

# Examiners' Report Summer 2009

GCE

## GCE O level Biology (7040)

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# GCE O Level Biology

## Examiners' Report June 2009

### 7040-01 Paper 1: Short Structured Questions

Once again the examiners were impressed by the answers that the candidates gave on the two papers. This shows that the teaching and learning in the centres is enabling candidates to develop, not only a sound knowledge of the specification material, but also a good understanding of biological principles. They are then able to apply these principles to unfamiliar data and new situations.

#### Question 1

- (a) This required candidates to complete a table to show the muscles involved in focusing light and the processes controlled by the heart and by the intercostals muscles. Almost all candidates correctly completed the process for the heart and the intercostals but many incorrectly named the circular muscle for focussing the light.
- (b) Most candidates were able to gain full credit for their description of the role of the diaphragm in breathing in.

#### Question 2

- (a) Most responses correctly identified combustion, respiration or decomposition as processes that increased the carbon dioxide in the atmosphere and photosynthesis as the process that decreases carbon dioxide.
- (b) The better candidates were able to gain all four marks by a clear account of how greenhouse gases can lead to global warming with melting of polar ice caps and increase in sea levels. They went on to describe how this could destroy habitats and lead to migration or extinction. The weaker candidates suggested that increased carbon dioxide would lead to suffocation.

#### Question 3

This item required candidates to complete a table inserting the function of red blood cells, guard cells, neurones and root hair cells. Almost all candidates gained credit on this item. Those who failed to earn full credit usually wrote about gas exchange rather than opening or closing of stomata.

#### Question 4

- (a) This showed a diagram of a bacterium and almost all candidates were able to identify the cytoplasm and most could identify the plasmid.
- (b) The next part asked candidates to describe the activity of various bacteria. Candidates were generally able to describe nitrifying, denitrifying and decomposing correctly but some had difficulty in describing nitrogen fixing.

### Question 5

- (a) This question gave a table showing the number of chromosomes found in diploid cells of a horse, a donkey and a mule. Candidates were asked to explain what is meant by diploid number. Only the best candidates could clearly state that this is the number of chromosomes when the nuclei contain two copies of each chromosome.
- (b) Most could give a location in which cells do not contain this number.
- (c) The majority of candidates were able to give the correct number of chromosomes that a mule would have but only the best responses could explain that an odd number of chromosomes would make gamete formation impossible.
- (d) Again most candidates could suggest that an amoeba would reproduce asexually but only the better responses explained this in terms of gamete formation.
- (e) The responses we expected described how meiosis leads to genetic variation and a change in chromosome number while no such variation results from mitosis. Many answers went beyond the knowledge required in the specification to describe independent assortment and crossing over.

### Question 6

- (a) This item described food tests carried out on a diet supplement. Most candidates could accurately complete the results table to show the tests reagents used and expected colour changes from the tests for glucose, starch and protein. Most errors came from the biuret test and some candidates seemed to be unfamiliar with this test.
- (b) Most were able to describe how when testing for glucose the test tube of reagents can be heated safely in a water bath. The best responses went on to describe how the tubes should be angled away from the experimenter and how wearing safety glasses and using tongs could also improve safety.
- (c) In this part candidates were asked to give two other components required in a balanced diet and their functions. Answers giving named vitamins, minerals or lipid and fibre were credited.
- (d) Finally in this question most candidates could correctly give a difference between starch and glucose but all could link this to their functions in plants.

### Question 7

This provided candidates with a pie chart showing deaths attributable to smoking.

- (a) Most could identify the disease causing most deaths.
- (b) Almost all could calculate the number dying from heart disease.
- (c) Again, most candidates could suggest two other factors that can increase the risk of heart disease. Only the very best candidates gained full credit for explaining how heart disease can lead to death. We expected a description of how the coronary arteries can become blocked with fat deposits and how this can lead to a shortage of oxygen and glucose in the heart causing a reduction in aerobic respiration, a build up of lactic acid and eventually a heart attack.

### Question 8

This presented candidates with a food web from the Antarctic Ocean.

- (a) Most were able to name the primary consumers from the web.
- (b) Almost all could draw the food chain but as always a few put the arrows the wrong way.
- (c) This required candidates to explain the effect of low light levels on this food web in winter. Many correctly explained how low light levels lead to a reduction in photosynthesis and so a lack of food for consumers leading to a reduction in numbers.

- (d) Finally in this question candidates had to explain how animals are adapted to survive changes in temperature. Many correctly described the homeostatic mechanisms employed such as vasodilation, sweating, less activity and changes to hair or fur. Others gained credit for hibernation, migration and behavioural strategies.

#### Question 9

This required candidates to complete a table to indicate the role of different hormones in the body and it was generally well done. The most common errors involved the role of oestrogen and progesterone.

#### Question 10

- (a) This part required candidates to name the mineral required by plants to make amino acids and chlorophyll. Most correctly did this but some lost credit for writing nitrogen as an ion.
- (b) Candidates were able to describe active transport and give two factors that could affect its rate.
- (c) The final part of this question described the process of salinisation. Most candidates failed to appreciate that as water evaporates from a soil solution the concentration of minerals in the soil would increase. This would lead to problems with the plant absorbing water and result in wilting.

#### Question 11

This question described a class experiment to determine reaction time and gave candidates a data set to examine.

- (a) Most were able to correctly determine the average and the range of reaction times.
- (b) Very few candidates understood that repeating the experiment would improve the reliability most thought it would affect accuracy.
- (c) Most could calculate the speed of nerve transmission using the measurements provided, however some did not gain full credit as they encountered problems converting their answers into the correct units.
- (d) Most could gain some credit for listing the structures in the pathway from retina to muscle.
- (e) Some interesting suggestions were given as to how a fast reaction time is an advantage to an animal.
- (f) The best candidates could give a factor that influences reaction time although some of these confused fast reactions with having an increase in reaction time.

#### Question 12

The last question on the paper looked at kidney function.

- (a) Almost all candidates could explain what is meant by excretion.
- (b) Most were able to complete the table to show how the urine would change in different circumstances.

# GCE O Level Biology

## Examiners' Report June 2009

### 7040-02 Paper 2: Structured Questions & Essays

#### Question 1

The comprehension offers students an opportunity to be examined on their ability to understand biological principles in a novel context. As ever, students tackle this question very well and their skill with this task is to be commended.

Most students were able to give two acceptable reasons why water can become polluted and have a high BOD. The few who chose reasons not 'given in the passage' lost credit. In this sense part (a) served as a gentle introduction to the paper as did part (b). Most appreciated that respiration is the process that uses up oxygen, but only the best candidates were able to deduce that the sample needs to be kept in the dark to prevent any microscopic plants photosynthesising and producing oxygen. Many candidates realised that the dark would prevent photosynthesis but failed to link this to oxygen, therefore only gaining one mark. It is good practice for candidates to look at the number of marks allocated to questions because this acts as a guide to the number of points that need to be in their answers. Part (c)(iii) was more challenging with only the best candidates making reference to 20 °C being the optimum temperature for enzymes. Many candidates wrote about temperatures above and below 20 °C, which is not really answering the question. Almost all candidates appreciated that raw sewage has a BOD above the legal limit. In part (d), the examiners were wanting to credit the idea that an 'aquatic ecosystem' is one in which biotic and abiotic factors interact, however expressed. This posed difficulty for many candidates who wanted to write about defining a habitat or failed to appreciate the role played by both plants and animals, or the abiotic factors in an ecosystem. Most candidates understood that the smaller surface area to volume ratio of larger organisms would make diffusion more difficult to supply the oxygen they need for respiration, though their answers concentrated on the two latter ideas. In part (f), many candidates wrote irrelevant material about the cause of eutrophication. Better candidates tended to concentrate on the fact that at some point plants die, are then decomposed by bacteria with the consequent depletion of oxygen by bacterial respiration. Many, wrongly, believe the plants consume the oxygen and that bacteria decompose mineral ions. In part (g), candidates were not rewarded by repeating methods outlined in lines 26 and 27. Ideas such as not applying inorganic fertiliser when raining, or not applying it in excessive amounts, were rewarded. Finally, in part (h), no mark was given for stating that there would be fewer minerals as this is stated in the passage. A mark was given for the consequence of there being fewer minerals, such as difficulty in plant growth, or for appreciating that dredging on this scale would totally disrupt the habitat.

#### Question 2

The vast majority of students were able to correctly calculate 22 cm per hour as the rate of sucrose transport. The examiners were allowed to look at the working of those who got a different answer and to reward one mark if they saw some evidence of 180 being divided by 60. In part (b), most candidates were able to recall an abiotic factor with light being the most popular. About half the candidates lost a mark in (ii) because they made no reference to a factor linked to the aphids, choosing an abiotic factor once again. A pleasing number of candidates know that phloem is the tissue that transports sucrose and that it is stored as

starch, or used in respiration, by root cells. Most recalled phloem as the tissue that transports sucrose, xylem being the most popular incorrect response. A pleasing number of candidates understood the importance of sucrose to plant roots with energy supply for active uptake being the most popular answer.

### Question 3

Students found the graph quite challenging. Marks were awarded for ensuring that at least half the grid was used and that the y axis was linear. Candidates were also expected to have the axes correctly aligned and labelled. They were expected to plot the bars correctly and to give the correct range whether they had used a linear or a non-linear scale for the x axis. One mark was also available for giving some indication of a key. In part (a)(ii), most appreciated there was a general increase, but two marks were only given to those who also recognised that there had been no change between 1963 and 1974, however phrased. Most were able to indicate that a change in eating style is responsible for the increase in overweight children, and the best candidates also appreciated that a more sedentary lifestyle is another contributing factor. The biological consequences of obesity are not fully understood, though many are aware that atherosclerosis is more likely and that this increases blood pressure and increases the risk of cardiac arrest. Diabetes and joint problems were also credited. A pleasing number of students are familiar with the nutritional problems of kwashiorkor, marasmus and general malnutrition.

### Question 4

Students are getting better at designing investigations. The best answers discussed setting up several sets of seeds with sulphur dioxide and several sets of seeds without sulphur dioxide, thus showing good understanding of controls and reliability. Standardising the biotic variable by stating the species of seed was often seen as was standardising the abiotic variables such as temperature and light intensity. Many answers showed the need to leave the seeds for a stated period of time for germination to occur and the best answers also discussed how to quantify the measurement of germination. Sadly, some candidates seem not to realise the nature of this type of question and they wrote copious notes about the biology of seed germination.

### Question 5

The colour changes in part (a) posed little difficulty and most were able to discuss the influence of respiration and lack of photosynthesis in producing a yellow colour in part (b). The biology of the lung is understood by most, though candidates need to be made aware of the difference in quality of answer. For example, stating that there are lots of alveoli is better than stating that there are alveoli, or stating that there is a dense network of capillaries is better than stating that there are capillaries.

### Question 6

Candidates had no difficulty in correctly describing the relationship between mass and lifespan and the relationship between mass and heart rate. Thereafter, candidates struggled. Only the better candidates appreciated that the idea that the heart is larger and that the stroke volume is bigger in (b)(ii). Most recalled the role of adrenaline or increased exercise in increasing heart rate but in (d), very few compared data from one animal with a short lifespan



and one with a long lifespan, whether they chose to agree or disagree with the suggestion. In part (e), about half the candidates appreciated that humans have a higher total number of heartbeats in a lifetime because they live longer than other animals, but a smaller proportion explained why humans live longer by reference to a medical aspect such as, for example, medical care.

### Question 7

This was the most popular question in this section. Most candidates appreciated that both processes involve movement from a high concentration to a low concentration and that osmosis involves water molecules only and a selectively permeable membrane. The fact that both processes are passive, involve random movement and are influenced by temperature and surface area were less evident. Part (b) was challenging to most candidates with only the best appreciating that lack of oxygen would have a detrimental affect on the ability of root cells to actively uptake mineral ions because aerobic respiration would be diminished.

### Question 8

This was the least popular question in this section. Defining genetic terms posed difficulty for many candidates. Many cannot distinguish between a gene and an allele and are confused about the relationship between dominant and recessive alleles. Most appreciated what genotype and phenotype refer to and a pleasing number discussed the consequences of a bacterium becoming resistant to an antibiotic.

### Question 9

A pleasing number of candidates understand that nervous communication is faster, brief, involves impulses rather than chemicals and involves neurones rather than the blood. Part (b) was more challenging but it did allow the better candidates to show their knowledge about auxin and cell elongation. They also understood that the lack of chlorophyll would have a detrimental affect on photosynthesis.

### Question 10

There were many excellent answers to this very popular question. Candidates fully understand the role of the blood in protecting us from infection. However, the examiners noted that many candidates used terms more associated with A level than O level which suggests that they may have overburdened themselves acquiring knowledge beyond the specification, perhaps with detrimental consequences elsewhere. The term 'germ' is not credited at O level. Candidates are expected to use the generic term 'pathogen' or a selection of other terms that are more detailed such as 'bacteria', 'virus', or 'microorganism'.

### Question 11

This question was as popular as Q10 and candidates scored highly demonstrating excellent knowledge of the structure and function of a leaf. There were a good number of excellent diagrams and the markers were encouraged to award certain points on the mark scheme if they were evident on the diagrams.

## Question 12

This was the least popular long essay question, though candidates who chose it tended to score highly. Answers displayed excellent knowledge and understanding of the process of digestion and circulation relevant to the scenario. Some candidates wrote too much and discussed digestion of carbohydrates and lipids rather than concentrate on protein alone. Once again, this illustrates the importance of reading questions carefully before rushing to put pen to paper.

## BIOLOGY 7040, GRADE BOUNDARIES

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Grade	A	B	C	D	E
Lowest mark for award of grade	142	123	105	95	71

**Note:** Grade boundaries may vary from year to year and from subject to subject, depending on the demands of the question paper.

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