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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

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

General comments

A standard deviation of 6.16 (15.4%) was obtained for this Paper. The mean score was 21.82 (54.5%). These statistics indicate that the overall standards are roughly the same as last year. **Questions 1**, **34** and **40** proved to be a little too easy, but only **Question 24** had a really poor discrimination. Seven questions (**3**, **6**, **22**, **24**, **25**, **36** and **39**) all had positive distractors. This is more than usual and indicates that many candidates had resorted to guessing. Some questions such as **3**, **22** and **24** indicate that although the results of the biological processes (osmosis, temperature control and stereoscopic vision) are well known, candidates lack an understanding of how they work.

Comments on specific questions

Question 1

Although this was intended as an easy starter question, it proved a little too easy, but nevertheless it showed a good knowledge of the characteristics of organisms.

Question 3

The very high facility of the positive distractor **D**, shows it tempted those candidates knowing concentration difference is involved in osmosis. However, they did not understand how osmosis works. distracted them from the easier explanation, that if water entered the tubing, the level in the beaker wo fall. Emphasis is needed in osmosis, to stress that the molecules diffuse from a high concentration in wate to a lower concentration in a solution.

Question 6

Both **B** and **C** were positive distractors, showing guessing and a lack of basic understanding of the nitrogen cycle. Emphasis on the syllabus objective that nitrogen fixing bacteria produce nitrate ions from atmospheric nitrogen is needed.

Question 22

Greater understanding was needed to see that the graph showed a lower air temperature, consequently vasoconstriction would be needed to maintain a higher body temperature. Evaporation of sweat would have lowered the body temperature. Possibly this proved a positive distrator because it was the most common mechanism for temperature control listed in the options.

Question 24

In dealing with stereoscopic vision, it is recommended that candidates perform the experiment where a finger is pointed at an object and first one, then the other eye is closed. This clearly shows the answer to the question, that each eye sees a different view of the object and it also helps to explain the mechanism of stereoscopic vision.

Question 34

Although this question proved a little too easy, it was pleasing to note candidates could apply the necessary deduction to the common experiment that did not prove so easy in the previous question. They deduced correctly that it was bacteria that caused the bad broth.

Question 36

The same preface ‘anti’ seen together in antibiotics, antibodies and antigens may have caused the name confusion here, resulting in two positive distractors.

Question 40

The candidates interpreted the graph very well and surprisingly the question proved easy.

Paper 5096/02

Paper 2

General comments

It was apparent that many candidates found difficulty in interpreting graphs or tables and in answering the more practical sections of the Paper. In particular, the concept of a control experiment was understood by very few. Where possible, theoretical studies should be reinforced with simple practical procedures, as indicated in the syllabus. With graphs, the axes must be studied to see what exactly is being shown by the curve and with what scale. As ever, attention to the precise wording of the question is vital, if knowledge is not to be wasted in vague or inappropriate answers. However, it was pleasing to see some candidates scoring very well on both sections of the Paper. Very few candidates seemed short of time and relatively few misinterpreted the instructions for **Question 10** by answering both parts.

Comments on specific questions

Section A

Question 1

This was concerned with aspects of breathing, gaseous exchange and the underlying process of diffusion.

(a) Candidates had to show the direction of diffusion by means of an arrow on the diagram. This should run from left to right, that is from the higher to the lower concentration. Eventually the two concentrations should be equal.

(b) Breathing helps to maintain diffusion by bringing in fresh supplies of oxygen into the alveoli, while the blood flow carries away oxygen that has crossed the membrane. Thus the gradient between the two concentrations is maintained and diffusion will continue.

(c) This question was intended to marry an understanding of the features of diffusion to the nature of the alveolar wall. Thus thin walls ensure only a *short distance* for the gases to diffuse, *between the alveolus and the blood*. The large surface area will increase the *efficiency* of diffusion, since lots of molecules can cross at the same time. Since the question was on diffusion here, not just the diffusion of oxygen, references to the movement of carbon dioxide were perfectly valid. Many candidates had grasped these ideas but failed to express them clearly in terms of gaseous exchange.

(d) This question showed a trace from a spirometer of the breathing pattern of a person first at rest and then during exercise. The axes were lung volumes and time, the former showing the changes with breathing in and out. In **(d)(i)** the two changes seen in the trace were: the rate of breathing increases (time), the depth of breathing increases (volume). Most candidates could extract this information and scored well. In **(ii)** the muscles fully contracted at **X** (breathing in) are *the external intercostals* and the diaphragm, while at **Y** (breathing out) it is the *internal intercostals*. Many candidates confused the two sets of intercostals or made no mention of the diaphragm, in spite of the clear clues on the volume axis.

Vital capacity is best defined as the *largest* volume of air breathed out, after the deepest breath in – that is the maximum volume that can be exchanged. Many answers lacked precision here.

The procedure to measure vital capacity using the apparatus shown is: take a maximum breath in; pinch the nose to seal it; blow out all the air possible; into the tube. The water is forced out of the jar; read the new level of water in the jar; and subtract it from the starting level. It was apparent that many candidates were not familiar with this procedure.

Smoking will reduce vital capacity, while exercise will increase it. Many candidates failed to score here by not tailoring their answers to vital capacity.

Question 2

This question was based on a diagrammatic representation of the control of blood sugar.

(a) The organ which detects changes in blood sugar levels is the pancreas.

(b) This question asked for the effects on the amount of sugar of glucagon and insulin. The former increases it, while the latter decreases it. Once again many answers failed to address the question of *amount* here, instead going into mechanisms.

(c) Sugar passes into the kidney by *filtration or ultrafiltration* but re-enters the blood by *reabsorption* or *active uptake*.

(d) Insulin cannot be taken as a pill, since it is a protein; and so would be digested before it could enter the blood. Few candidates saw this point, instead talking of the need to act quickly and so being introduced directly into the blood.

Question 3

This question on birth control was well answered with many candidates scoring full marks. From the failure rates, the contraceptive pill is the most effective and the rhythm method the least effective meth birth control. (By definition, *no contraception* is not a method of birth control and so is not acceptable as alternative to rhythm method.)

The IUD prevents implantation; the pill, ovulation. Semen is prevented from reaching the vagina by the condom, while the cap stops semen already in the vagina from entering the cervix.

Question 4

This began with a graph showing how bone density changes with age in men and women. A mineral found in bone could be calcium; magnesium, phosphorus or a carbonate or phosphate of calcium or magnesium. Iron was a common wrong answer here.

In **(b)** while both curves showed a decline in bone density with age, that of women showed a distinct drop at ages 50 to 53.

In accounting for this in women, candidates might suggest that they are experiencing the menopause; their periods have stopped; hormone supplies are reduced, especially oestrogen or progesterone. *Osteoporosis* is the name of the condition, not an explanation of *why* it occurs. This question was often poorly answered with candidates failing to read correctly from the graph in **(b)** and not relating their knowledge to an unfamiliar situation.

Question 5

This question was concerned with the pathogens or modes of transmission of five diseases. The answers were in order: virus; fungus; airborne/droplet/contaminated milk; bacterium; protozoan/protistan. While generally well-answered, common errors were to confuse bacterium with fungus for ringworm and to state *mosquito* for malaria.

Question 6

(a) The question asked candidates to identify three structures on a diagram of the stomach and associated organs. They were: liver, gall bladder and duodenum/small intestine. This was achieved by the majority of candidates.

(b) The fluid stored in **S** – the gall bladder – is bile.

(c) Fluids entering the duodenum were chyme (strongly acidic); bile (containing the breakdown products of haemoglobin) and lipase or pancreatic juice (hydrolyses fats). Hydrochloric acid or gastric juice were common errors for chyme as were bile salts for bile.

Question 7

This question began with a family tree of eight individuals showing the inheritance of albinism.

(a) Candidates were asked for the genotypes of **J** and **K**, two normal individuals with an albino daughter. Each must be Aa.

(b) **O**'s phenotype must be normal, since although **N**, his wife, is an albino one of their children is normal; so must have received a dominant allele from **O**.

This part of the question was often merely guessed at and explanations were often incorrect.

(c) Given N is aa and O is Aa the chances of their next child being a *normal boy* is 1 in 4/ 25% or ¼, since the chance of the child being normal is ½ and the chance of that child being a boy is also ½. Few spotted the pitfall in this question. Genetics remains a difficult area for many candidates.

Section B

Candidates were expected to answer **8**, **9** and one of the two **Question 10** options. **Question 8** p
be better answered than **Question 9**.

Question 8

(a) The early signs and symptoms of gonorrhoea in a man are: pain or burning on urination; pus or a yellow discharge from the penis and swelling of the penis. Most candidates managed the first two marks here, but there was some confusion with syphilis or a failure to locate the site of the discharge. It can be treated with an antibiotic such as penicillin.

(b) If not treated at this stage the effects on the male and female include: the infection spreads; to epididymis/vas deferens/testis in male; leading to infertility in the male. Similar spread in the female may block the oviduct; causing infertility in the female; a baby may be born blind and in either sex swollen joints or arthritis may result. A total of 4 marks was given for this section. Candidates usually identified infertility but failed to say why it occurred in each sex. Blindness in the adult was also quoted, as was insanity – a clear confusion with syphilis.

(c) A virus differs from a bacterium in *structure* in that a virus is smaller; has no cell wall, cytoplasm, ribosomes or membrane and is non-cellular. A virus has either DNA *or* RNA in a protein coat, whereas a bacterium has *both* nucleic acids in a cellular structure. Several candidates failed to read the question here and quoted non-structural differences. It is clear that this is another poorly understood section of the syllabus.

(d) Three means of spreading AIDS other than by sexual intercourse include: infected needles or instruments; blood transfusions; from mother to foetus across the placenta or from mother to infant in breast milk. Most candidates scored well here and it is pleasing to see how well this area is understood.

(e) The defensive cell destroyed by the virus is the lymphocyte or the T-helper lymphocyte. *White blood cell* is too vague and *phagocyte* is incorrect.

Question 9

This question was concerned with drugs and carbon monoxide. In general this question was poorly answered, not because the candidates did not know their effects, but because they talked in general terms about the pairs of substances without clearly distinguishing which substance produced which effect and consequently failed to score well.

(a) Drug dependence was almost always defined correctly as due to changes in the body or brain; so that the body feels it must have more of the substance.

(b) Of the two drugs nicotine and alcohol, nicotine enters the body at the *lungs*, while alcohol enters at the *gut*. This was one area where candidates did not specify which substance they were discussing.

(c) Alcohol is a depressant because it slows down the activity of the nervous system (especially at the synapses).

(d) A person should not drive a car after drinking alcohol since his reactions are slowed; especially those concerned with decision-making. His coordination is affected as is his vision, which may be blurred. He will feel sleepy and become over-confident or aggressive, losing his natural inhibitions. 4 marks were allowed for this section but were seldom gained.

(e) This asked candidates to explain how nicotine and carbon dioxide may lead women who smoke to have smaller babies than those of non smokers. The two substances have differing effects on different areas or substances so they must be handled separately – two separate paragraphs suitably headed would be a sensible approach.

Nicotine mimics a transmitter; at the muscles of the arterioles; so causes vasoconstriction of arterioles; of mother or foetus. Therefore less blood passes through the placenta; thus the foetus obtains less nutrients and less oxygen.

Carbon monoxide combines with hemoglobin damaging red blood corpuscles. Such [illegible] destroyed; so the red cell count is reduced. Less oxygen is carried in the maternal bl[illegible] less is passed to the foetal blood. The foetus can carry out less respiration/has less e[illegible] growth. These are ideas that are commonly tested at this level but few candidates score[illegible] here, since they talked only in general terms about oxygen or food without linking their answer[illegible] a particular substance or mechanism.

Question 10

Both of the **Questions** in **10** deliberately contained references to practical procedures in order to test the candidates' familiarity with this recommended part of the syllabus. In most cases they were found wanting. Nevertheless there was enough in each question for them to score reasonably well, if they could extract information from tables or diagrams.

The **either** question began with a model gut.

(a) The water in the beaker represents the gut blood supply; the visking tubing is the gut wall and the starch/amylase mixture the gut contents.

(b) The solution is tested for sugar by taking a sample, adding an equal volume of Benedicts solution, *boiling*, and looking for a green/brown/red coloration (actually a precipitate). Few remembered to boil the mixture.

(c) The test-results obtained with iodine solution and Benedicts solution on the contents of the tubing and the water are explained as follows:

(i) There is no starch in the water at the start, *since starch molecules are too big to pass through the visking tubing.* There is no starch in the contents of the tubing after five minutes, *since it has all been hydrolysed to sugar/maltose by the amylase.*

(ii) Sugar is found after five minutes in the contents of the tubing, *since the starch has been converted to sugar by the amylase.* Sugar is found in the water now, *since its smaller molecules can diffuse through the membrane of the tubing.* Many candidates showed a fair grasp of this experiment and its outcomes but a few confused diffusion with osmosis in the last answer.

(d) A control to show that the result obtained in the above experiment is due to the amylase and not some other cause is to repeat the experiment using identical apparatus; the same amount of starch solution; but adding boiled enzyme (or distilled water instead of enzyme); keep it at the same temperature as before; test after 5 minutes. This time, of course, the starch should not be turned to sugar and since the only difference in the two procedures is the presence or absence of amylase, we can say with confidence that it is the amylase that is responsible for the digestion of the starch. This was poorly done with very few candidates having a grasp of the principles of a control.

The **alternative Question 10** began with a simple apparatus to measure the energy content of a food sample and a table of results of such an investigation.

(a)(i) The temperature differences were 12 and 35 degrees.

(ii) Using these in the formula given produced two figures for the food samples, 1260 and 3675. Candidates were expected to show their working and to quote the correct energy units as joules.

(b) The reasons why a class experiment would yield varying figures for the same food type include:

- The mass of the sample varies,
- The food sample is burned at varying distances from the tube,
- Heat escapes and does not all heat the water,
- Some pupils are slower than others at placing the ignited sample under the tube,
- Not all the food sample is burned,
- Glass is a poor conductor of heat (to the water),
- The water was not stirred before reading the temperature.

Three reasons were expected, but few candidates could suggest more than one, once again indicating unfamiliarity with practical approaches to the subject.

(c) Of the three samples **X**, **Y** and **Z**, **Y** has the most energy.

(d) From the table of energy requirements for different people candidates were asked to d... contributory factors. Suitable answers included: *body size; gender; age; occupation; activity; whether pregnant or lactating.*

While many candidates scored well here, others were not able to interpret the information in the table and merely repeated the categories listed there.