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Examiners' Report January 2007

GCE

GCE O Level Biology (7040)

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January 2007

Publications Code UO018821

PAPER 1

General comments

Once again the examiners were impressed by the answers that the candidates gave on the two papers, especially to the unfamiliar items. 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 principals and acquiring the skills and confidence to apply these to novel situations. We would like to take this opportunity to remind centres that from the June 2007 examination series onwards, papers will be set on the new specification, details of which are available on the Edexcel International web site.

Section A

The two questions in this section dealt with camels and the assimilation of food in different organisms.

Question 1

This provided a passage on camels and asked candidates to use the information in the passage and their own biological knowledge to answer the questions. In (a) most candidates were able to recognise that a desert is an extreme environment because of the shortage of available water. In (b), the better candidates described how fur traps a layer of air and acts as an insulator so less heat is gained. Most candidates could explain why sweating would cause problems for a camel due to water loss and dehydration and gained credit in (c). Part (d) required suggestions as to how the urine and faeces of the camel would change during a journey. The better responses noted that there would be a reduction in the volume and an increase in the concentration of the urine and that the faeces would be harder after such a trip. Part (e) proved to be a good discriminator with only the better candidates describing the increase in concentration of the plasma leading to osmotic movement of water out of the cells. A reduced plasma volume would increase the viscosity of the blood and cause the heart to pump harder and slow the circulation system down. In (f), most candidates gave two advantages of being nocturnal such as reduction in exposure to hot daytime temperatures and therefore a reduction in sweating.

Question 2

This provided candidates with unfamiliar data on the fate of food eaten by different animals. Most could explain the meaning of egested food in (a), but some still confuse excretion and egestion. In (b), many could calculate the percentage but some were unable to explain that herbivores egest a higher percentage as their food contains cellulose which is difficult to digest. In (c), the better candidates recognised that carnivores respire more as they are more active, for example in hunting prey. Part (d) required responses which noted that the elephant converted less food to biomass because it needs to maintain its body temperature. Many candidates gained full marks in (e) for the correct calculations.

Section B

Candidates were required to answer three questions from section B. A very small number of candidates answered more than three questions and these would not have sufficient time to produce full answers for each question.

Question 3

This was the least popular choice being attempted by about 40% of candidates. In (a), most were able to name a monosaccharide and give its function but they did less well in naming two polysaccharides and explaining their role. In (b), almost all candidates gained some credit with common correct responses being no nucleus, no chloroplasts and no cellulose cell wall. For (c) we expected responses to include the name of the process and how it changes the level of carbon dioxide in the atmosphere; such as carbon dioxide being removed from the atmosphere by plants carrying out photosynthesis. In (d) the best candidates used the CORMS prompt to describe how they would expose a stated mass of leaves of the same species to two different temperatures. They could measure the original mass of the leaves and place them in the incubators at two temperatures for two months. They described how they would control the humidity in the incubators and then measure the final mass of the leaves. The experiment would be repeated using several samples of leaves at each temperature. Part (e) proved to be straightforward for many candidates who were able to describe in detail the fate of lipid in the small intestine.

Question 4

This was a more popular choice being attempted by about 62% of candidates. Those candidates who had revised the structure of a flower easily gained full marks in (a). In (b), most could give three differences between insect and wind pollinated flowers. However, in (c), only the best candidates were able to earn full credit. Many poor accounts described pollen grains or even sperm fertilising an ovary. In (d), those candidates who used the CORMS prompt tended to gain high marks. Candidates were usually able to earn credit in (e) for stating that cloning produces a large number of genetically identical plants in a short period of time, which have the same flavour (or some other stated characteristic).

Question 5

This was the most popular of the questions being attempted by about 80% of candidates. Most candidates were able to give the correct balanced equation for photosynthesis with only a few giving the respiration equation. In (b), although most were able to describe the effect of increasing light intensity, few could explain how the rate would increase up to the point where other factors limit the rate. Some candidates thought that increasing temperature would slow photosynthesis and only a few were able to explain how temperature increases kinetic energy and thus the rate of photosynthesis. In (c), many very good answers earned credit for a detailed account of absorption of water by root hair cells due to the higher water potential in the soil solution leading to osmosis. The passage of water up the xylem of the stem and into the leaves due to capillarity, cohesion or transpirational pull and evaporation from the mesophyll cells into the air spaces and out of the stomata all featured in candidates' responses. For (d) those candidates using the CORMS prompt gained good marks. In (e), most could name a cereal crop and explain its importance as a source of carbohydrate.

Question 6

This was the second least popular choice being attempted by about 52% of candidates. Most candidates were able to explain the meaning of a population as the number of a single species found in a specific area. In (b), candidates sometimes confused pollution due to sewage with eutrophication. Most could describe how urbanisation leads to a loss of plant life, habitat destruction and damage to food chains. Part (c) was well answered by those candidates who used the CORMS prompt. In (d), answers gained credit for describing how carbon dioxide is produced in cellular respiration carried in the blood to the lungs where it diffuses across the alveoli and is exhaled. Some candidates were confused and wrote that urea was produced in the kidney; however most could describe the role of the liver in breaking down amino acids to produce urea which is filtered in the kidney and excreted in the urine.

Question 7

This was the second most popular question being attempted by about 64% of candidates. Part (a) enabled candidates to describe and explain the response of stems to light, and stems and roots to light and to gravity. In (b), most candidates were able to gain credit for contrasting nervous and hormonal communication and it was evident that centres had prepared candidates well for this topic. Part (c) required an annotated diagram to show the withdrawal reflex, on which many candidates earned full marks. The better candidates gained further credit by explaining that by being a fast response, damage is reduced. In (d), candidates used the CORMS prompt to describe suitable experiments to explore the effect of exercise on sweat production. Some excellent and ingenious answers were seen including measuring sweat production by weighing a shirt before and after exercise.

PAPER 2

Question 1
This showed a diagram of part of the human gut. Part (a) was answered correctly by most candidates with only the weakest wrongly identifying the large intestine as the small intestine. In (b), some responses discussed the role of enzymes in the saliva rather than describing how starch is digested in the small intestine into maltose by amylase and then this is further digested by maltase into glucose. Similarly, some discussed digestion of protein in the stomach rather than confining their answers to the digestion in the small intestine. Part (c) was well answered by most candidates who correctly described the role of fibre, water, Vitamin D and iron in the diet.

Question 2
In (a), most responses correctly identified the structures in the eye but (b) was answered correctly by only the best candidates. The examiners were expecting a simple statement linking the change in shape of the lens to become fatter or thicker, caused by the contraction of the ciliary muscles and a reduction in tension of the suspensory ligaments. The change in shape of the lens refracts the light more and focuses the image onto the retina. Some answers discussed the change in pupil size caused by circular or radial muscles and gained no credit. Part (c) was better answered with almost all responses earning one mark and many gaining full credit.

Question 3
This required candidates to complete a passage about pollution. Most candidates gained credit for their responses with the most common error being use of a vague term such as 'environment' for the last space rather than 'plants' or 'organisms'.

Question 4
This question asked about heart structure having given the candidates an unfamiliar transverse section through the human ventricles. The responses in (a) were very good, and showed that the candidates understood heart structure rather than just rote-learned familiar diagrams. Most knew where adrenaline was produced. Many were able to gain full credit for describing how it increases heart rate enabling more oxygen and glucose to reach the respiring muscles and release more energy for the race.

Question 5
In (a), a surprising number of candidates was unable to identify yeast as a fungus. Most recognised that carbon dioxide is released as the waste gas during alcoholic fermentation. Only the better candidates were able to suggest two reasons for using the reservoir as allowing the gas to escape and to prevent the entry of other microorganisms. In (b), most correctly identified the region of the graph where yeast increased fastest. The best candidates recognised that the yeast numbers dropped in section D because the sugar solution was being used up and that the ethanol concentration was killing the yeast cells. Weaker responses suggested that the yeast was being denatured, perhaps confusing the shape of the curve with the effect of temperature on enzyme activity.

Question 6

This provided us with our last opportunity to ask about insect characteristics as this does not feature on the revised specification. Most responses scored well. Almost all were able to identify the genotype and phenotypes of the flies in (b). A few responses incorrectly suggested that the Aa fly would have medium wings. Likewise (c) proved straightforward for most, with almost all recognising the 3:1 ratio but fewer calculating that 60 flies would be expected to be heterozygous. In (d), most could complete the names of the life cycle stages.

Question 7

Part (a) was also answered correctly by most. Only a few candidates claimed to be able to see features in the photograph of the capybara that were not visible, such as mammary glands, appendix and diaphragm. The most obvious answers are usually the right ones, in this case fur and external ears. In (c), most calculated the energy transferred correctly but fewer gained all the marks for describing how energy is lost from the capybara to the snake. Part (d) was familiar to most candidates who could describe how deforestation leads to habitat loss, soil erosion, less rainfall and an increase in carbon dioxide levels.

Question 8

The graph in (a) was well answered by most candidates, those who did not earn full credit failed to label their axes or had chosen difficult scales for their plots. Most were able to calculate the rate of respiration in (b). However in (c), although most could describe how the respiration at 30 °C was faster than at 20 °C, few gave data to support this. Only the best candidates were able to give the reason for the increase in rate being due to increased kinetic energy of the enzymes and their substrates, leading to more and faster collisions. More candidates were able to explain how respiration rate would fall at higher temperatures in (d). In (e), almost all were able to give carbon dioxide as the gas produced, but fewer were able to identify a suitable absorber.

Question 9

In (a), many candidates gained full credit for correctly counting the chromosomes, identifying them as being from a male and explaining why. Some were able to give two ways that these differ from other species in terms of their number and shape or size. In (c), many gained full marks for correctly naming DNA, mutation and explaining that the changes could be passed on through the gametes during sexual reproduction.

Question 10

Part (a) gave the candidates a drawing of a moss plant. Most could identify the cell structures in (a) as being the cell wall, cytoplasm and chloroplast. They were almost always able to describe the role of chloroplasts as trapping light energy for photosynthesis. The better candidates were able to calculate the actual length from the drawing in (iii), but often units or calculators let them down. Part (b) asked candidates to suggest why a moss leaf does not need a waxy cuticle and the examiners were impressed by the large numbers who were able to explain that since moss lives in moist places it does not need a cuticle to restrict its water loss. The best candidates also explained that the moss does not need stomata as it is only one cell thick and gases can easily diffuse into the leaf. Most responses earned some credit in (iii), with only the weakest candidates repeating stomata and waxy cuticle.

BIOLOGY 7040, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	**139**	**119**	**99**	**89**	**63**

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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Order Code UO018821 January 2007

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