

# CONTENTS

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FOREWORD .....	1
HUMAN AND SOCIAL BIOLOGY .....	2
GCE Ordinary Level .....	2
Paper 5096/01 Multiple Choice .....	2
Paper 5096/02 Paper 2 .....	3

## 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

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## GCE Ordinary Level

<p><b>Paper 5096/01</b> <b>Multiple Choice</b></p>
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<i>Question Number</i>	<i>Key</i>	<i>Question Number</i>	<i>Key</i>
1	D	21	A
2	C	22	B
3	C	23	A
4	D	24	C
5	B	25	C
6	A	26	B
7	D	27	B
8	C	28	B
9	A	29	C
10	B	30	C
11	D	31	B
12	C	32	A
13	C	33	D
14	D	34	C
15	C	35	C
16	C	36	B
17	A	37	B
18	C	38	B
19	B	39	B
20	B	40	D

### General comments

A standard deviation of 6.86 (17.15%) was obtained for this paper. This standard deviation was an improvement on the previous year. Most questions performed well. The mean score of 22.7 (56.97%) was slightly lower because there were less questions proving to be easy. Only **Question 35**, concerned with the highly publicised socially significant sexually transmitted diseases, proved very easy. **Questions 15, 20 and 39**, which all depended on interpretation of data had a low facility. Again straightforward applications of knowledge questions perform the best. Surprisingly the questions on experiments (**Questions 20 and 24**) obtained good scores, although these were not matched by high facilities.

**Comments on specific questions****Question 7**

This tested knowledge that vitamin D assists the absorption of calcium ions and it proved a little difficult. It is clearly on the syllabus 3 (d) but appears to be neglected.

**Question 15**

A number of candidates interpreting the pie chart for inspired air, considered a sector representing oxygen of 20%, to be carbon dioxide, or nitrogen. This type of question has proved difficult before and maybe due to inexperience in interpreting pie charts.

**Question 20**

Although over half the candidates got this correct, the low facility and strong distractor (**A**), showed guessing played a part. It seems that few candidates really understood, that a larger drop of oil at the same temperature, contains the most heat.

**Question 35**

It is good to see the excellent understanding shown about sexually transmitted diseases. They are obviously important questions, but very poor discriminators.

**Question 39**

Although over half the candidates got this right, the low facility is no doubt due to the fact that shallow wells, commonly harbour pathogens from drainage of nearby houses, etc. Hence, a third of the candidates chose an option showing the shallow well as more polluted than a reservoir. However, the well drawn is free standing in the open and so much less likely to be polluted, than a larger open reservoir. Greater care is needed to interpret such value judgement questions.

<p><b>Paper 5096/02</b></p>
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<p><b>Paper 2</b></p>
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**General comments**

It is sometimes said that there are three rules for taking an examination:

1. Read the question.
2. Read the question.
3. Read the question.

To these should be added: look at the mark allocation. In answer to the request: 'Describe how a molecule of oxygen travels from an alveolus to the liver for use there in respiration', (8 marks), the statement that oxygen travels in the blood attached to hemoglobin will score only 2 marks. Candidates should reason that much more detail is required here and answer accordingly. Similarly, precision is required in scientific answers. It is not the crystal that moves during diffusion but *molecules* of the crystal.

When quoting numbers from a graph remember to add the units, or the figures are meaningless.

It was pleasing to see that almost all the candidates obeyed the instruction to answer only one alternative in **Question 10** and that the better candidates, at least, could interpret practical situations. Such experimental sections still give the weaker candidate problems and to many this is still unfamiliar territory. The paper gave a range of marks from 0 to 96 out of 100, with maximum marks being scored in all questions by some candidates. The majority of candidates chose the photosynthesis option in **Question 10**, where even weaker candidates managed to score marks on the section describing the Carbon cycle.

**Comments on specific questions****Question 1**

This question dealt with the circulation.

- (a) Labelled cross sections of an artery and a vein were given and candidates were instructed to fill in the table to show three differences of *structure* between them. The answers expected were lumen-size, wall-thickness, differences in the *amount* of muscle and elastic fibres. Common incorrect answers were to refer to non-structural differences or to talk of *thick v thin muscle fibres* – again a matter of precision, since the fibres are identical in size – it is the number of them that differs. References to the collagen fibres were not allowed, since these were identical in amount in the two vessels. Some candidates even confused the artery and the vein.

- (b)(c) These depended on reading a graph showing how the pressure and speed of flow varied in the circuit from the arteries to the veins.

The vessel with the lowest pressure was the *vein*, while the lowest speed was recorded in the *capillaries*. Speeds of more than 100 mm/second were evident in *arteries*, *arterioles* and *veins*. Although 5 marks were awarded here, candidates often ignored this clue and settled for one answer in the latter part. Several confused the lines for pressure and speed of flow. This is an area which requires practice.

At X pressure is *rising, reaches 112-116 mmHg* due to *systole* – all acceptable answers.

At Y pressure is *falling, falls to 85-88 mmHg* due to *diastole*.

- (d) Blood flows slowly through capillaries *to allow time for the exchange of materials or the formation and return of tissue fluid*.

The pressure is low to avoid *bursting the walls of the capillaries, since they are only one-cell thick*.

This part was often poorly answered.

- (e) Tissue fluid contains no red blood cells, no platelets and less protein, *since these are too large to pass through the capillary walls*.

Again, this was often poorly understood with few candidates able to see the *size* point.

- (f) The remaining tissue fluid returns via the *lymphatics* or the *lymph vessels*.

While more got this correct, the blood/tissue fluid/lymph interface remains a mystery to many.

- (g) If skin arterioles constrict, blood supply to the skin surface will be *reduced*, while blood-pressure in the rest of the circuit will *increase*.

- (h) If skin arterioles do constrict the effect on heat-loss from the skin will be *to reduce it-less blood will reach the skin capillaries; so less heat will be lost by the usual mechanisms of conduction, convection and radiation. In addition, less blood will reach the sweat glands, so less sweating and less heat loss by evaporation*.

Although 4 marks were indicated for this part, many gave little detail, even if they had the right response. Weaker candidates confused vasoconstriction and vasodilation.

**Question 2**

This question required candidates to extract information from a table of food-contents. This was often well-answered.

- (a) Animal-based foods might lead to a heart attack, since they are *rich in fats*, and may cause scurvy because they have **no vitamin C**.
- (b) Plant-based diets might lead to obesity and rickets, since they are *rich in sugars* and have **no vitamin D**.

It is incorrect to say they are *low* in these vitamins – the table shows there are none in the respective foods-precision again.

- (c) Of the six foods listed, *beef* would give the strongest reaction with biuret reagent-since it has the most protein. *Rice* would give the strongest reaction with Benedict's reagent, since it has the most sugar.
- (d) Most diets are plant-based for the simple reason that they are *cheaper/more readily available*. Very few appreciated this point.

**Question 3**

This showed diagrams of two processes in action. They were *diffusion* and *osmosis*.

- (b) The changes *visible* were: *the liquid level rose, the water level fell and the dialysis-bag expanded*. These parts were generally well-answered, although some candidates confused the two processes or did not distinguish clearly between the water and the sugar solution.

Diffusion occurs because *the crystal dissolves; molecules of the crystal then move, from a region of high concentration (the crystal) to a region of lower concentration*.

*Osmosis is the movement of water molecules; from a high concentration of water to a lower concentration of water; through the semi-permeable membrane of the dialysis bag.*

While many obtained the maximum 4 here, many answers talked of different concentrations without specifying what those concentrations were. Answers relating to water-potential were equally valid.

**Question 4**

This was concerned with a familiar topic – the life cycle of the malarial parasite, as shown in a diagram.

- (a) The fluids transferring the parasite are *blood* and *saliva*.
- (b) The female mosquito sucks blood *in order to obtain protein or to form her eggs*. Answers referring to reproduction were considered too vague to score.
- (c) Before the symptoms are evident, the parasite can be found in the *liver* or the *red blood cells*.

Once the symptoms are apparent the parasite can be found in the *liver, blood cells and the spleen*.

3 marks were notified here so three answers were expected. Many candidates contented themselves with two only. Some quoted suggestions such as the gut or the faeces.

**Question 5**

This showed a graph of the lead-content of snow samples taken at the poles between the years 1750 and 2000 A.D.

- (a) Candidates were asked to describe, using figures from the graph, what was shown. The graph had a marked change of slope after 1925.

Answers expected were that *the lead-content increased slowly from 1750 to 1925; from 20 to 95 micrograms per tonne of snow; but then rose rapidly from 1925 to 2000; from 95 to 250 micrograms lead per tonne of snow.*

Many scored 2 here but often failed to get the third mark by not quoting amounts or not specifying the units. Weaker candidates thought it referred to snowfall rather than lead-content. Always read the axes!

- (b) The change after 1925 is the *use of lead in petrol; and the increase in the number of vehicles using that fuel since 1925.*

Few candidates mentioned the presence of lead in petrol but most suggested increased cars or industry – the last not a valid answer.

- (c) Lead is an *enzyme poison; damages the nervous system, especially in children leading to learning difficulties and reduced IQ.*

**Question 6**

This tested how the sex chromosomes were inherited.

- (a) The diagram should have been completed as follows:

X	Y	X	X	<i>gametes</i>
XX	XX	XY	XY	<i>genotypes</i>
<i>female</i>	<i>female</i>	<i>male</i>	<i>male</i>	<i>phenotypes</i>

- (b) The ratio of males to females is thus *1:1 or 2:2; not 50%*, which is not a ratio.

Common errors were to omit the phenotypes or to place the genotypes in the wrong order. Many scored well here.

**Question 7**

This gave a table showing the concentration of some substances in plasma, glomerular filtrate and urine.

- (a) The most dilute fluid of the three is the *filtrate* – it has the greatest amount of water.

- (b) The amount of glucose you would expect in the urine of a healthy person is *0*.

- (c) The substance whose concentration is most increased in the kidney is *urea*.

There were a lot of guesses here and many candidates seemed unable to extract the necessary information from the table.

- (d) If each kidney filters 125 ml of blood per minute and you have 5 litres of blood it would take *20 minutes* to filter all the blood, not 40 minutes, since you have 2 kidneys. Very few performed this calculation correctly.

**Section B****Question 8**

This showed a section through the eye adjusted for normal light and viewing a distant object.

- (a) Candidates were asked to re-draw the eye still viewing a distant object, but adjusted to bright light. The lens should remain the same but the pupil should be shown narrower. Few managed both marks here, the majority showing some change to the lens. Drawing quality was often poor.
- (b) The changes are brought about by the *contraction of the circular muscles of the iris, narrowing the pupil*. Disappointingly few candidates managed the 4 marks here – many ignoring the iris and describing accommodation, which was the answer to part (c).
- (c) To focus on a near object *the ciliary muscle contracts, loosening the suspensory ligaments so that the lens becomes fatter or bulges, shortening its focal length*. In addition, *the cornea bulges*. Both these effects cause *more refraction* of the now divergent incident light. While this was generally better understood, the point about the cornea was seldom mentioned, although it is responsible for most of the refraction!
- (d) Two eyes are better than one since: *both eyes point forward and so focus on the same object. This enables stereoscopic vision or judgement of distance, since the brain registers the amount of tension in the muscles steering the two eyes. Two eyes give a larger field of view and, least importantly, if one is damaged you still can see something*. 3 marks were available here but most gave no more than the bald statement *that it enabled distance-judgement*.

For such a familiar topic as the eye, it was surprising that so many of the answers were very confused and only poor scores were recorded here.

**Question 9**

- (a) This asked for three *types* of non-transmissible disease, with an example of each.

Suitable types were: *inherited; e.g. sickle-cell anemia*  
*dietary deficiency; e.g. scurvy or rickets*  
*degenerative; e.g. arthritis, deafness*  
*occupational; e.g. silicosis*  
*by habit/self-inflicted e.g. lung cancer.*

Many good answers were noted here scoring 6 marks. Weaker candidates either did not know what a non-transmissible disease was, or quoted three of the same type.

- (b) This examined knowledge of three bacterially transmissible diseases, typhoid, tuberculosis and gonorrhoea; how entry to the body was achieved and how the spread of the disease could be limited.

Typhoid enters *via contaminated food and water*.

Its spread may be limited by *isolating carriers, purifying water supplies, covering food to prevent the visits of houseflies (the vector), killing flies, sanitary disposal of faeces and treatment with antibiotic*.

TB enters as *droplets or spores or from unpasteurised milk*.

Its spread may be prevented by *identifying carriers via X-rays, pasteurising milk, stopping spitting, coughing into a tissue or handkerchief, avoiding crowds, good ventilation and antibiotic treatment*.

Gonorrhoea is spread by *sexual intercourse*.

Its spread may be stopped by *abstinence, sticking to one faithful partner, using a condom, antibiotics and regular check-ups (since it may be symptomless in women)*.

This was the most highly scoring question and it is obviously a section of the syllabus that is well-understood.

**Question 10 Either**

This was concerned with aspects of respiration.

- (a) Oxygen travels from the alveolus to the liver by *diffusing into the plasma; entering a red blood cell where it combines with hemoglobin. This blood is carried to the left atrium by the pulmonary vein. It is passed into the ventricle and pumped into the aorta. From here it enters the liver by the hepatic artery. It leaves the hemoglobin and diffuses into the liver cells.* As noted before, this part was worth 8 marks, so some real detail was required. Good candidates appreciated this and scored well.
- (b) The word equation for respiration was:
- Glucose + oxygen = carbon dioxide + water (energy was not required).*
- (c) *The maggots are using up oxygen; giving out carbon dioxide in its place. This is absorbed by the soda lime; so the volume of gas in the tube falls. Hence the pressure falls and the drop of coloured liquid is pulled towards the maggots.*

It was apparent that the majority of candidates are unfamiliar with practical situations and were unable to fathom what was happening.

**Question 10 Or**

This dealt in a similar way with photosynthesis.

- (a) A simple word equation for photosynthesis could be:
- Carbon dioxide + water = glucose + oxygen.*
- (b) Carbon dioxide cycles in nature through several possible stages:
- Carbon dioxide is absorbed by plants in photosynthesis and converted to carbon compounds like sugar. Animals eat the plants, so the carbon is now in animal compounds like glycogen, fat or protein. Both animals and plants respire, returning the carbon as carbon dioxide to the air. Similarly both animals and plants die and decompose, when carbon dioxide is released. In addition, either organism may be converted to fossil fuel, which on combustion, releases the carbon as carbon dioxide.*

This could have been shown by a labelled drawing of the familiar carbon cycle.

Again detail was often lacking, but many good scores were noted here.

- (c) A simple syringe-apparatus was shown containing pondweed in pondwater.
- When illuminated as shown, the meniscus moves away from the pondweed since: in light, photosynthesis occurs releasing oxygen from the chloroplasts in the leaves of the plant. As the volume of oxygen increases, so does the pressure in the syringe, pushing the meniscus down the tube.*

Again, candidates found this difficult to understand, even though the apparatus is so simple. They could not connect the light with photosynthesis or that process with oxygen, even if they had stated the word equation correctly. Similarly, the linkage of volume-changes with pressure-changes was not grasped. The need for candidates to familiarise themselves with practical situations is not being met. It will continue to be examined.