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Examiners' Report January 2009

GCE

GCE O Level Biology (7040)

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7040/01 Biology Paper 1

General Comments

Once again the examiners were impressed by the wide range of knowledge and understanding shown by the candidates and their ability to apply their knowledge to new situations.

Question 1

Candidates did very well with plants and animals but struggled with fungi and bacteria. Many were unaware that fungi have cell walls and that bacteria are not multicellular.

Question 2

This question was more challenging than anticipated. Students were unsure about the types of organism that cause diseases and were not confident in expressing how the diseases are spread.

Question 3

Most candidates recalled the correct names of the trachea and the diaphragm. 10.6 was a common incorrect answer to the calculation but most recalled red blood cells and pulmonary artery as the correct response for parts (ii) and (iii) respectively. Part (c) allowed able candidates to display their knowledge: many could have gained another two or three marks beyond the maximum, whilst most gained one or two marks. The ideas of decreasing thoracic volume and increasing thoracic pressure were least often mentioned. The major error here was that far too many candidates, having been triggered by the mention of blood, concentrated on transport of carbon dioxide in the blood stream. The vast majority scored full marks in part (d), though many lost a mark for writing 'energy' instead of 'water' as the anticipated product of respiration.

Question 4

It is pleasing to note that knowledge and understanding of the steps involved with genetically modifying organisms is improving in centres. As such part (a) was well done by most. In part (b) able candidates mentioned glucose regulation and conversion into glycogen. Less candidates mentioned diabetes, and fewer still the possibility of osmotic damage. Almost no candidates picked up on the advantages of using GM insulin rather than animal-derived insulin. Sadly, some gave an account describing the GM process.

Question 5

Most candidates were able to fill in the table with the correct numbers but many did not look at the data to give water vapour as the correct answer to (a)(ii). In part (b)(i), most candidates scored highly showing excellent understanding of the methods that could be used to reduce carbon dioxide emissions. In part (ii), melting of ice caps and rising sea levels or flooding were mentioned by many candidates. However, many were vague or showed the common confusion with the hole in the ozone layer and acid rain. A significant number seemed not to understand the word "consequences" and described causes.

Question 6

Most were able to quote 46 as the diploid number, though a few stated 22, no doubt from the numbers in the table. Most were able to identify the person as a male, correctly recognising the X and Y chromosomes. A surprising number of candidates believe the XY combination denotes a female. Almost all are aware that testosterone is made in the testes and that the hormone is responsible for male secondary sexual characteristics. In part (b)(iii), most appreciated that a reduction in cholesterol would help to reduce the risk of blockage to arteries, though a few thought that the increase in testosterone was the key point. Candidates struggled with part (c), seeming not to appreciate that less diffusion would exist as a result of blocked tubes or less surface area. Many incorrect responses made reference to breathing rather than gas exchange.

Question 7

It was surprising that so many suggested numbers other than 1, 5 or 3 for the order. Organelles proved the most challenging to provide an example. Several candidates who mentioned a number of types of blood cells elsewhere, were unable to name a cell here.

Question 8

A pleasing number of candidates were able to calculate the correct percentage of infected people who are killed by malaria. For those who got the wrong answer, one mark was still available for seeing 2.7 or 500 somewhere in the working. Most appreciated that pathogens cause diseases and most recalled that malaria is spread when the mosquito pierces the skin to feed (however expressed). Very few appreciated that the flight of the mosquito between hosts was also a key factor in spreading the disease. The vast majority calculated the number of lives that could be saved by the use of nets sprayed with insecticide. Part (c)(ii), was more challenging, with only the most able gaining full marks. Most failed to appreciate that the larvae are killed by biological control; that tablets kill Plasmodium; that vaccines are involved with immunity, and that repellents keep the mosquitoes from wanting to feed.

Question 9

Candidates were able to cope easily with the early numerical part of this question; most recognised that protein contains all the elements listed and most appreciated that vitamins, minerals or dietary fibre were the missing components of a balanced diet. Part (b) was well answered by most, the commonest mistake being to leave out the water, or to put it on first. In part (c), a significant minority of candidate seemed guided by the word ‘baby’ into describing rennin and protein digestion.

Question 10

This question discriminated very well. Some believe that sperm cells and red blood cells contain 46 chromosomes, and only the better candidates recalled that there are two hormones released by the ovary; that three types of leaf cell contain chloroplasts, and that only one enzyme released by the pancreas digests fat.

Question 11

In part (a)(i), most candidates appreciated that there would be an increase in the rate of photosynthesis but only the better candidates explained the involvement of kinetic energy, collisions and enzymes as the explanation. Similarly, in part (a)(ii), many candidates mentioned there would be an increase in the rate of photosynthesis but failed to offer an explanation. As such, only the better candidates mentioned that more light could be trapped by chlorophyll or that the point would arise where other factors would become limiting. In part (b), marks were available for describing the process of active transport, though few candidates did this. Most produced a list of named minerals and stated why they were important. Sadly, the responses were too vague. For example, stating that magnesium is good for growth was not credited, but stating that it is important to make chlorophyll was credited. Candidates are encouraged to write detailed, precise biology.

Question 12

Respiration as a source of water for cells was understood by many candidates and most appreciated that water is lost from the body in exhaled air or in sweat. Part (b)(i) was usually well answered, though it was surprising to note that more candidates seemed to know about the relaxation of hair erector muscles than either vasodilation or sweating. It was pleasing to note the very small number of candidates who made the once common error of suggesting that arterioles moved. Most were able to comment that increased external temperatures would increase water loss from the body and result in less or more concentrated urine being produced. Answers to part (c) tended to be vague. It was hoped that answers would make reference to enzyme reactions and freedom to occupy habitats of extreme temperatures.

Question 13

Part (a) of this question was well answered by a large number of candidates. However, it was noted by the examiners that candidates used terms that are beyond the requirements of the specification such as ‘agranulocyte’ and ‘granulocyte’. Marks were awarded if these terms were used correctly but many candidates lost credit because they were confused by these terms. Centres are encouraged to use terms from the specification whenever possible, particularly for the weaker students. Most were able to offer acceptable suggestions to cool the body of someone with a fever.

7040/02 Biology Paper 2

Section A

Question 1 required candidates to answer questions on a passage about emphysema and its causes. In part (a) most were able to explain the terms ingestion, digestion and gas exchange. Some candidates described ingestion as taking food into the mouth rather than the context of being taken in by white blood cells. For gas exchange most gained credit for oxygen and carbon dioxide but only the best candidates described how these gases entered or left the blood. Part (b) was well answered by most candidates who were able to describe how the alveoli were digested reducing the surface area for gas exchange. In part (c) almost all responses correctly linked lack of oxygen with a reduction in respiration leading to less energy. Part (d) was a genetic diagram and was familiar to most candidates who correctly identified the genotype of the parents and were able to show the gametes and genotypes of the offspring. Some candidates did not earn credit for the phenotypes and merely stated the genotype or whether the offspring had the A1T allele or not. In part (e) most could name a human characteristic that is controlled only by genetics and one that is determined by genetics and the environment.

Question 2 presented the candidates with some data about the changes in pH and oxygen levels that happened in two ponds. In part (a) almost all could calculate the biomass and in (b)(i) most could calculate the percentage change in oxygen. However many candidates did not gain all 3 marks as they failed to include the minus sign indicating a reduction in oxygen. The best candidates were able to identify in (ii) the physical factors as being light and temperature and explain how these would lead to an increased rate of photosynthesis. In part (c) most were able to link the changes in pH to relative amounts of animals and plants in the two ponds and explain how the rate of respiration and photosynthesis led to a change in CO_2 and thus a change in pH.

Question 3 detailed an experiment showing data from a pitfall trap collected during the day and at night. Part (a) asked candidates to suggest why more animals were caught at night. Most common answers described the organisms as being nocturnal, avoiding hot temperatures or predators during the day, feeding at night and many described how organisms could see less well at night and therefore not see the trap. In part (b) most described the lid as preventing escape of the organism and could identify the meat as bait to attract animals to the trap. In (iii) almost all candidates correctly suggested two features of the meat that should be controlled such as mass, freshness or species. Answers such as taste or flavour were not credited.

Question 4 showed the candidates, what should have been, a familiar experiment using seeds to show that respiration produces heat. Those candidates from centres who had seen or discussed this experiment tended to do very well and found the items straightforward. Only part (c) in which they were asked to explain the use of cotton wool rather than a bung proved difficult. Most were able to gain one mark for explaining that cotton wool would allow oxygen to enter but only a few gained the second mark for description of gases being allowed to escape.

Question 5 required candidates to plot a graph showing the rate of decomposition of a mammal. Candidates who had experience of plotting such data had no difficulty in gaining full marks. Most were also able to gain full credit in (b)(i) by describing how the rate of carbon dioxide production rose then fell. In part (b)(ii) only the very best candidates

described how the number of bacteria increased respiring and releasing more carbon dioxide until the food supply began to run out. In part (c) most were able to name two factors such as temperature and oxygen and explain how these would change the rate.

Question 6 was the experimental design item. On this occasion candidates had to plan an investigation to find out how smoking affects heart rate. A large number of candidates from centres that had practiced such items used the CORMS prompt and achieved high scores. A small number of responses earned no credit for describing the effects of smoking on the body without designing any investigation.

Section B

This section gives candidates a choice of questions.

Question 7 was by far the most popular choice and was answered by 94% of candidates. Most did very well on part (a) gaining credit for comparing aerobic and anaerobic respiration in mammals. The points most commonly credited included oxygen use, energy yield, carbon dioxide and water production. Some answers described ethanol production even though the question stated 'in mammals'. In part (b) candidates did less well at explaining the link between animal size and respiration rate. Only the very best responses gained full credit for explaining that small animals have a large surface area to volume ratio and that this leads to heat loss and so to maintain constant body temperature they require a fast respiration rate.

Question 8 was the second most popular choice being answered by 71% of candidates. However, the candidates that chose this item performed very well. On part (a) many gained full credit for describing how pollution by sewage and fertilisers leads to eutrophication, increase in decomposing bacteria, oxygen being used up and death of organisms. Candidates also did well on part (b) with most able to explain how energy loss limits the number of links in a food chain and to give example of the energy losses.

Question 9 was done by only 32% of candidates and they generally scored poorly. In part (a) some candidates earned credit for recognising that less nutrients and oxygen would be circulated. Only the best responses linked this to respiration of the microorganisms and thus their continued growth. In part (b) only a small number of candidates gained full credit for explaining that cloned transgenic animals have genes from other species and that they are genetically identical. Some gave example of their use such as protein or hormone production and their possible future use in organ transplants

Section C

This section gives candidates a choice of questions.

Question 10 was the least popular choice and was answered by 41% of the candidates. Again only a small number scored well. The mark scheme gives the most commonly credited responses such as use of greenhouses, pesticides, biological control, fertilisers, selective breeding, genetic modification crop irrigation etc.

Question 11 was a popular choice answered by 78% of candidates. It was well answered by many candidates who had learned the material and were able to organise their thoughts to

gain full credit. Again the mark scheme gives the most commonly awarded points. A small number of candidates gained no credit by writing in detail about blood cells.

Question 12 was also a popular choice answered by 78% of candidates. Those who had carefully prepared the material could write well and with confidence about the kidney and its role in osmoregulation. Many candidates gained full marks. The mark scheme gives the most commonly credited responses.

BIOLOGY 7040 - GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	**139**	**119**	**100**	**90**	**65**

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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January 2009

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