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## FOREWORD

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

### General comments

This year a standard deviation of 5.959 was obtained. The mean score was 24.59 (61.5%) which is much higher than last year. The better statistics may somewhat reflect the increased number of candidates entered. However, it is pleasing to note that on no fewer than fourteen questions, the proportion of candidates obtaining correct answers was over 0.70, indicating a marked improvement in standard. Of these fourteen questions, ten tested factual recall (knowledge) only, as illustrated by **Questions 6, 7, 8, 15, 19, 23, 29, 32, 35** and **37**. While candidates did best on such questions testing knowledge, there was also an improvement in those testing deductive and experimental skills, as illustrated by **Questions 11, 12, 25** and **39**. Only the deductive type **Questions 4** and **36** caused real difficulty in this category this year. **Questions 8, 11, 25** and **29** are considered easy because the facility was over 0.80 in each case. In a 'social' biology paper, this is most likely because all these questions test syllabus objectives which are very significant, relevant and hence important to the everyday life of the candidates.

### Comments on specific questions

#### Question 3

This proved the most difficult of all the questions on the Paper, although the facility was within the acceptable tolerance at 0.26. Candidates had to deduce that the release of energy by mitochondria, is a more important indicator of activity, than any one specific function of the liver.

#### Question 4

Candidates had to distinguish between 'osmosis' involving the passage of water and 'diffusion' the passage of iodine, in order to interpret this experiment. It is surprising that so many candidates thought iodine could be moved by osmosis and chose option **A**. Perhaps more demonstrations on the experiments illustrating these terms would be helpful.

#### Question 8

This question proved easy, but the importance of antibodies in breast milk is so socially significant, that it is pleasing to note that it was so well known.

#### Questions 11 and 12

Both questions involved quite complex deductions from the diagrams yet they proved easy. It is heartening to see that deductive skills tested by such questions are now more confidently answered.

#### Question 22

No doubt the unfamiliar diagram accounts for the low discrimination here. Many candidates could not work out that if the muscle relaxes, the arteriole will enlarge and more blood will flow through the capillary. It was thought helpful that the drawing showed the contracted muscle bulging into the capillary, so that relaxation must enlarge the lumen.

#### Question 29

Again this question proved easy, no doubt due to the current interest and considerable publicity on the important topic of HIV spread. For this reason we consider the question is justified in spite of it being a poor discriminator.

#### Question 36

The difficulty experienced here indicates that candidates do not understand that immunity to tetanus is provided by an injection of immune serum, which immediately raises the concentration in the blood. The distinction between passive and active immunity has proved difficult in Past Papers as well, so that it may be useful to spend more time studying this topic.

Paper 5096/02

Paper 2

### General comments

The Paper produced a wide range of marks with a better than usual success-rate on **Section A**. Very few candidates appeared to be short of time and relatively few failed to obey the rubric in **Section B**. However, failure to read the questions carefully in **Section B**, meant that many candidates wrote at length without tailoring their answers to the question and so failed to score as well as they might.

## Comments on specific questions

### Section A

#### Question 1

This question began with a graph of fetal growth. Joining the points produced a line with a marked upward swing in weeks 36-40, whilst growth was slowest from 12 to 20 weeks of age. Providing the points had been linked by a line ruled with a sharp pencil, the fetal mass at 38 weeks fell between 2.8 and 3.0 kgs. Adding the second line caused some difficulties. It was supposed to represent the growth of a fetus whose mother began smoking heavily in week 20. It should, therefore, run from weeks 20-40 and show a slower growth rate. Finally, it should have been labelled S as instructed. Nevertheless, many candidates scored well in these first 12 marks. The fluid that surrounds the fetus is amniotic fluid. The rod-like structures in dividing cells are chromosomes and there will be 46 of these in a normal fetal cell. The 23<sup>rd</sup> pair differs between the sexes, being XY in a male and XX in a female. Again, many candidates scored well here. The last section dealt with *parts of the uterus*. The part which dilates during the first stage of birth is the cervix; the uterine *muscle* contracts strongly in stage two while the *placenta* or afterbirth is expelled at stage three.

#### Question 2

The three atmospheric gases were Carbon Dioxide (absorbed in photosynthesis), Oxygen (absorbed in respiration) and Nitrogen which is converted to nitrates in nitrogen fixation. The organism which carries out nitrogen fixation is a bacterium or a nitrogen-fixing bacterium, not a nitrifying bacterium, as many candidates said.

#### Question 3

This question asked candidates to fill in the blanks in a description of breathing. The correct answers were: the muscles *contract*, the volume of the thorax *increases*, the pressure inside *falls*. Since the pressure inside is now *lower*, air enters. Forced exhalation requires contraction of the *internal* intercostal muscles. Many candidates scored full marks here.

#### Question 4

Early signs or symptoms of gonorrhoea in a man include inflamed penis, pain on urination and pus in the urine. Sterility or joint pains are late symptoms. The causative organism is a bacterium, and the contraceptive method helping to limit the spread of the disease is the condom.

#### Question 5

This question showed a graph of changes in blood pressure in the left side of the heart and aorta during one heartbeat. Candidates were asked to read pressures from the graph. In **(a)** the answers were 136 and 16 mm respectively. Answers between 134 and 138 and 15 to 19 were acceptable. In **(b)** the bicuspid valve closes at A and the aortic valve at D. The left ventricle generates more pressure because it has more muscle, not because it is bigger.

#### Question 6

Calcium ions are used to promote clotting, muscle contraction or as an enzyme activator. Vitamin D is needed for calcium uptake from the gut. A breast feeding mother needs high calcium in her blood to pass into her milk. Although many candidates referred to the baby's needs for calcium, they did not link this to mother's milk and therefore not to calcium levels in her blood.

#### Question 7

This question showed two graphs comparing the number of bronchitis sufferers in towns **A** and **B**. Town **A** had a high level of air pollution, town **B** a low level. The evidence that smoking increases the incidence of bronchitis is that bronchitis incidence is greater in smokers, in both towns, i.e. in both levels of pollution. Both points were needed for the two marks. Similarly, the evidence that air pollution also plays a part is that the incidence of bronchitis is higher in non-smokers, in town **A** rather than in town **B**. Progressive damage to the body's defences by smoking is shown by the fact that the incidence of bronchitis increases in smokers with age. Many weaker candidates failed to refer to the graphs at all.

### Question 8

This question showed a blood smear. Most candidates were able to label the phagocyte correctly. **(b)** there was the usual confusion between the types of immunity but a pleasing number managed to get full marks.

### Section B

#### Question 9

This question was really testing the stages in digestion of carbohydrates and depended on realising that glucose needs no digestion so would be absorbed into the blood almost instantly. Starch, however, takes time to digest. The process begins in the mouth, where salivary amylase converts some of it to maltose. No digestion occurs in the stomach but pancreatic amylase completes starch digestion in the duodenum/small intestine. The process is a hydrolysis – very few candidates mentioned this. The resulting maltose is then converted to glucose by maltase and the glucose is absorbed in the ileum. The glucose from either the tablets or the starch is used in respiration to generate energy for the race. Many candidates scored well here but weaker ones failed to give details of starch digestion, even though the section was clearly labelled ‘10 marks.’ In **(b)**, rising blood glucose levels are detected by the pancreas which secretes more insulin. This stimulates the absorption of glucose into the liver, where it is converted to glycogen and stored. Since the question asked how rising glucose levels were controlled, no credit was given for descriptions of the roles of glucagon or adrenaline.

#### Question 10

This began by asking for a description of the stages in making sewage harmless including the parts played by micro-organisms. Again, this was worth 10 marks. Many candidates wrote a great deal here but on irrelevant topics such as how to site a pit latrine or how to make water fit for drinking. Even those who described the stages in a sewage farm failed to include many details on the micro-organisms and so did not score highly. The marking points included the following: the sewage is sedimented to separate it into liquor and sludge; the latter is digested by anaerobic bacteria in closed tanks or digestors releasing methane which can be used to power the plant. The sludge remains are then dried. The liquor is passed through a trickling filter or is aerated so that aerobic bacteria can digest the organic matter into salts and carbon dioxide. As the bacteria numbers increase, they are eaten by protozoa. Algae, also present, release oxygen from photosynthesis which helps destroy anaerobic bacteria. Since the question referred to micro-organisms, references to insects and worms were not valid. It was clear that this is an area of difficulty for many candidates. Part **(b)**, on the dangers of allowing untreated sewage to flow into rivers, was answered reasonably well by the majority of candidates. Answers included: such sewage lowers oxygen levels (as it is decomposed by bacteria); low oxygen levels kill fish. The sewage may contain bacteria which are pathogenic, for example typhoid or cholera, or other pathogens may be present, for example hookworm or amoebic dysentery. This water could be extracted for drinking or cooking or people might bathe in it and so contact or ingest the pathogens. References to malaria were not valid.

#### Question 11

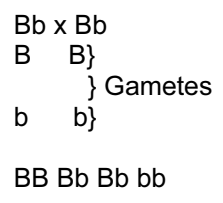
This was an either/or question. In the first option, various aspects of the eye were tested. In **(a)**, we look directly at a word so that its image falls on the centre of the retina or fovea. This is because focussing is most accurate here and because this is where the majority of the cones are situated. Each cone is directly connected to the visual cortex and so reports most accurately what we are viewing. The word must be well-lit because cones are less sensitive than rods and need more light in order to work.

In **(b)**, objects are more clearly seen out of the corner of the eye in dim light, since then the images fall on the side of the retina where we have only rods. Rods are more sensitive than cones and so work better in dim light.

In spite of the question stating *from your knowledge of the retina*, few candidates could give more than an outline of rod or cone function or distribution.

In **(c)** the changes that occur when we move from a dimly lit room into bright sunlight involve changes in the pupil. The circular muscle of the iris contracts so that the pupil is made smaller. Hence less light enters the eye, so avoiding dazzle. This is a reflex action. There was a lot of confusion between circular and ciliary muscles and some candidates even described accommodation.

In **(d)**, two brown eyed-parents may have a blue-eyed child if each is heterozygous. Candidates to use a diagram to explain this:



(bb is blue-eyed).

The probability that any child of such parents is blue-eyed is, as shown in the diagram above, one in four or 1 to 3, *not* 3 to 1.

The second option of **Question 11** dealt with aspects of kidney and liver function. In **(a)**, the blood of patients with liver disease shows high levels of amino acids and little or no urea, since no de-amination is occurring in the diseased liver so amino acids accumulate and little or no urea is formed.

In **(b)**, candidates were asked to describe what happens to proteins, amino acids and urea as they pass through the kidneys. This should have been a straightforward description of kidney function including the following points: proteins consist of large molecules so cannot be filtered but remain in the blood. Urea and amino acids *are* filtered, under pressure at the glomerulus, and enter the tubule. Amino acids are reabsorbed into the blood but the urea passes through into the urine. Many candidates failed to distinguish between these three substances, either having them all pass through the kidney or all being reabsorbed.

In **(c)**, the urine of a person who has been sweating a lot differs from that produced on a cold day by being higher in concentration and lower in volume. Most candidates got one of these points but then did not explain how the differences came about, as requested by the question. Answers should have included that the blood of a sweating person is more concentrated and that this is detected at the hypothalamus. The result is more ADH is secreted from the pituitary and carried by the blood to the kidney. Here, it affects the collecting duct, which becomes more permeable, so that more water is withdrawn from the urine into the blood.

In **(d)**, patients with high blood pressure are given diuretics, since an increase in urination will cause more water to be lost from the blood. Such a loss of fluid will reduce blood volume and, therefore, blood pressure.