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Examiners' Report
June 2018

GCE Biology 8BN0 02

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Introduction

All questions were attempted by the majority of candidates; very few blank responses were seen.

There was a tendency for a large number of candidates to write outside of the given space; although few extra marks were awarded.

There were some good quality responses throughout the paper and all items were answered well by some candidates. The multiple choice responses scored very well, there were few candidates selecting incorrect answers.

The quality of responses was in line with the previous year. This is still lower than years previously. There were some excellent answers to some items showing excellent understanding at a depth that showed great promise for A2.

Question 1 (a) (i)

Most candidates gained the mark here, few with the correct response of locus, most with the plural loci.

A common incorrect answer was allele.

Question 1 (a) (ii)

Many candidates were able to identify chromosome C. Those who did not continue to score full marks often neglected to compare chromosome C with A and B. Comments such as gene 1 and 2 are far apart did not gain a mark.

(ii) Explain which chromosome shows the weakest linkage between genes 1 and 2.

(3)

Gene 1 as it more further from it's start pair whilst gene 2 doesn't move

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Examiner Comments

A mistake in this response is the reference to the genes rather than the chromosomes. It is clear that the candidate does not understand linkage. By not reading the question carefully, they have lost any chance of gaining any mark.

(ii) Explain which chromosome shows the weakest linkage between genes 1 and 2.

(3)

Chromosome C, as the genes are the furthest away from each other compared to A & B. This means they are less likely to be inherited as a pair, making it a weak linkage.

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Examiner Comments

This response shows the correct answer. They only gain two of the three marks available as they have neglected to fully explain how genes are less likely to be "inherited as a pair".

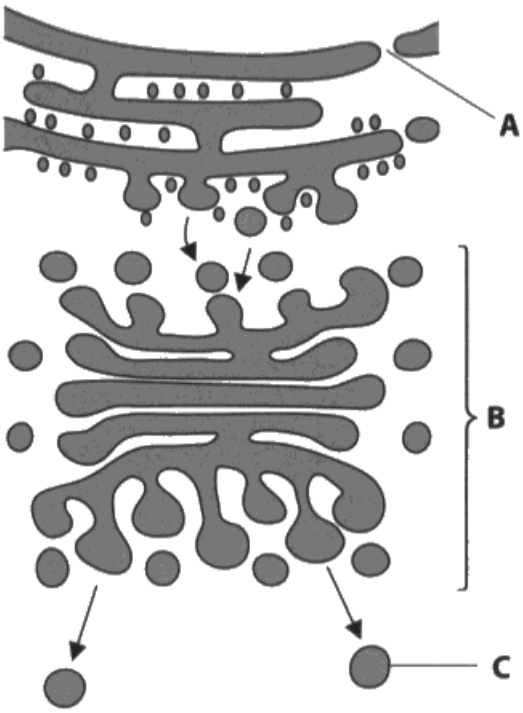
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Examiner Tip

If you could ask "how?" or "why?" when reading your response back, then there may be more marks available.

Question 2 (a)

Very few correctly identified the nuclear pore, most identifying A as rough endoplasmic reticulum. B was usually identified correctly as golgi apparatus. C was often identified as vesicles alone.

2 The diagram shows some of the cell organelles involved in the formation of extracellular enzymes.



(a) Name the parts of the cell labelled **A**, **B** and **C**.

(3)

A Endoplasmic Reticulum

B Golgi Apparatus

C Vesicles

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Examiner Comments

This candidate has not been specific enough in their response. Endoplasmic reticulum is not the correct answer for A. Due to the close proximity of the ribosomes on the diagram *rough* endoplasmic reticulum is accepted however the presence of the ribosomes necessitates the inclusion of rough.

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Examiner Tip

Vesicles alone may be acceptable in a description. In a question like this, you need to be specific.

Question 2 (b)

This question scored quite well with a large percentage of candidates gaining 3 or 4 marks.

The process of enzyme production was well understood although some candidates' responses lacked the detail needed to link structure to function.

Referring to B and C was acceptable as long as the context was correct.

(b) Describe the roles of parts **B** and **C** in the formation and transport of extracellular enzymes.

(4)

The golgi apparatus modifies the protein for example by adding a carbohydrate. Once modified, the golgi then packages the modified protein into secretory vesicles or lysosomes. These lysosomes (or secretory vesicles) carrying the protein moves towards and fuses with the cell surface membrane. Once this occurs, the lysosome or secretory vesicle secretes or releases the protein into the cell membrane. The lysosomes are released from the golgi by exocytosis.

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Examiner Comments

The mention of exocytosis may have been a mark on previous exam papers. It is clear in this response that the concept is not fully understood. They have, however, got as far as fusing with the cell membrane and have gained that mark.

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Examiner Tip

In questions with a sequence or pathway, consider the stages immediately before and after to complete the story.

Question 2 (c)

This question generated only a small range of responses. Many candidates gave a stock answer of differential gene expression or went into ideas of epigenetics. There were some good comments seen that also included ideas of cell signalling and communication.

(c) Extracellular enzymes are produced by specialised cells.

Explain how groups of cells can produce the same enzyme.

(3)

Cells all contain the same genetic information in their nucleus. A chemical stimulus can switch specific genes on, for example the gene to produce a specific enzyme. Activators will allow RNA polymerase to bind to a promotor and begin transcription to produce ~~a~~ mRNA, which can then be translated and folded to produce the same enzyme. Since all cells have the same genetic information, they can all produce the same enzyme when exposed to the same chemical stimuly

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Examiner Comments

The key aspect of this question is used well in this response. The word 'same' appears four times, tying the answer to the question.

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Examiner Tip

It can be quite simple to turn a text book answer to fit the context of a question.

Question 3 (a) (i)

Question 3 (a) (ii)

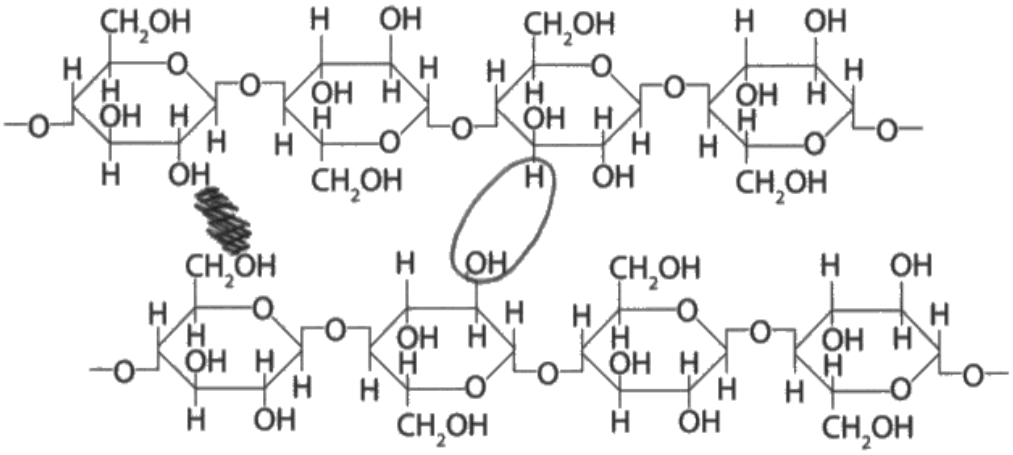
Those that correctly identified the plasmodesma in the previous question were able to describe the transfer of molecules. Few responses made reference to the continuation of cytoplasm.

Question 3 (b) (i)

There was a wide range of responses to this question. Frequently bonds were seen between the O in the glycosidic link, between two H on separate chains.

Quite often links were drawn that seemed to fall between the O and the H, unclear as to which it was intended.

(b) The cell wall consists of cellulose molecules arranged as microfibrils.
The diagram shows the partial structure of two molecules of cellulose.



(i) Draw **one** link on the diagram that would hold these molecules together in a microfibril.

(1)

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Examiner Comments

This response has the idea of the OH being involved in the bond although the circle does not show an acceptable form of a link.



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Examiner Tip

Make sure that lines end exactly where they are meant to. Vague connections between possible regions will not gain credit.

Question 3 (b) (ii)

This question scored very well with the vast majority of candidates able to clearly explain both differences and similarities between cellulose and amylopectin. Some responses referred to function rather than structure and in doing so, did not gain full marks.

(ii) Compare and contrast the structure of cellulose and amylopectin.

(3)

- ~~Both cellulose and amylopect~~ - Cellulose only has 1,4 glycosidic bonds which amylopectin has both 1,4 and 1,6 glycosidic bonds.
- Cellulose makes a straight chain molecule while amylopectin is branched.
- Both are made out of glucose, however cellulose is made of β-glucose while amylopectin out of α-glucose.

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Examiner Comments

There are three clear points here, each written as a direct comparison.

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Examiner Tip

Bullet points are a good way of organising a response to compare and contrast questions.

Question 4 (a) (i)

A simple question that had a large number of blank responses. Candidates could make any indication: an S in the diagram or the preferred option of a labelled line.

Question 4 (a) (ii)

This question produced a large number of incorrect responses. Many chose to measure an unspecified section of the image rather than measure the scale bar. There was an apparent difficulty in converting to μm.

(ii) Calculate the magnification of this image.

(3)

$M = \frac{I}{A} = \frac{35000}{50} = 700$

Answer X700

35 mm = 35000 u m

ResultsPlus
Examiner Comments

Writing out the equation in this way clearly demonstrates where each mark can be awarded.

ResultsPlus
Examiner Tip

Numbers alone can be unclear - remember to include units in your answers.

(ii) Calculate the magnification of this image.

(3)



50μm = 3.5cm

$m = \frac{3500}{50} = 70$

Answer 70

3.5 × 1000 = 3500

ResultsPlus
Examiner Comments

This is a good example of the importance of showing the process of getting to your final answer. There is an error, due to the conversion to μm, that makes this incorrect by a factor of ten.

The correct steps shown allow two marks to be awarded.

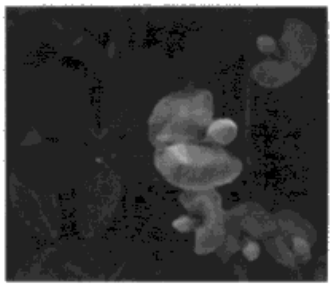
Question 5 (a) (i)

This question was a good discriminator. It was, however, difficult to say whether this was based on maths ability or ability to interpret the data.

Many candidates chose to divide one percentage by the other or other seemingly random attempts at "doing something with the data", others went too far with the calculation, ending up with a percentage decrease.

Those who followed the correct process stood out.

5 Mineral ions in the soil affect the growth of the peanut plant, *Arachis hypogaea*.



The effect of mineral ions on the production of fruit by these plants was investigated.

Young peanut plants were grown in soil containing all the mineral ions required.

After one week, 10 of these plants were moved into soil without calcium ions.
Another 10 plants were moved into soil without magnesium ions.

Ten plants were left in the original soil.

After leaving the plants to grow, the mean number of flowers per plant and the percentage of these flowers that formed fruit were recorded.

The results are shown in the table.

Soil	Mean number of flowers per plant	Percentage of flowers producing fruit (%)
Containing all minerals	644	9.2
Without calcium ions	392	5.4
Without magnesium ions	583	2.3

(a) (i) Calculate the mean reduction in the number of fruit produced by peanut plants grown in soil without calcium ions.

Give your answer to two decimal places.

(3)

containing all minerals

9.2 % of 644 =

644/100 = 6.44

6.44 x 9.2 = 59.248

Answer 2.80

without calcium ions

5.4% of 392 =

392/100 = 3.92

3.92 x 5.4 = 21.168

59.248 - 21.168 ÷ 2.798941

2.798941

= 2.80

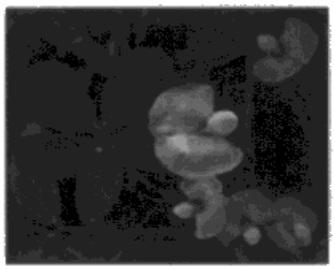
ResultsPlus
Examiner Comments

Although this candidate did not receive full marks, it is a good example of how to set out a response.

ResultsPlus
Examiner Tip

Calculations can become confused - label each step for clarity

5 Mineral ions in the soil affect the growth of the peanut plant, *Arachis hypogaea*.



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Containing all minerals	644	9.2
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Without magnesium ions	583	2.3

(a) (i) Calculate the mean reduction in the number of fruit produced by peanut plants grown in soil without calcium ions.

Give your answer to two decimal places.

All minerals ~~plants~~ flowers producing fruit = $644 \times 0.092 = 59.248$ (3)

Without Ca ions ~~plants~~ flowers producing fruit = $392 \times 0.054 = 21.168$

Reduction = $59.248 - 21.168$

$= 38.08$

Answer 38.08

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Examiner Comments

This response explains exactly how the calculation is progressing and highlights perfectly where marks should be awarded.

Question 5 (a) (ii)

The candidates were asked to comment on the data which seemed to be misinterpreted by some. Those that identified the idea of deficiency were able to score well. Many candidates reverted to quoting the data, referring to containing all minerals being the highest.

Question 5 (b)

This question was not particularly novel and allowed candidates to achieve high marks by recounting simple experimental technique in the correct context. Strong responses gave consideration to the needs of growing young plants. Responses recounting a practical involving germinating seeds were not able to score highly. Some responses gave no details instead inviting the reader to devise ways of controlling variables themselves and therefore could not score marks.

(b) Devise an investigation to determine the effect of nitrate ion concentration on the growth of young peanut plants.

(5)

Take 6 plants of the same age and source.
Give each plants water for the first 5 days and ~~dee~~ record the growth of each plant each day by measuring the height
Use 6 different concentrations of nitrate ion solution ~~are~~ ~~on~~ to give to the plants e.g 5%, 10%, 15%, 20%, 25% and 0%
The plant with 0% will be the control group.
Try to make sure each plant is recieving the same a mount of sunlight and are at the same temperature.
Record the height for 15 more days.

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Examiner Comments

This response shows an acceptable range of five concentrations as well as a control of 0%. Frequently candidates gave 0% as one of the concentratons and were not awarded the mark.

Question 6 (a) (i)

This question frequently generated one mark with candidates giving a means of variation being produced in meiosis. Few related the role of meiosis producing different combinations of alleles in gametes or that twins can be produced by the fertilisation of two separate eggs.

6 The saiga antelope is found in the grasslands of Eurasia. In the 1970s its population was 1 250 000. The population has decreased due to loss of habitat and a disease outbreak in 2015.

Population estimates suggest as few as 50 000 individuals remain.

Conservation efforts aim to ensure that the population recovers to previous levels.



(a) The population may recover quickly as saiga antelopes usually produce twins.

(i) Even though both offspring are from the same father and the same mother, they may be genetically different.

Explain why the offspring may be genetically different.

(2)

due to crossing over which results in different combinations of alleles and independant assortment which causes different combinations of chromosomes. These take place during meiosis

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Examiner Comments

This is an answer that has been learned for the question "How does meiosis cause variation". In not actually tailoring the response to the question asked, only one mark can be awarded.

Question 6 (a) (ii)

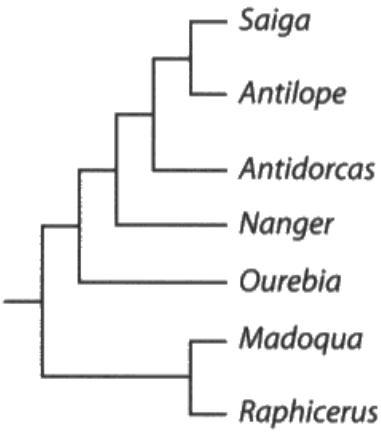
This question was generally answered well. Good descriptions of the cortical reaction were seen, often preceded by descriptions of the acrosome reaction. The final mark point was rarely seen with most candidates simply concluding with a rewording of the question.

Question 6 (c) (i)

This question frequently produced one mark with candidates able to identify that they shared a more recent common ancestor. Few referred to the study, only focussing on the branches in the diagram. Those that did refer to proteins were mostly unable to grasp the idea of molecular phylogeny.

(c) Saiga antelopes are related to a wide range of other species of antelope.

The diagram shows the phylogenetic relationships between some antelopes.
This diagram was produced using data from analysis of a protein.



(i) Explain how this diagram indicates that saiga antelopes are more closely related to *Antilope* than to *Antidorcas*.

(2)

Both Saiga and Antelope have a common ancestor which the Antidorcas does not have. The Antidorcas is different and contains different protein compared to the ancestor of Antelope and Saiga.

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Examiner Comments

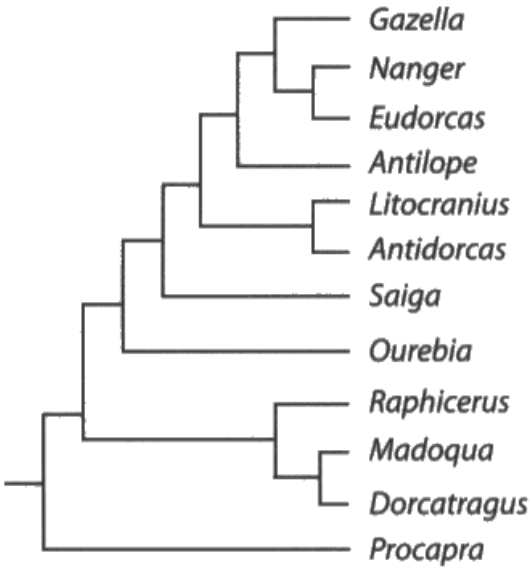
Although this response was near to gaining a mark, the candidate was not clear enough in their response.

The idea of protein analysis was picked. Unfortunately the candidate referred to differences between proteins rather than within a specific protein.

Question 6 (c) (ii)

Like the previous question, most candidates fell down when it came to discussing the study and referring to the mitochondrial genome. Most referred to the rearrangement of the diagram and the relative positions of the antelope without actually addressing the question.

(ii) This is a more recent classification diagram based on a study of the mitochondrial genomes of antelopes.



Deduce how this study led to different opinions about the relationship between *Saiga* and *Antilope*.

(3)

This diagram suggests that the Saiga and Antilope are less closely related than it was believed. The study of the genomes have shown that the Saiga and Antilope share a smaller amount of common DNA and are therefore less closely related as they share a smaller amount of similar molecules and are more genetically different than previously believed.

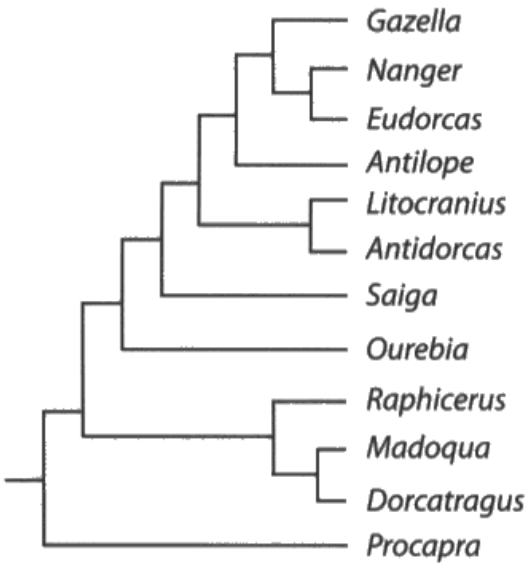
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Examiner Comments

This candidate referred to DNA, however they did not clearly relate this to the mitochondrial genome. This could be the DNA of the antelope. They then go on to compound this by referring to other molecules.

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Examiner Tip

Read the whole question and look for connections between different parts.

(ii) This is a more recent classification diagram based on a study of the mitochondrial genomes of antelopes.



Deduce how this study led to different opinions about the relationship between *Saiga* and *Antilope*.

(3)

This study Soggests that saiga and antelope are less closely related as they are found on different branches of the diagram. This suggest that the mitochondrial differences between the saiga and Antilope may mean they are less closely related.

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Examiner Comments

This response got one mark as they have identified that they are less closely related. The second sentence identifies that we are looking at differences in the mitochondria but doesn't describe the differences.

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Examiner Tip

Many responses need a comparison to be awarded a mark.

Question 7 (a) (i)

Most responses focussed on spruce being less effective than pine or larch. Few found it worthy of note that pine and larch seemed to have equal properties. A few candidates misinterpreted the data and rated spruce as the highest antimicrobial properties as growth continued to fall throughout the experiment.

Question 7 (a) (ii)

Candidates who appreciated the non-linear time scale were able to pick up marks here. Many candidates ignored the data and instead gave general responses about lack of repeats, lack of information regarding sample size or an explanation of how variables were controlled.

Question 7 (a) (iii)

This question was well answered by A grade candidates although few marks were awarded to many candidates. Although asked for improvements, too many responses described a different investigation based on measuring zones of inhibition.

There were few responses seen that explained the reason for their suggested improvement.

(iii) Explain how this investigation could be improved to provide additional data to determine whether pine or larch have greater antimicrobial properties.

(4)

By using a bacterial culture which is more than 50 cm^3 to make the results more reliable.
Ensuring that there is no contamination by sterilising the equipment ~~&~~ in use.
Ensuring that all the trees are of the same age to make the results more reliable.

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Examiner Comments

This response gains no marks as it refers to making the results more reliable. The question asks to provide additional data.

Question 8 (a)

This question scored well as would be expected; the majority of candidates gaining all three marks.

There was a tendency for candidates to repeat the full description without extracting the relevant information. Candidates did not score a mark for using long claws as an anatomical adaptation as this described a behaviour.

Question 8 (b) (i)

A simple concept that asked for little more than the definition of a species proved troublesome for many candidates. As often throughout this paper, higher performing candidates were able to give a clear and concise response. Weaker responses described the process of speciation rather than the classification.

(b) Three species of sloth are described in the table.

Species	Common name	Status
Bradypus pygmaeus	pygmy three-toed sloth	critically endangered
Choloepus didactylus	Linné's two-toed sloth	least concern
Choloepus hoffmanni	Hoffmann's two-toed sloth	least concern

It is believed that *C. hoffmanni* and *C. didactylus* shared a common ancestor before becoming isolated on either side of the Andes mountain range.

(i) Explain why they are now classed as different species.

(2)

Because they can nolonger interbreed to produce a ferbile, healthy offspring after being geographically isolated - for so long leading to reproductive isolation

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Examiner Comments

This candidate gained both marks. The reference to geographic isolation was unnecessary.

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Examiner Tip

Try to avoid terms like "they" in a response unless it is absolutely clear who "they" refer to.

Question 8 (c)

This level based question provided a range of respsonses although there were a majority who only reached level one.

Many candidates did not make reference to a change in the number of species only referring to increased or decreased population.

Other reasons for lower scores included general references to speciation or simply natural selection without any reference to either species referred to in the question.

The strongest responses referred to mechanisms leading to the extinction of Bradypus pygmaeus and evolution of *Choloepus hoffmanni* due to natural selection to a new species.

Paper Summary

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

- Be methodical in mathematical responses.
- Explain your working as you progress.
- Consider mathematical concepts such as significant figures and decimal places.
- Pay attention to command words, especially those that are new to this specification.
- Write enough discrete statements to match the number of marks allocated to the question.
- Plan your response before committing pen to paper, linking ideas in a clear and concise manner, especially for the levels based six mark question

Grade Boundaries

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

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