

Examiners' Report January 2008

GCE

GCE O Level Human Biology (7042)

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PAPER 1

General comments

A very wide range of performance was seen, with some excellent scripts being produced. However, there were many scripts with blank where no attempt had been made to answer a particular question. One candidate chose to answer all the questions by referring to football teams and football personalities which, whilst entertaining the Examiners, seemed to be a pointless exercise. Many candidates displayed weaknesses in knowing the definitions of basic biological terms and many were unable to carry out the simple calculations required by certain questions. One other common error made by candidates was to use vague terminology. For example, the comment 'easy to do' was a prevalent answer to several questions and secured no reward. Candidates must learn to be precise in their description of events and circumstances.

Question 1

The names of the parts of this joint were usually well known but a number of candidates gave A as the ulna and C as a tendon. Incorrect answers to (a)(ii) included ball and socket joint whereas hinge joint was the preferred answer. The function of synovial fluid was well known with correct references to reduction of friction and lubrication being common. However, this was one of the questions where 'easy' was common place in the form of 'easy movement'. The effects of the absence of cartilage were well understood in (b). Many candidates listed off the roles of cartilage as preventing the bones from rubbing together, allowing smooth movement and as a shock absorber. However, fewer candidates stated that the cartilage normally covered the ends of the bones and again 'easy to' was a regrettably common comment.

Question 2

The structure and region were known in (a), with glucose and amino acids being given as the two products of digestion that are absorbed. Some candidates included water in the answer to (b)(i): they should be reminded that water, whilst being absorbed, is not a product of digestion. A number made reference to lipids being absorbed. Most candidates were aware that glycerol and fatty acids are absorbed by the lacteal. In (c)(i), the majority of candidates were able to make reference to the large surface area that results from the presence of villi. However, in (c)(ii), many candidates made reference to the layer being thin or one cell thick but then failed to relate this to diffusion distance; instead, there were many references to 'easy to diffuse', which was not accepted. Liver was usually given as the correct answer to (d) and the role of the muscles in peristalsis and the movement of food along the alimentary canal were well described in answers in (e).

Question 3

Many candidates were unaware in (a) that the semicircular canals are filled with fluid. The instructions as to how to answer (b) were explicit, namely, label each with an arrow and the letter V. Many candidates chose to ignore that instruction and simply put the letter V over the top of their chosen structure. If it was absolutely clear as to the structure they intended and it was correct, then a mark was awarded. However, in most cases it was not clear and in labelling the two membranes it was always likely to be unclear in their chosen method of identification. The instruction for (c) was similar and, again, largely ignored. However, on this occasion the fault was not as critical although a number of candidates left the Examiners in doubt and so were not awarded the mark. The answers given for (d) were extremely poor. It was unusual to see a candidate score three or four marks. Where there was some appreciation of the role of the Eustachian tube, the way it functions was poorly understood and even more poorly described.

Many candidates realised that its role is to allow the movement of air to equalise pressure; however, the areas where the air moved to and from were often poorly defined and the effects of unequal pressure were confused. Few candidates were able to describe the resulting distortion of the ear drum and the subsequent effect on its vibration adequately. It was common for zero marks to be awarded for this section.

Question 4

Whilst most of the candidates were able to manipulate the calculation correctly, a common mistake was to subtract 1500 from 180 000, the result being a figure in excess of 90%. Simple back checking of the answer with the original figures should have demonstrated that such a figure is incorrect. Most candidates were able to provide protein as a substance that is not filtered and glucose as one that is completely reabsorbed. Although most candidates recognised that sweating would occur in the scenario presented in (b), and some recognised that it was increased sweating that occurred, very few were able to give a detailed explanation of the effects this would have on the volume of water in the urine. Many referred erroneously to the concentration of water in the urine and only a tiny number realised that the volume of water in the plasma and filtrate would remain unchanged. Most candidates could describe the origin of urea, although many failed to make it clear that it is excess amino acids that are deaminated by the liver. Many candidates thought that (c)(iii) referred to the route from the liver to the kidneys and gave a detailed sequence of the blood vessels encountered on the way. Candidates should have read the question more carefully, since it asks how, and they should have responded, 'in solution in the plasma'. Few candidates could give a rational explanation of how the figures supported the notion of urea being an excretory product. The closest many came was to make a simple statement to the effect that there was 25 g of urea in the urine.

Question 5

The definition of a vector was poorly quoted. Many candidates mentioned the transfer of disease rather than the transfer of a pathogen. Few were able to make any comment on the fact that a vector is unaffected by the organism that is being carried. Most candidates recognised that the transfer of *Plasmodium* occurs at the blood meal stage. The control measures employed were often confused and over-lapping. The use of pesticide rather than insecticide was common and not credited. Descriptions often lacked detail of how the measure achieved its results. In (b), many candidates thought that the problem was the fact that the mosquitoes are able to fly, although better candidates introduced ideas about large numbers being difficult to eradicate, the lack of a suitable vaccine, the limited availability of suitable drugs and the large number of potential breeding sites. The words 'global warming' in (c) triggered the usual copious references to the melting of the polar ice caps and sea floods. Some candidates inventively associated that phenomenon with an increase in aquatic breeding grounds for mosquitoes but failed to comprehend that the saline nature of sea water would not be appropriate. Increased numbers of mosquitoes because of more suitable warm climatic conditions coupled with an increased number of cases of malaria was all that was being demanded by the Examiners.

Question 6

This proved to be a difficult question for many candidates. Electrochemical (electric and electrical were common variants), synapses and neurotransmitter were terms that were well known by the majority of candidates. However, few could cite 'vesicle' as a container for the neurotransmitter. Also, movement by diffusion was not well known nor was the fact that another impulse is generated, rather than transferred at the post synaptic membrane. Most candidates failed to appreciate that the release of acetylcholine was energy dependent and that the mitochondria generate the ATP necessary for the process. Most candidates described the mitochondria as producing energy, which was not acceptable.

Question 7

Part (a) was generally well answered and candidates understood the idea. Two relatively common errors were a failure to state that the woman was obese after correctly calculating the BMI and an incorrect calculation because of a misapplication of the formula (failing to square the denominator). Only the better candidates scored maximum marks for (b). Many simply stated figures from the graph at the beginning of the graph and at the end. Better candidates recognised that there was a direct relationship between increasing BMI and the onset of diabetes in both men and women although the effects were more pronounced in women. In (c)(i), it was evident that many candidates had not practically performed a Benedict's test. A common mistake was to describe a text-book version which described the testing of glucose rather than urine. Although the colour changes were well known, many candidates omitted to heat / boil the mixture. The hormone insulin was well known as were the conditions that might arise, with heart attacks being the commonest correct answer and heart problems being a common, but not accepted answer.

Question 8

The two definitions of genotype and codominant proved to be challenging for many candidates. Many simply produced examples such as Tt without reference to alleles or genes in cells. The commonest correct expression usually included a reference to the genetic constitution or make-up of the organism. Definitions of codominant usually failed to make any reference to there being two different alleles or to the heterozygous condition. Usually one mark was achieved for a reference to neither being recessive or both showing dominance; there were few references to expression in the phenotype. Full marks were quite common in (b)(i) but, even so, there were many who failed to achieve this, largely because they could not accept that the homozygote condition could also be resistant to malaria. Part (b)(ii) proved to be very challenging for many candidates. The usual incorrect answer was to give two heterozygotes: this demonstrated a lack of understanding of the genetics involved.

Question 9

Candidates found it difficult to give a sufficiently detailed answer to the function part of the table. The role of blood vessels is to carry blood from one point to another e.g. the vena cava (A) transports blood from the tissues/organs of the body to the heart (right atrium). It is not sufficient to say either it carries blood to the heart or it transports blood from the tissues. References to oxygenated or deoxygenated were not required but many of the better candidates did correctly specify the condition of the blood: this practice is to be encouraged. The role of valves is simply to prevent the backflow of blood. Many better candidates amplified their answers with references to the precise role of X and Y. Almost all candidate knew that valves are found in veins although lungs were seen on one or two occasions. The differences in the thickness of the walls of the left and right ventricle were usually fully explained although many candidates used convoluted explanations. References to the quantity of cardiac muscle in the walls leading to different pressures being generated because of the different distances the blood has to travel is what was expected. Some weaker candidates thought that difference in thickness was as a result of differences in pressure of the blood in the chambers rather than the generated pressure.

PAPER 2

General Comment

Centres are reminded to ensure that candidates do not exceed the number of questions that the rubric demands. Most candidates managed to respond to most sections within the space provided. Problems were caused by those candidates who tried to squeeze several lines of writing into a one line space and also by those who made alterations by writing over previous work. Candidates should be warned of the need to indicate clearly if they have completed a response outside the area allowed for it: it must be obvious to the examiner if there is more to the answer or the work may be overlooked. Candidates should be aware that the space given is more than adequate to complete their answer. About 25% of candidates used extra paper for their answers - sometimes just to write one or two words - but much of this 'extra work' was not creditworthy. Candidates should aim to write concise answers which relate directly to the question being asked.

Question 1

Responses to this question were pleasing. Most candidates clearly understood the mechanism of breathing although a few seem to believe that the diaphragm muscles contract and push the ribs upwards! In (b), a significant minority dealt in detail with gaseous exchange across the alveolar wall rather than the changes that occur during exercise. This was also true in (c) when some candidates described the transfer of oxygen in detail but failed to mention red blood cells!

Question 2

Many candidates failed to realise that they were expected to describe the structure as well as the functions of the three types of teeth and thus failed to gain maximum marks. In (b), a number of candidates still think that sugar alone causes tooth decay and made no mention of bacteria. Most mentioned calcium salts and vitamins C and D as being required for the development of healthy teeth; phosphates were mentioned less frequently. The digestive action of amylase in saliva was well known.

Question 3

There was considerable confusion in the definition of a tissue but most candidates were able to name two tissues. There was also confusion between tissues and organs. 'Cardiac muscle' was an acceptable response but not 'heart'. The functions of the cell organelles were well known but many candidates lost marks by talking in vague terms such as 'mitochondria are the power house of the cell' without further explanation. In (c), candidates frequently wrote at great length about each of the digestive enzymes although the question was about enzymes in general and their overall importance.

Question 4

This was a popular and frequently high scoring question. In (a), many candidates gained maximum marks for their definition of a reflex action. Diagrams in (b) were of poor quality but were usually well labelled. Some candidates reversed the dorsal and ventral roots of the spinal nerve. In (c), most candidates understood the role of the iris reflex but there was some confusion between the iris and the ciliary muscles. Many candidates related the blink reflex to exposure to bright light rather than to an object approaching the eye.

Question 5

The biological principles on which the three methods of contraception were based were known but details were sometimes lacking. The advantages and disadvantages of the various methods were often explained in very vague terms. Most candidates knew that meiosis resulted in haploid gametes but some found it very difficult to explain why this was important. The secondary sexual characteristics of males were well known.

SECTION B

Question 6

Unfortunately, many candidates based their response on sulphur dioxide and the effects of acid rain on vegetation and buildings when the question was about effects on human health of car exhaust fumes. Oxides of nitrogen, carbon monoxide and lead compounds should have been discussed as well as other components of cigarette smoke all of which have specific effects on the human body. In (b), most candidates showed understanding of the roles of white blood cells in the defence of the body against pathogens. There was some confusion between antibodies and antigens. In (c), candidates had great difficulty in explaining their ideas clearly enough to gain marks, although most seemed to understand that antibodies were not produced in response to chemical irritants.

Question 7

Diagrams of bacteria were often very untidy and sometimes it was impossible to be certain about the structures to which label lines belonged. A few candidates showed both a DNA thread and a nucleus, sometimes one inside the other. The term pathogen was well understood and most candidates could name two examples of diseases caused by bacterial pathogens (or name the actual pathogens). Responses to (c) were often wide-ranging, including examples of biotechnology and genetic engineering. Candidates who dealt with bacteria and fungi separately often produced the clearest accounts. Yeast was occasionally referred to as a bacterium. Part (d) was very poorly answered, the commonest correct response being the presence of nuclei in a fungus.

Question 8

Most of those candidates who chose this did not really appreciate that the question was about measures to disrupt the life cycle of *Schistosoma* and that an account of the life cycle alone was inadequate. Some candidates appeared unfamiliar with schistosomiasis and discussed disease control in general and others suggested suitable controls but did not explain how they would work. The differences between epidemic and endemic diseases were not understood. Most candidates were unable to offer a convincing explanation for the differences in the spread of the two diseases

Question 9

Almost all candidates realised that plants provide an energy source, food, and a supply of oxygen for humans. They should have realised from the mark allocation that they had to expand on these ideas to mention the conversion of light energy in photosynthesis and the roles of other animals in food chains. In (b), the loss of energy throughout the food chain was appreciated but reasons for the loss were not always made clear. In (c), some candidates did not appreciate the difference between food preservation and hygienic food storage. Measures such as covering food to deny access to flies were not suitable. Some candidates do not seem to realise that deep freezing involves temperatures well below freezing point and that such temperatures inactivate but do not destroy enzymes. If heat is used to destroy bacteria (cooking) the food must then be stored in cans (canning) or vacuum packed to prevent re-contamination. Candidates understanding of how the methods of preservation worked was rather vague.

HUMAN BIOLOGY 7042, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	140	122	104	94	78

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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