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Examiners' Report
January 2010

GCE Biology 6BI01

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6BI01 Enhance Examiners' Report January 2010

Maximum mark	80
Mean mark	45.9
Standard deviation	11.0

General Comments

The majority of students tackled this paper well; there were very few items left completely blank and all marking points were seen.

The first two questions were done particularly well, as was question 5 part (a). There were some excellent accounts of the blood clotting process and some of the better candidates gave virtually all the marking points in a very clear and concise manner. Even though this question was also assessing QWC, 4 max marks were frequently awarded.

The questions that caused candidates the most problems were those involving graphical presentation of data, such as questions 3, 5 and 8. The first three parts of question 7 also caused problems, mostly through the poor wording of the candidate's responses.

Question 2

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Examiner Tip

Candidates need to be as specific as they can; answers should always double checked to ensure that appropriate detail has been included.

2 Read through the following passage on protein synthesis, then write on the dotted lines the most appropriate word or words to complete the passage.

(6)

Protein synthesis involves two stages. The first stage is Transcription and takes place in the nucleus of the cell. During this stage, a molecule called RNA is made using the antisense DNA strand as a template.

The second stage, known as Translation, takes place in the cytoplasm of the cell on structures called Ribosomes. During this stage, MRNA molecules enable the amino acids attached to them to line up in the correct order. The amino acids are joined together by the formation of peptide bonds.

ResultsPlus

Examiner Comments

On the third line of this passage the reference to 'RNA' is too vague. Candidates are supposed to know about the roles of mRNA and tRNA and therefore this degree of specificity is expected in their answers.

Question 3a

ResultsPlus
Examiner Tip

Read values very carefully from the graph and ensure that they are stated accurately in the answer.

(a) Using the information in the graph, compare the uptake of substance A with the uptake of substance B during this period of 5 hours.

(3)

Until about 1 hour in to the experement both sudo substance A and B were being taken up at an equal rate. Then Substance B stopped being taken up by the Amoeba as quickly as it had been and it began to level out, even though A kept being taken up at the same rate.

ResultsPlus
Examiner Comments

This would have been a good response if the candidate had followed the advice given above and would have scored all 3 marks. However, they only got 1 mark. The rate of uptake of substance A and B are the same up to 30 minutes not 1 hour, so the mark was lost for not reading the graph carefully enough. Mark point 4 could have been awarded at the end of the response if the candidate had stated the time at which the uptake of substance B had levelled out.

Question 3b

ResultsPlus
Examiner Tip

When a question asks for a description and an explanation of results, especially if it is also assessing QWC, then the explanation needs to be clearly linked to the description. It is best to link the sentences together with a 'because' in between, so that there is the first description and then the explanation, followed by the next description and the corresponding explanation.

*(b) Substance B enters the cells by diffusion. Describe and explain how the results of this experiment support this statement.

(4)

Substance B starts to diffuse, as it goes down a concentration gradient, so the concentration in the cytoplasm increases, the diffusion starts to slow down because equilibrium is nearly reached and then at just over 2 hours, equilibrium is reached so diffusion stops

ResultsPlus
Examiner Comments

This is a particularly clear answer that scored full marks.

Question 4a

ResultsPlus
Examiner Tip

Never try and alter the ticks and crosses – cross them out and make new symbols. If the question asks for ticks and crosses, do not leave blanks.

4 Many animals have hearts that pump blood through a network of blood vessels.

(a) The table below refers to blood flow in the four major blood vessels of the human heart. If the statement is correct, place a tick (✓) in the appropriate box and if the statement is incorrect, place a cross (✗) in the appropriate box.

(4)

Name of blood vessel	Carries blood away from the heart	Carries oxygenated blood
Aorta	✓	✓
Vena cava		
Pulmonary artery	✓	
Pulmonary vein		✓

ResultsPlus
Examiner Comments

This candidate only put the ticks into the boxes so only scored 2 marks for those. The examiner will not make the assumption that the boxes left blank should have crosses in them.

4 Many animals have hearts that pump blood through a network of blood vessels.

(a) The table below refers to blood flow in the four major blood vessels of the human heart. If the statement is correct, place a tick (✓) in the appropriate box and if the statement is incorrect, place a cross (✗) in the appropriate box.

Name of blood vessel	Carries blood away from the heart	Carries oxygenated blood
Aorta	✓	✓
Vena cava	✗	✗
Pulmonary artery	✓	✓
Pulmonary vein	✗	✗

ResultsPlus
Examiner Comments

In the right hand column, the alteration on the second row could not be marked. On the third row, the candidate has done what he/she should have done on the second row and crossed out the answer that he did not want us to mark and inserted a new symbol.

Question 5a

5 There are many venomous (poisonous) snakes in the world. Many of the venoms from these snakes affect the blood clotting process.

*(a) Describe the blood clotting process.

(4)

The blood clotting process takes place when damage is done to an artery wall. Thromboplastin is released which catalyses the conversion of prothrombin (protein) into thrombin (an enzyme). Thrombin then catalyses the conversion of fibrinogen (protein) into fibron (long fibres). These longer fibrin fibres then create a mesh which collects blood cells and platelets so forming a clot.

ResultsPlus
Examiner Comments

This answer illustrates the excellent quality of some of the responses that we read on the blood clotting process. It is also included to illustrate how QWC assessment is performed. The steps are clearly in the correct order. There is an error in the spelling of thromboplastin on the second line, so this mark could not be awarded. However, as the candidate went on to make at least 4 more points that were on our mark scheme, full marks could still be awarded. This also reiterates what we have said previously: the candidate should try and write more statements than there are marks for a question of this type.

Question 6a and bi

ResultsPlus

Examiner Tip

Candidates need to read the question carefully to ensure that their response actually answers the question. When they are asked to draw conclusions, or to describe results or draw comparisons, it is not sufficient to just quote figures.

(a) Using the information in the graph, describe the conclusions that the student could make about the caffeine content of these drinks.

The student could make the conclusion that coffee is by far the worst drink for affecting sleep, as it has the highest caffeine content (it has 130mg per serving). She could also conclude that white tea is the best drink to have before going to sleep, as it has the lowest caffeine content (it has 10mg per serving).

ResultsPlus

Examiner Comments

A large number of candidates discussed which was the best or worst drink to have before going to sleep, instead of drawing conclusions about the caffeine content of the various drinks. This response was awarded marking point 2, although the majority of the response was irrelevant.

(a) Using the information in the graph, describe the conclusions that the student could make about the caffeine content of these drinks.

(3)

The graph shows that coffee has he most caffeine in it at "130" mg whereas white tea has "10" mg. The conclusions she could make are that caffeine is sleep affecting if she tested he coffee & checked how she sleeps over night. If she has trouble that shows that he more caffeine he more sleep interuptions.

ResultsPlus
Examiner Comments

Again most of this response is irrelevant as it is discussing the effect that the drinks might have on a person's sleep. In the first sentence the candidate has stated that coffee has the most caffeine in it, but has only quoted the caffeine content of the white tea and not actually made a statement about the caffeine. Marking point 2 could not therefore be awarded.

(b) A friend of the student suggested that herbal tea might have a lower caffeine content than these drinks. The student decided to use *Daphnia* to compare the caffeine content of herbal tea with the caffeine content of these other drinks.

(i) Describe an experiment that the student could perform, using *Daphnia*, to confirm that herbal tea has the lowest caffeine content.

(4)

Firstly, the student should set up at least 4 different drinks to compare with herbal tea. ~~concentrations of herbal tea to water~~. This would allow the student to compare her results and confirm herbal tea has the lowest caffeine content. Then the Daphnia has to be placed on ~~the~~ a cavity slide and then on the microscope. After this ~~you~~ the student uses a pipette to supply ~~add~~ the ~~beetle~~ daphnia with the herbal tea. and the other drinks and the drinks This amount of herbal tea should be the same throughout the experiment. Then you measure the heart rate for 2mins for a period of ten minutes. This should be done drinks with all of the ~~concentration~~ with the same Daphnia. After these results should be recorded in a table and then drawn on a graph to see if the herbal tea has the lowest caffeine content. As you would expect the lowest heart rate.

ResultsPlus
Examiner Comments

For a question asking about one of the named practicals, this was done quite well. This was an average type of response where the candidate clearly knew details of the procedure but did not describe it specifically enough. This was awarded 2 marks (marking points 3 and 5). Although marking point 5 was given near the end of the account for stating that the same daphnia should be used, the use of the term 'amount' prevented this marking point from being awarded at line 9. Marking point 4 could not be awarded as there is no reference to the heart beat being measured. Marking point 7 could not be awarded here either. Very few candidates had read the question properly and thought about their response. There was no need for the daphnia to be put into any of the drinks other than the white tea, so if this was suggested then marking point 7 was not awarded. This was a very common error.

Question 6bii

ResultsPlus
Examiner Tip

Candidates need to understand what is meant by the term 'ethical'.

(ii) The friend did not agree with using *Daphnia* in this experiment. Give **one** ethical reason for the use of invertebrates and **one** ethical reason against the use of invertebrates in experiments of this type.

(2)

Reason for the use of invertebrates in the case of daphnia the heart is visible from outside its body with the use of a microscope so there is no need to cut it open to view its heart

Reason against the use of invertebrates because caffeine is toxic to all living animals at certain levels so the daphnia could be killed or paralysed by the experiment

ResultsPlus
Examiner Comments

Many candidates could gave us an ethical reason against the use of invertebrates, but there were many (wrong) responses such as this one, for the ethical reason for the use of invertebrates. Other common suggestions included the idea that 'there were loads of daphnia so using a few would not matter' and 'they did not live very long so it would not be a problem if they died a little sooner.'

Question 7

ResultsPlus
Examiner Tip

Candidates need to understand the difference between the term 'allele' and 'gene' and be careful to use them in the correct context. An appreciation of the terms 'haploid' and 'diploid' is also needed, with some careful wording when describing them.

(a) Suggest why cells from mouth swabs or blood samples are used rather than gametes.

(2)

It is a bit easier to get mouth swabs and blood samples. Gametes only contain half of the DNA of the person their taken from.

ResultsPlus
Examiner Comments

This was a fairly typical response and illustrates the point about haploid and diploid. The fact that the gametes have half the DNA is not the same as understanding that they only have one set of each

(a) Suggest why cells from mouth swabs or blood samples are used rather than gametes.

(2)

Gametes only contain half a set of chromosomes (ie half the genetic information). As not all gametes contain the same genetic information it would be impossible to see if either parent was a carrier using one set of ~~chromo~~ gametes as a recessive gene carried by a parent may not neccessarily be present in that particular gamete.

ResultsPlus
Examiner Comments

This candidate is a bit closer to appreciating the significance of the haploid cell but still the wording was not deemed to be good enough to award the third marking point. At the end of the response, the reference to 'gene' prevented marking point 6 from being awarded.

(a) Suggest why cells from mouth swabs or blood samples are used rather than gametes.

(2)

Gametes only contain half the full genetic make up of a person, so it may show that someone doesn't even carry the CF gene, when really they do but it just wasn't present in that gamete

ResultsPlus
Examiner Comments

This response also illustrates these two points about 'alleles and 'genes' and the significance of a haploid cell. It is also worth pointing out here, that the use of the term 'CF gene' is actually referring to the unaffected gene and not the mutated one.

Question 7e

ResultsPlus

Examiner Tip

When a question asks for a genetic diagram to be drawn, there will be marks for showing each stage. In this case for indicating the genotype of the parents, the alleles present in the gametes, evidence of a cross being done, the genotype of the offspring and the corresponding phenotypes. That is in addition to actually answering the question and stating the probability of a child having cystic fibrosis.

(e) Using your knowledge of monohybrid crosses, calculate the probability of having a child with cystic fibrosis if both partners are found to be carriers. Draw a genetic diagram to explain how you calculated this probability.

(5)

	B	b
B	BB	Bb
b	Bb	bb

B = dominant (non-CF)

b = recessive (CF)

Cystic fibrosis needs two recessive alleles in order for the person to have the disease; so the probability of the child having cystic fibrosis is 25%. (1 on 4)

Answer 25%

ResultsPlus

Examiner Comments

This was a very generous mark scheme and in this instance we did not insist on each step being clearly labelled. This was a fairly typical layout that enabled the candidate, in this case, to score marking points 2,3 and 4. Many responses did score 4 marks as the genotype of the parents was included. Fewer candidates scored all 5 marks as they did not link the phenotype to the corresponding genotype.

It is worth pointing out that consequential errors apply in a question of this type, so candidates should be encouraged to at least attempt the question and to not leave it blank.

Question 8cii

ResultsPlus
Examiner Tip

Candidates should be encouraged to use our published mark schemes during their preparation for exams, especially on topics such as this one. Although this question only asked for 2 changes to be described, the mark scheme does summarise exactly what they are expected to know about how the various risk factors are responsible for CVD.

*(ii) Cardiovascular disease (CVD) is responsible for many deaths.

Describe two changes that this woman may be able to make to her lifestyle, to reduce her risk of dying from CVD. Explain how each change would reduce the risk.

(4)

The woman could change her lifestyle to more sport active and energetic. Sport exercises, e.g. running, can increase her blood flow and so the exchang and respiration, and make her heart & muscle stronger.
Also she can have a healthy diet, with Vegetables and fruits. Reducing fatty food in you meal helps to makes your digestive organs work better and also contains prevents heart attacks and blockstages in the heart.

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Examiner Comments

This response scored marking point 7 and 8, but the response was too vague to be awarded any of the dietary-related factors. Being a QWC question, the explanation had to be closely linked to the change.

APPENDIX A

Unit Grade Boundaries And Uniform Marks

The raw mark obtained in each module is converted into a standardised mark on a uniform mark scale, and the uniform marks are then aggregated into a total for the subject. Details of the method of aggregation are given in Appendix B.

For AS examinations, the two examined unit tests (6BI01 & 6BI02) each have a weighting of 40% with a maximum of 120 uniform marks; and the coursework unit* (Unit 6BI03) has a weighting of 20% with a maximum of 60 uniform marks.

For the A2 units, the two examined unit tests (6BI04 & 6BI05) also each have a weighting of 40% with a maximum of 120 uniform marks; and the coursework unit* (Unit 6BI06) has a weighting of 20% with a maximum of 60 uniform marks.

Therefore, for candidates taking the full A level, the four examined unit tests (6BI01, 6BI02, 6BI04, 6BI05) each have a weighting of 20% with a maximum of 120 uniform marks; and the two coursework units* (Unit 6BI03 & 6BI06) have a weighting of 10% with a maximum of 60 uniform marks.

The table below shows the boundaries at which raw marks were converted into uniform marks in this examination. The A and E grade boundaries are determined by inspection of the quality of the candidates' work. The other grade boundaries are determined by dividing the range of marks between A and E. Marks within each grade are scaled appropriately within the equivalent range of uniform marks.

Unit Grade Boundaries

Unit	Max. Mark	A	B	C	D	E
	Uniform marks 120	96	84	72	60	48
6BI01 (Unit 1)	*Raw marks* 80	57	52	47	43	39
6BI02 (Unit 2)	80	57	52	48	44	40
6BI04 (Unit 4)	90	59	55	51	47	44

Unit	Max. Mark	A	B	C	D	E
	Uniform marks 60	48	42	36	30	24
6BI07 (International)	*Raw marks* 40	29	25	21	18	15

*or written alternative for International centres.

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