

Examiners' Report Summer 2009

GCE

GCE O Level Human Biology (7042)

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7042-01 Paper 1: Theory (Short Answers)

There were some excellent high scoring candidates who demonstrated a thorough knowledge and understanding of the biological principles involved. However, sounding a negative note, there appears to be an increasing number of candidates who do not have a sufficient grasp of the facts to be able to deliver acceptable answers.

Question 1

Many candidates correctly identified the three areas of the brain but answers to C were often hybrids of cerebrum and cerebellum. Candidates should be reminded that the Examiners do not choose; in those circumstances they give no marks. Candidates were usually successful in matching a region to a function.

In answer to part (c) most candidates were able to state that the region was involved in named involuntary actions but, did not then go on to say what effect the accident would have on the processes controlled by E.

Question 2

Part (a) caused problems for the majority of candidates. Whilst there was an appreciation that heat is lost via the skin in a variety of ways and so its temperature would be lower, there was little understanding of the processes involved in heat generation, thereby raising core temperature. A number of candidates mentioned chemical reactions as the heat generator but few specifically focussed on respiration occurring in the organs and tissues as releasing heat.

In answering part (b)(i) candidates, in many cases, did not follow the instructions which clearly stated 'label your graph curves'. Since one mark was awarded for appropriate labels, such candidates penalised themselves.

Few candidates seemed to appreciate, or else were unable to read correctly, that the core temperature was lower than the skin temperature when its curve fell below that of skin temperature. A relatively small minority were awarded a mark for their answer.

Part (b)(iii) caused great difficulty to candidates. There was a lack of understanding that the cold water would pass to the stomach and that it would cool the stomach and absorb heat from the blood flowing in the vessels supplying the stomach and that this in turn would cause cooler blood to be distributed around the body reducing core temperature.

The answers to part (c) usually made reference to enzymes and the well rehearsed effect of temperature variation on enzyme activity. However, few candidates went a stage further to describe the overall effect that this would have on metabolism.

Question 3

The common mistakes in the answers to this question were for malaria, many candidates gave the mosquito as the causative agent rather than *Plasmodium*.

Many candidates did not know that athlete's foot is caused by a fungus and there seemed to be a reluctance to state that gonorrhoea is spread by unprotected sexual intercourse. Instead, there were vague references to 'sexual contact'.

Question 4

The diagrams drawn in answer to (a)(i) were very varied. Some would not have been out of place in a text book whilst others were little more than scribble. Whilst the Examiners are always pleased to see the former, candidates can secure maximum marks by drawing simple line drawings that are clear to see and understand. On this occasion labels were not required though virtually everyone labelled their diagram.

The role of a tendon never seems to be well understood and the answers to part (a)(ii) reinforced that view. Many candidates described how they contracted which is not the case. The mark scheme required a simple reference to the transmission of the pull generated by the contracting biceps to the radius. There was a requirement for a specific reference to the radius rather than just to the forearm.

Joints Y and Z were usually correctly identified but the usual problems in describing the movement of a hinge joint occurred in answers to (b)(ii). Many candidates stated that a hinge joint allows movement in one direction which is clearly nonsense. Candidates should be encouraged to refer to planes of movement so that a ball and socket joint allows movement in three planes (and not in 3D as was seen on more than one occasion) whilst a hinge joint allows movement in one plane. In this way confusion should be avoided.

Candidates knew about synovial fluid and in answer to part (c)(ii) could describe increased difficulty/friction resulting in painful movement.

Question 5

Many candidates transposed the correct answers to part (a)(i) and their descriptions of ultrafiltration in answer to part (a)(ii) were often poor. Whilst most referred to high pressure in the glomerulus few made reference to it being generated by the heart though there were many references to diameter differences between the afferent and efferent arteriole. The word 'ultrafiltration' was often not mentioned and few made reference to the porous nature of the glomerulus and Bowman's capsule. In answering part (a)(iii) candidates often put the word 'protein' rather than plasma protein.

Few candidates appreciated that the diet has any effect on water reabsorption in answer to (b)(i) and not many made reference to the intake of water. There was often a reference to the weather having a part to play and sweating was mentioned. Some referred to 'activity' but often failed to give an adequate account of how it caused an effect.

The role of ADH in controlling the amount of reabsorption was usually well described though most candidates failed to mention that it is transported in the blood. A fair number of candidates thought that the hypothalamus secreted the ADH and only a minority referred to the role of the hypothalamus in monitoring blood water content rather than body water content. Too many candidates were unable to specify that the ADH acts on the collecting duct rather than just a vague reference to 'kidney tubule'.

Question 6

Most candidates scored two or three marks for part (a). In answering part (b) many candidates had difficulty in applying the correct terminology particularly with regards to the suspensory ligaments. Candidates should be reminded that ligaments do not contract as was suggested by many. Instead, they transmit the pull of the relaxing ciliary muscles and pull the lens thinner. In addition candidates should be further reminded that repeating the stem of the question i.e. 'decreases the curvature of the lens' is not going to secure a mark. A sizable number of candidates confused the mechanism of iris action controlling the size diameter of the pupil with the mechanism for accommodation.

Question 7

A common mistake in answers to part (a)(ii) was to state 'protein' rather than 'plasma protein' and white blood cells. Very few candidates made any reference to the fluid at R not being enclosed in blood vessels. In answering (b)(ii) many candidates failed to state specifically the direction of movement i.e. from S to R. Instead, there were answers that were simply arrows drawn on the paper or a common comment was to say 'upwards'. The role of the tissue fluid with respect to muscle cells was well known with many candidates describing the diffusion of glucose and oxygen into the cells and carbon dioxide outwards. Few candidates could make a satisfactory attempt to answer (c)(i). Few made any mention of friction but more surprising were the few candidates who made any reference to the reduction of the volume of liquid in the capillary. Few candidates also understood in (c)(ii) that the difference in pressure would result in the movement inwards of waste products particularly carbon dioxide.

Some candidates described the fluid P as a lymph vessel in answer to part (d)(i) rather than lymph. Many were not able to give an adequate description as to the point of entry of the lymph fluid into the circulatory system. The presence of lymph nodes was mentioned by only a few candidates.

Question 8

Despite being given the three alleles many candidates insisted on using simply AA, AO or AB to describe the genotypes in part (a); no marks were awarded if a candidate gave such an answer.

In answering part (b) many candidates penalised themselves because they did not give full annotation for the genetic cross which they had to draw. Each stage should be clearly labelled starting with the 'parental generation'. The gametes produced by the parental generation should be clearly labelled 'gametes'. Fertilization should be indicated and the F1 generation should be labelled as such followed by the phenotypes of the F1 and their ratio. All too often candidates wrote down crosses without any explanation and as a result failed to score many marks. The answer to part (b)(ii) was often given as 50% because candidates had not read the question carefully as it asks for two factors, i.e. blood group B and a girl.

Poor quality of expression left candidates struggling to score marks in answer to part (c). Many could give the XY of males and the XX of females but failed to explain that in a female the heterozygous condition would enable the allele for normal clotting to mask the haemophilic allele and so the female would be a carrier but not show the condition. In the case of the male the presence of the empty Y chromosome means that the haemophilic allele can't be masked and the male will be a sufferer.

Question 9

The decay of teeth was well known by the majority of candidates. However, a common mistake was to inadequately describe the relationship between the sugar and the bacteria. There were rambling answers about plaque and food stuck between teeth rather than a clear statement that the bacteria use the sugar for respiration producing acid as a waste product. Candidates need to be reminded that the acid dissolves or erodes the enamel and allows the bacteria to enter the pulp cavity causing infection and pain.

Reducing the chances of tooth decay was well documented in answer to part (a)(ii) but candidates should be reminded that 'brushing teeth regularly' is insufficient as regularly could be once a year which would be of no use. Brushing after each meal or every day are the expected answers.

Deficiency of protein was well understood with most candidates scoring well. The consequences of a diet containing too much fat or carbohydrate was well known but a

common mistake was to make vague references to 'heart disease' rather than give a precise reference to coronary heart disease or even heart attacks.

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7042-02 Paper 2: Theory (Essays)

General Comment

Candidates should ensure that they do not attempt more questions than the rubric requires. A number of candidates had not planned their response before beginning the answer and thus over ran the space provided and needed extra sheets. Often these extra responses contained irrelevant material. No question appeared to present particular difficulty to candidates, and although some questions were markedly more popular than others, there were some good responses for each question. There was some evidence of careless reading of questions.

SECTION A

Question 1.

This was a popular and often a high scoring question. It was surprising that a number of those candidates who chose to describe the emulsification test for fats did not realise that if they ground the food up in water to start with the test would not work. A minority of candidates described the translucence test and very few used the wrong reagents. In part (b) the digestion of fats and the role of the villi were well known. In their responses to (c), most candidates mentioned that the layer of fat under the skin was an insulator but many did not expand their response further. In (d) careless reading of the question caused some candidates to list numerous uses of fat in the body but not to explain any of them.

Question 2.

This was also a very popular question and often high scoring for those candidates who read the question carefully and responded to what was asked. They were expected to explain how deoxygenated blood entering the right atrium of the heart passed to the left ventricle and becomes oxygenated on the way. Details of the pumping action of the heart were not really required in (a)(i) or (a)(ii). In (a)(iii) candidates were expected to use their knowledge to explain how mixing of oxygenated and deoxygenated blood might affect an older child. The structure and functioning of various types of muscle was generally well known but a number of candidates responded with statements, about either the heart or skeletal muscle, which failed to make comparisons. Section (c) was poorly answered. Some candidates failed to notice that the question was about diet and included smoking, lack of exercise and stress in their responses.

Question 3.

This was the least popular question in this section but produced some good responses from those who selected it.

In (a)(i) candidates showed good understanding of a complex process. The role of DNA and formation of RNA were well described but a few candidates became confused about the order of events occurring on the ribosomes. Most candidates also realised that enzymes are protein in nature and control metabolic processes in cells. In part (b), the role of mitochondria was well known although some candidates appear to think that energy is formed or produced

rather than released during respiration. Most of the candidates who chose this question were able to give sound accounts of the events occurring during mitosis and some illustrated these with annotated diagrams.

Question 4.

This was a popular question but not always well answered. The diagrams produced in (a) were very poor and often inaccurate. Some showed the ovary inside the oviduct and others drew the cervix as a wide, open space with nothing to distinguish it from the uterus or the vagina. Many drawings were totally out of proportion and carelessly drawn with shading used to obscure areas of uncertainty.

The thickness of the uterine wall was often totally out of proportion with the rest of the diagram. Knowledge of hormonal control of the menstrual cycle required for (b) was patchy. There were some good responses but also some showing considerable confusion, especially about the role of L.H. and events leading to menstruation. Most candidates were aware of the importance of breast-feeding to a young baby.

Question 5

This was a popular question but in many cases candidates failed to read the question with sufficient care and responses, while on the correct topic, often failed to answer the question. In part (a), many overlooked the need to describe the structure of the thorax. Some just listed the structures present with no reference to their role and others gave a great deal of detail about the lining of the trachea, which were irrelevant in this section. The processes bringing about inhalation were often overlooked or crammed into the last two lines of the response. In part (b), very few candidates realised that it is an increase in the carbon dioxide concentration of the blood, which triggers changes in the rate of breathing. Most candidates understood the importance of such a change. The effects of anaerobic respiration were well known.

SECTION B

Question 6.

This was the most popular question in section B. Diagrams were disappointing. It appears that many candidates do not equip themselves with a suitable pencil and rubber for diagram work and diagrams drawn with a ballpoint pen and the altered were common. Lack of care when drawing label lines meant that the cell wall, and cell membrane were often indistinguishable. A significant number of cells were drawn with nuclei (as well as, in some cases, a thread of nuclear material). Methods of nutrition amongst bacteria were well known. In part (b) knowledge of tuberculosis was good but there was some confusion between treatment and prevention. Candidates should know that a vaccine given after infection is useless. Some candidates also confused antibodies with antibiotics. Responses to part (c) were usually sound but few could suggest sensible reasons for the current rise in cases of tuberculosis in some areas.

Question 7.

There were some excellent diagrams showing the structure of the skin but others were very poor. Most labelled their diagrams well but in some cases forgot to annotate them or to describe in their text the functions of the structures they had labelled. In (a)(ii) a number of candidates did not appreciate the significance of the outer layers of the skin being continuous,

dead and waterproof. A significant number of candidates wrote of the role of white blood cells in this section, which was totally irrelevant.

The protection provided by the lining of the airways was well known and in (c) damage caused by cigarette smoke was usually well described. Some candidates believe that cilia trap pathogens.

Question 8.

In part (a)(i) most of the candidates described saprophytic nutrition of fungi and bacteria as the cause of decomposition but they were unable to expand on this. A suitable temperature and a supply of water were often identified as conditions necessary for decomposition to occur and these were often linked to enzyme activity. Fewer candidates mentioned the need for a suitable pH or the presence of oxygen for complete breakdown. In part (a)(iii) recycling was frequently mentioned but few really explained this concept. In part (b) most candidates noted the question and chose three different methods of food preservation but some failed to note that several months (i.e. long term storage) was referred to and simply wrapping, cooking food or pasteurisation were not suitable. Others failed to explain the biological principle on which the method was based.

Question 9.

In this question those candidates who read the whole question before beginning their response would have found that one section often led thoughts to the next and might have avoided unnecessary duplication of ideas.

It was surprising that a significant number of candidates did not realise that an account of photosynthesis was essential to gain maximum marks in (a)(i). Some also failed to extend their response to cover the importance of the oxygen released in photosynthesis to all living things for respiration. In (a)(ii) candidates were expected to comment on the two processes of photosynthesis and respiration and the fact that they were more or less balanced for a long period of time but many missed this point..

In (b)(i) most candidates gave sound reasons to explain why carbon dioxide levels had risen over the last 50 years. Candidates should realise that global warming is a consequence of this trend, not a cause. The effects of carbon monoxide on humans were well known.

HUMAN BIOLOGY 7042, GRADE BOUNDARIES

Grade	A	B	C	D	E
Lowest mark for award of grade	138	119	100	90	73

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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