ResultsPlus

edexcel

Examiners' Report
June 2015

GCSE Biology 5BI1F 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.

ResultsPlus

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 2015

Publications Code UG042583

Introduction

This Foundation paper is the seventh of its kind in the Science 2011 Edexcel Pearson specification and has aimed to deliver a wide ranging and appropriately challenging assessment for all abilities at this level. The subject content ranges from Classification to Diabetes and from Nutrient Cycles to The Mammalian Nervous System and therefore both human biology and natural ecosystem biology is assessed. Biological and simple mathematics are also seen within this paper at the appropriate level and parameter and several multiple choice questions are seen as per the standard. Question types range from simple one word recall styles through to descriptions of biological processes. These question styles then move onto more demanding aspects of assessment with explanations of biological processes and with 2 six marker questions towards the end of the examination to highlight the need for good quality of written communication.

It is clear that students are very successfully learning many aspects of the Science specification and can communicate this well on their scripts. Namely and specifically from this assessment, candidates were scoring credit on the Classification and Carbon Cycle however it is also important to highlight the areas where most candidates were weak, including Inheritance and Cystic Fibrosis and also Pyramid of Biomass illustrations.

This report aims to highlight each question item and provide examples of good practice and advice upon how to be more successful with similar items in the future.

Question 1 (a)

This item asked candidates to select words from the various words within a box above a key-tree diagram. Four kingdoms needed to be identified based upon the characteristics provided within the key. For example, does the kingdom have chlorophyll → Yes → Plantae.

The Animalia kingdom was already provided in the key-tree diagram and therefore did not need to be written a second time. Candidates could score one mark for one correct kingdom stated, two for two, three for three and all four marks if all kingdoms were stated correctly.

This response clearly has all four of the correct words positioned in the correct places. The candidate has worked their way through all of the key descriptions and used the words available to them very well.

4 marks.

Classification

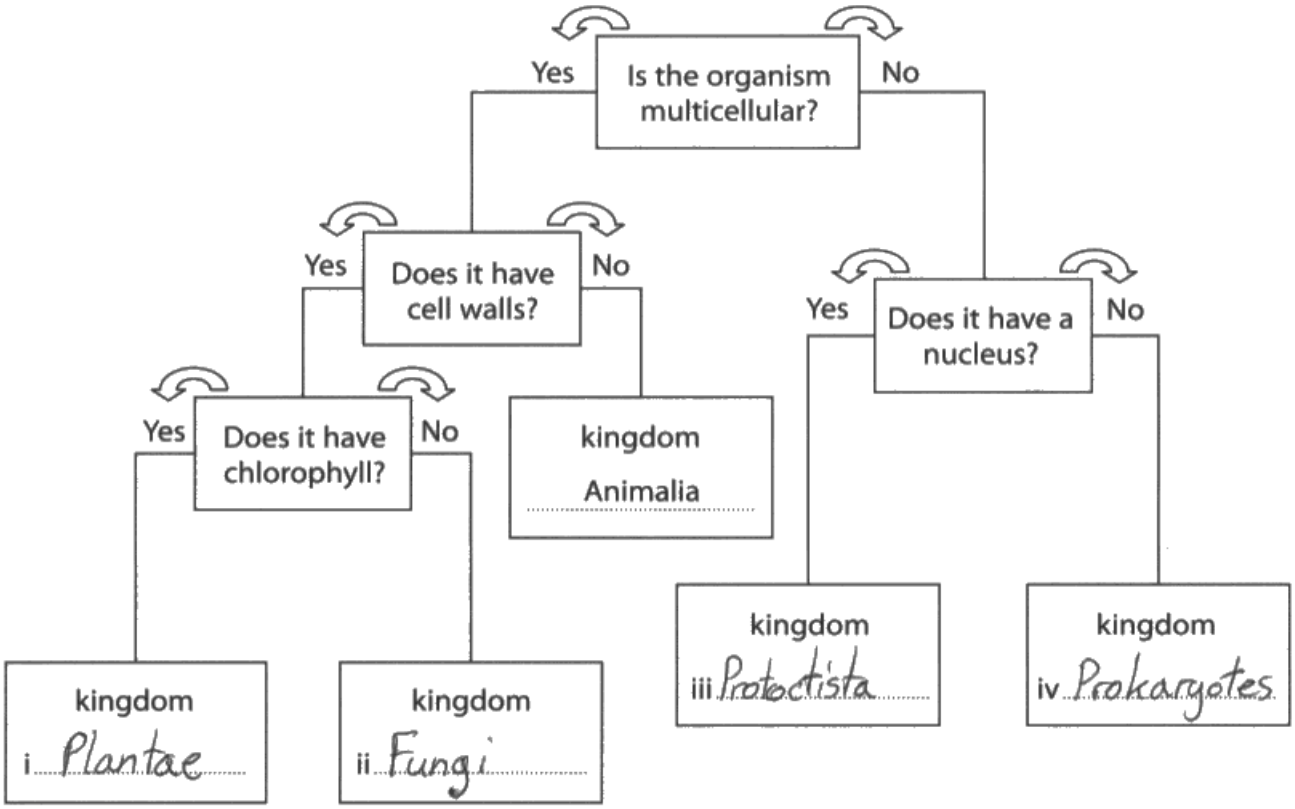
1 (a) John produced a key to classify organisms into their kingdoms.

The names of the kingdoms are shown in the box.

Animalia	Fungi	Plantae
Prokaryotes	Protoctista	

Use words from the box to complete the key. One has been done for you.

(4)



ResultsPlus
Examiner Comments

The need for clear handwriting throughout this examination script is of paramount importance. This candidate has used good quality handwriting to communicate their answer.

This candidate has only positioned two correct answers onto the areas available. Pleasingly, the candidate did recognise the need to not use the kingdom animalia and therefore could have still scored the marks available if fungi and protoctista were switched.

2 marks.

Classification

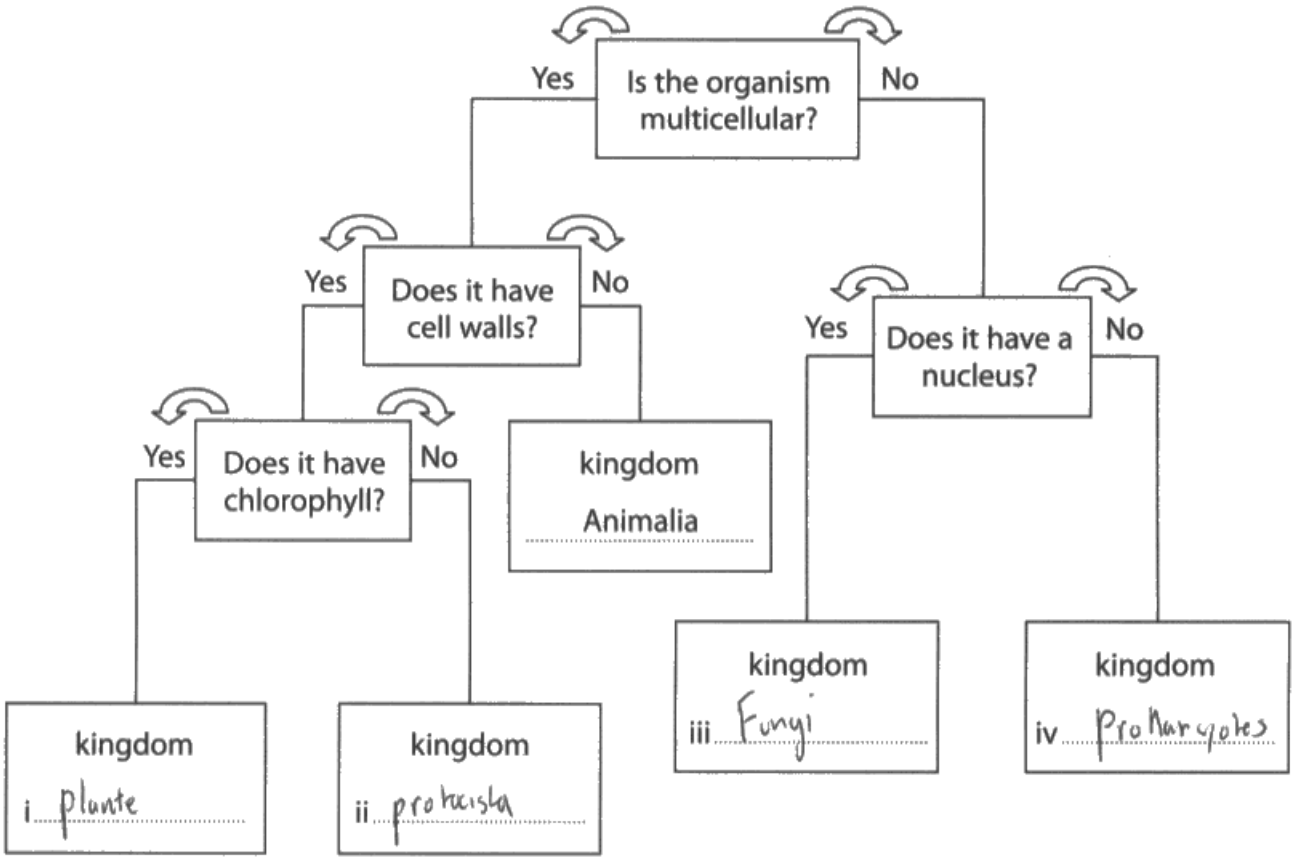
1 (a) John produced a key to classify organisms into their kingdoms.

The names of the kingdoms are shown in the box.

Animalia	Fungi	Plantae
Prokaryotes	Protoctista	

Use words from the box to complete the key. One has been done for you.

(4)



ResultsPlus
Examiner Comments

It is always important to view the question in its entirety. Noticing the clues in the question and what has already been provided is a must for full credit to be awarded to a candidate.

Question 1 (c)

This item asked candidates to explain how a hybrid is formed and required candidates to state that sexual reproduction occurred between two individuals of two different species.

Many candidates recognised the need for two separate species which was pleasing however some merely suggested that two different animals were only required which was scientifically incorrect. Some candidates were going one step further and stating that the hybrid was infertile; which in most cases is true, but does not form part of the explanation.

This candidate has concisely explained how a hybrid is produced. They have used coherence and clarity with the words "different" and "species" and also communicated the word "mating" to convey mark point 2.

2 marks awarded.

(c) Some organisms can form hybrids.

Explain how a hybrid is formed.

(2)

Their formed by two diffelent species, mating to create an hybrid.

E.g. A Lion and a tiger would make a Liger

ResultsPlus
Examiner Comments

It can always be useful to provide examples in the answer that are well communicated. However, candidates must be aware that any incorrect science could negate their actual answer that they may have already been awarded credit for.

ResultsPlus
Examiner Tip

It is very pleasing to see an example provided here. Candidates are always reminded to use examples in their answers if permitted.

This candidate has stated that a hybrid is produced by the breeding of different animals and therefore secured the second marking point. However they have failed to secure marking area one for stating that these animals belong to separate or different species.

1 mark awarded.

(c) Some organisms can form hybrids.

Explain how a hybrid is formed.

(2)

A hybrid is formed when two different animals breed together.

ResultsPlus
Examiner Comments

It is always important for candidates to really think before they communicate. Is the word animals as specific as can be? Do you really mean animals?

Question 2 (a) (i)

This item asked candidates to use the Body Mass Index equation to calculate the BMI of an individual with a height of 1.7 metres and a mass of 77 kilograms. Many candidates scored the two marks available here by firstly multiplying 1.6 by 1.6 to achieve 2.56. They then divided 77 by this 2.56 to calculate the correct answer of 30.07.

Some candidates however merely divided 77 by 1.6 and therefore scored zero marks for this incorrect calculation and answer.

This candidate has unfortunately calculated the incorrect figures. The equation clearly states that the height must be squared, yet they have only used 1.6 in the division rather than 2.56.

The error in the equation can therefore not score a mark for the incorrect answer of 48.125

0 marks awarded.

Type 2 diabetes

2 Research shows that overweight people may develop Type 2 diabetes.

(a) Body Mass Index (BMI) can be used to identify people who are overweight.

BMI can be calculated using the equation:

$$\text{BMI} = \frac{\text{mass in kilograms}}{\text{height in metres} \times \text{height in metres}}$$

(i) Calculate the BMI for a person who has a mass of 77 kilograms and a height of 1.6 metres.

77÷1.6=48.125 **(2)**

BMI = 48.125

ResultsPlus
Examiner Comments

It is not necessary for candidates to remember the BMI equation as it will always be supplied to them in the question being asked. Candidates must view this carefully and use the formula accurately.

This candidate has clearly used the equation to good effect and despite not proving to the examiner they multiplied 1.6 by 1.6 it is evident that this has been done as the answer 2.56 is seen.

Candidates who wrote 30.07 (or other acceptable answers) without any calculations were still able to be credited 2 marks.

Type 2 diabetes

2 Research shows that overweight people may develop Type 2 diabetes.

(a) Body Mass Index (BMI) can be used to identify people who are overweight.

BMI can be calculated using the equation:

$$\text{BMI} = \frac{\text{mass in kilograms}}{\text{height in metres} \times \text{height in metres}}$$

(i) Calculate the BMI for a person who has a mass of 77 kilograms and a height of 1.6 metres.

(2)

$$\text{BMI} = \frac{77\text{kg}}{2.56\text{m}}$$

BMI = 30.078125

ResultsPlus
Examiner Comments

It is always worth noting that showing the examiner the steps of how an answer is calculated is very important as there can be marks awarded for correct working yet an incorrect answer.

ResultsPlus
Examiner Tip

Always ensure that you use calculations to support your answers.

Question 2 (a) (ii)

This item asked candidates to describe how the scientific community could validate research previously undertaken. The answers that were available made comment upon the writing of scientific journals, the peer review system and also the attendance of scientific conferences to discuss such research. Many candidates were stating that all of the research would need to be repeated and therefore did not score the marks available.

Here the candidate has only made comments about repeating the research and this is not the case for validation by the scientific community. Only answers that commented upon journal use, conference discussions and peer review were credited.

0 marks awarded.

(ii) Scientific research has shown a link between high BMI and the development of Type 2 diabetes.

Describe how the scientific community would validate this research.

(2)

The Scientific community would validate this research by testing people with Type 2 diabetes.

ResultsPlus
Examiner Comments

This answer is also communicated with poor clarity.

Here the candidate has successfully recognised that the use of scientific journals and scientific conference discussions are important for research validation. This is pleasing as this is coherently conveyed.

(ii) Scientific research has shown a link between high BMI and the development of Type 2 diabetes.

Describe how the scientific community would validate this research.

(2)

~~they would do tests~~ they would confirm and write it in a scientific journal. They would have a conference and discuss what to do next.

ResultsPlus
Examiner Comments

This answer is also communicated with poor clarity.

Question 2 (b) (i)

This item asked candidates to choose two words from a bank of scientific words to describe the action of hormones on the disease diabetes. Candidates were asked to place the two words "Insulin" and "Pancreas" onto the spaces provided. Many candidates scored the maximum mark here however some candidates were suggesting that insulin was produced by the liver as they had the misconception of hormone secretion rather than glucose storage which this organ actually does.

Here the candidate has become confused with the use of the liver in normal blood glucose regulation and suggested that insulin is released from here. This is not the case and therefore only one mark is awarded here.

(b) Blood glucose levels are controlled by hormones.

(i) Use words from the box to complete the following sentences.

(2)

glycogen	liver	insulin
brain	pancreas	auxin

Type 2 diabetes develops when a person becomes resistant to the hormone insulin.

This hormone is produced in the liver.

ResultsPlus
Examiner Comments
Excellent and clear communication.

Pleasingly, both of the answers have been communicated here.

(b) Blood glucose levels are controlled by hormones.

(i) Use words from the box to complete the following sentences.

(2)

glycogen	liver	insulin ✓
brain	pancreas ✓	auxin

Type 2 diabetes develops when a person becomes resistant to the hormone insulin.

This hormone is produced in the pancreas.

ResultsPlus
Examiner Comments
It must be remembered that candidates should be spelling scientific answers correctly. If words are provided then these should be placed on the lines as accurately as possible as in this example.

Question 2 (b) (ii)

This item asked candidates to describe ways in which a Type 2 diabetic could control their blood glucose levels without the use of hormones. Many candidates scored well here by commenting that a Type 2 diabetic could undertake some form of physical activity. Fewer candidates stated that less glucose could be consumed or through careful control of glucose in the diet. Many were merely stating "healthy diet" which did not score credit.

Some candidates were stating that insulin could be administered and therefore did not score credit as insulin is the hormone that would be used by the diabetic.

As with other candidates, communicating the need for regular exercise has been awarded in this response. Unfortunately, this candidate has only stated that a healthy diet would be required without stating what this should contain or not contain.

1 mark awarded.

(ii) Describe **two** ways a person with Type 2 diabetes can control their blood glucose levels without the use of hormones.

(2)

A person with type 2 diabetes can exercise reguarly and have a healthy diet.

ResultsPlus
Examiner Comments

Candidates should always attempt to be as specific as possible when communicating with their examiner. They must think "is the word healthy really as specific as I can be?" "What do I mean by "healthy?""

ResultsPlus
Examiner Tip

Candidates are reminded that they need to always be specific about their communication. When conveying biological processes they must always be as specific as possible such as choosing a more definitive word than "healthy".

This candidate has made reference to both methods of glucose regulation without hormones. Both exercise and a diet with less glucose are advised and therefore two marks are awarded.

(ii) Describe **two** ways a person with Type 2 diabetes can control their blood glucose levels without the use of hormones.

(2)

A person with type 2 diabetes controls their blood glucose levels by eating healthier so less sugar and fat so the glucose can be turned into glycogen. And also by excersing more, to reduce the fat around the pancreas etc.

ResultsPlus
Examiner Comments

This candidate has shown excellent written communication; something that is advised throughout the paper.

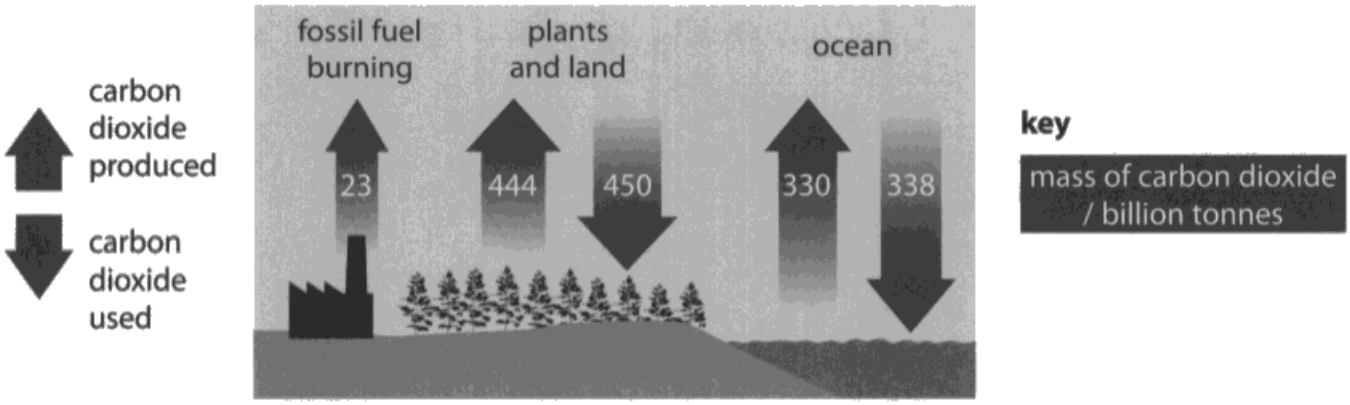
Question 3 (a) (i)

This item asked candidates to retrieve data from the diagram provided and calculate the difference in the mass of carbon dioxide used and produced by the land and plants. The candidates were given credit for retrieving the two numbers 444 and 450, and then full marks awarded for the correct answer of 6 billion tonnes of carbon dioxide.

This candidate has secured one of the marking areas as they have correctly retrieved both of the figures from the diagram, namely 444 and 450. They have not used them correctly however.

The carbon cycle

3 The diagram shows the mass of carbon dioxide used and produced during one year.



(a) (i) Calculate the difference in mass of carbon dioxide used and produced by the plants and land.

(2)

$\frac{450}{444} = \frac{75}{74} = 1.0135$

1.0135 billion tonnes of carbon dioxide

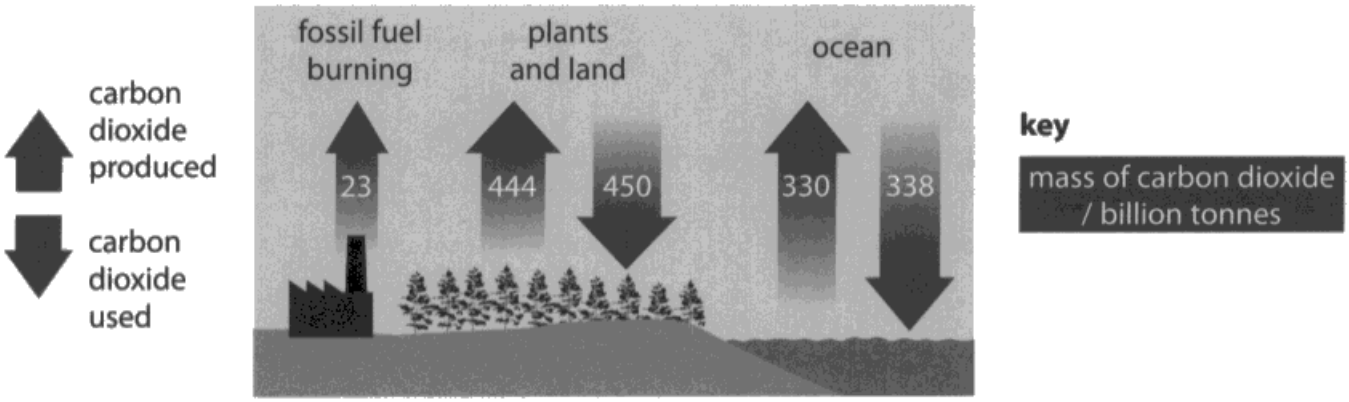
ResultsPlus
Examiner Comments

Candidates are advised to read the question at least twice to really understand the calculation required of them.

Here all of the correct figures have been used correctly from the diagram for the correct answer to be awarded 2 full marks.

The carbon cycle

3 The diagram shows the mass of carbon dioxide used and produced during one year.



(a) (i) Calculate the difference in mass of carbon dioxide used and produced by the plants and land.

(2)

450
− 444
6

6 billion tonnes of carbon dioxide

ResultsPlus
Examiner Comments

Excellent calculation shown. Always advised on calculation questions.

Question 3 (a) (ii)

This item asked candidates to retrieve data from the diagram provided and calculate the total mass of carbon dioxide produced. The candidates were given credit for retrieving the three numbers 23, 444 and 330 and then full marks awarded for the correct answer of 797 billion tonnes of carbon dioxide.

This candidate has secured one of the marking areas as they have correctly retrieved all of the figures from the diagram, namely 444 and 330 and 23. They have not used them correctly however.

(ii) The total mass of carbon dioxide used was 788 billion tonnes.

Calculate the total mass of carbon dioxide produced.

(2)

444
+ 330
+ 23

9 billion tonnes of carbon dioxide

ResultsPlus
Examiner Comments

Candidates must review their work to ensure that no errors are found. 444 added to 330 and 23 is clearly not 9.

Here, all of the correct figures have been used correctly from the diagram for the correct answer to be awarded 2 full marks.

(ii) The total mass of carbon dioxide used was 788 billion tonnes.

Calculate the total mass of carbon dioxide produced.

(2)

23 + 444 + 330 = 797

797 billion tonnes of carbon dioxide

ResultsPlus
Examiner Comments

Well calculated and well shown.

Question 3 (b) (i)

This item asked candidates to suggest one effect of an increase in the mass of carbon dioxide produced in the atmosphere. Simply stating that the greenhouse effect would be affected was credit worthy and seen the most frequently. A rise in temperature was also a popular answer. Few candidates commented that there would be an increase in the photosynthetic rate of plants which was still credit worthy.

Many candidates also focused upon the effects of the rise in temperature such as polar ice caps melting. These were not awarded credit as they are not a direct effect of carbon dioxide increases.

Here the candidate has successfully stated that a rise in temperature would be seen as a result of an increase in carbon dioxide. If they had merely stated "climate change" then this would not have been credit worthy.

(b) (i) Suggest **one** effect of an increase in the mass of carbon dioxide produced in the atmosphere.

(1)

The temprature can rise and can cause climate change.

ResultsPlus
Examiner Comments

It is always advised that candidates be as specific as possible and although this response was awarded the mark available they should have really communicated where the temperature increase actually was (the earth).

This candidate has not been specific enough to be awarded the more challenging marking area of "more carbon dioxide for the plants to photosynthesise more". Stating "air" and "to grow" is too vague to award credit.

(b) (i) Suggest **one** effect of an increase in the mass of carbon dioxide produced in the atmosphere.

(1)

There will be more air for trees to grow.

ResultsPlus
Examiner Comments

Candidates should always be as specific as possible with biological processes. The word 'grow' would not be awarded for any credit towards photosynthesis.

Question 3 (b) (ii)

This item asked candidates to explain why plants removed carbon dioxide from the atmosphere. Many candidates were scoring well here and were communicating the idea of plant photosynthesis requirements for light. Too few candidates were moving forward to explain the use of photosynthesis as the production of glucose or carbohydrates.

This candidate has secured the more difficult area here by stating that glucose will be produced yet they have not stated that it would be produced through the process of photosynthesis which is disappointing.

1 mark awarded.

(ii) Explain why plants remove carbon dioxide from the atmosphere.

(2)

Plants remove carbon dioxid from the ~~air~~ atmosphere to create glucose and oxygen.

ResultsPlus
Examiner Comments

Candidates should be reminded that they should always read their answer to ensure that all elements of their answer is communicated. It would have been clear that the word "photosynthesis" has been omitted if there was a reread.

ResultsPlus
Examiner Tip

It is pleasing to see that candidates are not afraid of evaluating their answers and amending if necessary. Always return to your answers if you have time to check to see what you have written is exactly what you want to convey.

This candidate has secured both marking points by stating that photosynthesis would be used by the plant and that the product here is glucose. Two very highly complex elements to the full answer and well linked.

2 marks awarded.

(ii) Explain why plants remove carbon dioxide from the atmosphere.

(2)

Plants carry out photosynthesis to get their food. photosynthesis is where the plant takes in carbon dioxide and produces glucose, (used as their food source) and oxygen

ResultsPlus
Examiner Comments

This answer is communicated with poor clarity despite being awarded full marks for its scientific content.

Question 3 (b) (iii)

This item asked candidates to suggest two ways in which carbon dioxide could be reduced in the atmosphere. Many candidates scored well here by stating that more plants could be planted and that less trees could be cut down or less deforestation; clearly making a link between subjects of Biology and Geography. It is pleasing to see cross curricular influence.

The reduction of fossil fuel burning was most popular among candidates and examiners were asked to view this answer in more practical methods as well such as "the use of fewer cars" or the "development of biofuels". It was again pleasing to see more practical methods of carbon dioxide reduction.

A very well communicated answer that conveys two areas of the mark scheme in a coherent fashion. The reduction in deforestation is linked to an explanation as well although this was not assessed here. The reduction is fossil fuel use is also communicated well.

(iii) Suggest **two** ways of reducing the mass of carbon dioxide in the atmosphere.

(2)

- Reducing deforestation as the trees take in massive amounts of carbon dioxide to photosymesis and by cutting them down that increases the carbon diatide mass.
- Stop burning fossil fuels.

ResultsPlus
Examiner Comments

Excellently communicated here with legible handwriting and correct spelling.

(iii) Suggest **two** ways of reducing the mass of carbon dioxide in the atmosphere.

(2)

Recycling not having to burn and release ~~CO^2 also~~ carbon dioxide. Also, cutting down on ~~trees~~ cars and vehicles.

ResultsPlus
Examiner Comments

This was the minimum that was accepted for the "reduction in fossil fuel combustion" area of the mark scheme. This candidate has made a suggestion that if fewer cars were to be used then this would reduce carbon dioxide in the atmosphere which is scientifically valid. The fact they have not mentioned that fossil fuels would be used less is implied and so credit awarded.

ResultsPlus
Examiner Tip

This answer is communicated with poor clarity.

Question 4 (a) (iii)

This item asked candidates to state the name used to describe alternative versions of the same gene. Many candidates stated that allele was the correct term, however too many candidates were also stating other genetic terms such as phenotype, genotype or DNA which clearly did not score any credit.

Here is an example where a candidate has attempted to communicate something creditworthy from the knowledge bank they have acquired from their revision or classroom based learning and although this is a genetic term it was not the term used for an "alternative version of the same gene"

(iii) A gene can exist in alternative forms.

State the genetic term used for an alternative form of the same gene.

(1)

genotype

ResultsPlus
Examiner Comments

Despite this being spelt correctly it is the incorrect word.

Here the candidate has communicated the correct answer and it is spelt correctly.

(iii) A gene can exist in alternative forms.

State the genetic term used for an alternative form of the same gene.

(1)

allele

ResultsPlus
Examiner Comments

A complex word to spell so it is pleasing to see this correct here.

Question 4 (b) (i)

This item asked candidates to state the genotypes of the offspring of two parents when the gamete alleles were supplied in a punnett square. This was a very successful item owing to the knowledge and scaffolding of candidate and item respectively. Many candidates were correctly identifying the genotypes FF, Ff, Ff and ff; however too many candidates were writing fF and although this was accepted it is not the scientific manner upon which this should be communicated.

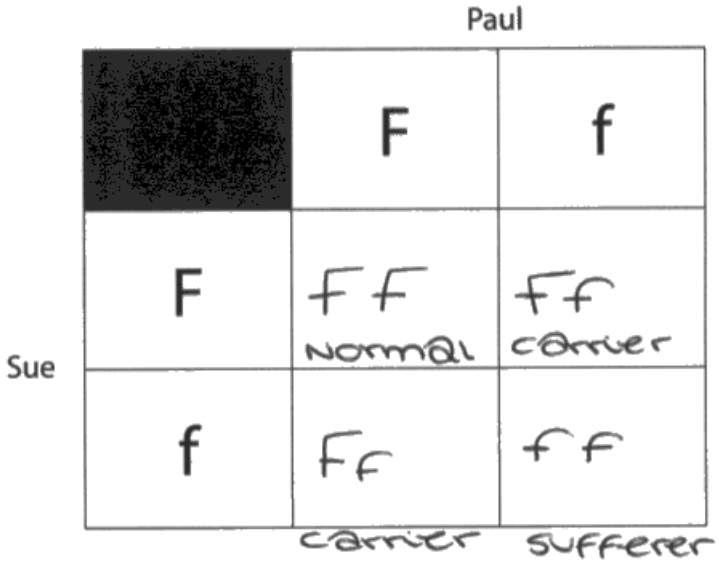
The candidate here has correctly analysed the gametes provided in the Punnett square and placed the correct genotypes into the square in the appropriate boxes. They have even gone as far as to state the terms given to each of the offspring although this was not necessary.

(b) Cystic fibrosis is a recessive genetic disorder.

Two parents, Paul and Sue, each have the same genotype **Ff** for cystic fibrosis.

(i) Complete the Punnett square to show the possible genotypes of the offspring of Paul and Sue.

(1)



ResultsPlus
Examiner Comments

It must be remembered that candidates should only give the information asked of them and although the information provided here was correct if it was not it could have negated the marks awarded for the punnett square.

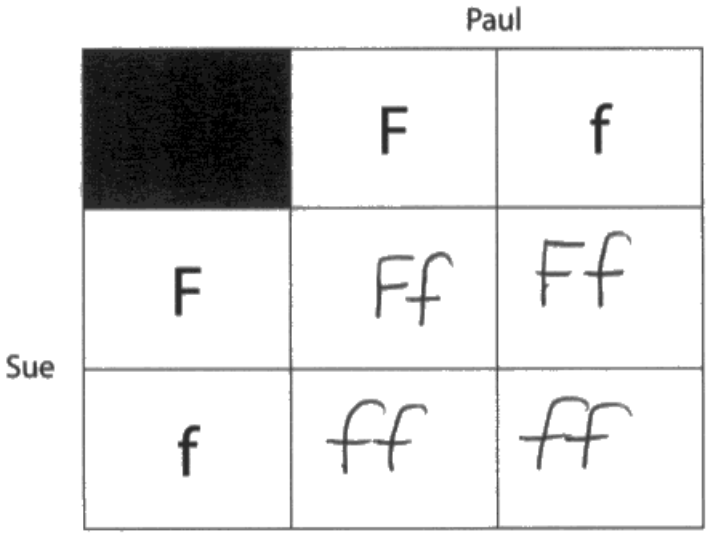
This candidate has unfortunately made an error with one of the heterozygous genotypes and placed a homozygous recessive answer in the punnet square twice.

(b) Cystic fibrosis is a recessive genetic disorder.

Two parents, Paul and Sue, each have the same genotype **Ff** for cystic fibrosis.

(i) Complete the Punnett square to show the possible genotypes of the offspring of Paul and Sue.

(1)



ResultsPlus
Examiner Comments

Candidates are advised to check their work for obvious errors such as this example. It is very easy in a rushed examination to place obvious errors in the space provided.

Question 4 (b) (ii)

This item asked candidates to analyse their punnett square and assess the probability of the offspring from the two parents inheriting cystic fibrosis. Many alternatives to 25% were accepted here such as "1 in 4", 0.25, 1/4 or 1:3.

1:4 was not accepted.

If a candidate had made an error in the punnett square (such as placing ff twice) yet they had stated that the probability was 50% then the error carried forward was not penalised and credit was awarded.

A qualitative version of probability here where the candidate has written "1 in 4" rather than anything more quantitative. This is perfectly acceptable as it still conveys the probability.

(ii) State the probability that Paul and Sue will have a child with cystic fibrosis.

(1)

1 in 4

ResultsPlus
Examiner Comments

Candidates should be reminded for the need to not write words like "likely" or "unlikely" when discussing probability.

This candidate has clearly identified that anything other than the recessive homozygous example has been counted in their probability. Unfortunately, the answer is the opposite to this and only the homozygous recessive genotype should have been used.

(ii) State the probability that Paul and Sue will have a child with cystic fibrosis.

(1)

75 %

ResultsPlus
Examiner Comments

Candidates should be reminded for the need to not write words like "likely" or "unlikely" when discussing probability.

.

Question 4 (c)

This item asked candidates to explain why a person could be underweight due to cystic fibrosis and expected responses such as "a build up of thick mucus blocking the pancreatic duct thus not allowing enzyme release". Clearly, candidates were answering in a manner of ways whilst still communicating the correct science. Any reference to sticky mucus or an accumulation of mucus was creditworthy and seen most frequently. Less frequently seen were references to the blocking of the digestive areas supplying enzymes. Any comment that the digestion of food was halted was seen as correct and creditworthy if in the correct context.

Many candidates were suggesting that the cystic fibrosis individual would not be able to breathe and therefore could not exercise hence being underweight which was not creditworthy.

(c) Explain why a person can be underweight due to cystic fibrosis.

(2)

The thick mucus stops/blocks the enzymes from helping to digest the food therefore causing loss of weight because the body is not getting enough nutrients.

ResultsPlus
Examiner Comments

This candidate has scored both marks available for stating that cystic fibrosis cause a build up of thick mucus which stops the passing of enzymes thus halting any food digestion. An excellent answer that is conveyed with clarity and conviction.

This candidate has provided enough information to be awarded one mark for the idea that digestive enzymes are not secreted. However, the communication of "tubes" getting blocked is too vague for the idea that any duct is not passable due to the blockage.

(c) Explain why a person can be underweight due to cystic fibrosis.

(2)

Because their tubes get blocked so digestive enzymes cant get through

ResultsPlus
Examiner Comments

Candidates must be more specific in future years when communicating their ideas about biological parts of the human body. Simply stating "tubes" is insufficient for "pancreatic duct"

Question 4 (d) (i)

This item asked candidates to explain why person X from a genetic diagram inherited sickle cell disease. Candidates were awarded credit for stating that both parents would have had to have been carriers of the genetic disorder and therefore person X had inherited two recessive alleles. Many candidates were successful with this item on the first point of the parents being carriers for the disease, however few candidates were appreciating the need for person X to have acquired two recessive alleles or that each parent supplied one recessive allele each to the X offspring.

(i) Explain why person X inherited sickle cell disease.

(2)

The mother and father of the first generation must of been carriers of the disease, with a dominant and recessive allele. This has caused person X to inherit the two recessive alleles and to be a sufferer.

ResultsPlus
Examiner Comments

This candidate has correctly stated that both parents would have had to have been carriers and therefore both passed on a recessive allele; it is an extremely coherent and well communicated answer. They have recognised and been clear that it is necessary for both of the parents to be carriers and had the confidence to state this. Many candidates were more vague about this fact and did not score credit.

(i) Explain why person X inherited sickle cell disease.

(2)

Person X got inherited sickle cell disease because one of her parents could have been a carrier of the disease

ResultsPlus
Examiner Comments

Here is an example where a candidate has not been confident enough to state the definitive fact that both parents had to have been carriers in this genetic diagram. Suggesting that they "could" have been was insufficient. Indeed, they have only said that "one" could have been as well and therefore once again not awarded credit here.

Question 4 (d) (ii)

This item asked candidates to explain why a person with sickle cell disease may have difficulty exercising. This item was challenging as many candidates failed to recognise that an individual with sickle cell disease has differently shaped red blood cells that reduced the oxygen carrying capacity of the blood. This would lead to a lack of aerobic respiration or energy release from the respiring muscles; this third point was seen rarely. Many candidates were stating that the individual with sickle cell disease would have joints or muscles that ached and therefore were scoring one mark here.

This candidate has successfully scored both marking areas here as they have stated that the red blood cells would have become misshapen and that this affects the carrying capacity of the blood for oxygen. It is important for the candidates to be specific when mentioning the red blood cells and not just "blood cells become misshapen".

(ii) Explain why a person with sickle cell disease may have difficulty exercising.

(2)

They would get out of breath easier as red blood cells can not carry normal amounts of oxygen due to being misshaped in accordance to the disease.

ResultsPlus
Examiner Comments

It is important for the candidates to be specific when mentioning the red blood cells and not just stating "blood cells become misshapen".

(ii) Explain why a person with sickle cell disease may have difficulty exercising.

(2)

Makes you tired, aching joints and muscles and fever and aneminia.

ResultsPlus
Examiner Comments

This candidate has scored both marks for correctly identifying that cystic fibrosis can lead to a reduction in red blood cells and therefore resulting in anaemia. They have also stated that aching joints would result in difficulty in exercising.

Question 5 (a) (iii)

This item asked candidates to explain the advantage of the reflex action when a pin pierces a finger. Candidates were credited for recognising that a reflex action creates a faster reaction speed and that the finger would remove itself faster than if a reflex were not used. Credit was further provided to candidates who stated that this would reduce the amount of damage to the finger as the pin would not have pierced as deep.

Many candidates were able to communicate that reflex actions were used to increase the speed of reactions but few commented upon the actual advantage of damage reduction.

This response gained two marks for correctly identifying that a reflex action would allow a faster reaction time and that this would be an advantage as less damage would be caused to that specific area of the body.

(iii) Explain the advantage of the reflex action that will occur when the pin pierces the skin of the finger.

(2)

Reduce damage from your body. ~~and~~ and it is ~~shorter~~ faster than going up the brain and back down

ResultsPlus
Examiner Comments

Candidates must remember to communicate their thoughts in a coherent fashion as possible. Obviously if an error is made (and therefore crossed out) then this is unavoidable, but they must think before they write about the manner to communicate.

This response has made good use of the idea that reflexes are significantly faster than normal reactions. However, they have only stated that the body uses the reflex in an attempt to defend itself and this was too vague for the "damage reduction" marking area.

(iii) Explain the advantage of the reflex action that will occur when the pin pierces the skin of the finger.

(2)

The advantage of a reflex are is that your reaction is significantly faster as the reflex are skips the brain and tries to depend itsely on instinct.

ResultsPlus
Examiner Comments

Candidates should be reminded about the use of clear handwriting in their communication. Whilst being appreciative of time limits it is always frustrating when an examiner cannot award credit owing to poor legibility of the candidate's written style. Every effort is made to decipher handwriting that is unclear.

Question 5 (b)

This item asked candidates to describe how the brain is linked to the skin of the finger in a reflex arc or the general nervous system. Candidates did not score vast amounts of credit on this item owing to many merely communicating any form of nervous system knowledge without correctly identifying that the spinal cord was connected to the brain and that the spinal cord was then connected to the skin via nerves. Many candidates stated that the brain was in direct neural connection with the skin which was not credited. Many candidates also just stated once again that a reflex arc was used for quicker reactions and therefore did not score on this communication.

This candidate has clearly and coherently communicated that the finger is connected to the spinal cord via a series of nerves and that the spinal cord is then connected to the brain. Both marks have been awarded here.

(b) Describe how the brain is linked to the skin of the finger in this reflex arc.

(2)

The finger is connected to the sensory neurone which is connected to the relay neurone which sends an impulse to the spinal cord which is connected to the brain. Then the brain sends an impulse down the motor neurone to the muscles

ResultsPlus
Examiner Comments

It is pleasing to see that this candidate has communicated their answer in a fashion that is logical and easily accessible to the examiner.

(b) Describe how the brain is linked to the skin of the finger in this reflex arc.

(2)

Because the neurone is linked to the brain.

ResultsPlus
Examiner Comments

Unfortunately, this candidate has failed to recognise that the spinal cord is involved in reflex actions and arcs and merely stated that the brain is connected to the skin via neurones.

Question 5 (c)

This extended writing item asked candidates to describe how alcohol and caffeine have different effects on reaction times. This item was largely based on a levelling marking system where the overall assessment was provided by a professional judgement based on indicative content and the quality of written communication. A level one (1 or 2 marks) was awarded where the candidates had provided one limited correct description based upon the effect of either caffeine or alcohol such as suggesting that alcohol was a depressant or that caffeine allowed the consumer to "become more alert". A level two (3 or 4 marks) asked candidates to communicate a simple description of both the drugs and the effect on reaction time such as "alcohol is a depressant and it slows down the reaction time of the consumer whereas caffeine is a stimulant and therefore decreases the reaction time of the consumer". Level three credit (5 or 6 marks) asked candidates to make a detailed description of both drugs and included some correct content on the action of nerve impulses or neurotransmitters across the synapse.

A great number of candidates were stating that alcohol had an effect on drink-drivers or that it was illegal to drink with more than a certain limit of alcohol in the body and although this is the case these were not awarded credit unless connected with some of the indicative content required. Many candidates were also stating that caffeine was "full of sugar" and found in such sugary food and drinks such as sweets, marmalades and energy drinks such as sports enhancements. This is clearly not the case for the majority and thus did not score credit.

*(c) Alcohol and caffeine affect the time the body takes to react to a stimulus.

Describe how alcohol and caffeine have different effects on reaction times.

(6)

Alcohol and caffeine affect the time the body takes to react to a stimulus because alcohol is a depressant and caffeine is a stimulant. Alcohol is a depressant, when we drink alcohol it slows down the neurone-transmitters in our body meaning that it takes us a longer time to react to certain situations. As neuronetransmitters take longer to get around/ diffuse across synapses we temperiary get blurred vision and slurred speech. As all of this happens our reaction times are effected. On the other hand, caffeine is a stimulant, this speeds up neuronetransmitters. Therefore, they get signals around the body faster and they diffuse across the synapse much quicker. As the neuronetransmitter diffuse across the synapse faster we are more alert and awake, we have quicker reaction time to certain situations. That is how caffeine affects our reaction times

ResultsPlus

Examiner Comments

An excellent response here which demonstrates both clarity and excellent written communication.

The candidate has stated a detailed description of both alcohol and caffeine and also used complex scientific words correctly to convey their answer.

All words are correctly spelt and the grammar and coherence are both used with good effect.

*(c) Alcohol and caffeine affect the time the body takes to react to a stimulus.

Describe how alcohol and caffeine have different effects on reaction times.

(6)

Alcohol and caffeine have different effects as alcohol slows down the brain and reaction times. Alcohol does damage to the brain by making impulses slower and can lead to memory loss whereas caffeine makes the brain feel awake and makes your reaction times speed up faster.

Alcohol makes the brain slower and makes impulses slower down which can lead to reaction times slowering down. whereas caffeine helps the brain more by making reaction times quicker and making you feel more awake.

ResultsPlus
Examiner Comments

This candidate has made reference to the impulses being lower with the use of alcohol and also that caffeine has an effect on the alertness of the consumer. They have not made enough comment upon neurotransmitters or neural pathways and their effects with alcohol or caffeine and therefore only awarded 4 marks.

The quality of written communication is such that their answer has been communicated effectively.

*(c) Alcohol and caffeine affect the time the body takes to react to a stimulus.

Describe how alcohol and caffeine have different effects on reaction times.

(6)

Alcohol makes reaction slow, because it slows your brain down and slows everything else down in your body. It slows everything down because, I think the chemicals in the alcohol reacts really quick.

Caffeine makes you reacts really quick because it's full of sugar and it can make you hyper and you could do everything really quick. And when you'd had caffeine your reaction is really quick. Because it's full with sugar and ~~enery~~ energy.

time

Alchol reaction could be about 20 seconds, but caffeine reaction would be about 5 seconds because all of sugal what you drank.

ResultsPlus

Examiner Comments

This candidate has made reference to both of the drugs but only in a very limited fashion about making the consumer's reactions either quick or slow without qualifying this much more than in the most limited of manners.

Level 1 with 2 marks awarded as the quality of written communication is satisfactory.

Question 6 (a) (i)

This item asked candidates to draw a pyramid of biomass based upon the figures provided to them for one mark. Many candidates did not recognise that the blocks on the pyramid needed to be proportioned correctly and that the top block needed to be approximately half the size of the middle. The middle block needed to be approximately three times the size of the lower. Many candidates did not draw accurately using a ruler and although this was not essential, it would make assessing their pyramid more straightforward. Some candidates used the incorrect data and therefore did not score the mark available.

Many candidates are still communicating triangular pyramids either in the conventional bottom heavy triangle or stiletto top heavy style. Either of these if used were not credited.

This candidate has clearly analysed the biomass figures and produced a pyramid with the exact measurements required. This is drawn accurately and clearly with the labels used, although this was not a requirement.

Energy

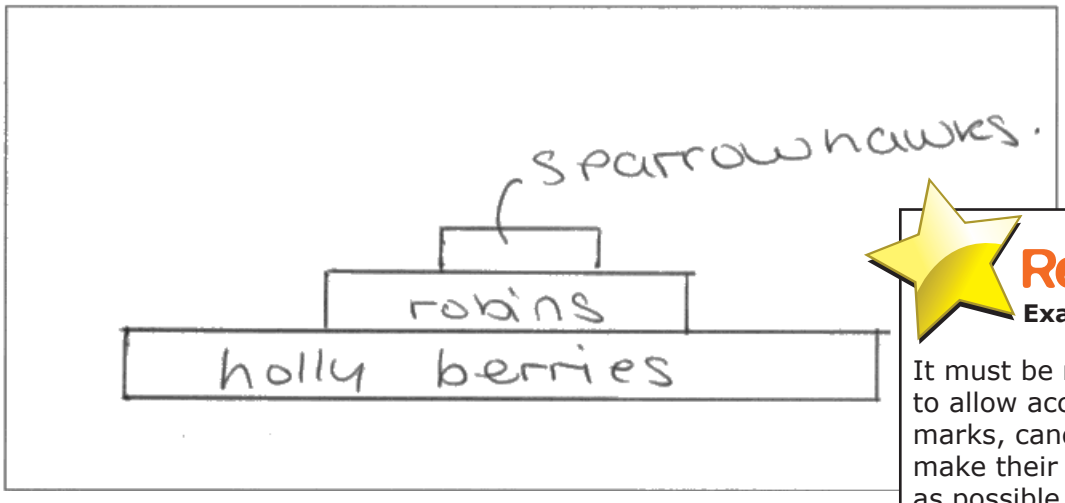
6 The diagram shows a woodland food chain.

The table shows the number and biomass of each part of the food chain.

part of food chain	number	biomass / g
holly berries	10000	5000
robins	25	1500
sparrowhawks	2	800

(a) (i) Draw a pyramid of biomass for this food chain in the box.

(1)



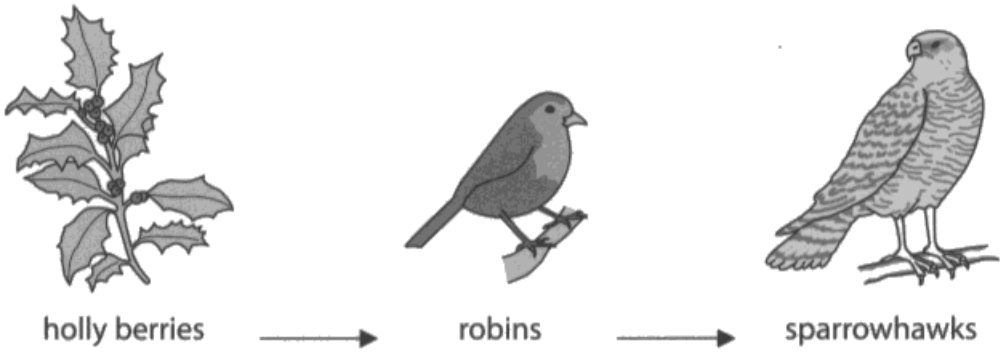
ResultsPlus
Examiner Comments

It must be remembered that to allow accessibility to the marks, candidates should make their answers as clear as possible such as here. A ruler has been used to allow clear marking.

In this example the top two blocks are not in proportion and also the third and second blocks are not proportioned correctly.

Energy

6 The diagram shows a woodland food chain.

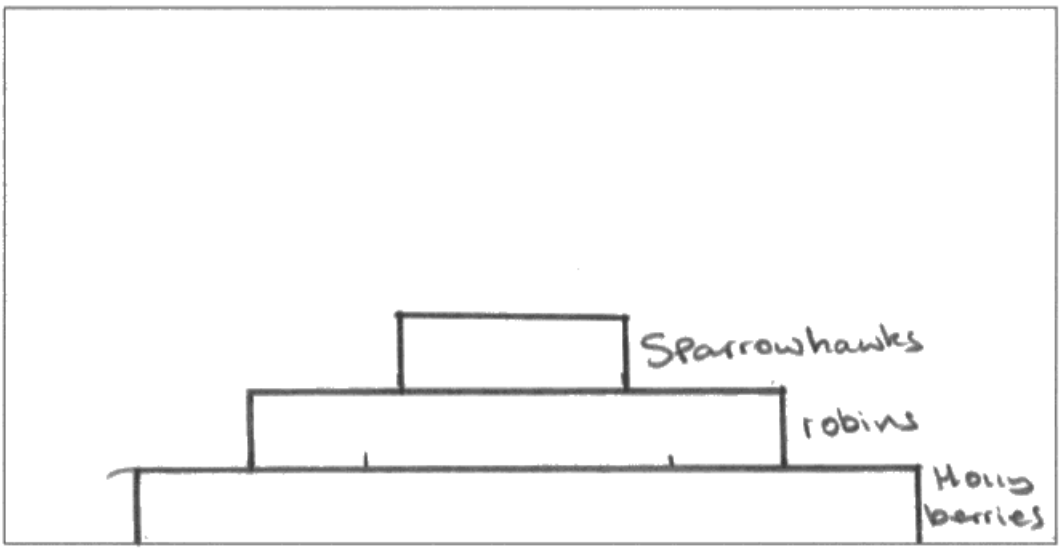


The table shows the number and biomass of each part of the food chain.

part of food chain	number	biomass / g
holly berries	10000	5000
robins	25	1500
sparrowhawks	2	800

(a) (i) Draw a pyramid of biomass for this food chain in the box.

(1)



ResultsPlus
Examiner Comments

Candidates are reminded for the need for extreme care when drawing pyramids. If numbers are used in the food chain then they must be correctly equated into any pyramid drawn.

Question 6 (a) (ii)

This item asked candidates to retrieve data from the food chain diagram provided and calculate the difference in the biomass between the robins and the sparrowhawks. The candidates were given credit for retrieving the two numbers 1500 and 800, and then full marks awarded for the correct answer of 700 grams.

(ii) Calculate the difference in biomass between the robins and the sparrowhawks.

(2)

1500 ÷ 800 =

1·875 g

ResultsPlus
Examiner Comments

This candidate has secured one of the marking areas as they have correctly retrieved both of the figures from the diagram, namely 1500 and 800. They have not used them correctly however.

(ii) Calculate the difference in biomass between the robins and the sparrowhawks.

(2)

1500 - 800 = 700

700 g

ResultsPlus
Examiner Comments

Here, all of the correct figures have been used correctly from the diagram for the correct answer to be awarded 2 full marks.

ResultsPlus
Examiner Tip

Always ensure that you use calculations to support your answers.

Question 6 (a) (iii)

This item asked candidates to place three words from the wordbank to describe the effects that different species and their activities can have on a food chain and the energy flow through that food chain. Many candidates were able to recognise the photosynthesis credit yet many failed to communicate that respiration was also a factor in food chain and energy flow. Candidates did well on recognising that food chains would become limited for the third marking area.

This candidate has only recognised that photosynthesis is the process by which light energy is used by the holly leaves and that if energy is lost at each tropic level then the food chain would become limited. Unfortunately, they have suggested that energy is released from excretion which is incorrect.

(iii) Biomass decreases at each trophic level in this food chain.

Use words from the box to complete the following sentences.

(3)

respiration	photosynthesis	longer
phototropism	excretion	limited

During photosynmesis, the holly tree leaves use light energy to make glucose.

The robins release energy from the glucose during the process of excretion

The length of the food chain is limited because energy is lost at each trophic level.

ResultsPlus
Examiner Comments

Candidates are reminded for the need to use correct spellings especially if the words are already provided to them.

(iii) Biomass decreases at each trophic level in this food chain.

Use words from the box to complete the following sentences.

(3)

respiration	photosynthesis	longer
phototropism	excretion	limited

During photosynthesis the holly tree leaves use light energy to make glucose.

The robins release energy from the glucose during the process of respiration.

The length of the food chain is limited because energy is lost at each trophic level.

ResultsPlus
Examiner Comments

All three of the required parts to this answer have been provided.

Question 6 (b)

This extended writing item asked candidates to describe how parasites depend upon host species to survive other than fleas. This item was largely based on a levelling marking system where the overall assessment was provided by a professional judgement based on indicative content and the quality of written communication. A level one (1 or 2 marks) was awarded where the candidates had provided one limited correct description based upon one parasite or a definition of what parasitism is such as "headlice live on the scalp of a human" or "parasitic relationships are where the host does not benefit yet the parasite is able to survive". A level two (3 or 4 marks) asked candidates to communicate a simple description of at least two parasites such as "headlice suck blood from the scalp of a human and mistletoe lives on the bark of another plant" or "Tapeworm lives inside the intestines of the consumer and eat the food and nits live on the scalp of a person". Level three credit (5 or 6 marks) asked candidates to make a detailed description of two parasites and include a reference to what is specifically taken from the host such as blood, digested food and mineral ions.

Many candidates were stating that fleas were parasites and live on animals such as badgers in the UK or species further afield such as aardvarks and primates and although this may be true this was communicated to them in the stem of the question and as candidates were asked "other than fleas" any correct reference to flea parasitism was not credited.

Although a relatively short answer, this candidate has been able to communicate all of the required elements to secure all 6 marks. Their answer is firstly written with good quality written communication and their content is such to allow level three to be accessed.

They have made comment about two parasites other than fleas and stated what the parasite retrieves from their host and where the parasite lives. They have clarified that mineral ions and water and blood are used by the parasite that has allowed them access to the level 3.

*(b) Fleas are parasites.

A parasite is an organism that depends on a host species to survive.

Describe, using **two** other examples, how parasites depend on host species to survive.

(6)

Mistletoes they live in the back of the trees, they grow by rooting their roots on the plant, taking mineral and water, glucose from the plant so that it can survive as food. Also Headlice feeds on human by sucking the blood as their food. Usually the host is damaged. Parasites damage the host and they survive if the host is alive. The feeding relationship is that only the parasites benefits.

ResultsPlus

Examiner Comments

Candidates are reminded for the need to use good communication in these 6 extended writing answers. Accurate spelling and grammar with coherence and fluency will be awarded credit throughout their answer.

This response has been awarded 4 marks as the candidate has stated two parasites and commented upon where they live; however they have not been specific enough to state what the parasite is consuming namely digested food products and blood and therefore cannot access the level 3 marking area.

*(b) Fleas are parasites.

A parasite is an organism that depends on a host species to survive.

Describe, using **two** other examples, how parasites depend on host species to survive.

(6)

Parasites depend on nosts as they give them food.
A Tape worm lives inside you and eats the food you eat so you don't put on weight nouever a tape worm is not a mutualist as is does not benefit the nost as it eats their food.
Headlice are parasites as they too ~~also~~ don't benefit the nost as it nakes them anoyed. Head lice need food from a humans nead thats why Humans are the ~~best~~ best nosts for them.

ResultsPlus
Examiner Comments

Candidates are reminded for the need to use good communication in these 6 extended writing answers. Accurate spelling and grammar with coherence and fluency will be awarded credit throughout their answer.

Paper Summary

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

- Candidates should always be prepared to show their calculations when answering mathematical items. There is always credit worth scoring here.
- Candidates should always make reference to the data of a results table or graph/chart when answering qualitatively. There will always be some marks awardable if more than a single mark is available.
- Candidates are reminded that when drawing pyramids of biomass only blocked drawings are acceptable and triangular shapes are not permitted or credit worthy.
- Candidates must be aware of the complexity of some of the Biology topic areas and whilst appreciating they may be more challenging they should be given equal standing whilst revising these areas.
- Candidates should be reminded that the spelling of their work is also assessed especially in the 6-marker style questions.

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

Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Rewarding Learning

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