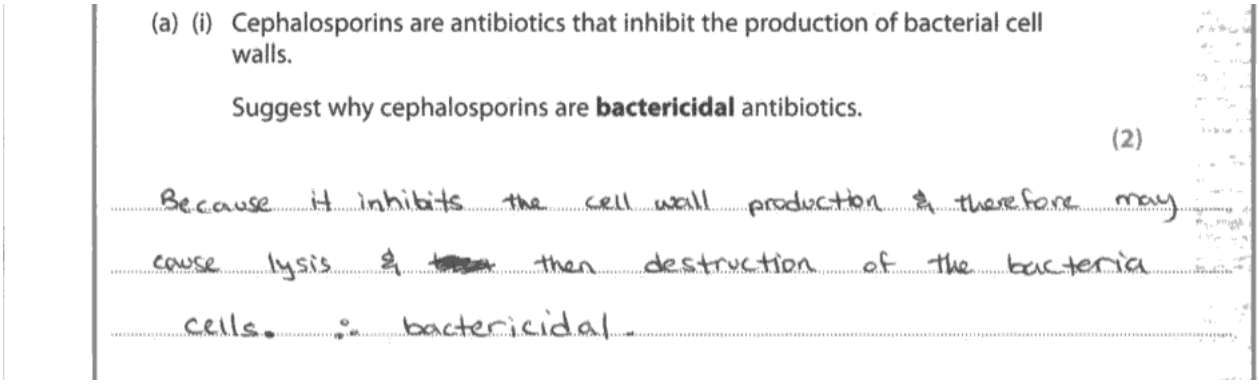
Publications Code UA034275

Introduction

Clearly candidates found this paper accessible as there were some very high scoring scripts, very few blank spaces and all mark points were seen. However, candidates had some difficulties with questions based on HSW concepts, especially questions 2(c), 5(b)(iv) and 6(c)(ii). The parts of the specification that are particularly well learnt and understood include PCR, the immune response and forensic entomology but areas related to the environment and speciation require more attention. The multiple choice questions were tackled without too many problems.

Question 1 (a) (i)

Candidates coped very well with this question and there was surprisingly little confusion between bacteriocidal and bacteriostatic antibiotics. The more able candidates used the mark allocation to suggest why the bacteria were killed or prevented from replicating respectively.



(a) (i) Cephalosporins are antibiotics that inhibit the production of bacterial cell walls.

Suggest why cephalosporins are **bactericidal** antibiotics.

(2)

Because it inhibits the cell wall production & therefore may cause lysis & then destruction of the bacteria cells. ∴ bactericidal.

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Examiner Comments

This a good response scoring 2 marks where the candidate has told us what bacteriocidal antibiotics do and why cephalosporins might kill bacteria.

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Examiner Tip

Always check the mark allocation for a question to ensure that you make enough points to access full marks.

Question 1 (a) (ii)

(ii) Quinolones are antibiotics that inhibit the synthesis of DNA in bacterial cells.

Suggest why quinolones are **bacteriostatic** antibiotics.

(2)

because they stop reproduction and prevent the increase in the number of bacterial cells, where phagocytosis the. the bacterial cells can divide and increase in number / reproduce.

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Examiner Comments

This candidate linked the inability to synthesise DNA with the inability for cell division to occur and then went on to use their knowledge of the effect of a bacteriostatic antibiotic, for 2 marks

(ii) Quinolones are antibiotics that inhibit the synthesis of DNA in bacterial cells.

Suggest why quinolones are **bacteriostatic** antibiotics.

(2)

1 Inhibit reproduction

- Stop bacteria from ~~reproducing~~ reproducing
- by inhibiting the synthesis of DNA
- Means they can not reproduce + pass on genetic information

ResultsPlus
Examiner Comments

This response scored 1 mark. This candidate has attempted to write sufficient for two marks but has simply repeated the stem of the question and their own comment twice.

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Examiner Tip

Repeating the stem of the question will not give you marks - you need to use it and extend or add information to it.

Question 1 (b) (i)

A number of candidates were clearly familiar with this practical, although there were a number of ways of describing the zones of inhibition. The weaker candidates described the appearance of the plates, with the better candidates using the command word to identify what was expected from them in their answer. There were a surprising number of careless mistakes confusing the antibiotic letters up.

(i) Explain how the appearance of the nutrient agar plates, after incubation, would have enabled the scientists to reach these conclusions.

(3)

A clear ring around each disc would show if the antibiotic had worked. This is called the zone of inhibition. With A and C no zone would have been present whereas with the D and B there would have been zone's with D's larger than antibiotic B's.

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Examiner Comments

This is a typical response made by a weaker candidate and scored 2 marks.

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Examiner Tip

When you see the command word 'explain', you are expected to use some scientific knowledge to say why something has happened.

(i) Explain how the appearance of the nutrient agar plates, after incubation, would have enabled the scientists to reach these conclusions.

(3)

Because after incubation the antibiotics would have made a clear zone around the discs creating a zone of inhibition. This is where the antibiotic has diffused through the agar gel. The clear zone can then be measured (measure diameter) using a ruler, and the ~~disc~~ antibiotic which has created the largest clear zone is the most effective. And if antibiotic A and C had no clear zone then it would be conclude that the bacteria is resistant to the antibiotics.

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Examiner Comments

This candidate has attempted to write a full answer, but has omitted to state which antibiotic has the largest zone. The explanation for the lack of zones around A and C is a repeat of the stem of the question. This scored 2 marks.

Question 1 (c)

Disappointingly very few candidates tried to answer this question in its context. It was hoped that candidates would make comments relating to the pillow cases that were also improvements, but many candidates simply wrote out everything that they knew about hospital hygiene practices. Quite a large number of candidates suggested that an improvement would be to wash pillow cases between patients.

(c) Hospital-acquired infections caused by bacteria can be a major problem for patients.

In a study in a London hospital, it was found that pillows contaminated with bacteria could spread infections between patients.

Suggest how this hospital could improve the prevention and control of the spread of infections.

(3)

pillows should be decontaminated between patients. Sterilising the material with a high alcohol concentrated substance would kill the bacteria. Washing the pillows at a temperature higher than the bacterias optimum temperature.

(Total for Question 1 = 12 marks)

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Examiner Comments

This candidate did attempt to answer the question in its context and scored 2 marks.

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Examiner Tip

When deciding how to answer a question, the first thing to do is identify which part of the specification you are being tested on so that you can recall the information that you have been taught. You then need to double check the context of the question and where appropriate, apply your knowledge to that context. Try and avoid writing a generic answer, and writing down everything you know on a topic.

Question 2 (b) (i)

This question was opened up to include the role and production of antibodies as well as the structure. It was pleasing that a range of responses was seen relating to all three aspects. The most common mistake was to state that antibodies bound to two antigens, without making it clear that these were the same antigen.

(i) State **two** characteristic features of antibodies.

(2)

antibodies have a y - shape, with antigen binding/precepter siten. The shands are bonded with disulphide bonds. Antibodies have a specific shape that fits with its specific antigen. They are proteins.

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Examiner Comments

This is an example of a good response, which scored 2 marks, demonstrating knowledge of antibody structure.

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Examiner Tip

If the question states that two features are needed then you must describe two if you want to access full marks. There is nothing wrong in extending your description to include another feature to ensure that you get full marks.

(i) State **two** characteristic features of antibodies.

(2)

They are in a 'Y' shape, the top is specific to a certain antigen, so differs between antigens. The bottom of the protein is constant, always the same for all antibodies, it has a disulphide bridge between the top two regions.

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Examiner Comments

Another example of the high-quality responses seen. This scored 2 marks.

(i) State **two** characteristic features of antibodies.

(2)

Every type of antibody is ~~specific~~ specific to a certain antigen and will be produced by ~~the~~ B-cells

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Examiner Comments

Although this candidate did not focus on structure, they were still awarded both marks.

Question 2 (b)(ii)

A range of responses were seen for this question. Many candidates simply produced everything that they knew about the primary immune response, including the activation and role of T killer cells in the cell mediated immune response instead of focussing on the humoral immune response. These candidates generally picked up marks as they included relevant points about the B cells. Some candidates had clearly not read the first paragraph carefully enough and described the result of HIV infection in initiating an immune response. Others thought that the antibody itself was being injected so described artificial passive immunity.

This was a QWC targeted question but most candidates gave very clear responses.

*(ii) The antibody 2G12 is produced in response to part of a glycoprotein found on the surface of HIV. Synthetic molecules have been made that resemble this part of the glycoprotein. The antibody 2G12 binds to these synthetic molecules.

Using the information, suggest how this may enable scientists to develop a means of producing **active** immunity to HIV infection.

(5)

Scientists can use the synthetic molecules as a vaccine. Then insert it into a patient. The patients' immune system will the actively produce the antibody 2G12, and fight off the synthetic molecules. B-effector cells will be activated by active T-helper cells and cytokines. The B-cell will then divide mitotically to produce B-effector cells and B-memory cells. The B-effector cells will make Complimentary shaped antibodies 2G12, and the B-memory cells will remember the synthetic molecule. This will allow a quick secondary response to the glycoprotein next time.

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Examiner Comments

This is an example of a reasonable response that gained all 5 marks.

*(ii) The antibody 2G12 is produced in response to part of a glycoprotein found on the surface of HIV. Synthetic molecules have been made that resemble this part of the glycoprotein. The antibody 2G12 binds to these synthetic molecules.

Using the information, suggest how this may enable scientists to develop a means of producing **active** immunity to HIV infection.

(5)

• They will be able to develope a Active Vaccination or Simply inject a HIV Sufferer with the antibodies which will be able to create some sort of resistance to the virus. They will be able to bind with the glycoproteins ~~resulting~~ preventing the glycoproteins binding to ~~The~~ CD_4 receptor on T helper cells or phagocites such as macrophages and therefore unable to fuse With the membrane to release it's genetic material (RNA) in with reverse transcriptase and intergrase. which will Prevent & Virus's RNA being made by reversing transcription using Reverse transcriptase ~~AA~~ So making more Viruses. It will then Not bud out ~~eous~~ of membrane, taking some of cells membrane as it's envelope causing lysis. Therefore will be able to use ~~T killer cells to de~~ The immune System to destroy it.

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Examiner Comments

This response scored 1 mark. This candidate clearly had good knowledge of HIV infection, but unfortunately only picked up the vaccination mark as they had mis-identified what was expected of them.

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Examiner Tip

Always read all the information that you are provided with very carefully before you begin to answer the question. It may even be necessary to read it though twice, especially when the question is worth a lot of marks, to ensure that you are writing an answer that matches the question.

*(ii) The antibody 2G12 is produced in response to part of a glycoprotein found on the surface of HIV. Synthetic molecules have been made that resemble this part of the glycoprotein. The antibody 2G12 binds to these synthetic molecules.

Using the information, suggest how this may enable scientists to develop a means of producing **active** immunity to HIV infection.

(5)

Active immunity is when a body produces its own antibodies. Scientists can make one immune to this virus ~~by undergoing~~ through use of ~~vaccination~~ artificial active immunity. A vaccine containing a harmless dose of the synthetic molecules can be injected into someone. When the lymphocytes recognise these ~~mole~~ synthetic molecules as non-self and foreign, ~~they~~ T helper cells will activate T Killer cells and B cells. B cells will divide by mitosis to produce lots of clones of B memory cells and plasma cells. Plasma cells will produce antibodies specific to the antigen. Glycoproteins act as antigens of the HIV virus. These antibodies will attach to the antigens and Phagocytosis will occur. The memory cells produced will stay in the body for long and will be able to attack the same ~~it~~ ~~sys~~ glycoprotein or antigen quicker the next time it occurs, ~~so~~ before any symptoms begin to appear.

ResultsPlus
Examiner Comments

An example of a really high-level response scoring 5 marks; the terminology is correct, the sequence is clear and there is very little irrelevant material included.

Question 2 (c)

This question resulted in a range of responses, covering all mark points.

Suggest why data about HIV infections are often estimates.

(2)

Because not everyone will be aware they have HIV since they will be completly healthy during the chronic phase since there are no symptoms to the disease

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Examiner Comments

This response scored 1 mark and was the most common point made by candidates.

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Examiner Tip

Although this response is clear, the candidate has only made one point and the question clearly requires two points to be made (it has a mark allocation of 2). Always check the mark allocation to guide you in what you are expected to write.

Suggest why data about HIV infections are often estimates.

(2)

HIV invades the immune system cells and destroys them, which means it isn't detected immediately. Because of this, it is difficult to identify every person with HIV infection.

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Examiner Comments

This response did not score any marks. This candidate is trying to make the same point but unfortunately has not taken their answer quite far enough to state that there would be no symptoms present. This was a common error.

Question 3 (a) (i)

This question was extremely well answered with well over half the candidates attaining full marks. It was pleasing to see the number of candidates that could correctly state the temperatures for the three stages in the process; teachers are clearly stressing the importance of knowing precise details about the specified practical work.

(i) Describe how small samples of DNA can be amplified.

(4)

PCR is used. DNA sample, taq polymerase, DNA primers and free nucleotides are added to tube. The contents are heated to 95°C to break hydrogen bonds and separate DNA strands. Temperature is cooled to 55°C so primers can anneal to start of STR sequence. Temp. raised to 70°C to free nucleotides align ~~with~~ against DNA strand (by complementary base pairing) and form an identical strand. Cycle is repeated to amplify DNA.

ResultsPlus
Examiner Comments

This response clearly gets full marks. Mark point 5 could not be awarded as it is not clear that the cycle was repeated several times. This candidate included an explanation of what was happening at each stage, but this was not necessary to be awarded the marks in this instance.

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Examiner Tip

Learn very specific details about all the practicals identified in the specification for all four units. e.g. names of chemicals, specific temperatures, significant equipment

(i) Describe how small samples of DNA can be amplified.

(4)

Polymerase chain reaction can be used where the sample of DNA, DNA polymerase, free nucleotides and primers are placed into a PCR machine. ~~Reverse transcriptase is~~ (Restriction endonuclease is first used to 'cut out' introns from the DNA) The mixture is heated to 90°c to break the hydrogen bonds. It is then cooled to 65°c to allow primers to anneal on to the strands. Finally, it is heated again to 72°c to allow DNA polymerase to synthesise the DNA strand. This is repeated approximately 30 times.

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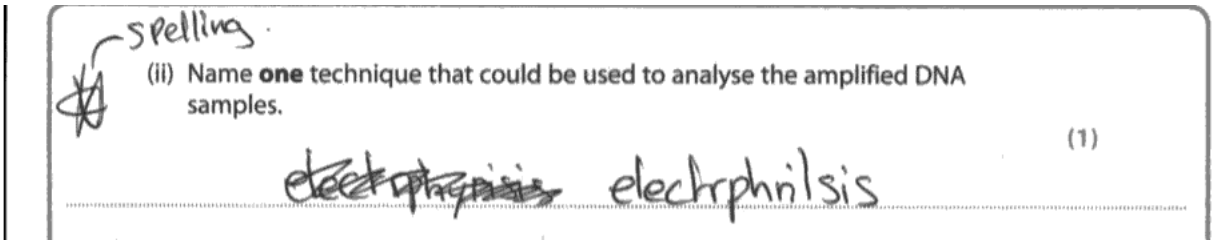
Examiner Comments

Another good response scoring 4 marks. The reference to the use of restriction enzymes is correct here, but there were some candidates who thought that these enzymes were used in the actual reaction itself, either in addition to or instead of DNA polymerase.

Question 3 (a) (ii)



ResultsPlus
Examiner Comments

This scored 1 mark.

There were some interesting spellings of electrophoresis.

Question 3 (b)

This question scored reasonably well as candidates knew that papers were published in Scientific journals and that peer review took place, but there were some odd descriptions of the procedures that take place.

(b) Suggest how the scientists who conducted the study had their results accepted by other scientists.

(2)

They published a paper on a scientific journal which was subject to peer-review before publication.

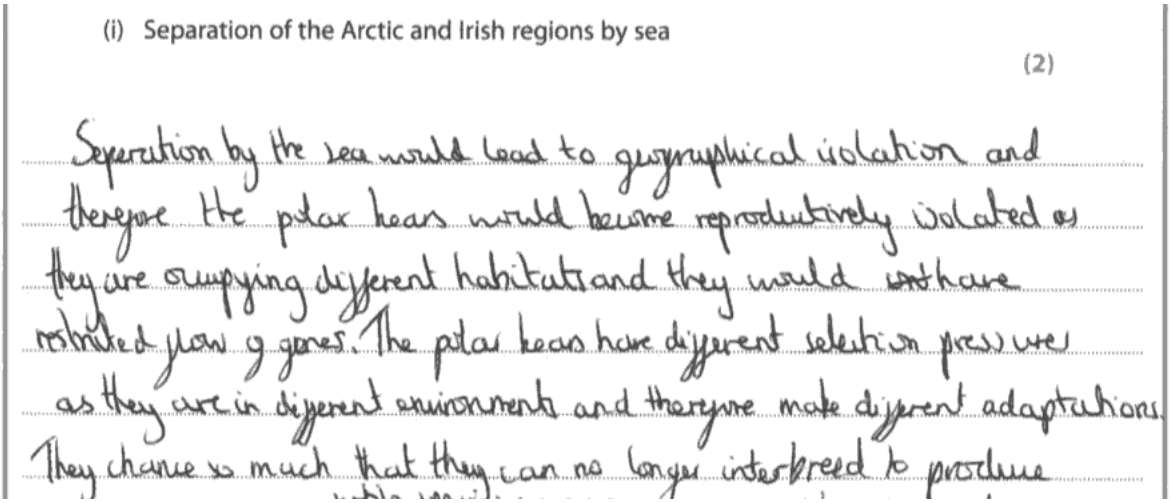
ResultsPlus

Examiner Comments

This answer was not only clear and concise, but the candidate had the right idea of the procedures that take place. This scored 2 marks.

Question 3 (c) (i)

Both parts to question 3(c) generated similar answers; many candidates had clearly seen past paper mark schemes and wrote everything that they knew about selection pressures and reproductive isolation. These responses scored marks in part (i) but not in part (ii).



(i) Separation of the Arctic and Irish regions by sea

(2)

Seperation by the sea would lead to geographical isolation and therefore the polar bears would become reproductively isolated as they are occupying different habitats and they would ~~not~~ have restricted gene flow ~~g~~ genes. The polar bears have different selection pressures as they are in different environments and therefore make different adaptations. They change so much that they can no longer interbreed to produce

ResultsPlus

Examiner Comments

This response, which scored full marks, is very clear and demonstrates a good understanding of species divergence. This candidate understands reproductive isolation and has not confused this term with species, which was a very common mistake.

Question 3 (c) (ii)

(ii) Genetic mutation

(2)

Random genetic mutation ~~can~~ would cause divergence because if the mutation proved to be advantageous, that adaptation would be passed on a continue. ~~[illegible]~~ The more beneficial genetic mutation, the more ~~[illegible]~~ adaptation. Thus divergence from original species.

(Total for Question 3 = 11 marks)

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Examiner Comments

Part (ii) scored less well. Those candidates who identified the correct response did not score well through poor expression. This response, which did not score any marks, is a typical example. We saw lots of mutations being adapted and adaptations being passed onto the offspring. Candidates must write about the effects of the mutations on the genes and the resulting alleles, at this level.

Question 4 (a)

Many candidates identified the link between temperature and development rate and wrote about enzyme activity. Very few linked their answer into an actual process involved in development and as a result mark point 5 was rarely awarded.

4 Frogs are ectothermic animals. This means that their body temperature will vary as the environmental temperature varies.

(a) Explain why body temperature affects the rate of development of animals.

(3)

At higher temperatures, the kinetic energy of molecules increases, causing new E-S complexes to be formed, hence enzyme activity increases. This would lead to a rise in metabolic and biochemical processes, resulting in a greater growth rate in animals.

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Examiner Comments

This response scored full marks. It is clear and accurately worded and actually answers the question.

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Examiner Tip

When writing about enzymes and temperature, remember to:

1. state that it is 'kinetic' energy that is affected
2. talk about the substrate molecules as well as the enzyme molecules
3. never refer to enzymes 'starting' to denature above the optimum temperature.

4 Frogs are ectothermic animals. This means that their body temperature will vary as the environmental temperature varies.

(a) Explain why body temperature affects the rate of development of animals.

(3)

Body temperature affects the rate of enzyme activity of animals. Enzymes needed for respiration, cell reproduction and metabolism are all highly dependent on temperature. The amount of energy required and generated will also vary with temperature. The lower the temperature from optimum temperature, there will be no enzyme activity. The higher the temperature from the optimum, enzymes get denatured.

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Examiner Comments

This response illustrates the points being made above. Although the candidates are saying similar things, this response is much too vague to score marks at this level. This scored 1 mark.

Question 4 (b)

This question did not yield many good answers. The previous question had attempted to lead the candidates into this by getting them to think about enzymes, but few made this connection.

Using the information, suggest why the lower and upper lethal temperatures limit the range of latitudes inhabited by each species of frog.

(2)

Because temperature below the lower lethal temperature & above the upper lethal temperature the enzyme activity of the frog would be very low leading to its death so there is an upper & lower limit to ensure the survival of the frog

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Examiner Comments

This candidate did make the connection and talked about enzymes and therefore scored full marks.

Using the information, suggest why the lower and upper lethal temperatures limit the range of latitudes inhabited by each species of frog.

(2)

- They are limited because if the go below minimum/lower and maximum/upper they will die This means they will not inhabit an area closley related to these latitudes.

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Examiner Comments

This candidate scores the first mark point but has not mentioned enzymes to score anything further.

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Examiner Tip

We try and have a theme running through a question and use each question part to lead you into the next part. In this question we tried to get you thinking about enzymes in part (a) to help you with part (b). Always look out for these clues.

Question 4 (d)

This question was well answered, again there was clear evidence that candidates had completed past papers and knew what was expected of them in this type of question.

(d) Populations of the different species overlap on the boundaries of each latitude range.

Suggest why interbreeding does not take place between these populations.

(3)

Because of reproductive isolation, the male and female gametes may not be compatible, They do not respond to each others mating behaviours, they are ready sexually at different times or their sex organs do not fit

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Examiner Comments

This is an example of a good response which scored full marks and there was no confusion between reproductive isolation and the term species. We accepted comments about incompatible genitalia as we felt that candidates could not be expected to know about frog reproduction.

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Examiner Tip

Learn the difference between a definition of species and of reproductive isolation.

Question 4 (e)

Most candidates linked global warming with an increase in temperature and the idea that the animals would move. Marks did get lost by candidates who did not specify where the animals would move to i.e. somewhere cooler or more northerly. The main reason for very few candidates being awarded full marks for this question was a lack of detail in the responses; only the more able candidates used the mark allocation to give three relevant points.

(e) Suggest how global warming may affect the distribution of these species of *Rana* in North America.

(3)

If global warming occurs then temperature will increase so species ~~~~ that survive in warmer climates (such as R. pipiens who can survive at 3.0°C) will become more abudant there. So the distribution will spread more to the North. If temperature increases to 5.0°C then R. palustris may ~~~~ become abudant there and so competition between species may increase and therefore R. sylvatica may then decrease. Species need alleles to allow them to cope in the climate that they are in or they will die via natural selection.

(Total for Question 4 = 13 marks)

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Examiner Comments

This is an example of a response scoring full marks.

ResultsPlus
Examiner Tip

Use the mark allocation to help you write a sufficient number of comments to access full marks for a question.

Question 5 (a)

This question saw far more specific responses than the similar question last summer did. It is encouraging that teachers and students are learning from these reports and improving the quality of student responses.

5 Photosynthesis can be divided into two main stages, the light-dependent stage and the light-independent stage.

(a) Explain why the light-independent stage cannot take place without the light-dependent stage.

(3)

The light dependant stage produces 2 products needed for the light independant stage. In the light dependant stage photophosphorylation takes place which is the synthesis of ATP through light NADP is also reduced to become reduced NADP. ATP gives the required energy for ~~reduced~~ hydrogen carrier of NADP to transfer hydrogen to GP to form GALP in the calvin cycle.

ResultsPlus
Examiner Comments

An example of a very clear and concise response which scored full marks.

5 Photosynthesis can be divided into two main stages, the light-dependent stage and the light-independent stage.

(a) Explain why the light-independent stage cannot take place without the light-dependent stage.

(3)

The light dependent stage involves the conversion of ADP + Pi to ATP and NADP with hydrogen to reduced NADP. The light independent stages needs ATP and reduced NADP to use the energy to convert GP into GALP.

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Examiner Comments

This response illustrates one of the most common errors seen. It is not clear from the response that it is ATP (and not the reduced NADP) that provides the energy for the reaction. This scored 2 marks.

ResultsPlus
Examiner Tip

Try to keep your sentences as simple as possible and put only one piece of information in each sentence. This will avoid ambiguity and the possibility of losing marks as a result. This will also help you to write enough pieces of relevant information to match the mark allocation.

Question 5 (b) (ii)

This question was not well answered. Very few candidates understood the implications / limitations of interval data. The candidates that did recognise that the minimum temperature was above zero did not put an upper limit on it.

(ii) The temperatures used in this investigation were 0°C, 10°C, 20°C, 30°C, 40°C and 50°C.

6

Suggest what the results of the investigation show about the minimum temperature required for photosynthesis in *Elodea*.
Give a reason for your answer.

(2)

The minimum temperature needed is ~~anything~~ above 0°C as at 0°C it was not photosynthesising but past 0°C it started to photosynthesis for example at 5°C it was photosynthesising at a rate of 50

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Examiner Comments

This is unfortunately an example of a typical response which scored no marks.

(ii) The temperatures used in this investigation were 0°C, 10°C, 20°C, 30°C, 40°C and 50°C.

Suggest what the results of the investigation show about the minimum temperature required for photosynthesis in *Elodea*.
Give a reason for your answer.

(2)

the minimum temperature required for photosynthesis in Elodea is 10°C or is between 0°C and 10°C, because at 0°C no photosynthesis took place while at 10°C the rate of photosynthesis was 100. Therefore, it is possible that the minimum temperature is between ~~with~~ 0°C – 10°C, under 10°C is the compensation point

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Examiner Comments

Those candidates who did score 2 marks, generally made these two points (mark points one and two).

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Examiner Tip

Be prepared to answer questions relating to HSW not just the unit specification points.

Question 5 (b) (iii)

A good understanding of the term 'abiotic' was demonstrated in the responses but too many candidates simply repeated the term 'controlled' so were not awarded full marks. Candidates should be reminded to define / explain all components of a term to access full marks.

Question 5 (b) (iv)

This question served as a good discriminating question. The weaker candidates only attempted to describe how the conclusion was supported, the more able candidates tried to give reasons for and against the conclusion, with only the most able candidates accessing full marks.

(iv) The student, who carried out this investigation, wrote the following as part of her conclusion.

Enzymes control the rate of photosynthesis in *Elodea*.

Discuss how far the results of this investigation support her conclusion.

(4)

The rate of photosynthesis increases with an increase of temperature, meaning that the metabolic processes are taking place. It reaches an optimum temperature at 30° where therate of photosynthesis is the highest. Then the rate starts to fall as the enzymes get denatured. Below 0° there is no photosynthesis proving the enzymes are inactive as it maybe frozen. The results in the graph support her results as it is similar to a graph of temperatur and enzyme activity.

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Examiner Comments

This is an example of one of the more common answers, where the candidates are trying to explain why the results support the investigation. This response scored 2 marks.

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Examiner Tip

Generally, if a question asks you to 'discuss' something then you need to talk about both sides of the argument.

(iv) The student, who carried out this investigation, wrote the following as part of her conclusion.

Enzymes control the rate of photosynthesis in *Elodea*.

Discuss how far the results of this investigation support her conclusion.

(4)

Enzyme activity is effected by temperature, the extreme hot or cold temperatures can inhibit enzyme activity and the creation of enzyme-substrate complexs which inhibits the rate of photosynthesis. The results show that the rate of photosynthesis declines rapidly after 40°c from 340 units to 50 units demonstrating that high temperatures like 40°c can denature enzymes and inhibit activity rapidly. close to Photosynthesis's rate peaks at 30°c which is the optimum temperature for enzyme activity. Below 20°c the rate of photosynthesis inclines from 0 units to 340 units supporting that as ezyme activity increases so does the rate of photosynthesis.

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Examiner Comments

This candidate has made a good attempt at describing how the results support the conclusion, but unfortunately has mis-quoted figures from the graph. This scored no marks.

ResultsPlus
Examiner Tip

Always check the values of points read from a graph to ensure that they are accurate.

(iv) The student, who carried out this investigation, wrote the following as part of her conclusion.

Enzymes control the rate of photosynthesis in *Elodea*.

Discuss how far the results of this investigation support her conclusion.

(4)

· Enzymes are needed and require a moderate temperature in order for photosynthesis to be carried out effectively. Her results show that at 0°C there was no enzyme activity and so no rate of photosynthesis. At 10°C there is a slight gradual increase in the rate of photosynthesis as the enzyme can work faster at higher temperatures. At 30°C the rate of photosynthesis starts to decrease. This could be due to enzymes being denatured, however it could also be due to various other limiting factors of photosynthesis for example, the amount of light given to each of the plants was not sufficient enough in order to further increase the rate of ~~the reaction of~~ photosynthesis.

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Examiner Comments

This candidate has attempted to provide evidence to support the conclusion and to explain why it is not fully supported. This response scored 2 marks.

Question 6 (a) (i)

Candidates clearly understood the concept of succession but many described succession from bare rock, rather than giving a succinct definition of the term. The mark scheme did allow for this.

(a) Explain what is meant by each of the following terms.

(i) Succession

Succession is the change of species in a habitat over time. (2)
It is the process from which bare land with no species inhabiting it becomes a habitat for a species, and how the habitat changes to accommodate other species till a climax community occurs.

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Examiner Comments

This particular candidate gained both marks. They gave both a definition and then went on to give an example.

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Examiner Tip

Learn the definitions of key terms used in the spec.

Question 6 (a) (ii)

Again, very few candidates gained both marks by giving an actual definition of the term. The second mark was awarded frequently as candidates clearly knew that the community was stable. Mark point one tended to be awarded for a response that implied a climax community related to the final stage of succession.

(ii) Climax community

(2)

This is the final community present in succession, this is stable and there are species interactions as each species occupies a specific niche and all species work together.

ResultsPlus
Examiner Comments

This is an example of a good response which scored full marks.

(ii) Climax community

(2)

A community that have already achieve a stable condition where the species in the community will not change anymore

ResultsPlus
Examiner Comments

This response scored 2 marks. This is an example where mark point one was awarded for the implication that a climax community is the final stage of succession.

Question 6 (b) (i)

A whole range of responses were seen for this question.

(i) Suggest why it is important to conserve rare and endangered plants.

(2)

The plants may be vital to their environment and without them other species could die. some species may also be important to humans, like for medicine. we have a duty as the ones who caused the decline in numbers

ResultsPlus
Examiner Comments

This response scored 1 mark. This candidate was awarded the mark for the plants having possible medicinal uses. The reference to the plants being vital to their environment and other species was too vague.

ResultsPlus
Examiner Tip

Try to be as specific as possible, relating your answer to the context of the question.

(i) Suggest why it is important to conserve rare and endangered plants.

(2)

1 Conserving these plants will keep biodiversity high in the area. Many herbivors may rely on these plants for food or shelter, so conserving the plants to prevent them for extinction will also preserve existing reliant communities.

ResultsPlus
Examiner Comments

An example of a good response scoring 2 marks.

ResultsPlus
Examiner Tip

Check the number of marks allocated to the question to guide you. Two marks here indicates that two suggestions are needed; giving three will not hurt.

Question 6 (b) (ii)

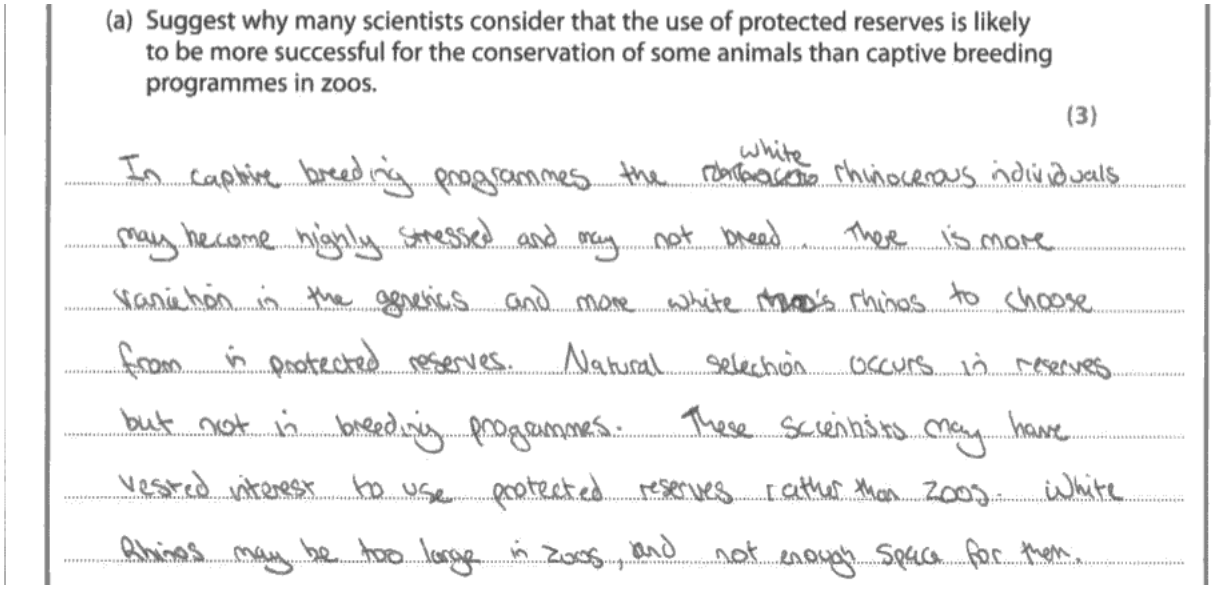
About half the candidates came up with a correct suggestion for this question. Some of the incorrect ideas gave the impression that the question had not been read properly.

Question 6 (c) (ii)

This question caused all sorts of problems to the candidates, as do many of the HSW-based questions.

Question 7 (a)

Candidates showed a reasonable knowledge and understanding of conservation techniques. The full three marks were scored by those candidates who realised that they were supposed to give three suggestions. Probably the commonest suggestions related to the animals being more stressed in a zoo and less likely to breed.



(a) Suggest why many scientists consider that the use of protected reserves is likely to be more successful for the conservation of some animals than captive breeding programmes in zoos.

(3)

In captive breeding programmes the white rhinoceros individuals may become highly stressed and may not breed. There is more variation in the genetics and more white rhinos to choose from in protected reserves. Natural selection occurs in reserves but not in breeding programmes. These scientists may have vested interest to use protected reserves rather than zoos. White rhinos may be too large in zoos, and not enough space for them.

ResultsPlus
Examiner Comments

This candidate put forward several suggestions and gained all three marks.

(a) Suggest why many scientists consider that the use of protected reserves is likely to be more successful for the conservation of some animals than captive breeding programmes in zoos.

(3)

This is because in the wild it means that ~~there~~ the baby rhino's still can look after themselves and can feed and survive ~~while in captivi~~ while in captivity the baby Rhino's might not have the life lessons which means when released into the wild they will die anyway, but were they are protected in reserves baby rhinos will learn to live for themselves and number will increase.

ResultsPlus
Examiner Comments

This candidate has written a lot, but only put forward one suggestion and scored 1 mark.

ResultsPlus
Examiner Tip

If there is more than one mark for a 'suggest' question where you are not asked to explain or describe anything, you must put forward more than one suggestion to access full marks.

Question 7 (b)

Candidates on the whole have good knowledge and understanding of this topic, particularly of forensic entomology. It was evident that a number of candidates had not read the question properly as there were several descriptions of changes to body temperature and rigor mortis. Very few candidates seemed to appreciate that all available information would be put together to determine the time of death (mark point 9). This was a QWC question; the commonest mis-spelt words, not surprisingly, were entomology and succession.

Suggest how the time of death of a white rhinoceros could be determined if it is discovered several days after being killed.

(5)

You could use the sign of decomposition and the stage of succesion and the forensic entomology. Forensic entomology helps detemine how long an organism has been dead by looking at the type of insects that colonised the dead body and the life cycle of the insects. Decomposition helps determine the time after death. Microorganisms decompose the organic matter into small molecules e.g. CH_4 and CO_2 and are released into the atmosphere. Also, there will be green discloration around the skin. Tissues break down by their own enzymes and cause the liquid to seep out into the surrounding area. This is autolysis. Bacteria causes blisters which contain CH_4 and CO_2 and when they release, the dead body becomes bloated.

(Total for Question 7 = 8 marks)

ResultsPlus
Examiner Comments

This is a typical example of the high quality responses that were seen for this question. Although entomology is mis-spelt, this candidate has made sufficient creditworthy points to still gain full marks.

ResultsPlus
Examiner Tip

It is always worth trying to make more points than there are marks allocated for a particular question, particularly in the QWC questions.

Suggest how the time of death of a white rhinoceros could be determined if it is discovered several days after being killed.

(5)

~~The extent of the decomposition can't be use~~ Forensic entomology can be used to assess the stage at which adult blowflies are in their life cycle. This is used as blowflies ~~can be~~ take 24 hours to lay eggs. ~~The Forensic~~ Forensic entomologist can look at the stage the life cycle is at (e.g 3rd instar stage) and determine that the body died a certain number of hours ago. This in combination with the extent of decomposition would provide an accurate time of death as decomposition can also be used in this case.

ResultsPlus

Examiner Comments

Another example of a good answer scoring full marks.

Suggest how the time of death of a white rhinoceros could be determined if it is discovered several days after being killed.

(5)

- The succession of organisms inside the body.
- Time of flys arival can be recorded, time of beetles too.
- forensic entomology
- How much of the rhinoceros is decayed.
- Skin starts to blister after ~~around~~ a week (depending on organism)
-
- Determining of how old larvea of flys is inside the body.

ResultsPlus
Examiner Comments

Although bullet point answers are acceptable, the information does need to be in some sort of sentence i.e. not just a list of key terms. The poor spelling in this response was only penalised once. This response scored 4 marks.

ResultsPlus
Examiner Tip

Do not simply list key terms - they need to be put in some sort of sentence, but bullet points are fine otherwise.

Question 8 (a) (i)

Question 8 probably caused candidates the most problems. Although both lysozymes and interferons are clearly on the specification, they have not been tested very much and candidates have not been asked to make a comparison between them.

(a) (i) Describe how the production and action of interferon differs from the production and action of lysozyme.

(3)

Interferon is a protein that is produced by cells infected by viruses, and it diffuses to the surrounding cells to prevent viral reproduction by preventing viral protein production. Lysozyme is an enzyme secreted from the ~~from~~ body in saliva & tears, which destroys bacteria instead of viruses. It is produced by specific cells, and not from cells that have been infected like interferon. Lysozyme works by destroying bacterial cell walls, not by inhibiting viral protein synthesis.

ResultsPlus
Examiner Comments

The more able candidates did score full marks on this question. Many gave separate descriptions of the molecules, but as we had not actually used the command word 'compare' we decided to piece together their answers. This response scored full marks.

ResultsPlus
Examiner Tip

Again, use the mark allocation to help guide you into how much you write. If the question asks you to give differences and is worth three marks, then you must give three differences.

(a) (i) Describe how the production and action of interferon differs from the production and action of lysozyme.

(3)

Interferons are only produced when viruses have entered a cell and they inhibit the replication of viruses so the virus cannot spread to other cells. Lysozyme is produced constantly from certain cells (eg in tear ducts) and act on bacteria, not viruses and they attack the cell wall.

ResultsPlus
Examiner Comments

This candidate has the right idea but unfortunately their answer is poorly worded and we felt not clear enough for mark point 2. This scored 2.

ResultsPlus
Examiner Tip

If you have time at the end of the exam always read through your answer very carefully, word for word. You might think you have the right answer but you must check that what you have written makes sense and actually says what you intended.

(a) (i) Describe how the production and action of interferon differs from the production and action of lysozyme.

(3)

Interferon is produced by cells to kill viruses by inhibiting them and lysozyme is found in tears and sweat to kill bacteria by engulfing it and releasing enzymes to kill it.

ResultsPlus
Examiner Comments

Another example of a candidate with the right idea but we really cannot accept the idea that viruses are alive and can therefore be killed. This scored 1 mark.

ResultsPlus
Examiner Tip

Wording of answers is very important to relay correct Biology. Viruses are not living organisms and therefore cannot be killed. Remember that enzymes are not living organisms either and therefore they cannot be killed - this is another frequent mistake that candidates make.

(a) (i) Describe how the production and action of interferon differs from the production and action of lysozyme.

(3)

Lysozymes are found in tears and mucous and destroy the cell walls of pathogens. These are used as physical barriers to prevent ~~&~~ viruses and bacteria from entering a body. Interferons ~~destroy~~ are produced by an ~~a~~ infected cell to warn other cells that ~~they~~ there is a foreign body found. They inhibit ~~go~~ protein synthesis, meaning that viral DNA cannot be synthesised. These are produced when bacteria and viruses are in the body.

ResultsPlus
Examiner Comments

Candidates need to appreciate how the body reacts to bacteria differently from viruses; the two types of microorganisms should not be discussed as though they are the same. Although not relevant to this particular response, many candidates made vague references to pathogens instead of specifying bacteria or viruses. This response scored 1 mark.

Question 8 (a) (ii)

Very few candidates picked up on the link between lysozymes and enzymes. Those that did rarely gave enough information to gain all four marks, although all four mark points were seen.

(ii) Suggest why the protein structure of lysozyme is important to the way in which it acts against pathogens.

(4)

The protein structure decides which receptors are on the lysozyme in order for them to bind to pathogens and destroy their cell walls. It also determines which enzymes are suitable for catalysing the reaction

ResultsPlus
Examiner Comments

This candidate had the right idea but the response was poorly worded. The reference to pathogen was too vague. This example scored 1 mark.

(ii) Suggest why the protein structure of lysozyme is important to the way in which it acts against pathogens.

(4)

- Protein structure affects the three dimensional shape of the enzyme's active site.
- The active site will be specific to the structure of the cell wall of the pathogen
- Hence, the lysozyme will only be able to break down the cell wall (or capsid) of pathogens ~~which~~ if the cell wall structure is complementary to the structure of the active site.
- Therefore, lysozyme will only be able to 'destroy' pathogens with such cell wall structure.
- If sites are incompatible to the structure of the cell wall, the cell wall cannot be broken down.

ResultsPlus
Examiner Comments

Again the right idea but poor wording prevents many marks from being awarded. The reference to 'capsid' negates mark point three. This response scored 2 marks.

ResultsPlus
Examiner Tip

Make sure that you understand the differences between the structure, behaviour and body responses to bacteria and viruses. Check through your answer to make sure that you are clear about these differences.

Question 8V (b) (i)

This part of question 8 was probably answered the best. Candidates tended to know which cells produced histamines and the characteristic signs of inflammation. The commonest mistake was naming wrong types of blood vessels for mark point 3.

(i) Explain why an insect bite, which breaks the surface of the skin, may lead to inflammation around the injury.

(3)

The damaged white blood cells release histamines which allow arterioles to become dilated, meaning more blood plasma, antibodies and white blood cells will be at the area, this will cause the oedema to around the injury

ResultsPlus
Examiner Comments

Full marks for this response.

(i) Explain why an insect bite, which breaks the surface of the skin, may lead to inflammation around the injury.

(3)

when the surface of skin is broken, white blood cells may also be damaged, this creates an inflammatory response where histamine is released causing the arteriole and capillaries to dilate in the surrounding area causing oedema and increased blood flow to the area where the cells in the plasma eg phagocytes can destroy any pathogens.

ResultsPlus
Examiner Comments

Another clear response which scored 3 marks.

Question 8 (b) (ii)

Not a well-answered question, partly through poor wording and partly because not enough statements were made to access the full three marks. Mark point three was probably the commonest, with a number of candidates making the fifth and sixth points.

Suggest why applying this cream might be better than taking tablets containing antihistamines.

(3)

- Inflammation is a localised response and only occurs in a specific area. Applying the ~~antihistamines~~ antihistamines directly to the site will mean that they act faster to break down or inhibit histamines and thus, reduce inflammation.
- If tablets are taken orally, they will take longer to deliver the antihistamines to the affected site. Also, their concentration at this site will be much lower than if applied directly.

(Total for Question 8 = 13 marks)

ResultsPlus
Examiner Comments

This is an example of one of the clearer responses that was seen for this question and scored full marks.

Suggest why applying this cream might be better than taking tablets containing antihistamines.

(3)

The antihistamines would be applied directly to where it is needed. This reduces the amount of histamines in the area, reducing the inflammation. A tablet would take much longer to give an effect as it has to travel to where it is needed.

ResultsPlus
Examiner Comments

This response is more typical of the ones that we tended to see. This candidate has made a good attempt at answering the question but unfortunately has repeated too much of the stem of the question without extending the information given. This scored 1 mark.

ResultsPlus
Examiner Tip

Although it is important to use the information given to you in the stem of the question, you must extend it and not simply reword it.

Paper Summary

Based on their performance on this paper it is evident that there were two main causes for candidates losing marks. Firstly, poor wording and secondly, insufficient points were being made in an answer to access full marks.

Candidates are offered the following advice:

- The meanings of terms used in the specification need to be learnt and not simply examples of them e.g. succession
- The difference between the terms species and reproductive isolation needs emphasising.
- The uses of the terms mutation, alleles and genes need clarification.
- Emphasis on the mark allocation, especially for suggest questions that do not require an explanation.
- More statements than marks allocated should be made, especially in QWC questions.
- Candidates need to understand the HSW specification points as well as the topic specification points.
- Although bullet points are acceptable, key words on their own are not.

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