

Examiners' Report

June 2016

IAL Biology WBI04 01

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk.

Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.



Giving you insight to inform next steps

ResultsPlus is Pearson's free online service giving instant and detailed analysis of your students' exam results.

- See students' scores for every exam question.
- Understand how your students' performance compares with class and national averages.
- Identify potential topics, skills and types of question where students may need to develop their learning further.

For more information on ResultsPlus, or to log in, visit www.edexcel.com/resultsplus. Your exams officer will be able to set up your ResultsPlus account in minutes via Edexcel Online.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk.

June 2016

Publications Code WBI04_01_1606_ER

All the material in this publication is copyright
© Pearson Education Ltd 2016

Introduction

Generally speaking, the paper performed very well with some excellent responses seen for most of the questions and there were a few very high-scoring scripts seen. There were questions where the E grade candidates could access and demonstrate their knowledge and there were some good discriminating questions for the more able candidates to demonstrate their exceptional ability. Some of the multiple choice questions were also discriminating, particularly 1(a)(ii), 4(a)(ii) and 4(b).

There have now been several papers written for this current specification. We were impressed to see that:

- mark schemes for previous papers have been used by candidates in their preparation for this exam.
- more candidates are revisiting the AS content, as one of the aims of this paper is to be synoptic and include questions assessing AS knowledge and its application.
- more candidates are remembering to manipulate figures when describing data.

It was disappointing that:

- some candidates are still leaving questions blank as sometimes odd marks can be picked up by at least attempting the question
- some multiple choice questions were even left blank; marks do not get deducted for selecting the wrong answer
- A level detail of photosynthesis is not always given
- relatively few candidates understand and appreciate the concept of species diversity.

Question 1 (a)(iii)

Most candidates were able to name enzyme Y as RNA polymerase, although we did see a few references to helicase and RNA ligase. The candidates who did not answer this question correctly put DNA polymerase as their answer.

Question 1 (a)(iv)

(iv) State the role of enzyme Z.

(1)

To remove the introns on the mRNA
and join the remaining ~~big~~ exons together.



ResultsPlus Examiners' Comments

We saw some detailed descriptions of the role of enzyme Z; a typical response is shown here. In this answer we ignored the reference to "exons", as it was clear that the candidate knew the difference between the introns and the exons.

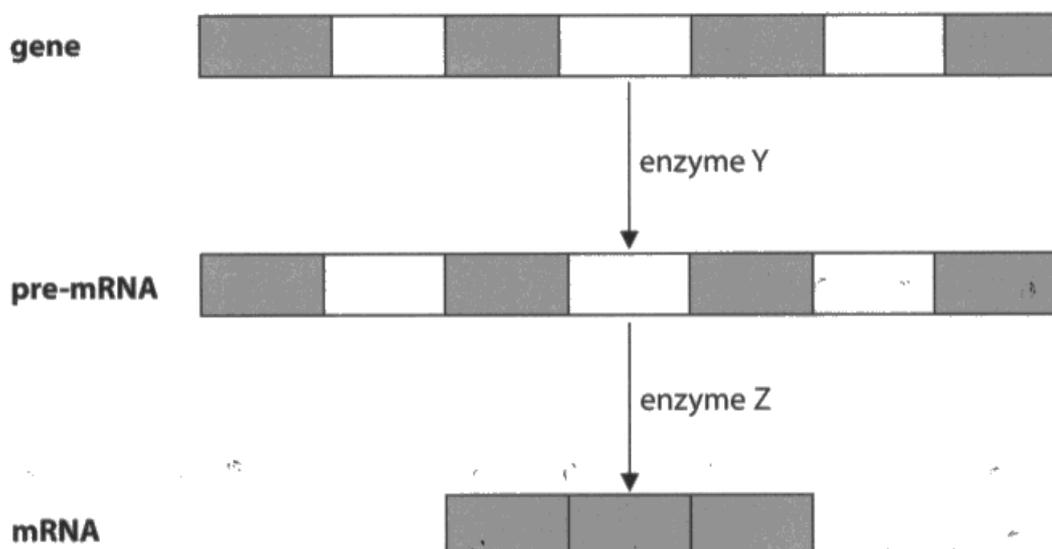


ResultsPlus Examiner Tip

Try to correctly spell the biological terms, especially the short words and the ones that can be confused with other terms.

Question 1 (a)(v-vi)

(a) The diagram below shows two steps involved in the synthesis of a polypeptide.



(v) Name the parts of the pre-mRNA molecule, represented by the shaded areas in the diagram.

(1)

Exon.

(vi) A gene may be defined as a length of DNA coding for one polypeptide chain.

Using the information in the diagram, explain why this definition does **not** apply to this gene.

(4)

Because not all parts of a gene code for a polypeptide. There are sections called exon and introns. Exons are responsible for coding containing genetic instructions on how to synthesise a protein or in simple terms, they code for a polypeptide. Introns are non-coding sections which do not code for any protein. They are removed after post-transcriptional modification.



ResultsPlus
Examiner Comments

The majority of candidates could name the exon and then go on to give a couple of our mark points. This response is an example of the standard of response that we were hoping for, although the explanation has not been completed for all four marks.



ResultsPlus
Examiner Tip

Always check the mark allocation for each question so that you make enough points in your response.

Question 1 (b)

(b) Describe how the polypeptide chain is synthesised from the mRNA.

(4)

~~When the mRNA binds~~ The mRNA moves out of the nucleus and binds to the ribosome for translation to take place. The ribosome reads each codon on the mRNA. The tRNA molecules carrying the specific amino acids needed move to the ribosome, and their anticodons line up against the codons of on the mRNA. Hydrogen bonds form between anticodon and codon. Peptide bonds form between the amino acids by condensation reactions. As a result a polypeptide ~~is~~ chain is formed.



ResultsPlus Examiner Comments

We saw some very good descriptions of translation from the more able candidates. This is one such description that scored all but the last of our mark points.



ResultsPlus Examiner Tip

When describing translation, make sure that you make it very clear that the tRNA only carries one amino acid and that the anticodon on the tRNA binds to the codon on the RNA. Using mark schemes to previous exam papers will help you appreciate what is expected in your responses.

Question 2

- *2 There are apps (computer software) available on some smartphones that can calculate the time of death of a person.

The image below is from the screen of a smartphone with some information that has been put into this app when a body was found.

Body Temperature	20.0 °C
Ambient Temperature	9.0 °C
Body Weight	80 kg
Taken Time	Sep 11, 2010 7:51 AM
Body Cover	Naked >
Where Found	Still Water >

Explain why the information required by this app is needed to calculate the time of death of this body.

(6)

After death, body temperature decreases due to conduction and radiation from the body because the metabolic reactions that produce are no longer happening. The decrease in body temp is affected by the body cover as a naked body will lose heat more rapidly. The greater the temperature gradient of the body from the surroundings, the greater is the rate of cooling of the body, so the ambient temperature is also to be known. ~~If the~~ The location where the body is found affects the stage of succession ^{of insects on the body} as well as the extent of decomposition, so is crucial in determining the time of death. A greater body weight ~~man~~ means that insulation is provided by the excess fat, so the rate of cooling is less. ~~the~~ The time when the body is found can be used to calculate the time of death for eg: how many hours before founding, the body died.



ResultsPlus Examiner Comments

We saw a range of responses for this question. The more able candidates worked their way down the criteria given in the app image and wrote about each one in turn. This response illustrates a good response where a number of the criteria in the app have been commented on.

The temperature of the body has an effect on time of death. As the person dies, the body temperature starts falling. The ambient temperature affects the rate at which body temp falls. The weight of the person affects, the rate at which body cools down. The time at which these things are recorded is needed to estimate how long ~~before~~ has it been after person died. The clothing of body affects the rate at which it cools down. The place where body is found affects the time of death because it affects the rate at which the body temp changes.



ResultsPlus Examiner Comments

Candidates who did not score so well in this question either only commented on one or two of the criteria, usually body temperature and ambient temperature, or else made vague comments such as 'the body weight affects the temperature'. This is a typical weak response.



ResultsPlus Examiner Tip

Try and use all the information that you are given, as it is included in the question for a reason. In this question there are six criteria listed in the app image and 6 marks for the question. It is therefore very likely that there is at least one mark for an explanation of each criterion.

Question 3 (a)

3 Ebola virus disease (EVD) in humans is caused by the Ebola virus.

(a) Describe the structure of a virus.

(2)

A virus can have DNA or RNA, it can have an envelope stolen from the host cell, it has a capsid (protein coat), spikes/receptors and can have proteins like reverse transcriptase in HIV.



ResultsPlus Examiner Comments

Candidates have clearly used past mark schemes in preparation for their exams. The majority of candidates made it very clear that viruses only contain DNA or RNA and that not all viruses possess an envelope or carry enzymes inside them.

This is an example of the quality of response that we were hoping to see. Few candidates gave so much detail.

We did see some confusion between capsids and capsomeres; if candidates are unsure they can simply describe the virus as having a protein coat.



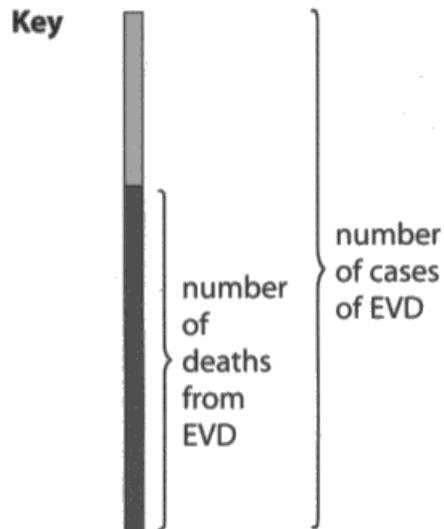
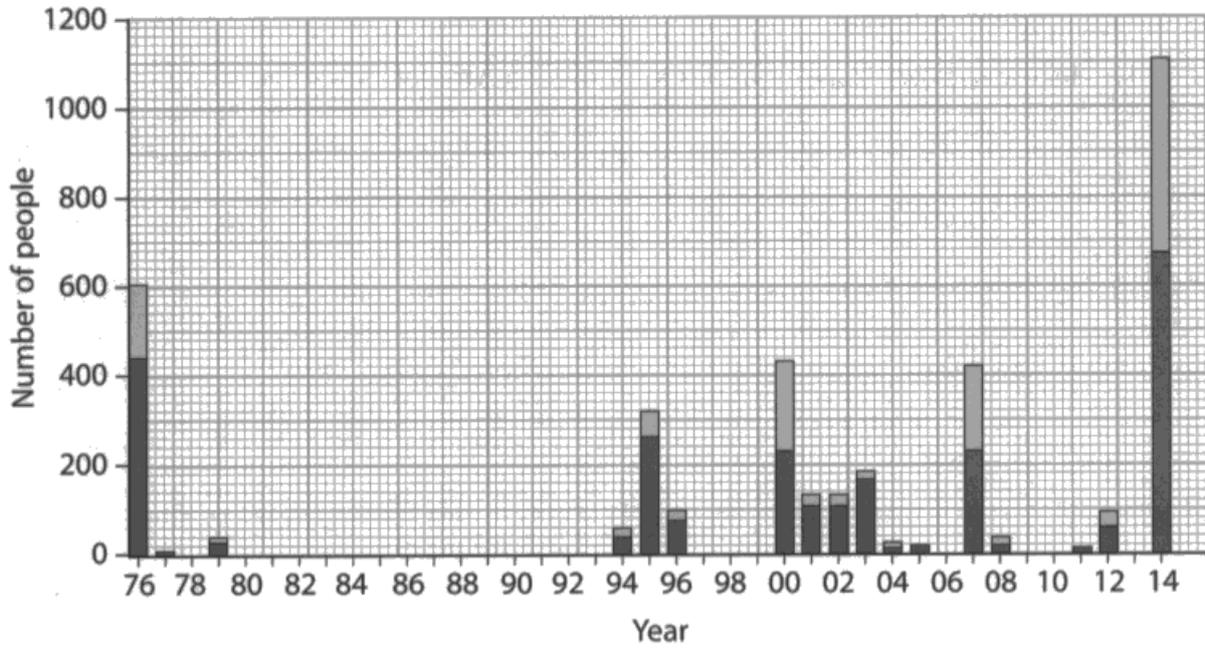
ResultsPlus Examiner Tip

Provided you have not been asked to 'name', 'state' or 'give' then it is a good idea to make more points than there are marks allocated to a question, if you have the time.

Question 3 (b)(i)

(b) There was an outbreak of EVD in Liberia in 2014.

The graph below shows the number of EVD cases and the number of deaths from this disease, in Liberia, from 1976 until 2014.



- (i) Using the information in the graph, calculate the percentage of people with EVD who died in 2014.

Show your working.

(2)

$$\frac{670}{1100} \times 100 = 60.91$$

Answer 60.91



ResultsPlus
Examiner Comments

In this question we allowed the candidates to use a value of 1100, 1105 or 1110 even though we did not think that the grid could be read that accurately. We also allowed the answer to be given up to two decimal places.



ResultsPlus
Examiner Tip

Always show your working as you may get marks for the working out even if you have made a mistake somewhere.

Do not give your answer to too many decimal places. In a calculation of this kind, up to two decimal places is appropriate.

Question 3 (b)(ii)

- (ii) EVD is fatal in up to 90% of cases.

Suggest why the calculated value for 2014 is below 90%.

(2)

Medical care improved in 2014. Diet of Liberia improved in 2014 with more proteins or other nutrients.



ResultsPlus
Examiner Comments

We saw some good suggestions for this question. Two of the commonly seen ones are shown in this response.

(ii) EVD is fatal in up to 90% of cases.

Suggest why the calculated value for 2014 is below 90%.

(2)

- 90% is the maximum amount of cases EVD is fatal in.
- Some cases not reported so decreases percentage.
- Death from EVD may occur in the next year / further years after ~~acquiring~~ infected by virus.



ResultsPlus
Examiner Comments

Another two suggestions are shown in this response.



ResultsPlus
Examiner Tip

If you see the command word 'suggest' then make sure you give as least as many suggestions as there are marks.

Question 3(c)(i)

(c) In 2014, there were no available drugs or licensed vaccines for EVD. Vaccines were being developed and were undergoing clinical trials.

(i) Using the information in the graph, suggest why vaccines for EVD were not developed earlier.

(1)

The EVD infection was rare and few cases had appeared. ~~None~~ No cases were seen between 1980 - 1993. so no way of researching or investigating.



ResultsPlus
Examiner Comments

We thought that there were seven reasonable suggestions that could be made for this question and we saw all of them. The most frequent suggestion, as given in this response, was the first one.



ResultsPlus
Examiner Tip

Although only one suggestion is needed in this question, it is worth making a couple of suggestions in case your idea is not appropriate.

Question 3 (c)(ii)

(ii) Describe the methods used to test new drugs in humans.

(3)

In stage 1, very few healthy persons are given this drug to check if the drug ~~has~~ do have any effect. In stage 2, few hundred of patients are given this drug to check how the drug works. In stage 3, a huge number of patients are given this drug. In this stage some patients are given placebo which is an inert substance. This is blind trial. Neither the doctor nor the patients know who are given placebo. This is to check the mentality of people towards medicine.



ResultsPlus Examiner Comments

This question was one of the synoptic questions where Unit 2 knowledge is being applied in a Unit 4 context. A whole range of responses were seen for this question; one of the better ones is shown here.

Candidates who did not score well for this question either described only one or two of the phases, got confused between the sample sizes or did not state whether the people being tested were healthy or patients.



ResultsPlus Examiner Tip

Unit 4 has a synoptic element to it which means any of the AS content, both Unit 1 and Unit 2, can be tested. Always revise the AS content when preparing for Unit 4. This also applies to Unit 5 as well.

Question 3 (c)(iii)

(iii) Drugs are being developed that contain either interferon or chemicals that interfere with viral replication.

Suggest how these drugs could prevent the development of EVD in humans.

(3)

The drugs that contain interferon act by not allowing the ebola virus to infect other cells and using them as hosts.

They also contain chemicals that interfere with viral replication. This does not allow new viral genetic material to be synthesized to give rise to new viruses. This causes the number of viruses to not increase further, protecting other cells from being infected.



ResultsPlus Examiner Comments

This question was a good discriminator as only the more able candidates discussed interferon separately from the chemicals.

This candidate has distinguished between the interferons and the chemicals.

- (iii) Drugs are being developed that contain either interferon or chemicals that interfere with viral replication.

Suggest how these drugs could prevent the development of EVD in humans.

(3)

Interferons bind to cell surface membrane receptors, altering their structure in such a way that virus cannot attach or penetrate through the cell surface membrane. Without a host cell to provide its necessary needs viruses cannot reproduce or live. Hence, EVD are not allowed to replicate or infect cells ^{in the presence} ~~when~~ with drugs & with interferons, ~~or~~ ~~that~~



ResultsPlus
Examiner Comments

This candidate has only discussed the interferons.



ResultsPlus
Examiner Tip

Always read the question very carefully. This question states that the drugs being developed contain EITHER interferon OR chemicals. If you are asked about two things then you must write about both things to access full marks.

The question also states that the drugs interfere with viral replication so you won't get a mark for repeating this in your answer. You need to give detail of how the replication is prevented.

Question 4 (a)(iii)

(iii) Using the information in the table, compare the antibody composition of human colostrum with that of bovine colostrum.

(3)

Antibody concentration in human colostrum of class IgA is higher than in bovine colostrum. $17.4 - 3.9 = 13.5$ more. The concentration of IgG is very low for human colostrum and much higher in bovine colostrum. $47.6 - 0.9 = 47.6$ more. There is no IgG2 present in human colostrum but 2.9 mg cm^{-3} is present in bovine colostrum. Bovine colostrum has an overall higher antibody concentration than human concentration.



ResultsPlus Examiner Comments

The majority of candidates had no problem in describing this data. A number of very good descriptions, such as this one, were seen.



ResultsPlus Examiner Tip

Always quantify at least one of your points when describing data from either a graph or a table. You must give the units as well.

You are expected to have a calculator in the exam so use it - the values must be exact and not approximations.

Question 4 (b)(ii)

(ii) Explain why colostrum increases the survival chance of a calf.

(2)

Ready made antibodies from the mother are transferred to the calf which helps it to fight infections and opsonise and agglutinate the pathogens for destruction by phagocytes. These antibodies are short lasting but help the calf to fight infections until the immune system is developed.



ResultsPlus Examiner Comments

This proved to be one of the more challenging questions; very few candidates really understand the role of antibodies in the immune response. This is an example of one of the few good responses that we saw.

(ii) Explain why colostrum increases the survival chance of a calf.

(2)

The colostrum increases the survival chance of a calf because it contains antibodies that can fight against any bacteria present in the body.



ResultsPlus Examiner Comments

This response is far more typical of the responses that we saw. Many candidates simply stated that antibodies fight the bacteria or the infection, as seen in this response. We also saw a lot of antibodies 'killing' the bacteria.



ResultsPlus Examiner Tip

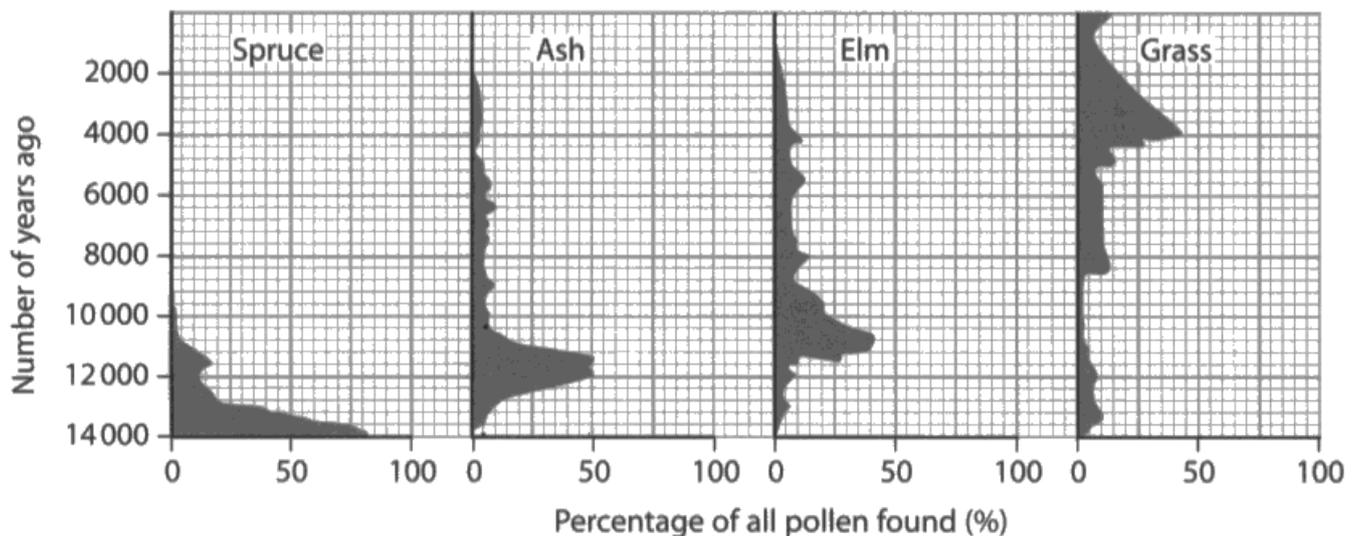
Antibodies bind to the pathogens so that they clump together to prevent them from moving through the tissues so rapidly (agglutination). The antibodies also bind to the phagocyte joining the pathogen to the phagocyte (opsonisation). These together enhance phagocytosis resulting in the phagocyte destroying the pathogen.

Question 5 (a)(i)

5 Pollen grains present in peat bogs and lake sediment may provide evidence of climate change.

(a) In an investigation, the age of the sediment in a lake was determined. The abundance of pollen grains, from four types of plant, in the lake sediment was recorded.

The results are shown in the graph below.



(i) Using the information in the graph, describe the changes in abundance of spruce, ash and elm trees over the last 14 000 years.

(3)

Spruce was very present 14 000 years ago then it gradually decreased to 0% by 9 500 years ago, ash was very present at 12 000 years ago then it rapidly decreased by 45% between 12 000 and 10 500 years ago. Elm and the percentage ~~steadily~~ gently fluctuated & reaching 0% in 10 000 years ago. Elm tree percentage was at its maximum 11 000 years ago then it slowly decreased to 0% by 10 000 years ago. Grass was present at all times even though the percentage fluctuated reaching its maximum 4 000 years ago and its still present now at 15%.



ResultsPlus
Examiner Comments

This question discriminated well with only the more able candidates using the data and making a description for each of the three trees. We did piece the candidate's answers together in this instance as we felt that the data was quite difficult to interpret succinctly.

This response is a typical good answer.



ResultsPlus
Examiner Tip

When describing data from either graphs or tables key values need to be quoted.

As there is information shown for three trees in the graphs and there are three marks it is safe to assume that there is at least one mark for each tree. This should help structure your response.

The question does not ask you to describe the changes in grass so don't waste your time doing so.

Question 5 (a)(ii)

(ii) Ash and elm trees grow in wet, poorly-drained soils. Grass grows in drier conditions.

Using the information in the graph, describe the changes in climate at this lake over the last 14 000 years.

(3)

14000 years ago the climate was not wet enough for Ash and Elm trees to grow but around ¹³⁶⁰⁰~~12600~~ years ago the land became more moist and wet and resulted in the growth of these trees. The earth was most wet about 11200 years ago. The earth started drying up and so grass reached a ~~peak~~ the highest ~~sum~~ percentage about 4000 years ago.



ResultsPlus
Examiner Comments

The responses to this question were a little disappointing; we had hoped that leading them in with the previous question, the information that we gave the candidates and the mark allocation would lead them to realise that there were three periods to mention.

This was one of the few high-scoring responses that we saw.

There was less grass percentage found between and lots of ash between 14000 years ago and 18000 years ago, this means soil was wet and therefore condition was a temporary cold. But 6000 years ago until 2000 years ago we can see that there is less ash found and more grass found, so this means climate become warmer and condition become drier.



ResultsPlus
Examiner Comments

This was a far more typical response and we felt that we could reward a response such as this for the idea that overall the conditions must have become drier.

Question 5 (a)(iii)

(iii) Explain how the information in the graph indicates that other types of plant were present around this lake.

(2)

The other type of plant can be noticed because the abundance of the Spruce, Ash, Elm and Grass never reached 100%.



ResultsPlus
Examiner Comments

This is an example of a typical response that we saw.



ResultsPlus
Examiner Tip

If you read through this response the candidate has only made one point. One point will not score two marks. Therefore always check that you have made at least as many points as there are marks allocated to the question.

Question 5 (b)

(b) Explain how dendrochronology may also be used to provide evidence for climate change. (3)

Dendrochronology is the study of the growth of tree rings. If the climate is favourable, the width of the ring would be wider/longer. Favourable conditions are long periods of rainfall and high mean temperature of the atmosphere, as more photosynthesis can take place and GPP increases. Each ring represents a certain amount of time. i.e year.



ResultsPlus
Examiner Comments

It was very pleasing to see so many good responses; the majority of candidates have a good understanding of the theory behind dendrochronology. This is just one of the good responses that we saw.

Question 6 (a)(ii)

(ii) Describe how an increase in greenhouse gases could cause the loss of sea ice.

(3)

Increase in GHG ~~energy~~ means more GHG accumulate in the atmosphere. GHG absorb infra-red radiation from the Sun which has been reflected from the Earth's surface. More infra-red radiation increases the mean surface temperature of the Earth which means that sea ice melts more quickly.



ResultsPlus
Examiner Comments

Many candidates could tell us that the greenhouse gases absorbed the infrared radiation and that this increased the temperature of the earth's atmosphere. However, few went on to explain that the result of this was an increase in the melting of the sea ice. The candidate who wrote this response had clearly read the question carefully and knew that sea ice melted in unpolluted air and that an increase in the greenhouse gases would increase the melting.

~~When green ho~~ When concentrations of of greenhouse gases such as Carbondioxid and methane increases, they absorb ~~at~~ more of the sun's radiation. The ~~radiation~~ ~~wo~~ radiation is trapped, ~~was~~ warming the ~~east~~ Earth's atmosphere. The increas in temperature causes the sea ice to melt



ResultsPlus
Examiner Comments

We did see a few very vague responses.



ResultsPlus
Examiner Tip

A proportion of our questions require you to apply your knowledge to a particular scenario and not simply recall it. Always read the question carefully to ensure that you have actually answered it.

Question 6 (b)

(b) Suggest why the loss of sea ice could result in a decrease in the number of polar bears. (3)

If sea ice is lost that could mean a loss of habitat for polar bears, which could cause them to die as they will always be in the water. If sea ice melts, seals will not give birth ~~on~~ if there is no sea ice, so the polar bear may not be able to locate seal during winters and may lose it's only food source, so polar bears die from lack of nutrition.

— Without ice, polar bears can't make dens for their young, so population will fall.



ResultsPlus Examiner Comments

Candidates found this question fairly straightforward and it was high-scoring. We saw some detailed responses about the direct effect of the loss of sea ice on the polar bears and its indirect effect by affecting the seals.

This is one of the detailed responses that we saw.

Interestingly, the only mark point on our mark scheme that we did not see was mark point 4; this is actually the main reason that the polar bear numbers are decreasing from the loss of sea ice.



ResultsPlus Examiner Tip

If you are unsure how to answer a question such as this, look at the information that we have given you in the question. We only give you information that you are going to need.

Question 6 (c)(i)

(i) Suggest why a footprint can be used as a source of DNA.

(1)

May contain trace of polar bear hair or dead skin cells.



ResultsPlus Examiner Comments

Many candidates could suggest a reason for the footprint being a source of DNA. A few, such as this candidate, offered more than one reasonable suggestion.

Unexpectedly, there were a number of candidates who read footprint for fingerprint and as a result discussed the uniqueness of the imprint left.

Question 6 (c)(ii)

(ii) Suggest **two** advantages of using DNA obtained from a footprint, rather than collecting DNA directly from a polar bear.

(2)

~~The~~ DNA from footprint is non-invasive so will not stress polar bear so no ethical issues arise.

A polar bear may be hard to control or tame to extract DNA directly from it and it is very dangerous.



ResultsPlus Examiner Comments

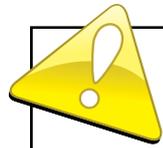
All our mark points were seen but the majority of candidates, like this one, discussed the effect on the polar bear and the danger that the scientist could be in.

- It's way fast and easier to collect footprints and test them.
- It's way cheaper and doesn't need much equipments like collecting DNA directly.



ResultsPlus
Examiner Comments

A few candidates mentioned the cost advantages and tried to explain why it might be a faster or easier method.



ResultsPlus
Examiner Tip

Read your answer through carefully to make sure that you have written what you really meant to write and haven't made a careless mistake.

In a suggest question like this it can be a good idea to offer an extra suggestion in case one of yours is not considered appropriate.

Question 6 (c)(iv)

(iv) Suggest how the scientists could conclude that the DNA they identified came from both the polar bear and a seal.

(2)

Compare DNA profiles produced by gel electrophoresis with known DNA of polar bears & seals. Compare number size & width of bands produced. The more similar these are the more closely related the organism & hence the more likely they are from the same species.



ResultsPlus
Examiner Comments

Far more candidates were describing the comparison of the bands produced from gel electrophoresis; it was pleasing to see that our published mark schemes have been used and our points taken on board. We had very few comparisons of fragments this series.



ResultsPlus
Examiner Tip

Always use our mark schemes for past papers to help in your final preparation for an exam.

Question 7 (a)

(a) Distinguish between the terms **environment** and **habitat**.

(2)

A habitat is the place where an organism lives.

Environment is all the biotic and abiotic factors that are in an area/habitat.



ResultsPlus

Examiner Comments

Sometimes the simplest of questions can cause the most problems. Defining a habitat did not cause the problem but describing an environment did.

This is an example of the standard of response that we were hoping for.



ResultsPlus

Examiner Tip

Make sure you know the meaning of every biological term used in the specification as you could be asked to define any of them.

Question 7 (b)

(b) Explain why microorganisms are added to the soil in the biosphere.

(3)

Micro organisms such as bacteria are decomposers and fungi are decomposers. ~~These break down~~ when the plants and animals die, they break down the organic ^{matter} content in them using hydrolytic enzymes (proteases, amylases) to produce inorganic molecules. Breaking down of organic matter provides the microorganisms with respiratory substrates such as glucose which they use to respire and release carbon as carbon dioxide which is taken by plants photosynthesis. The

microorganisms allow the recycling of compounds such as carbon, nitrogen and sulphur.



ResultsPlus
Examiner Comments

This was one of the more discriminating questions on this paper. More able candidates, such as this one, realised that their response had to explain more than the fact that microorganisms are involved in decomposition.



ResultsPlus
Examiner Tip

If you are not sure what you are supposed to write, think back to the specification points and try and identify which one could be being tested and then what you know about it.

Question 7 (c)(i)

(i) Explain the meaning of the term **species richness**.

The number of different types of species⁽²⁾ in the habitat.



ResultsPlus
Examiner Comments

This question did not cause too many problems to candidates except those who thought that species richness was the number of a particular species.

Question 7 (c)(ii)

(ii) Suggest why a decrease in species richness would decrease the use of light energy in the biosphere.

(2)

More the number of species, more the light energy would be absorbed for the process of photosynthesis as it would be needed by ~~chlorophyll~~^{Photosystem} and for photolysis of water in the light dependant reaction. Thus light energy consumption would decrease with corresponding decrease in number of species which would have absorbed different wavelengths of light.



ResultsPlus
Examiner Comments

This was one of the more challenging questions on this paper and we only saw a few responses that scored both marks. This candidate eventually scored two marks at the very end of their response.

(ii) Suggest why a decrease in species richness would decrease the use of light energy in the biosphere.

(2)

Less number of different plant species present in the biosphere. Hence, less less plants means less carbon dioxide used in photosynthesis. Less plants means less light energy used for photosynthesis light-dependent reaction.



ResultsPlus
Examiner Comments

This response is far more typical of the ones that we saw, scoring one mark.

Question 7 (c)(iii)

(iii) Explain why the uptake of carbon dioxide and plant productivity both decrease as species richness decreased.

(4)
As species richness decreased, the rate of photosynthesis decreased. This decreased the ~~rate~~ light-independent reactions which used CO_2 . As ~~the~~ ^{less} carbon fixation takes place, the Calvin cycle is turned less and less G3P and glucose formed. The plant becomes less productive. There are less photosynthesising plants, and less predation, so the plants become less productive, and overall, less photosynthesis & glucose production takes place.



ResultsPlus

Examiner Comments

This question also discriminated well. The more able candidates extended their response to give relevant details of photosynthesis to score three or four marks. Three of our mark points are illustrated in this response.

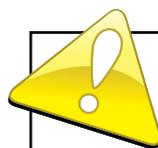
When species richness decreases, number of plants and animal decreases. When number of plant decreases, lesser photosynthesis takes place. Carbon dioxide is used to conduct photosynthesis in Calvin cycle. Lesser carbon dioxide causes lesser 3GP molecule to be formed. Lesser 3GALP formed from products such as reduced NADP and ATP from light dependent reaction. 3GALP molecule ~~does~~ not used to build more complex organic molecules such as enzymes and cellulose. Hence, plant productivity decreases.



ResultsPlus

Examiner Comments

Another example of a reasonable response that scored three marks.



ResultsPlus

Examiner Tip

When a question is clearly asking about photosynthesis, remember to put in the A level detail and not write a response that lacks detail and is barely above what you knew from GCSE.

Question 8 (a)

(a) Describe the structure of a cellulose molecule.

(3)

A cellulose molecule is made up of monomers of β glucose that are joined together by 1,4 glycosidic bonds. They then form microfibrils.



ResultsPlus Examiner Comments

This was one of the questions targeting AO4. Many candidates, such as this one, could tell us that cellulose was a polymer of β glucose with 1-4 glycosidic bonds.



ResultsPlus Examiner Tip

Remember to learn your AS material for both your A2 papers as any of it could be tested in either papers.

Read the question carefully to check if you are being asked about a cellulose molecule as in this question, or the cellulose in a cell wall. Comments about microfibrils go beyond the structure of a cellulose molecule.

Question 8 (b)(i)

*(i) Describe how an investigation could be carried out to collect the data shown in this table.

(5)

For this investigation we will choose an ~~10~~⁵⁰ m² area of each habitat. In ~~each~~ each habitat we will place ~~10~~¹⁰ quadrats of 1x1 m size. We will place them randomly ^{through computer.} by generating random numbers. We will take care not to damage other organisms while placing them. We will then count the no. of quadrats containing pellets in each habitat. We can then calculate the % of quadrats containing pellets using the formula.
$$\frac{\text{no. of quadrats containing pellets}}{10} \times 100$$



ResultsPlus
Examiner Comments

This is a particularly good response to this question assessing one of the set practicals. Many candidates were able to write a response that applied to the context of the question.

*(i) Describe how an investigation could be carried out to collect the data shown in this table.

(5)

To carry out this investigation, you would use quadrats of a known measurement. At each habitat, a random sampling technique should be used where a quadrat will be thrown randomly. A total of 5 quadrats should be used at each habitat. Once set up, count the number of squares that contain pellets in the quadrat. Divide this number of squares by the total number of squares in the quadrat and multiply by 100. Take a mean of the 5 quadrats at each habitat and put them into table form and then a bar graph. The experiment must be done during peak feeding hours of the hare. Repeat the experiment a week later and compare results.



ResultsPlus
Examiner Comments

This is also a good response, illustrating some of the other mark points on our mark scheme.



ResultsPlus
Examiner Tip

When answering a question like this there will normally be a reliability mark but you need to say more than "repeat the investigation to get a mean". You need to be more precise about what needs to be repeated, in this case the number of quadrats counted.

Question 8 (b)(ii)

(ii) State **two** conclusions that can be made from the results of this investigation.

(2)

Habit known as Young heather contain greatest number of pellets, this means that this area does not contain or to contain little number of hares. Furthermore, habits such as Old heather and Mat grass contain mean 20% of pellets, this means that this ^{areas} ~~areas~~ contain high percentage of hares.



ResultsPlus
Examiner Comments

Most candidates were able to pick out that the hares mostly fed on young heather.

(ii) State **two** conclusions that can be made from the results of this investigation.

(2)

- Hares ^(eat in) occupy all five habitats

- Hares ^{are mainly} ~~mostly~~ in the habitat young heather



ResultsPlus
Examiner Comments

Fewer candidates made the conclusion that the hares fed in all the habitats.

Question 8 (b)(iii)

(iii) Suggest the limitations of using the percentage of quadrats containing pellets as an indication of the food preferences of mountain hares.

(3)

- Pellets may be excreted after feeding at a different location from where they ate.
- Number of pellets in each quadrat may be significantly different indicating ~~extent~~ how much mountain hare feeds off one habitat, while percentage of quadrats containing pellets doesn't tell us this abundance, qualitative data.
- Pellets could come from other animals in the area, & hard to distinguish which ~~is~~ pellet ~~can~~ between them.

(Total for Question 8 = 13 marks)



ResultsPlus Examiner Comments

We listed a number of limitations in our mark scheme and were pleased to see all of them mentioned across the papers.

This candidate made three suggestions.



ResultsPlus Examiner Tip

In a question of this type it is always worth making more suggestions than there are marks.

The hares might have grazed on some other plants but might have excreted in some other place thus giving a false indication of food preference.



ResultsPlus Examiner Comments

Two suggestions made here.

Paper Summary

Overall we were pleased with the standard of responses made by these candidates. Points that would have improved the performance of these candidates include:

- learning the meaning of all the biological terms used in the spec
- including more A level knowledge in the response to extend it above GCSE knowledge
- making at least as many statements in the response as there are marks allocated
- ensuring that a response is applicable to the context of the question.

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>

Ofqual



Llywodraeth Cynulliad Cymru
Welsh Assembly Government



Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London WC2R 0RL.