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FOREWORD

This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned.**

HUMAN AND SOCIAL BIOLOGY

GCE Ordinary Level

Paper 5096/01
Multiple Choice

<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	D	21	D
2	B	22	C
3	A	23	B
4	C	24	B
5	B	25	A
6	A	26	A
7	C	27	D
8	B	28	B
9	C	29	C
10	D	30	A
11	D	31	B
12	C	32	C
13	B	33	D
14	A	34	D
15	D	35	A
16	A	36	A
17	D	37	B
18	D	38	A
19	A	39	C
20	A	40	C

General comments

A standard deviation of 6.38 (15.95%) was obtained, with a mean score of 23.66 (59.1%). These statistics are very similar to those obtained last November indicating consistent standards maintained.

Generally the questions performed well although question numbers **5**, **22**, **29** and **40** proved easy. These easy questions tested little more than factual knowledge of common syllabus objectives. However, these results are pleasing to note and illustrate thorough teaching of these basic syllabus objectives. The overall statistics for the paper were balanced by **Questions 17, 21, 33** and **37**, which proved difficult. These questions generally required more thought and application, rather than memory to work out the answers. Questions numbers **17, 21, 24, 33, 36** and **37** all had positive distracters. These distracters show that some of the weaker candidates have misconceptions, which hopefully can be noted and rectified in the future.

Comments on specific questions

Question 5

This question is typical of the other ones that were rather easy. Here 92% of the candidates correctly that the word equation for photosynthesis required chlorophyll for its completion.

Question 8

The low discrimination for this question is difficult to interpret. The good facility may indicate that the weaker candidates guessed the answer based on the common knowledge that eggs are good for you and relatively expensive. The better candidates in applying more thought may have had difficulty in relating two syllabus objectives. Firstly 3(i) that eggs contain iron, and secondly 3(f) that iron deficiency causes anaemia.

Question 17

This question proved difficult with evidence of guessing. Knowledge that mitochondria provide the energy to do the work in the cell had to be applied to knowledge that diffusion and osmosis do not required cellular energy. That the nerve impulse does need energy for its transmission was not understood.

Question 21

Over half the candidates are not clear on how the evaporation of sweat produces cooling. The misconception that sweat ducts dilate to allow heat to be carried in sweat to the skin surface shows considerable confusion and needs correcting.

Question 24

It appears from the positive distracter that many candidates could not distinguish the suspensory ligament from the ciliary muscle on the diagram. The exact position of these two structures needs clarifying when dealing with the parts of the eye.

Question 33

Two positive distracters here show a lack of knowledge of the life cycle of *Schistosoma*. This is likely to be because this is an addition to the syllabus and was neglected in study. Please note the lined parts of the syllabus showing these new additions for the year 2004.

Question 36

The concept that passive immunity is obtained from a serum and not by antibody production in the body, was not known and produced the positive distracter here.

Question 37

The same error made in **Question 36** is perpetuated here in a different context, to give another positive distracter. Passive immunity using immune serum was not used to control smallpox, whereas isolating infected people played an important part. This is partly a historical question and may be difficult because it is outside of the direct experience of the candidates.

Paper 5096/02

Paper 2

General comments

Very few candidates seemed short of time and less than 1% failed to obey the rubric by answering both parts in **Question 10**. The paper produced a very wide spread of marks with a pleasingly high percentage scoring 70% or more. Some candidates did not fill in their details on the cover of the answer booklet, writing them instead on the additional sheets used for **Section B**. A few laboriously wrote out **Section A** on additional paper instead of using the answer spaces provided. This is a great waste of time. Once again, the questions testing practical knowledge proved difficult for some, indicating this is an area worth more attention.

Comments on specific questions**Section A****Question 1**

- (a) This was a key. The answers expected were virus, bacterium, fungus, protozoan and insect to be selected from those five plus flatworm. Weaker candidates trusted to guesswork here and there was confusion between *virus and bacterium* and *flatworm and protozoan*. The commonest correct response was *insect*.
- (b) This showed two red blood cells, one in plasma the other in a more concentrated solution. The substance lost from the latter was water and the process concerned was osmosis, not *plasmolysis* which only happens in plant or bacterial cells. *Oxygen* was a common error for water, here.

If the former cell was transferred to distilled water, it would swell up and burst, since water would enter by osmosis. The organ that controls plasma concentration is the kidney or the brain. The *hypothalamus* is not acceptable here, since it is not an organ, as the question requested.

- (c) This showed six cell types, three of which were epithelial cells lining tubes in the body. Ciliated cells line the trachea, bronchus, bronchiole and oviduct. Columnar cells with microvilli line the *small intestine* and kidney tubules whilst squamous cells line the various blood vessels, oesophagus, mouth, rectum and vagina. Several answers here were too imprecise e.g. *intestine* or *lungs*. The advantages of having living cells in the bone is to enable growth and repair. Relatively few candidates scored even one mark here. The phagocyte and the sperm can both *move*, not *swim*. The nucleus of the sperm is unique in this group since it is haploid or has only 23 chromosomes. To prepare some liver cells for the light microscope one should place a small piece of liver on a slide, add a drop of stain, then a cover slip and squash gently. Alternatively, one could squash the sample and stain between two slides (if only low power lenses were to be used). This is specified as a practical application in the syllabus and yet most candidates were unfamiliar with the technique.

Question 2

This showed the cascade of reactions leading to clot formation.

- (a) The two constituents of a clot are fibrin and red cells-not *platelets*, a common error.
- (b) Two advantages of blood clotting are that blood loss is prevented or reduced and that the entry of pathogens is prevented. Nearly all candidates knew these points.
- (c) Calcium is the ion needed to activate prothrombin, not *phosphate* as many candidates wrote.
- (d) Fibrinogen differs from thrombin in being soluble. There was a lot of confusion between the two substances.
- (e) This question concerned DVT or deep vein thrombosis. Clots that form in the leg veins may prove fatal but only after the passenger has walked some distance. This is because the exercise causes the clots to move from the legs, in the veins, towards the heart. They may then block a vessel in the heart muscle (a coronary vessel) or a pulmonary vessel in the lungs. They do not *block the heart*. This was generally poorly understood with many talking of the clots either *dissolving with exercise* or *bursting the veins*.

Question 3

- (a) This was concerned with fly and mosquito larvae. Each has tracheae opening by spiracles at the rear of the body. The advantage to the maggot is that it can be buried in semi-liquid food and yet still breathe. The mosquito larva lives in water, but needs only to pierce the surface with its tail to reach air. Some candidates thought it enabled the wriggler to breathe and *suck blood* at the same time!
- (b) Two advantages of the maggot moving away from light include: avoiding overheating or drying out; avoiding predators and staying in the food source. This proved difficult for all but the better candidates.
- (c) The adult housefly collects pathogens by landing on faeces or carrion to feed or to lay eggs; the adult mosquito by sucking blood from an *infected* host. Most candidates scored well here, although some failed to state the mosquito's host must be infected.

Question 4

This showed the genitalia of a man who has had a vasectomy. The two products of the testis are _____ and testosterone, not *semen* or just *hormone*.

- (b) The advantages of vasectomy are that it is very effective as a means of birth control, since it prevents sperms from entering the penis; it should not affect the sex drive of the individual, and in the long run is cheap. The disadvantages are that it is not easily reversible; it does not stop venereal infection; the operation has some risk of infection and is painful and, in the short term, is relatively costly. Many candidates scored one or two points here.

Question 5

This dealt with the different types of immunity. The answers were artificial active; artificial passive; natural passive and natural active. There was, predictably, a lot of confusion here. This part of the syllabus remains a minefield for many.

Question 6

- (a) This concerned the heart pacemaker. Its function is to stimulate the heart muscle to contract, first the atria and then the ventricles. It provides a regular or rhythmic stimulus but can respond to signals from the brain to speed up or slow the heart. It is automatic, so we do not have to think about it. Two marks were on offer here, so more than one point was needed.

Few scored both marks and some answered by referring to artificial pacemakers.

- (b) Chemical changes in the blood that speed heart and breathing rates include: *lowered* oxygen, *raised* carbon dioxide; *raised* acidity and adrenaline. Three changes were required. Simply stating *oxygen* or *acid* without qualification did not earn a mark. References to *temperature* were not valid, since the question asked for chemical changes.

Question 7

This was a genetic problem concerning the inheritance of cystic fibrosis in a family tree.

- (a) The genotypes were Tt, Tt, tt and Tt.
- (b) There is a 50% chance that the next child has fibrosis and, therefore, a 25% chance the child is a female with fibrosis.

Many candidates could solve the puzzle of the genotypes and selected 50% as their answer for the next child. However, fewer could then calculate the chance of that child also being a female.

Section B**Question 8**

- (a) This began with a diagram of the elbow joint. Four structures were labelled A, B, C and D. These were: a tendon; the triceps muscle; a ligament and a cartilage. Common confusions were biceps for tendon, tendon for ligament and synovial fluid for cartilage. Candidates were asked to describe the role of each of these structures in the movement of the forearm. Thus the tendon is non-elastic; joins the biceps to the radius bone and transmits the pull of the muscle to that bone, raising the forearm. The triceps muscle contracts to straighten the arm. The ligament is an elastic cord which connects one bone to another and prevents dislocation of the joint during movement. Cartilage coats the bone-ends to cushion them and is slippery to reduce friction. Where candidates had misnamed these structures their functions were still credited if correct. Even so, scores were often poor here with much confusion of part and function.

- (b) This asked for the action of circular muscles in (i) peristalsis and (ii) reducing the amount of light entering the eye.

In peristalsis circular muscles contract, *behind* the bolus, to force the bolus onwards. In addition, the action helps to mix the gut contents. Many answers lacked detail here with candidates talking vaguely about muscles *contracting and relaxing* without relating the action to the effect on the bolus.

Circular muscles of the iris contract to reduce the size of the pupil, so that less light enters. Few candidates mentioned the iris, confusing this with ciliary muscles and the action of accommodation. These two sets of circular muscles remain a problem for many.

Question 9

- (a) This asked for the definitions of excretion and egestion. The former is the removal of the waste products of *metabolism* from the *blood*. Egestion (defaecation) is the removal of undigested food-remains from the anus. Many candidates scored the full four marks here, although the point about the blood was seldom mentioned.
- (b) This asked how the kidney removes urea from the blood, while retaining useful substances. Some seven marks were expected here from the following points. Blood is filtered at the glomerulus or the Bowman's capsule, a process that is pressure driven. All small molecules pass through, including useful ones as well as urea and other wastes. Large molecules such as proteins do not leave the blood at this point. A second process, selective reabsorption, now removes useful substances from the filtrate at various points in the nephron. This is an active process using energy. In addition, most of the water is reabsorbed, by osmosis, leaving the bulk of the urea together with a little water and some salts to pass out into the ureter as urine. Weaker candidates had only a sketchy idea of the process and many moderate candidates' answers lacked detail, especially in locating the tubule-regions, where particular actions occurred. Good candidates had no problems in collecting their seven marks.
- (c) More ADH is secreted by the pituitary gland when the brain detects a rise in blood concentration. The hormone travels in the blood to the kidney where it makes the distal convoluted tubule and the collecting duct of each nephron more permeable to water. Thus more water is reabsorbed by the kidney into the blood, so the urine is more concentrated and of lower volume. This mechanism was not well understood by the majority many of whom took the wrong option and had ADH promoting urine production.

Question 10

Either

This proved less popular than the alternative question.

- (a) This asked candidates to use the glassware in the picture to collect a sample of expired air. The steps expected were to fill the trough and the gas jar with *water*; submerge the shelf in the trough; *invert* the gas jar with its lid onto the shelf and remove the lid. Insert the tube into the base of the shelf and exhale until the jar is full of air which will displace the water. Slide lid onto the full jar to trap the sample of air.

Five marks were given for some eight steps but were seldom all achieved. Practical techniques remain a difficult area for many.

- (b) The expired air will have more carbon dioxide and moisture, but less oxygen. Nitrogen will be in the same amount in the two samples of air.
- (c) This was concerned with the steps to be taken in mouth to mouth resuscitation. These included: place the patient face-up; tilt the head back-to open the airway; open the mouth to check the airway is clear and pull the tongue forward; pinch the nose; form a seal with your mouth and blow air in; watch to see if the patient's chest rises; remove mouth to let the air escape and repeat until the patient recovers or help arrives. This was well understood by the great majority of candidates.

Or

- (a) This also asked for some apparatus to be used in a practical situation, here to demonstrate the presence of bacteria on teeth. The suggested sequence was; use the sterile swab to collect a sample of bacteria from your teeth; smear this onto the agar in the petri dish and replace the lid. Secure the lid with an X of tape; place in the incubator at 20 – 30 degrees Celsius for some 24 hours. Remove and look for colonies. Few candidates got the point about colonies developing and some incubated the swab rather than the petri dish, or used the tape to get the sample. However, many scored well here.
- (b) The link between bacteria, food remains and tooth decay was tested. The answers wanted were that food remains may stick to the teeth where they are attacked or fed on by bacteria. Acids result from this process which then corrode the enamel of the teeth. Bacteria can now penetrate into the tooth, forming cavities or worse. Many scored well here, although some candidates did not make the links between bacteria, food and acid.
- (c) This asked for a description of what happens to a piece of bread when in the mouth. Some six points were to be selected from the following: the bread is moistened with saliva and softened; amylase, an enzyme, hydrolyses the starch of the bread to maltose, a sugar. The molars chew the food, increasing its surface area. The bread is tasted by the tongue and then rolled by the tongue into a bolus and swallowed. Tasting was hardly ever mentioned nor was hydrolysis but many candidates scored well here. Some confusion exists over maltose, starch and glucose. Many candidates gave good detail here and did not appear pressed for time.