HUMAN AND SOCIAL BIOLOGY

Paper 5096/11
Multiple Choice 11

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

General comments

Questions 1, **3**, **12**, **14**, **18**, **22**, **25**, **30**, **32**, **34**, **37**, **38** and **39** presented a challenge to many of the candidates. Many of these questions required deductive skills rather than straight recall. **Questions 9**, **10**, **20** and **30** were well answered.

Comments on specific questions

Question 3

The positive distractor indicates candidates cannot interpret the results of osmosis, to understand that cells transferred from a solution to distilled water, will absorb water to increase the length of a strip.

Question 11

The positive distractor shows many chose the gall bladder that stores bile, instead of the liver where it is made. Maybe this was due to a lack of care in reading the question.

Question 12

All the distractor options involve breakdown processes, while the key correctly shows the assimilati membranes from lipids. Candidates did not know that amino acids break down to form urea, not ass it.

Question 18

Clearly candidates did not understand the word carcinogen and could not associate cells that continually divide with cancer.

Question 22

Commonly known terms such as glycogen and insulin were selected causing two positive distractors, while the function of glucagon in elevating the blood sugar concentration was not known.

Question 25

Interpreting the graphs to show that the concentration of progesterone in the blood rises at the start of pregnancy proved too difficult.

Question 29

The positive distractor here is likely due to candidates not carefully reading the question, to notice that it applied to the ovum. They are likely to know the ovum just has one X chromosome, but so many candidates chose two X chromosomes because they occur in all other body cells.

Question 32

Candidates could not select drug resistance, effect of HIV on the immune system and overcrowding as all contributing towards the increased incidence of TB.

Question 37

The positive distractor shows more candidates thought the immediate increase in concentration of antibody in the blood shown by the graphs was due to active, rather correctly passive immunity. Most candidates appreciated they were both artificial.

Question 38

Although over half the candidates obtained the correct answer, too many did not know that sewage effluent is treated with aerobic bacteria and the sludge with anaerobic bacteria.

HUMAN AND SOCIAL BIOLOGY

Paper 5096/12
Multiple Choice 12

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

General comments

Results for these candidates clearly show they attained a very pleasing standard. The good standard is also reflected by **Questions 5, 8, 16, 18, 26, 31, 32,** and **33**, all with high facilities, were easy for these candidates. Nevertheless this showed a very good understanding of the objectives tested.

Comments on specific questions

Question 1

The positive distractor here shows most candidates wrongly think that a common feature of all insects is having only 3 segments. No doubt this is because they confuse body parts as in the housefly and mosquito that they study, with body segments. That all insects have jointed limbs is the syllabus objective tested here. They are made up of many segments and this provided a very strong distractor.

Question 16

Candidates trying to deduce the answer, might well think that the benefit to athletes of longer bon provide more space for muscle attachment, rather than correctly as providing longer levers. Howeve candidates gave the correct key.

Question 28

The positive distractor here is likely due to candidates not carefully reading the question, to notice that it applied to the ovum. They are likely to know the ovum has one X chromosome, but so many candidates chose two X chromosomes because they occur in all other body cells.

Question 31

Most candidates know rickets is caused by a vitamin D deficiency. This question tested a specific syllabus objective and shows good knowledge.

Question 32

The low discrimination is possibly because some candidates thought the high fever develops before malarial pathogens are released into the blood, but all should have applied common sense that heat must attract the vector before feeding and not after feeding.

HUMAN AND SOCIAL BIOLOGY

Paper 5096/13
Multiple Choice 13

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

General comments

Results for these candidates clearly show they attained a very pleasing standard. The good standard is also reflected by **Questions 5, 8, 16, 18, 26, 31, 32,** and **33**, all with high facilities, were easy for these candidates. Nevertheless this showed a very good understanding of the objectives tested.

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Candidates trying to deduce the answer, might well think that the benefit to athletes of longer bon provide more space for muscle attachment, rather than correctly as providing longer levers. Howeve candidates gave the correct key.

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The positive distractor here is likely due to candidates not carefully reading the question, to notice that it applied to the ovum. They are likely to know the ovum has one X chromosome, but so many candidates chose two X chromosomes because they occur in all other body cells.

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Most candidates know rickets is caused by a vitamin D deficiency. This question tested a specific syllabus objective and shows good knowledge.

Question 32

The low discrimination is possibly because some candidates thought the high fever develops before malarial pathogens are released into the blood, but all should have applied common sense that heat must attract the vector before feeding and not after feeding.

HUMAN AND SOCIAL BIOLOGY

Paper 5096/21

Theory 21

General Comments

The large majority of candidates were able to complete both **Section A** and **Section B** questions as required, thus confirming that the time allowed for completion of the paper was adequate. A higher than usual proportion of candidates (approximately 10% total entry) failed to comply with the rubric for **Section B** and answered both **Question 10 Either** and **Question 10 Or.** Most of these candidates also answered both **Questions 8** and **9**.

In general, the overall performance of candidates was slightly poorer as compared with recent examinations.

In **Section A**, most candidates appeared to find **Questions 3** and **7** to be more testing than the other questions in the section.

In **Section B**, none of the questions appeared to cause major problems to candidates.

Detailed Comments

Section A

Question 1 was concerned with various aspects of blood and it's function.

Part (a) required candidates to identify the type of blood cell shown in **Fig. 1.1**. Most candidates correctly identified red blood cell/erythrocyte.

Part (b) required candidates to explain how the *cell membrane* and the *size and shape* of the cell identified in **(a)** carry out it's functions. Whilst the role of the *cell membrane* was usually adequately described, many candidates had difficulty in providing sufficient relevant detail concerning *size and shape* to gain the available marks.

Part (c)(i) required candidates to explain how *sickle cell anaemia* may affect the functioning of the blood. Candidates were generally able to provide sufficient detail to gain both of the available marks. **Part c(ii)** required candidates to show, using a genetic diagram, how two parents who do not suffer from sickle cell anaemia can produce a child who does suffer from this condition. Whilst more able candidates often gained all three of the available marks, many weaker candidates struggled to score any of the marks. It is clear, once again, that many candidates do not have knowledge and/or a clear understanding of the principles of genetics.

Part (d) required candidates to identify the blood vessel **A** and the cell **C** shown in **Fig. 1.3**. Most candidates were able to correctly identify *capillary* and *phagocyte*. Weaker candidates provided a variety of incorrect answers.

Part (e)(i) and **(ii)** asked candidates to explain what is happening to bacteria at **B** and **D** respectively as shown in **Fig. 1.3**. Whilst most candidates correctly described *phagocytosis* at **D**, relatively few correctly described *agglutination* and the role played by *antibodies* at **B**.

Part (f) was concerned with aspects of the clotting of blood. Candidates were required to identify **E**, **F** and **G** as shown in **Fig. 1.4**. The standard of answer for **E** and **F** was variable, with much confusion evident between *fibrinogen*, *fibrin* and other blood proteins. Relatively few candidates were able to correctly identify **G** as an *enzyme* (*thrombin* was an acceptable alternative.)

Question 2 was concerned with aspects of the interpretation of **Fig. 2.1** which showed an experiment to demonstrate the washing of three fat stained shirts (**H**, **I**, **J**) with a washing powder containing fat digesting enzymes.

Part (a)(i) candidates were first required to identify the temperatures at which shirts **H**, **I**, **J** were washed using the information provided in **Fig. 2.1**. Much confusion was evident concerning the understanding of the effect of temperature upon enzyme activity, with many candidates failing to gain both of the available marks. **Part (a)(ii)** required candidates to explain the answers which they had given for **I** and **J** in **Part (a)(i)**. The general standard of answer was disappointing even for those candidates who had previously correctly identified the two shirts in question.

Part (b) required candidates to suggest a change to the washing procedure of shirt **J** which might have resulted in the complete removal of the fat stain. Very few candidates scored the available mark for either *wash for longer* or *change the pH*. Most candidates made reference to the a temperature change (usually higher), thereby missing the point that shirt **J** had been washed at 35 °C which is the optimum temperature for lipase present in the washing powder (the question stated that the enzymes contained in the washing powder were similar to those found in the human duodenum.

Question 3 showed, in **Fig. 3.1**, structures involved in reflex actions.

Part (a) required candidates to explain why the muscles (*biceps* and *triceps*) are arranged as shown in **Fig. 3.1**. This was poorly answered with few candidates describing the *basic action of muscles* and the role of *antagonistic pairs of muscles* in the movement of the forearm. It appeared that many candidates did not understand the question.

Part (b)(i) required candidates to label, in **Fig. 3.1**, the relevant *motor* and *sensory neurones*. This was reasonably well answered with many candidates scoring both of the available marks. **Part (b)(ii)** required candidates to *label and name the muscle responsible for moving the forearm downwards*. The required answer was the *triceps*. Many candidates labelled and identified both the *biceps* and *triceps* and thereby did not gain the mark. **Part (b)(iii)** required candidates to *indicate, with an arrow and label, the place where a **named** stimulus might result in the reflex movement shown* in **Fig. 3.1**. The general standard of answer was very poor, with few candidates indicating the correct location (*close to the receptor shown at the base of the thumb*) and fewer still giving a suitable **named** stimulus.

Question 4 was concerned with nutritional aspects of milk.

Part (a) required candidates to suggest why skimmed milk is better for an adult circulation system than full fat milk, using information presented in **Table 4.1**. Most candidates made correct reference to the fat content and to the deposition of fat in blood vessels, thereby gaining both of the available marks.

Part (b) required candidates to explain why a mother's milk is better for a baby than milk from another mammalian species. This was also generally well answered, with a majority of candidates gaining at least two of the available three marks.

Question 5 was concerned with disease insect borne disease/prevention, based upon a pictorial representation shown in **Fig. 5.1**.

Part (a)(i) and **(ii)** required candidates to state, with regard to **Fig. 5.1**, a relevant insect borne disease and to name the vector of the organism responsible for the disease named. A majority of candidates realised that **Fig. 5.1** showed a scene at night and correctly named either *malaria* or *dengue* as the disease and also made the correct link with the *mosquito*, thereby gaining both of the available marks. The most common error was to name *typhoid/cholera* and to make the link with the *housefly*.

Part (b) required candidates to name four precautions to reduce the risk of catching the disease and, for each, to state how it offered protection. Most candidates managed to gain at least two of the available four marks. Common errors included references to irrelevant features shown in **Fig. 5.1** e.g. *fire*, *manure/compost heap*.

Question 6 was concerned with aspects of the digestive system.

Part (a) required candidates to label (letter **K**) in **Fig. 6.1** the muscle contracting to push the bolus shown. Somewhat surprisingly, the overall standard of answer was poor. Many candidates fail specifically identify the muscle layer and, even when this was correctly identified, the label was often placed in the correct location (*bulge shown immediately to the right of the food bolus*).

Part (b) required candidates to identify region **L** as shown in **Fig. 6.2**. The majority of candidates made correct reference to the *colon/large intestine*.

Part (c) required candidates to interpret **Fig. 6.3(a)** and **Fig. 6.3(b)** which showed highly magnified sections of **L** (*colon*) and **M** (*ileum*). **Part (c)(i)** required candidates to identify structure **N** shown in **Fig. 6.3(b)**. Most candidates correctly identified this as the *villus*, thereby gaining the available mark. **Part (c)(ii)** required candidates to explain how the internal surfaces of **L** and **M** are adapted for their functions. This was generally well answered, with most candidates gaining at least two of the available three marks.

Question 7 was concerned with aspects of the control of blood sugar by adrenaline. Information, in the form of two graphs, was shown in **Fig. 7.1**.

Part (a) required candidates to name the sugar known as blood sugar. A large majority of candidates correctly identified *glucose* and gained the available mark.

Part (b) required candidates to interpret the graphs shown in **Fig. 7.1**. The general standard of answer was disappointing. Relatively few candidates linked the rise in adrenaline with the rise in blood sugar shortly afterwards, and therefore failed to link adrenaline with the *release of glucose from glycogen stored in the liver and released into the blood*.

Part (c) required candidates to explain how the concentrations of blood sugar and adrenaline are returned to their original levels. This too was poorly answered, with relatively few candidates gaining one of the three available marks.

SECTION B

Question 8 was concerned with aspects of pollution.

Part (a) required candidates to define *pollution*. The three elements sought were *harmful substances* (**not** examples), *human activity* and *environment*. Surprisingly few candidates were able to provide a concise and accurate definition in order to gain the three available marks, although most did correctly mention environment.

Part (b)(i) required candidates to describe how water pollution occurs. A majority of candidates gave largely accurate and relevant answers, thereby gaining at least three of the available five marks. The most common error involved non-specific reference to *waste/rubbish/garbage*.

Part (b)(ii) required candidates to describe how water pollution can cause harm to humans. Once again, the general standard of answer was pleasingly high. A majority of candidates gave detailed/accurate answers and gained at least four of the available seven marks.

This question was reasonably well answered by the majority of candidates. Most candidates gained at least seven or eight of the available fifteen marks, whilst marks of twelve or higher were not uncommon.

Question 9 was concerned with aspects of cellular structure and function in plants and animals.

Part (a) required candidates to state the similarities and differences between plant and animal cells. In general, this was well answered with many candidates scoring at least three of the five available marks.

Part (b) required candidates to describe the importance to the cell of each structural feature identified in **Part (a)**. This part of the question was also reasonably well answered by the majority of candidates. Many gained at least five of the available ten marks, with more able candidates often gaining eight or more.

Overall, the standard of answer to this question was pleasingly high. It appeared that a majority of candidates had sound knowledge/understanding of this aspect of the syllabus The large majority of

candidates managed to gain at least seven of the available fifteen marks, whilst marks of two or were not uncommon.

Question 10 Either was concerned with heroin abuse (**part (a)**) and HIV/AIDS (**parts (b)(i)** and **(ii)**). question was answered by approximately 90% of candidates.

Part (a) required candidates to state physical and social effects on a person of heroin abuse. In general, the standard of answers was disappointing. The most common failing was lack of detail, even amongst more able candidates. As a result, relatively few candidates gained three or more of the available five marks.

Part (b)(i) required candidates to describe the chief signs and symptoms of HIV/AIDS. Many candidates failed to correctly identify more than one or two signs/symptoms. A wide variety of incorrect signs/symptoms e.g. *loss of weight*, *loss of appetite* often appeared in answers. Answers were generally disappointing, with few candidates gaining more than three of the available five marks.

Part (b)(ii) required candidates to explain how HIV/AIDS is spread. Full and relevant answers were common, with a majority of candidates gaining at least four of the available seven marks. It was pleasing to note that this aspect of the syllabus appears to be well understood by the majority of candidates.

Overall the standard of answer to this question was a little disappointing, especially **parts (a)** and **(b)(i)**. Marks of twelve, or greater, were relatively uncommon. The majority of candidates gained between six and nine marks.

Question 10 Or was based upon tuberculosis. This question was answered by approximately 10% of candidates.

Part (a) required candidates to state the chief signs and symptoms of tuberculosis. The majority of candidates provided reasonably full answers, and gained at least three of the available five marks.

Part (b) required candidates to state the cause of tuberculosis and to explain how the disease is spread and controlled. Once again, the majority of candidates provided much accurate detail concerning aspects of the spread and control, and usually gained at least five/six of the available ten marks. Many candidates, including more able ones, failed to make reference to the causative organism (*bacterium, Mycobacterium species*) thereby failing to gain these marking points.

Overall the general standard of answer to this question reasonably good, with the majority of candidates gaining at least eight or nine of the available fifteen marks. Whilst this question was much less popular than the **Question 10 Either** alternative, candidates who attempted this question tended to gain more marks than those who attempted the alternative.

HUMAN AND SOCIAL BIOLOGY

Paper 5096/22

Theory 22

General Comments

The large majority of candidates were able to complete both **Section A** and **Section B** questions as required, thus confirming that the time allowed for completion of the paper was adequate. A higher than usual number of candidates failed to comply with the rubric for **Section B** and answered both **Question 10 Either** and **Question 10 Or**. Most of these candidates also answered both **Questions 8** and **9**.

In general, the overall performance of candidates was comparable with recent examinations. The relative proportion of stronger candidates was again increased, confirming the trend established in recent years.

In **Section A**, **Question 7** proved to be a little more challenging than other questions for some candidates.

In **Section B**, none of the questions proved to be especially difficult.

Detailed Comments

Section A

Question 1 was concerned with various aspects of the circulatory system.

Part (a) required candidates to explain how the wall of the capillary is suited for its functions. A majority of candidates made correct reference to the thin wall, gaining one of the three available marks, but then often failed to link this aspect of structure with function e.g. to allow *diffusion* of substances *to/from cells*.

Part (b) required candidates to interpret information, presented graphically in **Fig. 1.2,** concerning blood pressure in the circulatory system. Many candidates correctly identified arteries as **B**, capillaries as **C** and the heart as **A**. A relatively common error was the mis-identification of capillaries as **D**.

Part (c) required candidates to explain how eating fat/cholesterol foods can lead to high blood pressure. A majority of candidates were able to correctly link the deposition of fat in blood vessels with narrowing of the lumen and gained both of the available marks.

Part (d) required candidates to describe how the structure of the heart ensures unidirectional blood flow through chamber **F** (*left ventricle*) shown in **Fig. 1.3**. The general standard of answer was disappointing, with many candidates failing to provide sufficient of *bicuspid/mitral* and *aortic/semilunar* valves and their actions.

Part (e) asked candidates to state two ways in which the **composition** of blood differs in chambers **E** and **F** as shown in **Fig. 1.3**. Many candidates made correct reference to differences in the relative levels of *oxygen* and *carbon dioxide* and gained marks accordingly. Some of these candidates failed, however, to explain the **reasons** for the differences and failed to gain further marks. A very common error was reference to *pressure* differences, when the question made specific reference to *composition*.

Part (f) was concerned with the consequences of the formation of a clot formation in the coronary artery upon cells in area **G** as shown in **Fig. 1.3**. Many candidates made correct reference to *lack of oxygen* and its effect upon *respiration* and scored accordingly. A very common failing was non-specific reference to lack of *nutrients* rather than specific reference to lack of *glucose* and *amino acids* and their effects. As a result, very few candidates managed to gain all of the five available marks.

Question 2 was concerned with aspects of the interpretation of experimental data, shown in **Fig. 2.1**, **Fig. 2.2** and **Table 2.3**, concerning the action of lipase upon samples of milk.

Part (a)(i) and **(ii)** required candidates to state one reason why bile salts were added to the mi[illegible] majority of candidates correctly identified *emulsification* and gained the available mark.

Part (b) asked candidates to explain how the action of lipase caused the indicator to change from pu[illegible] colourless. A minority of candidates were able to correctly identify the production of *fatty acids* from fats the enzyme action and the consequent *pH change* as being responsible. A wide variety of incorrect answers were seen.

Parts (c)(i) and **(ii)** required candidates to deduce the relative fat contents of samples **H**, **I**,**J** and to give an explanation for their answer. Whilst many candidates correctly identified the relative fat contents (**I<J<H**) and gained the available mark, fewer were able to give a valid explanation in order to secure the second available mark.

Question 3 was concerned with aspects of the female reproductive system.

Part (a) required candidates to identify a feature in **Fig. 3.1**, which showed the reproductive organs of a woman, which might indicate that the woman is infertile and to explain their answer. Most candidates correctly identified the blocked fallopian tubes/oviducts, and usually provided a correct explanation. A common error was candidates describing the non-movement movement of *ovaries* rather than *ova* through the fallopian tubes/oviducts as their explanation. Some candidates incorrectly described *mis-shapen/formed ovaries* as the feature.

Parts (b) and **(c)** required candidates to interpret **Fig. 3.2** which showed aspects of the menstrual cycle.

Part (b) was to suggest a time when implantation would be likely to be successful and to explain their answer. The time sought was *22 – 25 days*, but relatively few candidates gave answers within this time frame (usually answers were a day or two before). A majority of candidates, however, made correct reference to *condition of uterus* ***lining*** and *elevated levels of progesterone* as their explanation. A very common error was a description of the *uterus* ***wall*** rather than the ***lining***.

Part (c) required candidates to draw, on the graph in **Fig. 3.2**, a line to show the concentration of oestrogen from day 0 to day 28. Overall, the standard of answer was poor, with relatively few candidates even managing to gain one of the two available marks.

Question 4 was concerned with two different models to demonstrate the actions of muscles when a person is breathing, as shown in **Fig. 4.1**.

Part (a) required candidates to identify structures **P, Q, R** and **S**. More able candidates usually gained at least one of the two available marks, whilst weaker candidates gave a variety of incorrect answers for each of the structures. Common errors included identification of **P** as the sternum (rather than the vertebral column) and **R** as *internal* intercostal muscles (rather than *external* intercostals muscles).

Part (b) required candidates to name the muscles whose actions are represented by **K/L** and **M/N**. A majority of candidates were able to correctly identify these as *intercostals muscles* and *diaphragm* respectively, thereby gaining both of the available marks.

Part (c) required candidates to state which two of **K, L, M,** or **N** represent the thorax after breathing out. Most candidates correctly identified **N** to gain one mark, but often had difficulty in identifying **K** as the second correct answer, thereby missing the second marking point.

Part (d) asked candidates to state three ways in which **M** and **N** do not accurately represent the process of breathing. In general, this part of the question proved to be more challenging with few candidates gaining all three of the available marks and many gaining one or none.

Question 5 was concerned with the structure and function of the eye.

Part (a) showed, in **Fig. 5.1**, a section through an eye of a person who is focusing on a nea[r] Candidates were asked to continue, on **Fig. 5.1**, the light rays into the eye to show how a focused im[age] produced on the retina. Most candidates correctly showed the rays converging at the *fovea* to gain [one] mark, but failed to show refraction at **both** the *cornea* and the *lens* to score the second available mark. Refraction at the *cornea* was invariably missed.

Part (b)(i) required candidates to identify, from **Fig. 5.2**. which shape shown (**T, U, V, W**) most accurately resembles the lens in the eye when focused upon an aeroplane after looking at a book. More able candidates correctly identified **W** to gain the available mark, whilst less able candidates gave a variety of incorrect answers.

Part (b)(ii) asked candidates to describe how the change in shape of the lens described in **part (b)(i)** occurs. The answers sought were *ciliary muscles relaxes*, *suspensory ligaments tighten* (**not** *contract*!), and *elastic lens becomes thinner/less convex*. More able candidates often gained all three of the available marks. Common errors amongst less able candidates included incorrect mention of *circular and radial* muscles, *contraction* of suspensory ligaments, and *expansion/contraction* of the lens.

Question 6 showed, in **Fig. 6.1**, a replacement joint in a person's arm.

Part (a) required candidates to state the type of movement allowed by the replaced joint (elbow). Many candidates correctly answered *hinge* and thereby scored the available mark. A variety of incorrect answers were seen.

Part (b) required candidates to name the structure which attaches a muscle to point **Y** shown in **Fig. 6.1**, and to explain its importance in the movement of the forearm. Many candidates correctly named the structure as a *tendon*, thereby gaining one of the three available marks, and often mention its *inelastic* nature to gain another mark but were unable to add further detail (*transmits force to ulna*, *triceps contracts to straighten arm*) in order to gain the third available mark. A significant number of candidates incorrectly identified the structure as a *ligament* and failed to gain any marks.

Question 7 was concerned with aspects sweating.

Part (a) required candidates to explain why it is important not to use antiperspirant spray over the whole body. Relatively few candidates managed to gain all three of the available marks. The effect upon heat loss was often mentioned in generalised way to gain one mark, but sufficient detail of the process (*evaporation*, *removal of latent heat*) was often not provided in order to gain further marks. Many candidates gained one mark for mentioning the use of sprays in the most sweaty/smelly areas (e.g. *under arms*).

Part (b) required candidates to interpret data given **in Table 7.1** to suggest why the use of antibacterial soap is a better way of controlling body odour. Overall, the standard of answers was disappointing. Many candidates made no reference to the data shown in **Fig. 7.1** and failed to gain either of the available marks.

Section B

Question 8 was concerned with aspects disease.

Part (a) required candidates to describe the life history of a named parasitic flatworm. Most candidates correctly named *Schistosoma* (schistosomiasis/bilharzias) and provided sufficient correct detail of the life history to gain at least three of the available five marks. A common error was the failure to mention both larval stages, whilst some candidates failed to mention either of the larval stages. A small number of candidates based their answers upon *Taenia* (tapeworm), but often failed to provide sufficient correct detail of life history to gain marks.

Part (b) required candidates to name two bacterial diseases and describe the methods used to prevent their spread. The majority of candidates correctly named two diseases (usually two from *cholera, typhoid, tuberculosis, gonorrhoea*) and provided sufficient correct detail of methods used to prevent their spread in order to gain at least five or six of the available ten marks. Higher marks were not uncommon. A significant number of candidates provided much correct information concerning the *signs, symptoms, and effects* of the named diseases. Such information was not required in the question and, therefore, represented wasted time/effort by the candidates. Weaker candidates often provided sketchy answers and did not gain many marks. Some candidates named diseases caused by *viruses* or *fungi* and failed to gain any marks.

This question was reasonably well answered by the majority of candidates. Most candidates gain seven or eight of the available fifteen marks, whilst marks of twelve or higher were not uncommon.

Question 9 was concerned with aspects of the nitrogen cycle.

Part (a) required candidates to describe how a named nitrogen-containing ion in soil becomes part of a plant protein. A majority of candidates correctly named *nitrate* as the ion, and most were able to provide at least some of the detail concerning the transition of nitrate into plant protein. As a result, such candidates usually manage to gain at least three of the available five marks. Weaker candidates named a variety of incorrect substances in soil, which were often not ions e.g. *ammonia*, and failed to provide any correct detail concerning the synthesis of plant proteins.

Part (b) asked candidates to describe what happens to plant protein between consumption by animals and the return of part of it to a nitrogen-containing ion in the soil. Stronger candidates usually provided reasonably detailed accounts of protein digestion, amino acid absorption, deamination in the liver, excretion by the kidney and nitrification in the soil. As a result, such candidates usually gained at least five or six of the available ten marks. Weaker candidates often provided sketchy, and sometimes confused, answers.

Overall, the standard of answer to this question was pleasingly high. A majority of candidates managed to gain at least eight or nine of the available fifteen marks, whilst marks of twelve or higher were not uncommon.

Question 10 Either was a based upon immunity and the effects of motor exhaust fumes upon the body. This question was more answered by approximately 65% of candidates.

Part (a) required candidates to explain, using examples, the difference between active and passive immunity. Most candidates appeared to understand the basic difference between *active* and *passive* immunity and, usually, the subdivision of each of these types into *natural* and *artificial* variants. Stronger candidates often gave detailed answers and gained at least five of the available nine marks. The most common failing amongst weaker candidates was lack of relevant/correct details in their answers. Some of the weaker candidates confused *antibodies/antibiotics*, *lymphocytes/phagocytes.*

Part (b) required candidates to explain why motor exhaust fumes can be harmful to the body. This part of the question was generally well answered by the majority of candidates, who were able to identify *carbon monoxide, lead, particulates, oxides of nitrogen* and their individual effects. Many candidates gained at least three or four of the available six marks. A common error amongst weaker candidates was confusion between *carbon monoxide/carbon dioxide*.

Overall, this question was answered reasonably well by the majority of candidates, most of whom managed to gain at least eight or nine of the available fifteen marks.

Question 10 Or was genetics-based. This question, perhaps predictably, was answered by approximately 35% of candidates.

Part (a) asked candidates to distinguish between the terms *mitosis* and *meiosis*. Whilst the majority of candidates were able to make a basic distinction between the two terms and gained two of the available six marks, lack of sufficient further detail was a common failing. As a result, relatively few candidates gained more than four marks.

Part (b) required candidates to show, using symbols and with the help of a genetic diagram, how characteristics are inherited in a monohybrid heterozygous cross. This question was reasonably well answered which is perhaps not too surprising, since only stronger candidates with confidence in the subject matter would be likely to attempt it. Weaker candidates, who tend to be put off by genetics-based questions, would probably have opted to answer **Question 10 Either**. The majority of candidates correctly used upper/lower case letters and gave accurate genetic diagrams (sometimes in the form of a Punnett Square) to support their answers. As a result, many candidates gained at least six of the available nine marks and, often, more. Some of the weaker candidates who did attempt this question gave poor/confused answers and did not gain as many marks.

Overall the general standard of answer to this question was reasonably good. The majority of candidates gained at least eight or nine of the available fifteen marks.

HUMAN AND SOCIAL BIOLOGY

Paper 5096/23

Theory 23

General Comments

The large majority of candidates were able to complete both ***Section A*** and ***Section B*** questions as required, thus confirming that the time allowed for completion of the paper was adequate. A higher than usual number of candidates failed to comply with the rubric for ***Section B*** and answered both **Question 10 Either** and **Question 10 Or**. Most of these candidates also answered both **Questions 8** and **9**.

In general, the overall performance of candidates was comparable with recent examinations. The relative proportion of stronger candidates was again increased, confirming the trend established in recent years.

In ***Section A***, **Question 7** proved to be a little more challenging than other questions for some candidates.

In ***Section B***, none of the questions proved to be especially difficult.

Detailed Comments

Section A

Question 1 was concerned with various aspects of the circulatory system.

Part (a) required candidates to explain how the wall of the capillary is suited for its functions. A majority of candidates made correct reference to the thin wall, gaining one of the three available marks, but then often failed to link this aspect of structure with function e.g. to allow *diffusion* of substances *to/from cells*.

Part (b) required candidates to interpret information, presented graphically in **Fig. 1.2,** concerning blood pressure in the circulatory system. Many candidates correctly identified arteries as **B**, capillaries as **C** and the heart as **A**. A relatively common error was the mis-identification of capillaries as **D**.

Part (c) required candidates to explain how eating fat/cholesterol foods can lead to high blood pressure. A majority of candidates were able to correctly link the deposition of fat in blood vessels with narrowing of the lumen and gained both of the available marks.

Part (d) required candidates to describe how the structure of the heart ensures unidirectional blood flow through chamber **F** (*left ventricle*) shown in **Fig. 1.3**. The general standard of answer was disappointing, with many candidates failing to provide sufficient of *bicuspid/mitral* and *aortic/semilunar* valves and their actions.

Part (e) asked candidates to state two ways in which the **composition** of blood differs in chambers **E** and **F** as shown in **Fig. 1.3**. Many candidates made correct reference to differences in the relative levels of *oxygen* and *carbon dioxide* and gained marks accordingly. Some of these candidates failed, however, to explain the **reasons** for the differences and failed to gain further marks. A very common error was reference to *pressure* differences, when the question made specific reference to *composition*.

Part (f) was concerned with the consequences of the formation of a clot formation in the coronary artery upon cells in area **G** as shown in **Fig. 1.3**. Many candidates made correct reference to *lack of oxygen* and its effect upon *respiration* and scored accordingly. A very common failing was non-specific reference to lack of *nutrients* rather than specific reference to lack of *glucose* and *amino acids* and their effects. As a result, very few candidates managed to gain all of the five available marks.

Question 2 was concerned with aspects of the interpretation of experimental data, shown in **Fig. 2.1**, **Fig. 2.2** and **Table 2.3**, concerning the action of lipase upon samples of milk.

Part (a)(i) and **(ii)** required candidates to state one reason why bile salts were added to the mi[illegible] majority of candidates correctly identified *emulsification* and gained the available mark.

Part (b) asked candidates to explain how the action of lipase caused the indicator to change from pu[illegible] colourless. A minority of candidates were able to correctly identify the production of *fatty acids* from fats the enzyme action and the consequent *pH change* as being responsible. A wide variety of incorrect answers were seen.

Parts (c)(i) and **(ii)** required candidates to deduce the relative fat contents of samples **H**, **I**, **J** and to give an explanation for their answer. Whilst many candidates correctly identified the relative fat contents (**I**<**J**<**H**) and gained the available mark, fewer were able to give a valid explanation in order to secure the second available mark.

Question 3 was concerned with aspects of the female reproductive system.

Part (a) required candidates to identify a feature in **Fig. 3.1**, which showed the reproductive organs of a woman, which might indicate that the woman is infertile and to explain their answer. Most candidates correctly identified the blocked fallopian tubes/oviducts, and usually provided a correct explanation. A common error was candidates describing the non-movement movement of *ovaries* rather than *ova* through the fallopian tubes/oviducts as their explanation. Some candidates incorrectly described *mis-shapen/formed ovaries* as the feature.

Parts (b) and **(c)** required candidates to interpret **Fig. 3.2** which showed aspects of the menstrual cycle.

Part (b) was to suggest a time when implantation would be likely to be successful and to explain their answer. The time sought was *22 – 25 days*, but relatively few candidates gave answers within this time frame (usually answers were a day or two before). A majority of candidates, however, made correct reference to *condition of uterus* ***lining*** and *elevated levels of progesterone* as their explanation. A very common error was a description of the *uterus* ***wall*** rather than the ***lining***.

Part (c) required candidates to draw, on the graph in **Fig. 3.2**, a line to show the concentration of oestrogen from day 0 to day 28. Overall, the standard of answer was poor, with relatively few candidates even managing to gain one of the two available marks.

Question 4 was concerned with two different models to demonstrate the actions of muscles when a person is breathing, as shown in **Fig. 4.1**.

Part (a) required candidates to identify structures **P**, **Q**, **R** and **S**. More able candidates usually gained at least one of the two available marks, whilst weaker candidates gave a variety of incorrect answers for each of the structures. Common errors included identification of **P** as the sternum (rather than the vertebral column) and **R** as *internal* intercostal muscles (rather than *external* intercostal muscles).

Part (b) required candidates to name the muscles whose actions are represented by **K/L** and **M/N**. A majority of candidates were able to correctly identify these as *intercostals muscles* and *diaphragm* respectively, thereby gaining both of the available marks.

Part (c) required candidates to state which two of **K**, **L**, **M**, or **N** represent the thorax after breathing out. Most candidates correctly identified **N** to gain one mark, but often had difficulty in identifying **K** as the second correct answer, thereby missing the second marking point.

Part (d) asked candidates to state three ways in which **M** and **N** do not accurately represent the process of breathing. In general, this part of the question proved to be more challenging with few candidates gaining all three of the available marks and many gaining one or none.

Question 5 was concerned with the structure and function of the eye.

Part (a) showed, in **Fig. 5.1**, a section through an eye of a person who is focusing on a nea[r] Candidates were asked to continue, on **Fig. 5.1**, the light rays into the eye to show how a focused im[age] produced on the retina. Most candidates correctly showed the rays converging at the *fovea* to gain [one] mark, but failed to show refraction at **both** the *cornea* and the *lens* to score the second available mark. Refraction at the *cornea* was invariably missed.

Part (b)(i) required candidates to identify, from **Fig. 5.2**. which shape shown (**T, U, V, W**) most accurately resembles the lens in the eye when focused upon an aeroplane after looking at a book. More able candidates correctly identified **W** to gain the available mark, whilst less able candidates gave a variety of incorrect answers.

Part (b)(ii) asked candidates to describe how the change in shape of the lens described in **part (b)(i)** occurs. The answers sought were *ciliary muscles relaxes*, *suspensory ligaments tighten* (**not** *contract*!), and *elastic lens becomes thinner/less convex*. More able candidates often gained all three of the available marks. Common errors amongst less able candidates included incorrect mention of *circular and radial* muscles, *contraction* of suspensory ligaments, and *expansion/contraction* of the lens.

Question 6 showed, in **Fig. 6.1**, a replacement joint in a person's arm.

Part (a) required candidates to state the type of movement allowed by the replaced joint (elbow). Many candidates correctly answered *hinge* and thereby scored the available mark. A variety of incorrect answers were seen.

Part (b) required candidates to name the structure which attaches a muscle to point **Y** shown in **Fig. 6.1**, and to explain its importance in the movement of the forearm. Many candidates correctly named the structure as a *tendon*, thereby gaining one of the three available marks, and often mention its *inelastic* nature to gain another mark but were unable to add further detail (*transmits force to ulna*, *triceps contracts to straighten arm*) in order to gain the third available mark. A significant number of candidates incorrectly identified the structure as a *ligament* and failed to gain any marks.

Question 7 was concerned with aspects sweating.

Part (a) required candidates to explain why it is important not to use antiperspirant spray over the whole body. Relatively few candidates managed to gain all three of the available marks. The effect upon heat loss was often mentioned in generalised way to gain one mark, but sufficient detail of the process (*evaporation*, *removal of latent heat*) was often not provided in order to gain further marks. Many candidates gained one mark for mentioning the use of sprays in the most sweaty/smelly areas (e.g. *under arms*).

Part (b) required candidates to interpret data given **in Table 7.1** to suggest why the use of antibacterial soap is a better way of controlling body odour. Overall, the standard of answers was disappointing. Many candidates made no reference to the data shown in **Fig. 7.1** and failed to gain either of the available marks.

Section B

Question 8 was concerned with aspects disease.

Part (a) required candidates to describe the life history of a named parasitic flatworm. Most candidates correctly named *Schistosoma* (schistosomiasis/bilharzias) and provided sufficient correct detail of the life history to gain at least three of the available five marks. A common error was the failure to mention both larval stages, whilst some candidates failed to mention either of the larval stages. A small number of candidates based their answers upon *Taenia* (tapeworm), but often failed to provide sufficient correct detail of life history to gain marks.

Part (b) required candidates to name two bacterial diseases and describe the methods used to prevent their spread. The majority of candidates correctly named two diseases (usually two from *cholera, typhoid, tuberculosis, gonorrhoea*) and provided sufficient correct detail of methods used to prevent their spread in order to gain at least five or six of the available ten marks. Higher marks were not uncommon. A significant number of candidates provided much correct information concerning the *signs, symptoms, and effects* of the named diseases. Such information was not required in the question and, therefore, represented wasted time/effort by the candidates. Weaker candidates often provided sketchy answers and did not gain many marks. Some candidates named diseases caused by *viruses* or *fungi* and failed to gain any marks.

This question was reasonably well answered by the majority of candidates. Most candidates gain seven or eight of the available fifteen marks, whilst marks of twelve or higher were not uncommon.

Question 9 was concerned with aspects of the nitrogen cycle.

Part (a) required candidates to describe how a named nitrogen-containing ion in soil becomes part of a plant protein. A majority of candidates correctly named *nitrate* as the ion, and most were able to provide at least some of the detail concerning the transition of nitrate into plant protein. As a result, such candidates usually manage to gain at least three of the available five marks. Weaker candidates named a variety of incorrect substances in soil, which were often not ions e.g. *ammonia*, and failed to provide any correct detail concerning the synthesis of plant proteins.

Part (b) asked candidates to describe what happens to plant protein between consumption by animals and the return of part of it to a nitrogen-containing ion in the soil. Stronger candidates usually provided reasonably detailed accounts of protein digestion, amino acid absorption, deamination in the liver, excretion by the kidney and nitrification in the soil. As a result, such candidates usually gained at least five or six of the available ten marks. Weaker candidates often provided sketchy, and sometimes confused, answers.

Overall, the standard of answer to this question was pleasingly high. A majority of candidates managed to gain at least eight or nine of the available fifteen marks, whilst marks of twelve or higher were not uncommon.

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