



Examiners' Report

June 2018

IAL Biology 4 WBI04 01

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Introduction

This session saw some responses of a very high standard; many candidates had clearly prepared themselves thoroughly for the exam and had followed advice that we have given them in previous reports on how to answer certain types of question.

We saw very few blank responses and the QWC and multiple choice questions performed well.

Question 1 (a) (i)

This question caused very little problem to many candidates, which was a nice straightforward start to the paper. Candidates who did not score on this question tended to be too vague and wrote 'light-dependent reaction' as their answer.

Question 1 (b) (ii)

A large proportion of candidates knew the relative position of the H to the OH group in a glucose molecule. However, fewer appreciated that it is the position of these components on carbon 1 that determines the specific sugar molecule.

(ii) Use the information in the diagram to explain why this is an alpha-glucose molecule.

(2)

This is an alpha-glucose molecule because the first carbon has an -OH group facing downwards while a β -glucose molecule would have the -OH group facing upwards.



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Examiner Comments

This is a very clear response, illustrating both mark points.

(ii) Use the information in the diagram to explain why this is an alpha-glucose molecule.

(2)

the position of the OH groups attached to the carbons allows the type of glucose molecule to be determined.

it is alpha-glucose because the C₁ & C₄ have OH groups attached at the same position and C₂ & C₃ have their OH groups attached on opposite sides with C₂'s below the molecules ring.



This response is too vague for the orientation of the OH group. It is typical of many of the responses where both carbon 1 and carbon 4 were named.

Question 1 (c)

Candidates who had read the question and attempted to answer it scored well. A number of candidates clearly knew all about the biochemical reactions taking place in the stroma but did not phrase their response in such a way as to answer the question.

(c) Explain the roles of the stroma in the synthesis of glucose.

(2)

Stroma is place where light independent reaction / calvin cycle take place with CO_2 in the and RuBP fixed together, the presence of Rubisco enzyme to produce G3AP which is know as carbon fixation.
Stroma contains the enzymes needed for light independent reaction (enzyme RUBISCO)



This candidate has clearly answered the question and scored both mark points.

(c) Explain the roles of the stroma in the synthesis of glucose.

(2)

In the stroma the light-independent reaction or Calvin Cycle takes place. In the stroma glucose is synthesised. As RuBP reacts with carbon dioxide to react a unstable 6C compound and is catalysed by RUBISCO into two 3C sugar compound GP. Reduced NADP converts GP to form GALP a glucose.



This candidate scores the first mark point but not the second one as they have given us an account of the light-independent reaction and not told us the role of the stroma in it.

Question 1 (d)

The responses to this question were probably the most disappointing on the paper. Very few candidates told us that fructose was made from glucose but more disappointingly, a relatively large number of candidates did not seem to know that sucrose is made of glucose and fructose.

(d) Glucose is used for the synthesis of sucrose in plants.

Describe how sucrose is synthesised from glucose.

(2)

α Glucose ~~forms~~ is converted into fructose.

α Glucose forms glycosidic bonds with fructose to form glucose.



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Examiner Comments

This was one of the few responses that scored two marks.

Question 2 (a)

This question was in a slightly different style to questions on previous papers. Candidates have a clear understanding of the term 'endemic' and were able to select the appropriate information from that given to answer the question correctly.

- (a) Using the information given, explain what proportion of baobab tree species are endemic to Madagascar.

(2)

6 out of the 9 trees are endemic to Madagascar as they are only found in Madagascar.

Endemic species are found only in one area. Only 6 baobab trees are found only in Madagascar so these 6 species are endemic to Madagascar.



An example of a clear response, scoring both mark points.

Question 2 (b) (i)

When this question was written it was anticipated that candidates would write for the first mark point, 'the conditions are the same'. We saw many responses where the candidates had given a higher level response, describing the same selection pressures or common ancestors.

(b) The species of baobab trees found in mainland Africa and Australia look almost identical.

Suggest **one** reason for each of the following.

(i) These two species look almost identical.

the two species may be very closely related⁽¹⁾ meaning their genotypes are similar and because of the similar environments the phenotypes, shown characteristics are almost identical



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Examiner Comments

This was a nicely reasoned response.

Question 2 (b) (ii)

Candidates who explained that these two baobab trees were separate species because they could not produce fertile young easily scored the mark for this question. A number of candidates explained that this was due to reproductive isolation, which would have been fine but they included references to geographical isolation implying that this caused the trees to be separate species.

Question 2 (c)

We saw all four of the possible mark points, with the second and fourth being the most frequent. The main reason for candidates not scoring two marks was because they only described one adaptation.

- (c) Using the information given, explain how baobab trees are adapted to living in dry areas.

(2)

Baobab trees can store thousand litres of water so when they are able to store such a huge amount of water they will be able to survive in dry condition. They can also shed leaves in dry season so it reduces the rate of transpiration from the leaves so less amount of water is lost so its adapted to live in dry areas.



This is a good example of a response scoring mark points 2 and 4.

(c) Using the information given, explain how baobab trees are adapted to living in dry areas.

(2)

Baobab trees are able to store thousands of liters of water. So during heavy rain seasons, it stores a lot of water and uses it to stay alive and hydrated during dry seasons. They are large so they contain a lot of large xylem vessels that conduct water.



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Examiner Comments

Mark points 1 and 2 are illustrated in this response.

(c) Using the information given, explain how baobab trees are adapted to living in dry areas.

(2)

Because they can store lots of water so they are not dependent on an external water source. They shed their leaves in dry season so they do not have leaves throughout the whole year and more seeds are dispersed.



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Examiner Comments

This candidate has attempted to give two reasons but neither really explains why the tree is adapted. It is more like two descriptions.



The command word 'explain' means that you need to use some Science to say why or how. Try using terms such as: because, therefore, so

Question 2 (d) (i)

There were plenty of different ideas catered for in the mark scheme and we saw all of them. Candidates who did not gain full marks were those who did not state what the actual climate change was or only described one effect.

(d) Some of the baobab trees in Madagascar are listed as endangered species.

(i) Climate change is thought to be partly responsible.

Explain how climate change could affect the populations of baobab trees.

(3)

Climate change suggests that mean average temperature on the Earth's surface increases. Due to this rainfall patterns fluctuate and tortoises might not eat the seeds anymore as they migrate due to the weather. Therefore, less seeds are spread, which could decrease the population of baobab trees.



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Examiner Comments

This candidate gained mark points 1 and 7 for using the information in the question about the tortoises.



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Examiner Tip

Always read the information in the question carefully and use it - it will not be included in the question if it is not needed.

(d) Some of the baobab trees in Madagascar are listed as endangered species.

(i) Climate change is thought to be partly responsible.

Explain how climate change could affect the populations of baobab trees.

(3)

- Baobab trees are found only in dry areas.
Due to climate change the surrounding areas will be warmer and dryer and the population of baobab trees in that area would ^{change} ~~increase~~.
- Thus there is ^{less} ~~more~~ & more competition in terms of space and water for example.
- The pt. trees that struggle to compete will die off and ~~the~~ therefore the population will eventually fall.



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Examiner Comments

This candidate took an alternative route and talked about a change in competition for mark points 1 and 5.

Question 2 (d) (ii)

We saw different combinations of all possible mark points for this question.

- (ii) Suggest **two** reasons, other than climate change, for baobab trees becoming endangered.

(2)

deforestation and the extinction of
some tortoises species that help spreading
baobab seeds.



This candidate opted for reasons that were mark points 2 and 1.

- (ii) Suggest **two** reasons, other than climate change, for baobab trees becoming endangered.

(2)

- A disease may be present wiping out all population
- The number of herbivores feeding on trees may be higher than usual, so it is more eaten



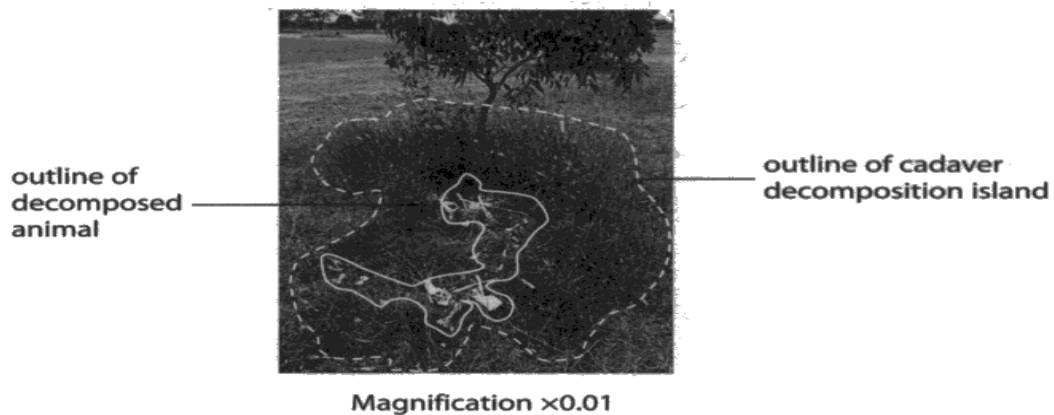
This candidate was awarded mark point 3 and 4 for their suggestions.

Question 3 (a)

We saw some excellent responses for this question. We have asked about the role of microorganisms in decomposition several times in the past and candidates have clearly used these in their preparation for this exam.

- ✓ When a dead animal (cadaver) decomposes, an area called a cadaver decomposition island can form.

The photograph below shows a cadaver decomposition island.



- (a) Describe the role of microorganisms in recycling the organic matter in a dead animal. (4)

microorganisms, like bacteria or fungi, are saprophytic, so they are able to release digestive enzymes such as proteases on the animal and they digest the protein (polymer) into smaller monomers of amino acids. These decompose & release carbon dioxide by respiration, and ~~also~~ absorb the monomers; ~~as well as~~ ~~leave~~ ~~of~~ ~~and~~ taken up by the soil, so it fertilises the soil, while the decomposed ~~contribute~~ to the recycling of in the nitrogen cycle.

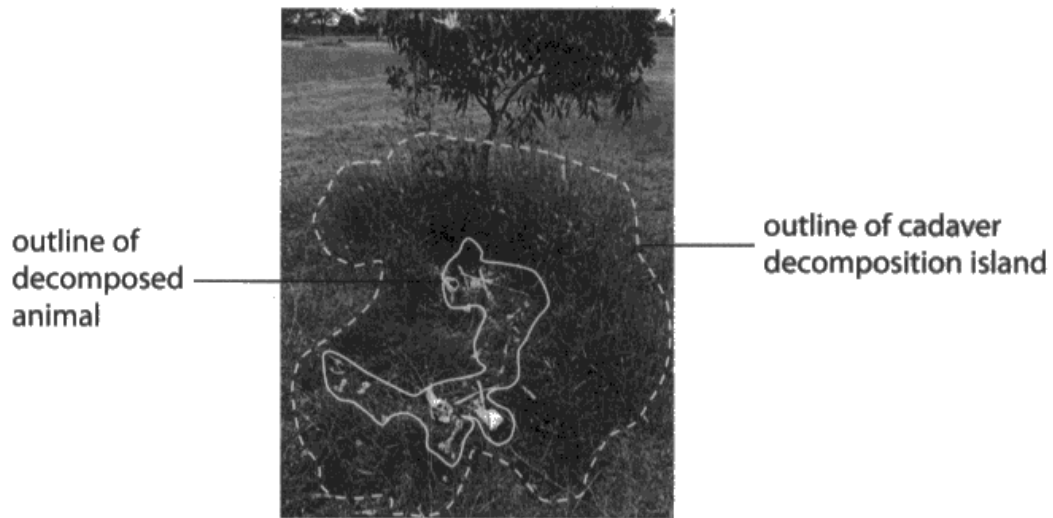


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Examiner Comments

This is an example of a very good response, gaining mark points 1, 2, 5, 3 and 6. For mark point 4, we wanted to know what was being respired.

3 When a dead animal (cadaver) decomposes, an area called a cadaver decomposition island can form.

The photograph below shows a cadaver decomposition island.



Magnification $\times 0.01$

(a) Describe the role of microorganisms in recycling the organic matter in a dead animal.

(4)

- The microorganisms like bacteria and fungi are decomposers.
- The decomposition of dead animal occurs by releasing extracellular enzymes like protease and amylase.
- The hydrolytic enzymes break down Peptide bond by Protease and Glycosidic bond by Amylase forming amino acids and Glucose.
- The amino acids and glucose are taken up by the microorganism where Glucose is used in Respiration which releases Carbon dioxide to the atmosphere and amino acids taken up to synthesise proteins like enzymes and for Growth.



This is another good response but the candidate has gone into auto pilot and not considered the context of the question. The cadaver is an animal therefore mark point 2 cannot be awarded as amylase would not be involved in its decomposition.



Read the question carefully, as your response must answer the question being asked in the context that it is asked.

Question 3 (b)

This was the first of the two QWC questions. In general the responses were presented clearly and logically. Pleasingly, many candidates appreciated that there had to be two parts to their answer, one part considering succession and the other part biodiversity. Some candidates addressed these aspects in relation to the decomposing cadaver whilst others in relation to the cadaver island. Our mark scheme catered for both contexts.

*(b) Below are two statements about cadaver decomposition islands.

1. The formation of a cadaver decomposition island is an example of succession.
2. Cadaver decomposition islands increase the biodiversity of an area.

Using the information in the photograph and your own knowledge, explain these two statements.

(6)

As the land next to and near the cadaver decomposition island was originally surrounded by only short grasses, the microorganisms or pioneer species decomposed the carcass and through their excrement produced soil that was able to allow the growth of other organisms. Taller grasses were able to grow on that patch of soil along with a small tree. The land was originally dry grass and is now ^{covered with} more species of plants. This is an example of secondary succession as the land was already able to grow plants and harbor animals. The decomposition islands allow for more plants to grow which in turn attract herbivores. These herbivores then attract predators, when the herbivores are killed, more decomposition islands form and thus biodiversity increases.



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Examiner Comments

This is quite a good example of a typical response that illustrates mark points 2, 3, 4 and 5.

*(b) Below are two statements about cadaver decomposition islands.

1. The formation of a cadaver decomposition island is an example of succession. ✓
2. Cadaver decomposition islands increase the biodiversity of an area. ✓

Using the information in the photograph and your own knowledge, explain these two statements.

(6)

When an animal dies it undergoes a series of succession with time. The first to arrive are colonisers (anaerobic bacteria) that grow in the lactic acid rich environments of the animal muscles. The muscles are broken down by enzymes that spread this colonisers. The second stage is the arrival of flies attracted by the smell and moisture of natural orifices. They lay eggs and their maggots pupate and continue with the body digestion. Further stages of succession develop as beetles then arrive to the body. Their larvae feed on maggots and they break down dead tissue making it impossible for early colonisers to no longer inhabit the body. Fastly stronger bugs arrive such as carrion beetles and moth larvae that feed on the keratin and hairs. As the succession develops the community increases its species biodiversity which also depends on abiotic factors. A climax (Total for Question 3 = 10 marks)



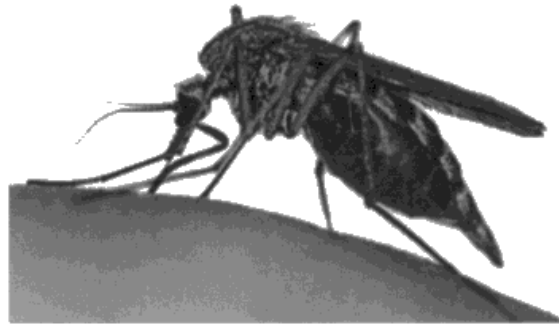
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Examiner Comments

This response gained mark points 1, 5 and 6. We did not think that it was quite clear enough for mark point 7.

Question 4 (a)

We did see some good responses but unfortunately too many candidates did not read the question carefully enough so wrote out everything that they knew about the clotting cascade without answering the actual question asked.

- 4 Entomology and DNA analysis can both be used in forensics to identify a murder suspect. The photograph below shows a mosquito.



Magnification x3

- (a) Mosquitos feed on human blood.

Mosquitos inject saliva into the skin before sucking blood from a person. The saliva prevents the blood from clotting.

Explain how injecting saliva allows blood to be sucked up into mosquitos.

(4)

The saliva contains an anticoagulant, which prevents a formation of a blood clot. This is done by binding to ~~the enzyme~~ clotting factors such as platelets and ~~the enzyme~~ thrombin (inhibiting it). Without thrombin fibrin can not be made from fibrinogen and a clot cannot form. The saliva may also contain a vasodilator to increase blood flow to the area.



This candidate starts off well, providing a response that starts answering the question, gaining the first three mark points. Unfortunately they did not finish the story by actually telling us why the mosquito could suck up the blood.



Read the question carefully. Identify where your answer should start and where it needs to finish and then use the mark allocation to help guide you into the number of steps that you need to include.

Question 4 (b) (i)

Candidates are well-rehearsed on the process of gel electrophoresis and we saw many accurate and detailed responses. Unfortunately these will not gain full marks as the mark schemes are designed to ensure that full marks can only be achieved if the response actually answers the question.

(b) The body of a woman was found at the scene of a crime.

A person was suspected of murdering this woman.

At the home of this person, a pathologist found a dead mosquito.

The blood in the mosquito was analysed using gel electrophoresis.

The blood contained DNA from the murdered woman, indicating that she had been in the home of this person.

(i) Explain how gel electrophoresis could be used to analyse the DNA in the blood.

(4)

Amplified DNA from the polymerase chain reaction is placed in a well in a agar block covered with a buffer and ethidiumdibromide dye is added. An electric current is passed through the apparatus and the DNA molecules move towards the anode. The electric current is switched off and the apparatus is placed under UV light. The number of bands, distance moved by the bands and the width of each band is compared with the DNA obtained profile obtained from the woman.



This is a good example of answering the question. The candidate starts off describing gel electrophoresis and then at the end ties it in with the context of the question by referring to the DNA bands of both the mosquito and the woman victim.

(b) The body of a woman was found at the scene of a crime.

A person was suspected of murdering this woman.

At the home of this person, a pathologist found a dead mosquito.

The blood in the mosquito was analysed using gel electrophoresis.

The blood contained DNA from the murdered woman, indicating that she had been in the home of this person.

(i) Explain how gel electrophoresis could be used to analyse the DNA in the blood.

(4)

take sample of blood of blood in mosquito
and woman's blood. Use restriction enzyme
to cut the DNA into fragments. add it
to the ~~agarose~~ agarose gel wells.
And apply potential difference stop when
the dye reach the end, each fragment
will at different speed depending
upon its size and charge. compare
the fragments of ~~Blood~~ blood found in
mosquito with the blood of woman.
fragments of



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Examiner Comments

This candidate tried to answer the question but unfortunately referred to comparing fragments and not bands.

Question 4 (b) (ii)

This question saw a range of responses. There was confusion between blood and DNA and whose DNA was in whose blood.

(ii) Explain why it was also necessary to analyse the DNA of the mosquito.

(2)

- blood might contain mosquito DNA, so mosquito DNA band might be seen
- to compare the bands and identify which band is from the woman or mosquito
- increases reliability.



This response gained the first two mark points.

Question 5 (a)

We have not asked candidates to explain the meaning of the term 'trophic level' before, even though we have used the term in plenty of questions in the past. There were a number of candidates who clearly knew its meaning.

5 Predator-prey relationships and trophic levels influence the species found within a habitat.

(a) Explain what is meant by the term **trophic level**.

(2)

Trophic level is the energy level in any food chain or food web. The 1st trophic level are always the producers.



This is one such example.

5 Predator-prey relationships and trophic levels influence the species found within a habitat.

(a) Explain what is meant by the term **trophic level**.

(2)

It is the level at which an organism is found
and occupies that niche e.g. - herbivores, producers
and secondary consumers.



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Examiner Comments

This candidate has some idea but clearly does not understand the term 'niche'. This was not uncommon.



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Examiner Tip

You need to learn the definitions of all the Biological terms used in the specification as you can be asked to define any of them.

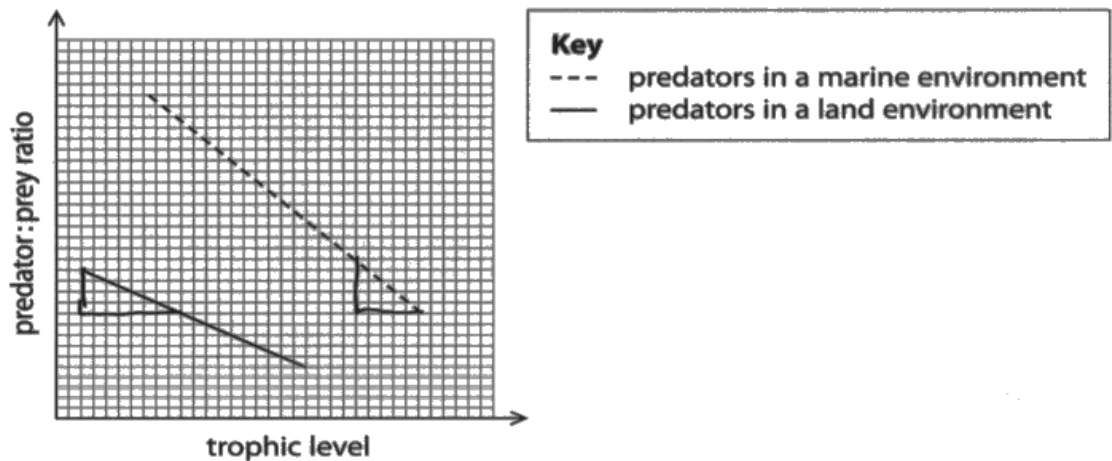
Question 5 (b)

Candidates who read the y axis label carefully did reasonably well on this question. Those who did not score well were those who talked about the numbers of predators or prey. The other error was to describe the gradients of the lines in terms of rate.

(b) A study of predators in a marine environment and in a land environment was carried out.

The trophic level of each predator and the ratio of the numbers of each predator to its prey (predator : prey ratio) were determined.

The graph below shows the results of this study.



Describe conclusions that could be made from this study.

(3)

The overall predator to prey ratio of the marine environment is higher.

As the trophic level increases, the predator to prey ratio decreases, this means that as we go up the trophic level, less food is available.

Marine has a greater decrease as you move up the trophic level with a gradient of -1 and for the land environment it is -0.57

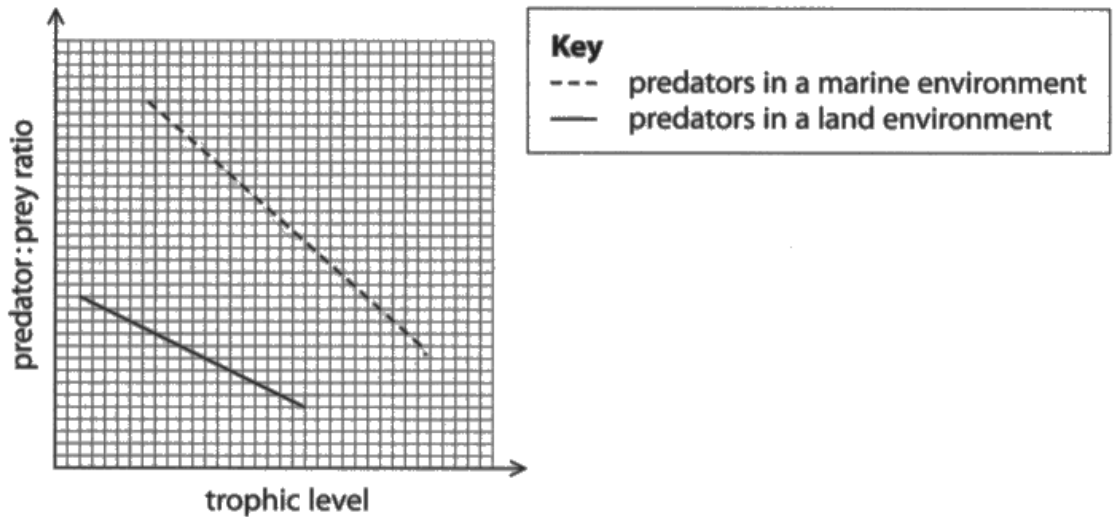


This response illustrates the first three mark points.

(b) A study of predators in a marine environment and in a land environment was carried out.

The trophic level of each predator and the ratio of the numbers of each predator to its prey (predator : prey ratio) were determined.

The graph below shows the results of this study.



Describe conclusions that could be made from this study.

According to the graph both ^{no. of} the predator in (3)
marine and land environment decreases as the
trophic level increases. But the predators in
marine environment has a larger decrease
when compared to the predators in land.
The graph also ~~says~~ suggests that the
no. of prey is higher in the marine
when compared to the land.



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Examiner Comments

This is an example of where the candidate had not read the y axis label carefully enough and wrote about the numbers of predators and prey.

Question 5 (c) (ii)

Most candidates coped with this calculation as they have been asked to do it a number of times now.

- (ii) Calculate the percentage of energy lost between trophic level 2 and trophic level 3.

Show your working.

$$2800 - 120$$

(2)

$$\frac{2680}{120} \times 100 = ?$$

Answer 2233 %



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Examiner Comments

This candidate started off the calculation correctly but then went wrong. They were still awarded the first mark point.



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Examiner Tip

Always attempt a calculation and show your working. You may well pick up the odd mark even if you cannot finish the calculation correctly.

Question 5 (c) (iii)

We have not asked this question before but the candidates coped with it well and we saw all the mark points. The most frequently seen wrong idea was that there were no more trophic levels as the animal on the third trophic level had no predators.

(iii) Suggest why there were only three trophic levels in this food chain.

(2)

There were only producer, primary consumer and secondary consumer in the habitat ~~the~~ living from where this food chain was made. One herbivore and its predator which could be carnivore or omnivore. And the energy loss due to heat, movement etc. trophic levels. was also too high, so by end not much energy was left for more



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Examiner Comments

This response illustrates mark points 3 and 2.

(iii) Suggest why there were only three trophic levels in this food chain.

(2)

A lot of energy lost from one trophic level to another and if there was a 4th trophic level it will have an insignificant amount of energy available from ~~the~~ ^{its prey} which won't be enough for its survival.



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Examiner Comments

This response illustrates mark point 1 and 2.

Question 6 (a) (i)

This was the second of the two QWC questions. A wide range of responses was seen to this question ranging from those who wrote everything they knew about interferons, without using the information in the diagram, to those who systematically discussed each component of the diagram.

*(i) Using the information in the diagram, explain the role of interferons in viral infections.

(6)

Interferons has many roles in fighting of viral infections. One of the roles done by interferons is the synthesis of a proteins - One of these proteins is ribonuclease and this protein helps destruct any viral mRNA that has formed. The other protein is ~~protein~~ kinase - it is an enzyme that inhibits the ^{viral proteins from being made.} ~~replication~~ of ~~viral DNA~~. Both of these protein prevents the ~~viral~~ virus from replicating and reproducing by ~~blocking its~~ ~~role~~ by breaking any mRNA that forms and an enzymes inhibiting any protein synthesis - The next role of interferons is increasing the recognition of virus infected cells - this helps T-killer cell to identify infected cells much quicker and efficiently. This means that infected cells are destroyed before any other cells get infected. ~~then~~ The final role of interferon is the self destruction of infected cells, this role helps infected cells to destroy them selves by the action of enzymes. lysosomes inside cells rupture releasing enzymes that destructs the cells.



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Examiner Comments

This response was awarded mark points 3, 1, 6 and 7.

* (i) Using the information in the diagram, explain the role of interferons in viral infections.

(6)

- Interferons that result in protein synthesis to form ribonuclease that breaks down mRNA is used to break down the formation of ~~the~~ viral mRNA that is used for transcription in the synthesis of viral proteins & nucleic acids such as DNA or RNA
- Protein kinase inhibits viral protein synthesis by ~~and~~ thereby the virus is unable to form a capsid & to make its own viral proteins that are required for its growth.
- By causing apoptosis of virus infected cells viruses cannot use the cell's organelles to produce its nucleic acids & as viruses are non living outside cells, it cannot grow.
- Interferons increase recognition of virus infected cells & T-helper cells are activated to activate T-killer cells that produce chemicals to lyse / ~~the~~ destroy the virus infected host cell so that the virus cannot grow & replicate within the host cell.



This response was awarded mark points 2, 5 and 6.

* (i) Using the information in the diagram, explain the role of interferons in viral infections.

(6)

Interferons are chemicals which are released by the infected cell. Infected cell is inside the host cell. Antigen attaches to the MHC on the macrophage and forms the Antigen presenting cell. T-killer cells exposed to cytokines ~~and~~ with the T-helper cells results in mitosis and differentiation produce ~~T-killer~~ clone of T killer memory cells and ~~activation~~ activated T-killer cells. Activated T-killer cells attaches to the body cell and the infected cell is removed.

T-helper cells activates plasma cells which produces antibodies against the antigen opsonins label the pathogens for phagocytosis.



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Examiner Comments

This response is an example of an answer given by a candidate who has probably seen the term 'interferon' and simply written everything that they knew.



It is really important to read the question very carefully and then apply your knowledge to the context of the question. Do not skim read the question, word-spotting terms you recognise and then writing everything that you know.

Question 6 (a) (ii)

Some very good responses were seen to this question.

- (ii) Suggest possible disadvantages for cells of producing ribonuclease and protein kinase.

(3)

The protein synthesis inside the host cell to produce its own proteins will also be ceased as mRNA is broken down & protein synthesis is inhibited.

So the cell cannot form proteins which are useful for growth & making enzymes.

Less enzymes mean the metabolic reactions in the cell will be ceased & it will also not grow properly.



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Examiner Comments

This response illustrates all four of the mark points, in the order 2, 1, 3 and 4.



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Examiner Tip

It can be an idea to give specific examples in your answer, particularly if you have made fewer points than there are marks available.

Question 6 (b)

Candidates who had prepared themselves thoroughly for this exam, using past paper mark schemes, scored well on this question. It was direct recall.

(b) Describe the immune response of the body to viral infections.

This happens through the specific immune response. (4)

The viral antigen, upon entry, is detected by macrophages.

They are engulfed by pseudopodia and hydrolysed

within the macrophage, which expresses some of ~~the~~ its antigens at ~~the~~ its surface to mix with MHC complexer.

The antigen presenting cell makes the antigen detectable by

T-helper cells, which release cytokines to activate T-killer cells

and B-cells with receptors complementary to the shape of the

antigen. These activated cells undergo clonal expansion to increase

in number. The T-killer cells kill the host-cells containing the

virus by releasing perforins which poke holes in their membrane,

and toxins to kill them. The B-cells ~~and~~ mature and

differentiate into plasma cells, enabling the release of antibodies to

attack the ~~the~~ virus and assist in its phagocytosis. Some

differentiate into memory cells to produce (Total for Question 6 = 13 marks)

immunological memory.



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Examiner Comments

This candidate clearly understands the immune response at the level we would expect. The mark points illustrated are 3, 1, 2, 4 and 5.



Mark schemes from past papers will help you judge the level of detail that you are expected to know but you may need to apply the knowledge to the context of the question. This was not necessary in this particular question. Also, remember that viruses are non-living so cannot be killed. Although this is not the case in this particular response we did see this comment in a number of the responses.

Question 7 (a) (i)

Candidates have clearly learnt the detail we expect for describing PCR. Mark point 1 was a context mark and was rarely awarded. In this particular case, full marks could be awarded for the PCR detail only but this will rarely be the case.

(i) Explain how multiple copies of mammoth DNA could be produced.

(4)
The PCR, polymerase chain reaction can be carried out. Identify the mammoth DNA and place it in a medium of primers, DNA polymerase & free nucleotides. The mixture should be heated to 95°C to break the hydrogen bonds between the two strands of DNA. It should then be cooled to 55°C where the primers can bind to the DNA. It should then be heated to 75°C when DNA polymerase is most active forming new DNA strands of complementary base paired nitrogenous bases. This cycle should be carried out around 30 times to produce a large amount/volume of mammoth DNA.



This is an example of a clear response gaining all the mark points except the first one.

Question 7 (a) (iii)

Most candidates realised that they were being asked about peer review and repetition of investigations to validate data. Candidates are less clear about the differences between terms such as accuracy, precision and validity.

(iii) This work has not yet been reported in a scientific journal.

Explain why the claims made by these scientists have to be treated with caution.

(2)

Their results have not been replicated by other scientists which make them less valid. Their results should go through peer review before being up for discussion. The claim and experiment are unethical so people will oppose it and them.



Both mark points were awarded for this response.

(iii) This work has not yet been reported in a scientific journal.

Explain why the claims made by these scientists have to be treated with caution.

(2)

It has not undergone peer review, so information could be invalid or biased.



This candidate has the idea of peer review being necessary but has not quite got the right idea for the second mark.

Question 7 (b) (i)

We saw all sorts of responses to this question. Candidates should be discouraged from comments such as 'it is playing God' or 'it could lead to designer babies'.

- (b) The DNA inserted into the elephant skin cells included genes coding for the woolly coat.

It is claimed that it may be possible to create an elephant that has some features of the mammoth.

An embryo containing these genes could be implanted into the uterus of an elephant.

- (i) Suggest **two** reasons why this procedure may be unethical.

(2)

embryo could die and this is killing
The new embryo may be an elephant with
unknown and a high risk of diseases.
Interfering with nature is unethical
extra embryos will be discarded or used
for experiments.
Animals can't consent but they have
rights. mother elephant may feel pain



This response was awarded mark points 2 and 1 as they considered the mother and the embryo.

Question 7 (b) (ii)

Candidates who had read the stem of the question could link the woolly coat to elephants being able to survive in colder climates. The more able candidates then linked this to conservation by explaining that more (colder) areas could be inhabited. Mark point three was rarely seen.

- (ii) Elephants live on the African plains and in the rain forests of Africa and South East Asia.

Elephants are endangered.

Suggest why scientists are hoping that this procedure may help to conserve the elephant.

The woolly coat of the mammoth in an elephant⁽²⁾ will allow it survive cold environments. So it will expand it's ~~area habitat~~ area of living as the colder places ~~can~~ are now the habitat for the elephants.



This response illustrates mark points 1 and 2.



Use the mark allocation to help you work out how much to write. If you only make one point you will only get one mark.

Question 7 (b) (iii)

This question was not well-answered; candidates did not pick up on the fact that they had to relate their answer to a reduction in conservation.

(iii) Some scientists are concerned that this procedure could reduce conservation efforts to protect elephants and other organisms found in their habitat.

Suggest why some scientists are concerned that this procedure could reduce the number of elephants and other organisms found in these habitats.

(2)

.....
THERE WOULD BE LESS EFFORTS TO CONSERVE ELEPHANTS IN NATURE
.....
AND IT COULD LIMIT SUPPORT FOR MANAGING THESE PROTECTED AREAS
.....



ResultsPlus
Examiner Comments

This candidate had picked up on a reduction in conservation but did not make more than one point.



ResultsPlus
Examiner Tip

You must make at least as many statements as there are marks allocated to the question.

- (iii) Some scientists are concerned that this procedure could reduce conservation efforts to protect elephants and other organisms found in their habitat.

Suggest why some scientists are concerned that this procedure could reduce the number of elephants and other organisms found in these habitats.

(2)

If the procedure is successful, many woolly mammoths maybe produced. When placed in the same habitat with elephants they may outcompete the elephants for food. This may lead to death of elephants due to lack of enough food. The organisms that were well adapted to environment supported by only elephants may die.



ResultsPlus
Examiner Comments

Mark point 3 was the most frequently awarded.
This response illustrates this mark point.

Question 8 (b) (ii)

We have asked this question before and candidates who had used past paper mark schemes to prepare for this exam, scored well.

- (ii) Vaccines produce artificial immunity in people. Vaccines can be used to protect people from measles and cholera.

Vaccines are partly responsible for the low number of deaths from measles and cholera.

Describe how vaccines produce artificial immunity.

The vaccine is injected into the body. It is engulfed by ~~the~~ ^{(3) macrophage} the antigen is presented on the surface of macrophage and makes it an APC. T helper cell identifies the antigen and binds to the macrophage. It produces cytokines which can stimulate the production of more B cells and T killer cells and antibodies. More memory cells are produced. If the patient is infected with the same disease, many antibodies will be produced in a short period of time to fight the infection, this is secondary immunity.



ResultsPlus
Examiner Comments

Mark points 2, 3, 4 and 5 could all be awarded for this response. Mark point 1 was not awarded as we wanted to know what was injected.



ResultsPlus
Examiner Tip

As in question 6, we did not accept vaccines that contained dead virus. Viruses are not alive therefore they cannot be killed.

Question 8 (c)

Many candidates picked up on the fact that we were examining them on the action of antibiotics on bacteria. Some went on to explain how antibiotics affect these cells. Although not relevant to this question, we saw several details on how cells become cancerous; candidates have clearly learnt their AS content for any synoptic questions that might appear on this paper.

(c) Explain why antibiotics cannot be used to treat people with cancer.

(2)

This is because antibiotics can only be used to inhibit or kill bacteria as they are either wide range or specific. Antibiotics act by either damaging the cell walls of bacteria cells and cancer cells do not have cell-walls so antibiotics will not be effective. Some Antibiotics also affect and disrupt protein synthesis of some bacteria ~~but~~ so they cannot reproduce but cancer^{cells} reproduces by uncontrolled cell division of the cancer cells and antibiotics cannot prevent the cancers replicating.



ResultsPlus
Examiner Comments

Both marks could be awarded for this very detailed response.

(c) Explain why antibiotics cannot be used to treat people with cancer.

(2)

Its because cancer cells are very resistant against the antibiotic because the cancer cells change there their shapes so the antigens present on the cell is not reconised correctly so when an antibiotic is given they made not be able to bind to the correct antigens.



We did see responses where candidates had got confused between antibiotics and antibodies, such as in this one.



Whenever you see a question about either antibiotics or antibodies, pause before you start writing to double check that you are writing about the correct term. Candidates do muddle up these terms. Remember: our *bodies* produce *antibodies*.

Question 8 (d)

Very few blank responses were seen to this question suggesting that candidates had sufficient time to complete this paper. All our mark points were seen but very few candidates went into enough detail to be awarded four marks. A number of candidates commented that broad spectrum antibiotics and combinations of antibiotics were examples of mis-use of antibiotics. Although these will lead to an increase in resistance, their use is necessary in certain instances and therefore cannot be accepted as examples of mis-use.

(d) Explain why the number of deaths from antibiotic resistant infections (ARIs) in 2050 is expected to be so high.

(4)

This is due to the antibiotic resistance spreading amongst bacteria due to a strong selection pressure which is due to the repeated use of antibiotics causing some resistant bacteria (which arose due to random mutation giving rise to an allele for resistance) surviving to breed while the non-resistant die, this resistance will be passed through plasmid through the conjugation or bacteria bacteria reproduce rapidly resulting in resistance spreading fast



ResultsPlus
Examiner Comments

This response could be awarded mark points 2, 4 and 5. One of the few examples where candidates tried to give enough detail for four marks.



ResultsPlus
Examiner Tip

Always look at the mark allocation to help you plan your response to make enough points to answer the question in sufficient detail.

Paper Summary

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

- apply your knowledge to the context of the question e.g. question 6a where we wanted you to apply your knowledge and use the information in the question
- use the mark allocation to help you judge how much detail to put into your answer e.g. question 8d where 4 marks were allocated and therefore at least four statements had to be made
- read the stem of the question very carefully as all the information given will be needed somewhere in the question e.g. question 2 where all the facts given would help you answer each question part
- do not word-spot and write everything you know about the topic e.g. question 6a where we did not want you to write everything you knew about interferons
- read through your answers very carefully at the end to make sure that you have not made silly mistakes e.g. question 6b to make sure that you have not talked about killing viruses
- attempt calculations showing your working e.g. question 5ci where you could get mark point 1 even if there were errors in the rest of the calculation

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>

