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

General comments

For this examination a standard deviation of 5.88 (14.7%) was obtained. The mean score of 23.18 (54.5%) is better than in previous years indicating a slight improvement in standards. The more clearly laid out objectives in the syllabus for this year, may have helped candidates and resulted in more questions proving easy. **Questions 7, 8, 9, 32 and 36**, all had strong positive distractors each showing a commonly held misconception, which will need eradicating.

Comments on specific questions

Questions 1 and 3

Although an easy start to the paper is desirable, perhaps these questions proved too easy. They showed good knowledge of the characteristics of organisms and virus reproduction.

Question 7

The syllabus section 3(a) requires the knowledge that proteins are components of insulin. Hence it is surprising that most candidates thought that starch is used to make amylase. Perhaps the association with the digestion of starch to maltose by amylase and neglecting in the responses the word 'make', caused this positive distractor. This shows how errors can occur, without careful reading and consideration of the wording of questions.

Question 8

The positive distractor here shows many candidates have the misconception that vitamin C helps in the development of bones and teeth, rather than understanding the importance of vitamin D.

Question 9

Another very common misconception here is that bile is made in the gall bladder. The confusion results from the knowledge that bile is stored in the gall bladder before secretion. Emphasis on the manufacture of bile in the liver is needed.

Question 15

Perhaps this question was too easy because knowledge of breathing is so common in everyday life that most candidates understand it.

Question 16

As in previous years Examiners note that candidates have difficulty in interpreting graphs particularly to deduce trends. Hence the majority of the candidates could not deduce from these graphs, that the vital capacity of a group of men increases with height. Possibly candidates do not perform the associated experimental work and were unaware of these results.

Question 18

The poor discrimination is difficult to explain. This question is a direct test of the syllabus objective 7(b), that calcium phosphate makes bones hard and rigid while collagen makes bone tough. It appears that the more able candidates wrongly chose collagen to make bones hard and rigid.

Question 25

Because the cap contraceptive on the diagram, is shaped like a cap, the answer was possibly partly self evident to candidates with little knowledge of contraception. A good knowledge of the action of the cap is shown to separate options A and B.

Question 32

Answers to **Question 33** show that most candidates know that antibiotics destroy bacteria, although this knowledge may not have been applied in this question. Most candidates here thought antibiotics destroy the malarial parasite. Hence it seems likely that the knowledge that the pathogen is a protozoan was lacking.

Question 36

Question 3 on this paper very clearly shows that most candidates understand that viruses reproduce in cells. This gives the clue to the correct answer for this question on the control of the smallpox virus in humans. Yet more than half the candidates wrongly thought that the use of antibiotics was the reason for the success of smallpox control. The need for knowledge about the various pathogens responsible for diseases is shown by both **Questions 32** and **36**. It also seems that the history of smallpox control is a neglected topic.

Paper 5096/02

Paper 2

General comments

The paper produced a wide range of scores with some candidates scoring very well indeed. Weaker candidates struggled to interpret experimental results or graphical information and were noticeably ill at ease, when asked to describe practical procedures. Almost all obeyed the rubric in **Section B** to answer only one of the **Question 10** options and very few appeared to be short of time. However, a small, but significant number failed to answer **Section A** in the spaces provided on the paper, writing them out on the extra paper provided instead. The quality of the English used was generally commendable.

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

- (a) This illustrated a common experimental procedure for demonstrating some of the requirements for photosynthesis.

The process forming starch is photosynthesis. Leaf B made no starch, since it was enclosed in a black bag, hence it received no light which is essential for photosynthesis. Leaf C was similarly unproductive, since the soda lime absorbed the carbon dioxide which was required for photosynthesis. In each case both points were required for a full answer. Leaf A did photosynthesise and the gas that would collect in its bag was oxygen. Many candidates scored well on this opening part.

- (b) This showed part of the Nitrogen Cycle and candidates were asked to identify four processes from a list of six possible answers given. The answers were nitrogen-fixation, decay of animals and plants, excretion and uptake by plants. Once again many scored well here, although there was some confusion between uptake by plants and photosynthesis.

- (c) This showed a graph of crop yield against fertiliser applied. Of the four marks offered, two could be obtained by simply stating that at first the yield increased with increasing amounts of fertiliser, but then levelled off. The other marks came for stating by *how much* the yield improved, over *what range* of fertiliser, at *what point* levelling occurred in the fertiliser-application and what was the final yield. When figures are quoted on the axes of graphs it pays to use them. This is an area that would benefit from a little practice by most candidates.

- (d) This was a table of foods derived from animal and plant sources in terms of their composition per 100 g samples.

- (i) Vitamin D was not present in the plant foods.
- (ii) Cereal provided 1500 kJ per 100 g, milk only 300 kJ. Thus 5 times 100 g of milk must be consumed or 500g. Relatively few candidates could perform this calculation given the information in the table.
- (iii) A diet consisting entirely of milk would not suit an adult since it would lack fibre, be low in energy, iron and protein and one would need such a lot of milk. Weaker candidates found it difficult to extract this information from the figures in the table, but many scored well here.

When, as in this case, three numbered lines are provided for the three answers required, the rule is one answer per line. Some candidates did not follow this procedure.

The vitamin needed to heal wounds is C. This was usually correctly stated.

Question 2

This was another graph showing how blood-volume and rate of heart-beat changed during a period of exercise followed by activity and then another period of rest.

- (a) The lines for heart-rate and blood-volume peaked at 8 and 10 minutes respectively, but since the period of exercise must start when the curves begin to climb (at 6 minutes), it took 2 and 4 minutes to reach these values i.e. 8-6 and 10-6 respectively. Few candidates could interpret the graph accurately to reach these figures.
- (b) Blood-volume increases from 5 to 40 litres/minute, which is an increase of 8 times. Once again this proved beyond all but the better candidates, although all the information was readily available on the graph.
- (c) Blood flow to the muscles increases during exercise to supply *more* glucose, *more* oxygen for *more* respiration; to remove *more* carbon dioxide, lactate and heat. Blood does not supply energy as such, a common wrong answer.

Question 3

This showed the life cycle of a species of *Schistosoma*.

- (a) Three ways to reduce its spread as deduced from the diagram included; sanitary disposal of urine (not faeces), killing the snails by using a molluscicide (not an insecticide), treating drinking water, wearing boots/protective clothing in water, taking drugs to kill the worm in man.
- (b)1. The larvae are released during the day since (i) they are short-lived and (ii) humans are more likely to be using the water during the day.
- 2. Adult worms coat themselves with molecules from the host's red blood cells, since this disguises them from the immune system.
- (c) Although drugs are effective the worm remains widespread, since many cannot afford the drugs, re-infection is easy, many waters are infested with snails and rats are a reservoir of infection. Many candidates scored well on this question.

Question 4

This dealt with water gains and losses in a person.

- (a)(i) The amount of water lost in the urine was 1.5 litres.
- (ii) In the gut most water is absorbed in the colon.
- (b) The word equation for respiration is: glucose + oxygen = carbon dioxide + water. Most candidates scored well here.
- (c) During exercise, water loss would *increase* through the lungs but decrease in the urine. Many candidates ignored the question set here and referred to urine concentration not volume.

Question 5

This showed the results of an experiment to test the effects of pH on the activity of salivary amylase, using drops of solution tested against iodine solution at 1 minute intervals.

- (a) Tube A at pH4 gave blue-black results throughout the 5 minutes. This is because the enzyme is denatured at this acid pH, so no starch is digested.

Tube B at pH7 tested negative for starch at 3 minutes, tube C at pH 9 at 5 minutes. The enzyme digests the starch faster in tube B since pH7 is its optimum pH; whereas the enzyme works slower at pH9, so starch remains in the solution for 4 minutes.

Many candidates could not interpret the results of what should be a familiar experiment and some even reversed the pHs, stating that pH9 was acid.
- (b) If tube B was rerun at 30 degrees instead of at 20, it would take half the time, but certainly less than 3 minutes. Again, few were able to deduce this answer.

Question 6

This showed the bones of the hand, arm and shoulder. Candidates were asked to label a hinge joint (wrist or elbow); a ball and socket joint (shoulder); where blood cells are made (humerus, radius or ulna, but not *scapula*) and where cartilage may be found (at finger, elbow or shoulder joint surfaces). While many found this easy to complete, some quoted the wrist as a hinge or ball and socket joint.

Question 7

- (a) This asked candidates to study two diagrams, one of a cell undergoing mitosis the other meiosis and to state three differences apparent *there*. Suitable answers included: the cell divides once in mitosis but twice in meiosis; hence there are two products in mitosis but four in meiosis; mitotic products are identical while meiotic ones are different; meiotic products are haploid while mitotic ones are diploid and meiotic products show crossing over while mitotic products do not. Common errors were to use information *not* in the diagram, such as *meiosis occurs in the gonads while mitosis occurs in normal body cells*; *meiosis gives 23 chromosomes while mitosis gives 46* or to state only what they could see in one process without referring to the other, thus failing to complete the comparison.
- (b) If the cell undergoing meiosis is from a man, the cells produced are sperms or gametes.

Section B**Question 8**

This concerned breathing and tuberculosis. This question revealed a good working knowledge with many candidates scoring 14 or 15 marks.

- (a) When breathing in the external intercostal and diaphragm muscles contract; the rib-cage moves upwards and outwards; the diaphragm flattens; the volume of the thorax increases and the pressure inside decreases. Since the internal pressure is now lower than the external, air rushes in. Marks were also given for describing the route of the air so that it was fairly easy to score a maximum of 7 marks here and many did.
- (b) The pathogen causing tuberculosis is a bacterium and it is spread as droplets when an infected person coughs or sneezes. Alternatively, sputum can dry up and spores of the bacillus can be wind-blown and breathed in by another person. This was usually well-answered.
- (c) The risk of catching the disease can be reduced by a patient not spitting, covering the face when coughing or sneezing, isolation of the patient and by a BCG vaccination.
- (d) The mass X-ray is to detect the disease, so that the patient can be treated or to detect carriers.

Question 9

This was generally poorly done since candidates did not go into enough detail in their answers. The three parts were worth 6, 5 and 4 marks and yet many candidates were satisfied with the baldest of statements.

- (a) The roles of the ovary and oviduct were usually dismissed as: *the ovary produces the egg which is fertilised in the oviduct*, scoring only 2 marks. The answer expected references to the egg being part of a follicle, whose cells nourish the early embryo; the ovary secretes estrogen to begin the repair of the endometrium. Progesterone is released from the ovary after ovulation. This hormone makes the lining of the uterus more receptive and maintains the pregnancy. The oviduct is the site of fertilisation but it is also where early division of the embryo occurs and the conduit for the embryo to reach the uterus.
- (b) Oxygen reaches the tissues of the fetus by first diffusing into the maternal blood at her lungs. Here it combines with haemoglobin in her red cells to form oxyhaemoglobin in which it travels to the placenta. At this structure the oxygen passes across to the haemoglobin in the fetal blood by diffusion and is carried by the umbilical vein to the fetal heart for distribution to the fetal tissues. Once again many points were missed out and references to *blood or air crossing the placenta* were all too common.

- (c) The fetus is protected from physical damage by the amniotic fluid which is incompressible and acts as a cushion or shock-absorber. But it also receives protection from the muscular spine and pelvic girdle, the abdominal muscles and changed behaviour patterns of the mother. These last points were seldom if ever mentioned, although the section stated it was worth 4 marks. Failing to appreciate how much detail is required is poor exam technique and caused many candidates to score less well than they should.

Question 10

Either

This question proved the more popular with the majority of candidates probably because they did not read as far as part (c) before starting.

- (a) This asked for the dangers to human health when sewage was left untreated. The 5 marks were awarded for the following points: Sewage contains bacteria, many of which are pathogenic, such as those of typhoid, cholera or dysentery. Also stages of parasites such as tapeworm, hookworm etc. Flies may transport germs from sewage to food or kitchen surfaces. Sewage may be washed into water sources which then become a source of infection if they are used untreated. Common errors were to refer to mosquitoes in this context or to digress into the possibilities of oxygen denudation in water that would kill fish. For many this was a high scoring question.
- (b) This part asked for two pollutants from car exhausts (other than oxides of nitrogen) and their effects. Possible answers included lead, carbon monoxide or dioxide, particulates or specific components such as benz-pyrene. Lead is an enzyme poison; it is a cumulative poison; damages the brain or nervous system affecting learning, memory etc. Carbon monoxide combines with haemoglobin, reducing oxygen carriage. Carbon dioxide is acidic, an irritant, speeds breathing and heart-rate. Benz-pyrene is a carcinogen. Many could name two pollutants but were vague about their effects or got confused with smoking and talked about tar or nicotine.
- (c) This asked how candidates would test a sample of water to see if it contained bacteria. The expected answers should have suggested adding some of the water to a sterilised, agar plate; incubating this at a suitable temperature-25 degrees, for at least 24 hours and examining for *colonies*. Credit was given for incorporating an agar plate with no water as a control. Few candidates seemed aware of this procedure and instead referred to the use of a microscope or to boiling the sample and looking for a residue.

Or

This was also in three sections, the first asking how the body prevents glucose-levels from rising too high after a meal. This is a familiar part of the syllabus, but many did not seem to recognise it.

- (a) The rise is detected in the pancreas or islets, which secrete more insulin. Insulin promotes the conversion of glucose to insoluble glycogen which is stored in the liver. Some glucose is converted to fat or protein. There were the usual confusions between glycogen and glucagon and the roles of the liver and the pancreas.
- (b) Here candidates were asked to name two chemicals entering the kidney in the blood and for each one to explain what happens to it there. Possible substances were glucose, salts, water, amino acids or urea all of which are filtered from the blood at the glomerulus into the tubule. The first four are reabsorbed to varying degrees in the different regions of the tubule. Some urea is reabsorbed also, but the majority is passed on through to the ureter. Proteins also enter the kidney but are too large to pass into the tubule and so remain in the blood.
- (c) This required candidates to state how they would test a sample of urine for glucose. The commonest answers involved the use of Benedict's reagent, but few knew to add an *equal volume* of the reagent or to *boil* the resulting mixture in a *water-bath* which would give a green/brown or red precipitate, if glucose were present. Alternatively, dip in a Clinostix test strip which would turn from pink to a shade of blue or purple, the colour being compared with a colour chart to give the precise percentage of glucose. Practical procedures remain a problem for many.