

HUMAN AND SOCIAL BIOLOGY

Paper 5096/11
Multiple Choice

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

General comments

Questions 3, 4 and 24, where the responses had two or more parts, showed a number of candidates knowing most parts, but unfortunately were wrong in just one part.

Candidates found some questions difficult and this may indicate common misconceptions for some areas of the syllabus.

Questions 9 and 17 were easy but showed a good knowledge of the objectives they tested.

Comments on specific questions

Question 3

Candidates who have the misconception that all protozoa cause disease and that they cannot reproduce by mitosis incorrectly chose option **B**. Most candidates knew protozoa have a nucleus and not a cell wall.

Question 10

The answer is best obtained by eliminating the 'wrong' options. Diet 2 with sufficient energy, protein, calcium and iron was suitable for a pregnant woman, therefore the key was **A**.

Question 23

There was evidence that candidates were guessing as all options were chosen. Candidates needed to work out that chemicals, sound and touch are stimuli that can be detected by receptors, but sight is a function of an organ.

Question 24

While nearly half the candidates chose the key **B**, others had misconceptions about where a motor neurone connects with the intermediate and sensory neurones.

Question 25

A significant number of candidates incorrectly chose options **A** or **B** indicating that they had not read the question carefully enough or there is a misconception that injecting heroin causes cirrhosis. Few candidates knew both heroin and alcohol slow the speed of nerve impulses.

Question 27

Many candidates did not realise the tuberculosis bacteria being large cannot cross the placenta, while alcohol and nicotine can pass across and harm the fetus.

Question 30

Most candidates could not deduce that a new strain of the influenza virus spreads fast because it takes time to develop a new vaccine. A new vector is very unlikely, while any effect of drugs and the virulence of the strain is unknown.

Question 32

That oil prevents mosquito larvae from breathing was well known, but a number of candidates thought it more significant that oil prevented the adults from laying eggs. Oil may hamper the laying of eggs but will not prevent it.

Question 35

The question asks for the 'best' control and requires the knowledge that a control only differs in 'one' respect from the experiment. Some candidates wrongly think that boiling disinfectant would stop its action.

Question 39

Some candidates appeared to have the misconception that waste food would attract mosquitoes, although most candidates appreciated that the danger is the attraction of rats and mice.

HUMAN AND SOCIAL BIOLOGY

Paper 5096/12
Multiple Choice

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

General comments

Candidates found **Questions 1, 5, 13, 16, 17, 21, 23** very easy while **Questions 4, 8, 9, 11, 24, 25, 28, 30, 32, 33, 35, 36, 39** and **40** were easy. Candidates have clearly done their preparation well and their results show excellent understanding of the syllabus.

There is a possibility that some candidates are not carefully looking at the wording in some questions as exemplified by **Questions 26, 29** and **32**.

Comments on specific questions

Question 12

Although over half the candidates obtained the correct answer candidates should know that the pancreas is both a ductless gland for insulin and a ducted gland for pancreatic juice, while oestrogen is secreted from a ductless gland only. That the salivary and sebaceous glands are ducted should be also known.

Question 26

Although three quarters of the candidates obtained the correct answer, a number may have chosen the answer when more oestrogen and progesterone 'started' to be secreted, rather than when their concentrations were highest.

Question 29

This question proved the most difficult on the paper which may be due to careless reading of the question. The significance of 'only' and 'always' was missed when considering the options. Although clearly related, degenerative diseases are not 'only' associated with getting older and they are not 'always' associated with obesity.

Question 32

That oil prevents mosquito larvae from breathing was well known, but a number of candidates thought it more significant that oil prevented the adults from laying eggs. Oil may hamper the laying of eggs but will not prevent it.

HUMAN AND SOCIAL BIOLOGY

Paper 5096/21

Theory

Key Messages

Candidates need to be able to produce discursive answers that add information additional to that provided in the stem of a question. When producing such responses, candidates are advised to read through the question again, and after writing their answer, to ensure that the question set has been answered.

General Comments

Most candidates were able to complete all sections; there did not seem to be a problem with the time allowed for the paper.

A very small number of candidates did not follow the rubric for **Section C** and answered both **Question 9** and **Question 10**. Almost all candidates answered **Questions 7** and **8**.

Comments on Specific Questions

Section A

Question 1

This question is about investigations into starch digestion and how a villus absorbs the products of starch digestion.

- (a) (i) Candidates were asked to state where villi were found in the alimentary canal. Most knew that they were in the ileum. Small intestine was creditworthy. A few incorrectly wrote stomach, or stated organs outside the digestive system e.g. heart .
- (ii) Those candidates who gave a detailed description of the absorption of glucose scored well. However the descriptions that were vague were unable to gain credit. Thin alone was not enough; a thin epithelium was needed. Many wrote about the lacteal which was irrelevant in this question. A large surface area, microvilli and diffusion were ideas that were often missed by the weaker candidates'.
- (b) In an experimental the tubes should be left to allow them to reach the temperature needed for the experiment. Few candidates realised this. Incorrect answers included, to allow the reactions to be completed, to allow the starch to settle, or to remove the starch.
- (c) The question asked for an explanation of the results in tubes **A** and **E** but many candidates muddled the tubes and gave either the answers for the wrong tubes or all of the tubes. Many simply gave a description but not an explanation. The explanation should refer to the reasons why these results were obtained.
- (d) The question asked for an explanation of the results in tubes **B**, **C** and **D** but many candidates muddled the tubes and gave either the answers for the wrong tubes or all of the tubes. Many simply gave a description but not an explanation. The explanation should refer to the reasons why these results were obtained, e.g. the orange-red colour showed no starch was present as it had been digested / removed at different times. Candidates did not always correctly extract the data from Table 1.1 when they gave the times when the orange-red colour appeared. An enzyme reference would have gained credit but not all answers referred to enzymes.

- (e) Candidates were told that the appearance changed from cloudy to clear in tubes **B**, **C** and **D**. They were asked to explain this change not the colour change. Starch is insoluble and therefore cloudy whereas after digestion by amylase the products of digestion were soluble and gave a clear solution.
- (f) (i) Tube **A** had originally been at 0 °C and was then placed at 36 °C. The best candidates gave an explanation such as 'a low temperature does not destroy the enzyme, it simply makes it inactive, in the higher temperature (it would become active again) the starch would disappear'.
- (ii) Tube **E** had originally been at 72°C and was then placed at 36 °C. Again the best candidates gave an explanation 'a high temperature denatures the enzyme, in the lower temperature it cannot become active again and the starch would remain'.

Question 2

This question is about carbon monoxide. It requires candidates to translate information from one form to another and present reasoned explanations for phenomena, patterns and relationships.

- (a) Candidates were asked to complete the bar chart in Fig. 2.1. They were required to draw the remaining two bars accurately with the correct column length and width and label the x axis. There were a few who did not attempt this at all. Many candidates gained full credit, those who forgot to label the axes gained partial credit.
- (b) This question asks for conclusions about the relationship between cigarette smoking and the amount of carboxyhaemoglobin in the blood. Candidates realised that the more cigarettes smoked, the higher the COHb in the blood but rarely did they give any further information, and so were unable to gain further credit. There were several other conclusions that could have been made e.g. non smokers do not have zero COHb.
- (c) In this question candidates had to look at two sets of data and suggest reasons why they are different. Many candidates did not give a sufficiently detailed answer. The level of COHb was higher in both non smokers and smokers suggesting a higher level of CO in the air in the African city or v/v. There are many reasons for this that could have been suggested e.g. location of recording of data.

Question 3

This question is about vectors of disease related to bacterial infections and malaria.

- (a) Organisms that spread disease are called vectors. Some common incorrect answers included protozoa, pathogens and parasites.
- (b)(i) and (ii) This question wants a disease causing organism and a disease spread by houseflies. A (named) bacteria is the organism and a correct disease caused by a bacterium is the disease. Viruses and germs are not creditworthy answers.
- (c) Candidates were asked for two precautions that should be taken in a kitchen to prevent houseflies from spreading disease. Candidates who gave specific instances were awarded credit; many answers were too general to gain credit.
- (d) The question asks why only the female *Anopheles* mosquito spreads malaria. Candidates often gave a long and detailed answer the spread of malaria but it did not always answer the question.

Question 4

This question is about nutrition and diet. Candidates were given a data table concerning breast milk and teething biscuits. They were asked to extract data from this table and then suggest why certain nutrients were important for babies.

- (a) Most candidates gained full credit for naming the nutrients lacking in breast milk such as fibre, iron and vitamin D. A common incorrect response was protein.
- (b) Most candidates gained full credit for naming vitamin D, calcium and protein. Common incorrect responses were vitamin C or iron.
- (c) There were many detailed answers but they did not always answer the question. Iron is a component of haemoglobin, an answer of red blood cell was not enough to gain credit. The function of haemoglobin is to carry oxygen.
- (d) Fibre is important in the diet to promote peristalsis or prevent constipation. This question was well answered by most candidates.

Question 5

This question is about amino acids and the liver.

- (a) The correct answer of deamination was not seen very often. Incorrect answers included digestion, metabolism of proteins and emulsification.
- (b) In this question candidates were asked to name the process that produces carbon dioxide. Respiration is the answer.
- (c) The question asked what happened to the amino acids. This question was challenging for the best candidates, with credit being awarded for the idea of assimilation and amino acids turned into protein. Common incorrect answers included absorbed into the blood stream, used by red blood cells or cells, deaminated and used for energy.
- (d) The candidates were asked what happens to the ammonia in the liver and why. Most candidates gained credit for the idea that urea is formed.

Question 6

This question is about the clotting of blood.

- (a) When there is a wound, there is blood loss and the question asks the advantages of blood clotting in this situation. Many candidates gained full credit 'for prevents blood loss and entry of pathogens'. The idea of a scab forming underneath was seen rarely.
- (b) The information given in the question was not credited in the answers. The idea of slow flow rate and low blood pressure meaning more time to flow through the leg veins. Also the distance away from the heart is greater and has to flow further against gravity.
- (c) This question asks why the risk of DVT is more during a long flight as there is lack of exercise. Responses just repeating the stem cannot gain credit. Creditworthy answers included less contraction of muscles, less pressure on the veins, therefore reduced blood flow.
- (d) This question wants to know why obesity causes DVT. The idea of fatty deposits gained credit as did the lack of exercise/movement. The best candidates related these ideas to poor circulation.
- (e) Many candidates gave a correct answer to this question. They knew what conditions were likely to occur if a part of the clot broke off and moved in the blood stream.

Section B

Question 7

This question is about the kidney and its functions.

- (a) The candidates were given a diagram of a nephron which had letters for labels. Many candidates gained full credit for their answers.
- (b)(i) The question asked for a description of reabsorption of glucose from the kidney tubule. This was poorly understood by most candidates with many repeating the question or giving very vague and incorrect comments e.g. 'the glucose will reabsorb the kidney through the bowmans', and 'glucose is reabsorbed from the urine'.
- (ii) The question asked for a description of reabsorption of water from the kidney tubule. Again this was poorly understood by most candidates. Again candidates gave vague statements like 'the water is reabsorbed'; incorrect comments e.g. insulin being involved.
- (c) Here candidates were asked about the removal of substances e.g. drugs. Candidates gained credit for the idea that the liver was involved and some substances were lost in the sweat.

Question 8

This question is about the eye and how it functions

- (a) The candidates were asked to name four parts of the eye. Those who had learned their diagrams often gained full credit. The lens was known by most candidates. Some muddled the two humours.
- (b) Describing how an image is formed on the retina is an area of the syllabus that the candidates found very difficult. The idea of refraction of the light rays at the cornea and the lens was not known. Those who gained credit usually knew that the rays were focused onto the retina or that the image was inverted.
- (c) The candidates were asked how rods differed from cones. The best candidates wrote about the shape, the colour, the sensitivity and intensity in which they worked and presence or absence in the fovea. Incorrect answers included 'rods control light intensity' and 'cones give out colour and rods give out black and white'.
- (d) The candidates were told that the information passes from one neurone to another, so the question needed detail of how this happens. Few wrote about impulses. The idea that the impulse started at the sensory neurone and passed to another neurone via a synapse was rarely mentioned. Detail at the synapse was not included.

Section C

Question 9

This question is about ways of preventing and getting rid of disease.

- (a) What is meant by an antibiotic was the question. Many confused antibiotic with antibody or antiseptic. Some candidates wrote about the fact that it was a tablet or a chemical. The ideas that were wanted were that it kills bacteria or inhibits their growth. Many are specific to a certain pathogen and they cannot destroy viruses.
- (b) This question asks about antiseptics and disinfectants. There was confusion between antiseptics and antibiotics with septrin and penicillin being incorrectly given as examples. The mode of action of these two was also confused. The antiseptic is used externally on the body and the disinfectant is used on surfaces as it damages human tissue.
- (c) This question asked for the use of immune serum (antiserum). It was not answered well. This type of serum gives immediate protection and is used straight after an infecting agent has entered the body. Conventional antibody production would be too slow. It is a form of passive immunity.

Question 10

This question is about respiration, carbon cycle and reflex actions.

- (a) Candidates were asked about the process of respiration. There was a lot of possible ways to gain credit but candidates did not score as highly as expected. Respiration releases energy and is involved in the production of ATP. Giving detailed information about either or both types of respiration, using equations and mention of mitochondria were all creditworthy.
- (b) The carbon cycle was the subject for this question and there were some good answers. Correct reference to photosynthesis, respiration, decomposition, and feeding all gained credit. The role of carbon dioxide as the input or output in the stages of the cycle was also creditworthy.
- (c) This section where candidates were asked about the reflex arc wanted information about the action in terms of it being fast, automatic and not involving the brain. This was not always included in the written answer. Detail about a reflex arc would gain credit e.g. which neurone picks up the stimulus and what happens to it. Mention of synapses could be included in the detail. Candidates rarely gave answers gaining all available credit.

HUMAN AND SOCIAL BIOLOGY

Paper 5096/22

Theory

Key Messages

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General Comments

Most candidates were able to complete all sections; there did not seem to be a problem with the time allowed for the paper.

A very small number of candidates did not follow the rubric for **Section C** and answered both **Question 9** and **Question 10**. Almost all candidates answered **Questions 7** and **8**.

Comments on Specific Questions

Section A

Question 1

This question is about the kidney and how it works.

- (a) Higher ability candidates were able to gain full credit for correctly identifying the parts of kidney. Generally those who were not awarded full credit used incorrect names such as pulmonary or hepatic; not included the word renal; mislabelled or spelt ureter incorrectly.
- (b) Defining a longitudinal section proved difficult for many candidates as they used longitudinal in their definition.
- (c) (i) Many candidates knew there are no plasma proteins in the urine and gained credit. Those who gave incorrect answers thought they were reabsorbed or only in the tissue fluid.
 - (ii) Candidates did not appreciate that blood contains a normal level of glucose all the time and that this is kept constant. They seemed to think that it was either stored in the liver or being used in the cells and tissues and that there was none in the blood.
 - (iii) The best answers contained information about how the blood sodium chloride level is kept constant by homeostasis as body cells need a constant osmolarity and that the urine changes depending on many factors including the amount of salt in the diet. Some candidates wrote about sweat containing salt. This only gained credit if it went on to relate it to the fluctuations in urine.
 - (iv) The idea of homeostasis was only mentioned by the best candidates. Many candidates mixed up the hormones insulin and glucagon or confused glucagon and glycogen. Some candidates wrote about the dependence on dietary input or about the control of blood glucose level by the pancreas and were unable to gain credit.
 - (v) Again only the best candidates realised that the level of urea would rise in blood **and** urine if the person ate a high protein diet or more amino acids were deaminated in the liver. Common incorrect answers included a reference to a hot or cold climate. This might affect the urine but not the blood. Exercise was given incorrectly as a reason.

- (d)(i) Many candidates gave a good detailed account of how a dialysis membrane works. Most knew it was selectively permeable and that urea and excess salts diffuse through it. Few wrote about the large surface area which maximised the filtration. Lower ability candidates gave vague answers; they did not name substances and wrote small molecules could pass through and large ones could not.
- (ii) Many candidates only gained partial credit for their answers as the reason glucose is included in the dialysis fluid was not fully explained.
- (iii) Candidates appreciated the idea that the dialysis fluid is kept moving so that a concentration gradient is maintained otherwise the urea would not diffuse out of the blood and thus gained full credit.

Question 2

This question is about birth. Some candidates wrote about pregnancy rather than birth.

- (a) This section about stage 1 was generally well answered. Most candidates were awarded credit for the contractions of the uterus and waters breaking. The idea of pain was frequently mentioned but the account did not always say where the pain was, and some wrote about contractions in other parts of the body without specifying where they were happening.
- (b) This question was more specific and wanted to know what happens in stage 2. The best candidates answers explained that the amnion membrane broke releasing the fluid and also mentioned that the cervix dilated. Accounts like 'the baby is about to go out' are too vague to gain credit.
- (c) Many candidates wrote a correct answer about what happens in stage 3 and were awarded full credit. Good answers included correct comments about the placenta and umbilical cord.

Question 3

This question is about nuclear division, mitosis and meiosis and a comparison between them.

- (a) This was remarkably well done with candidates making few errors. Candidates' correctly identify cells which were genetically identical and genetically different. All the cells shown in mitosis were identical as was the original cell in meiosis, so candidates could have chosen any three of these. When choosing the three that were genetically different any one of these same four could have been chosen along with any three others.
- (b) The second part of this question wanted a comparison of these two processes in humans. A few candidates missed the human reference and sometimes wrote down the wrong chromosome numbers. Some candidates wrote gamete cells for the location of meiosis rather than the cells in the ovary, testes or gonads. Reproductive organs or systems were also incorrect answers to this part.

Question 4

This question is about the blood and the gases it carries.

- (a) There were many possible answers to the question of where haemoglobin releases oxygen. Any named tissue or organ except the lungs was creditworthy.
- (b) Only the best candidates could state that CO combines more readily with haemoglobin so there is no space for oxygen or there is less free haemoglobin.
- (c) Most candidates were awarded partial credit for their answers.as they wrote about there not being enough oxygen getting to the heart muscle (or the tissues) but did not complete this by stating 'as a result the heart had to pump faster/harder'.
- (d) The question wanted a source of carbon monoxide. Car, cigarettes and smoke was not enough to be awarded credit - car exhaust or cigarette smoke was required.

Question 5

This question is about the skin and the function of some of its blood vessels.

- (a) Many candidates knew which vessels were which but a few muddled the arteriole and the venule. Answers giving artery and vein were credited.
- (b) The best candidates gave detailed information about vasodilation. Some candidates confused it with vasoconstriction. Heat loss by conduction usually gained credit. Common incorrect answers included capillaries dilating or becoming wider and blood vessels moving nearer the skin surface. Many missed the idea of increased blood flow.

Question 6

This question is about hormonal and nervous control systems.

- (a) This is not a question which asks directly about the two systems. Candidates were expected to use their knowledge to work out why the hormonal system has a more widespread effect than the nervous one. As hormones are distributed by the blood, they go to all parts of the body and may affect more than one target organ whereas the impulse (not message) passes along a neurone, a direct and specific pathway. Consequently impulses do not reach every part.
- (b) The best candidate answers expressed the ideas that hormones continue to circulate until broken down (by the liver) and that nervous impulses do not continue .i.e. the effect stops once the impulse has arrived.

Question 7

This question is about smoking.

- (a) After reading some data about doctors who smoked, candidates were asked to say why doctors were a suitable group for the study. Few candidates gained credit. Incorrect answers included, because they knew a lot about smoking, some smoked and some did not smoke. The ideas wanted were that they were easily contactable; they could describe and record data accurately.
- (b)(i) The calculation proved too difficult for many. There was no pattern to the incorrect answers. 23 was the correct answer.
- (ii) The idea that smokers died earlier was written in many different ways and gained credit. However only a few went on to give more detail.

Section B

Question 8

This question is about the structure and function of the thorax, the air we breathe in and an investigation into this air.

- (a) Most candidates gained full credit for correctly naming parts of the thorax. Some confused the ribs with the intercostal muscles.
- (b) Some candidates wrote about breathing out instead of breathing in so all the answers were the opposite of what was expected, and so were unable to be awarded full credit. What happens to the external internal muscles, the ribs, and the diaphragm was expected as part of the answer.
- (c)(i) This was well answered with many candidates gaining full credit.
- (ii) This was not well answered with candidates unable to explain why the mouthpiece should not be removed.

- (iii) Higher ability candidates knew that atmospheric air holds little CO₂ so one breath will not change the limewater, and that when more breaths and hence more CO₂ pass through the limewater, it will change that is will turn cloudy.

Question 9

This question is about proteins and carbohydrates in plants.

- (a) (i) Those candidates who understood the role of nitrogen fixing bacteria and the process gained credit. The formation of nitrates and how they were taken into the root cells were also facts that were creditworthy. Some candidates knew their facts but many struggled with the detail.
- (ii) This question followed on from (i) and wanted to know how the leaves were involved in the production of protein. Many candidates gained credit for knowing that photosynthesis was involved. Detail of the process would have gained further credit
- (b) Candidates knew that carbohydrates are the main energy source and that they also can be a store of energy. The details were known by the more able candidates.

Section C

In this section candidates were asked to answer either **Question 10** or **Question 11**. A few candidates attempted parts of both questions.

Question 10

This question is about heroin.

- (a) In this section candidates were expected to describe the direct effects of the drug (heroin) on the human body. Most knew that it was an addictive drug and that individuals become tolerant, needing more and more to get the same effect. The idea of a high and it being a depressant were also known but details of other effects were sketchy. There was no credit available in this section on withdrawal symptoms as that is trying to stop using the drug rather than the direct effects.
- (b) This section wanted to know about the non-medical use of heroine including the social consequences. In this section candidates could gain credit for describing withdrawal symptoms. Candidates knew about the use of non-sterile syringes which could lead to HIV / Hepatitis. Details often not included were effects on the kidney and nose (if sniffed). The risk of family and friends breakdown was well documented as was the risk of getting into criminal activities in order to obtain money to buy the illegal drugs.
- (c) The last section of this question asked about the problems associated with heroin when legal form of the drug is used under medical supervision. The candidates who gained credit wrote about the registered addict programme in detail or the fact that the needles were clean, hence less risk of infection. There is a use for legal forms being used as painkillers.

Question 11

This question is about antibodies.

- (a) This question asks about the changes in the concentration of antibodies against measles in the blood at a certain time. It was split into 0-40 days and after 40 days. Those who tailored their answer to the question generally gained more credit than those candidates wrote all they knew about antibodies. This answer required considerable detail about artificial active immunity.
- (b) Candidates had to draw a line on a graph to show what would happen to the number of antibodies in the blood after exposure to a different infectious organism. The line should have started at zero but many incorrectly continued the line already on the diagram. The line was expected to mimic the 'measles' line.