Curriculum Council

TERTIARY ENTRANCE EXAMINATION, 2000

QUESTION/ANSWER BOOKLET

HUMAN BIOLOGY

Please place your student identification label in this box

STUDENT NUMBER - In figures

In words

TIME ALLOWED FOR THIS PAPER

Reading time before commencing work: Ten minutes
Working time for paper: Three hours

MATERIAL REQUIRED/RECOMMENDED FOR THIS PAPER

TO BE PROVIDED BY THE SUPERVISOR

This Question/Answer Booklet
Separate Multiple Choice Answer Sheet
Question Sheet for Part III (inside front cover of this Question/Answer Booklet)

TO BE PROVIDED BY THE CANDIDATE

Standard Items: Pens, pencils, eraser or correction fluid, ruler

Special Items: A 2B, B or HB pencil for the separate Multiple Choice Answer Sheet and calculators satisfying the conditions set by the Curriculum Council.

IMPORTANT NOTE TO CANDIDATES

No other items may be taken into the examination room.

It is your responsibility to ensure that you do not have any unauthorised notes or other [illegible] of a non-

STRUCTURE OF THIS PAPER

Part		No. of questions available	No. of questions to be attempted	Marks available
I	Multiple choice	40	ALL	80
II	Diagram and short answer questions	12	ALL	80
III	Extended answer questions:			
	Section A	2	1	20
	Section B	2	1	20

Total marks = 200

INSTRUCTIONS TO CANDIDATES

PART I Answer **ALL** questions, using a 2B, B or HB pencil, on the separate Multiple Choice Answer Sheet. Do **NOT** use a ball point or ink pen.

PART II Should be answered in this Question/Answer Booklet. Write your answers in the spaces provided, using a blue or black ball point or ink pen. Draw any diagrams in pencil.

PART III Should be answered in this Question/Answer Booklet. Answer on the pages following the end of questions, using a blue or black ball point or ink pen. Draw any diagrams in pencil. The questions for this part have been repeated on a removable question sheet, which is inserted into the front of this booklet, so that you can refer more easily to the questions while answering.

At the end of the examination, check that your Student Identification Label and your Student Number (in figures and words) have been placed in the spaces provided on the front cover of this Question/Answer Booklet and the separate Multiple Choice Answer Sheet.

SEE NEXT PAGE

QUESTION SHEET FOR PART III

Extended Answers (40 marks)

Answer ONE question from SECTION A and ONE question from SECTION B. Illustrate your answers with diagrams where appropriate. Up to TWO MARKS may be deducted for poorly structured answers: that is, answers in point form or diagrams not explained in the text of your answers. DO NOT WRITE ANSWERS IN PENCIL. Write your answers on the lined pages in your Question/Answer booklet following the end of the questions.

SECTION A

ANSWER EITHER QUESTION 53 OR QUESTION 54—NOT BOTH

QUESTION 53 (Total 20 marks)

Since HIV was first recognised in 1981 as the cause of AIDS, over 40 million people have been infected with this virus. The medical profession is under extreme pressure to investigate and cure this problem. Consider the various aspects of the virus using the following sections.

(a) Describe how the infectious agent is transmitted and relate this transmission to **three** associated risk groups. (4)

(b) What symptoms may a person show in the first two months after HIV infection, and how can the initial infection be detected? (6)

(c) Full-blown AIDS may not occur for many years following the initial infection with the virus. Describe the effect of long-term AIDS on the immune system and predict **three** likely natural causes of death of people with the disease. (6)

(d) Discuss **two** methods used to prevent the spread of the HIV virus. (4)

OR

QUESTION 54 (Total 20 marks)

(a) An athlete wearing a brief swim-suit competed in a summer triathlon in Western Australia that consisted of a swim in the ocean, followed by a bicycle ride, and then finished with a run. During the exercise, the working muscles generated excess heat.

Explain the body's response to the excess heat and describe the main ways in which heat is lost from the athlete's body during:
(i) the swim;
(ii) the bicycle ride;
(iii) the run. (12)

(b) Many athletes monitor their heart as they exercise. Describe what changes are expected to occur with the heart during exercise, why these changes are necessary for continued exercise, and how the changes in heart function occur. (8)

SECTION B

ANSWER EITHER QUESTION 55 OR QUESTION 56—NOT BOTH

QUESTION 55 (Total 20 marks)

(a) Evolution by natural selection is a commonly accepted theory for the appearance of diverse forms of life on earth. Discuss the evidence that suggests all vertebrates may have arisen from a common ancestor. (12)

(b) You have just constructed a family pedigree chart for a particular characteristic. After studying the pedigree, you recognise that the trait shows an autosomal pattern of inheritance. Explain what information the pedigree would contain for a dominant characteristic and what information it would contain if it was recessive. (8)

OR

QUESTION 56 (Total 20 marks)

(a) Urbanisation can have negative influences on a population, particularly in developing countries, as increasing numbers of people move to cities that are not ready to cope with the huge numbers. Describe **five** problems that may occur in crowded cities, and explain how these problems can be linked to poor health in the people. (10)

(b) With the evolution of ***Homo sapiens***, humans started to develop a culture. Some aspects of the culture of early humans can be assumed, by the study of remains and artefacts.

(i) Define the term "culture", as used by anthropologists investigating the life of early humans. (2)

(ii) Describe **four** examples of cultural traits that are assumed for humans living about 35,000 years ago. For each trait, describe the archaeological evidence and how this evidence indicates the evolution of culture. (8)

PART I (40 marks)

Mark your answers to Questions 1-40 on the **SEPARATE MULTIPLE CHOICE ANSWER SHEET**, using a 2B, B or HB pencil. If you make an error, follow the instructions given to you on the answer sheet.

SELECT THE SINGLE CORRECT ALTERNATIVE IN EACH OF THE FOLLOWING QUESTIONS

1. Urea is eliminated from the body via

   (a) the faeces and sweat glands.
   (b) the kidneys and the lungs.
   (c) the faeces.
   (d) the kidneys and sweat glands.

2. Reabsorption of sodium by the kidney occurs in

   (a) proximal and distal convoluted tubules only.
   (b) proximal and distal convoluted tubules and loop of Henle.
   (c) the loop of Henle alone.
   (d) distal convoluted tubule and collecting duct.

3. In which direction does blood flow in the capillaries surrounding the loop of Henle in the kidney?

   (a) From the renal artery and drains to the afferent arteriole of the glomerulus.
   (b) From the efferent arteriole of the glomerulus and drains to the renal vein.
   (c) From the afferent arteriole of the glomerulus and drains to the renal vein.
   (d) From the renal vein to the efferent arteriole of the glomerulus.

4. ***Homo erectus*** is thought to have lived

   (a) up to 35,000 years ago in Europe.
   (b) 2-3 million years ago, but only in Africa.
   (c) from 1.75 million to 250,000 years ago in Africa, Europe and East Asia.
   (d) between 35,000 and 1.75 million years ago only in Africa.

5. A clinal zone occurs in a region where

   (a) the physical characteristics of all people are very similar.
   (b) two groups of people are separated by a physical barrier, such as mountains.
   (c) people are found living in similar climatic conditions.
   (d) physical characteristics show gradual changes due to gene flow.

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6. Radiocarbon dating provides

(a) relative dating valid for rocks over 200,000 years old.
(b) absolute dating valid for organic material up to 70,000 years old.
(c) relative dating valid for organic material over 70,000 years old.
(d) absolute dating valid for rocks up to 70,000 years old.

7. The major physiological trigger for a sensation of thirst is

(a) a dry mouth from exercising excessively.
(b) becoming agitated and breathing rapidly.
(c) a rise in plasma osmotic pressure.
(d) having drinks containing caffeine.

8. The movement of water between cells and their environment is controlled by

(a) ATP metabolism and active transport.
(b) fluid pressure and osmotic forces.
(c) fluid pressure and filtration.
(d) osmotic forces and active transport.

9. Deamination of proteins involves

(a) liberation of ammonia from amino acids by the liver.
(b) production of sugars by the liver and kidney.
(c) liberation of ammonia from amino acids by the kidney.
(d) production of small amounts of urea by the sweat glands.

10. The type of fluid that makes up two-thirds of the total water in the body is

(a) tissue fluid.
(b) plasma.
(c) cerebrospinal fluid.
(d) cytoplasm.

11. Humans are believed to have first entered Australia

(a) less than 10,000 years ago when they arrived with dingoes.
(b) between 20,000 and 30,000 years ago by a land bridge from SE Asia.
(c) over 40,000 years ago, after Australia and Tasmania last separated due to rising sea levels.
(d) over 40,000 years ago by means of one or more ocean journeys.

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12. The first appearance of skeletal remains of modern-appearing ***Homo sapiens*** in Europe has been dated to about 40,000 years ago. This was accompanied by

(a) increased evidence of the cultivation of grains, and settlement in villages.
(b) blade stone tools and art-works in the same strata as the skeletons.
(c) increased skull size and body mass in the skeletons.
(d) increased numbers of bones of domesticated sheep and cattle.

13. **Racism** is defined as the belief that groups of people

(a) have become phenotypically different by isolation and genetic drift.
(b) who differ in appearance and genetic origin are inherently inferior or superior.
(c) have become phenotypically different by refusal to interbreed.
(d) can be classified according to their phenotypic appearance.

14. In a neuron, the impulse is conducted through the dendrite to the

(a) myelin sheath.
(b) axon.
(c) associated sensory neuron.
(d) cell body.

15. Which of this list is **NOT** a part of the body's peripheral nervous system?

(a) Cranial nerves
(b) Spinal nerves
(c) Spinal cord
(d) Touch receptor

16. Name the part of the brain that regulates body temperature, hunger, thirst, and sleep.

(a) Medulla
(b) Hypothalamus
(c) Cerebrum
(d) Pons

17. Sensory hair cells can be found in all of the structures listed below **except** the

(a) auditory canal.
(b) cochlea.
(c) semicircular canals.
(d) vestibule.

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18. A dominant gene controls tongue rolling. A man who can roll his tongue is married to a woman who cannot. They have four children, who can roll their tongue and two who cannot. If '**A**' represents the gene for tongue rolling and '**a**' the recessive allele, what is the genotype of the parents?

(a) Man **Aa** x woman **AA**
(b) Man **Aa** x woman **Aa**
(c) Man **AA** x woman **aa**
(d) Man **Aa** x woman **aa**

19. Red-green colour-blindness is an X-linked recessive disorder. A mother with this condition will pass this allele to

(a) her daughters only.
(b) all of her children.
(c) her sons only.
(d) none of her children.

20. World population growth is

(a) at a sustainable rate.
(b) best controlled by decreasing birth rate.
(c) made up of similar growth rates in all continents.
(d) not of concern due to improved agricultural productivity.

21. Cystic fibrosis is an autosomal recessive disease. A married couple are both carriers for this disease. If they have two children, what is the probability that **both** will be born free from this disease?

(a) 9/16
(b) 1/16
(c) 2/3
(d) 6/8

22. Which of the following is **NOT** a characteristic of an X-linked recessive disorder?

(a) For a female to show the trait, her father must also have it.
(b) More males than females are affected.
(c) The trait often skips a generation from grandmother to grand-daughter.
(d) If a woman has the trait, all of her sons will have it.

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23. During the ovarian and menstrual cycle

(a) LH is released from the anterior pituitary in response to increased oestrogen from the ovarian follicle.
(b) FSH is inhibited by the release of oxytocin from the posterior pituitary after ovulation of the follicle.
(c) menstruation occurs as a consequence of the inhibition of LH by progesterone from the corpus luteum.
(d) progesterone is released from the non-pregnant uterus allowing secretion of FSH to stimulate the growth of a new follicle.

24. The release of thyroid stimulating hormone (TSH) from the anterior pituitary

(a) is stimulated by increasing blood concentrations of thyroxine.
(b) is decreased when there is increased secretion of TSH-releasing factor.
(c) does not occur, because thyroid stimulating hormone is released from the hypothalamus.
(d) is increased when there is a low metabolic rate or increased energy requirement.

25. Antidiuretic hormone (ADH) is released from the

(a) posterior pituitary in response to excessive consumption of water.
(b) anterior pituitary and causes the distal convoluted tubule of the nephron to become impermeable to water.
(c) posterior pituitary and causes the collecting duct of the nephron to become permeable to water.
(d) hypothalamus and causes the proximal convoluted tubule to become impermeable to sodium.

26. Taking drugs on a regular basis can

(a) only cause physical dependence in cases of prolonged use.
(b) only cause problems of dependence with illegal substances.
(c) result in the development of tolerance so that smaller doses are required for the same effect.
(d) lead to physical or psychological dependence on that drug.

27. Cardiovascular disease, brain damage and cirrhosis of the liver are all symptoms of the long-term abuse of

(a) heroin.
(b) nicotine.
(c) alcohol.
(d) marijuana.

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28. Cardiac output is

(a) influenced by both the stroke volume and the heart rate.
(b) increased by the parasympathetic nervous system.
(c) not influenced by seasonal changes.
(d) unchanged by the amount of blood returning to the heart.

29. In a population of 2 million people, for one particular year, there were 20,000 births and 4,000 deaths. The percentage rate of natural increase of that population for that year was closest to

(a) 16.0
(b) 0.8
(c) 4.0
(d) 1.0

30. Regarding the population of a developing country, we generally find a

(a) high birth rate and low death rate.
(b) low birth rate and low death rate.
(c) low birth rate and high death rate.
(d) high birth rate and high death rate.

31. Algal bloom is a problem in waterways

(a) because it uses up nitrogen in the water so there is none for the fish.
(b) that can result from excessive salinity of waterways following tree clearing.
(c) that results from run-off of toxic metals such as lead from the roads.
(d) producing toxins and reducing oxygen in the water so that water animals die.

32. Excessive nutrient concentrations in waterways can be reduced by

(a) limiting the use of fertilisers and using slow release fertilisers.
(b) use of soaps rather than detergents for washing clothes.
(c) making sure there are plenty of fish in the water to use the nutrients.
(d) aerating the water, for example with fountains.

33. During exercise, the heart rate increases

(a) due to the decreased carbon dioxide in the blood.
(b) to increase the supply of blood to the alimentary organs.
(c) and the blood vessels in the muscles dilate.
(d) and the firing of the sino-atrial node is decreased.

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34. When a person is exposed to the cold, the body can warm itself by

(a) vasoconstriction of skin blood vessels and parasympathetic outflow to the adrenal gland.
(b) increasing metabolic rate through the effects of noradrenalin and thyroxine.
(c) shivering and vasodilation to bring the warm blood to the skin surface.
(d) vasoconstriction and sweating.

35. Loss of skin pigment by people living in Northern Europe is thought to have given selective advantage because

(a) it increased sexual attractiveness and hence the genes controlling this feature increased in the population.
(b) it shows close correlation with increased intelligence and creativity.
(c) it shows close correlation with physiological tolerance for cold, wet conditions.
(d) increased penetration of UV light assists the skin to create Vitamin D, lacking in the typical diet of this region.

36. Which **pair** of statements in the table below best describes aspects of cell-mediated **AND** humoral immunity?

	Humoral Immunity	Cell-mediated Immunity
(a)	Lymphocytes produced in bone marrow	Lymphocytes produced in the thyroid
(b)	Lymphocytes secrete antibodies	Plasma cells produce antibodies
(c)	Antigen is attacked by antibody	Antigen is attacked by killer cells
(d)	Attracts pathogens in lymphatic fluid	Destroys pathogens in the bloodstream

37. Plasma cells are formed from

(a) T lymphocytes.
(b) B lymphocytes.
(c) macrophages.
(d) red bone marrow cells.

38. The lymphocytes that activate the secondary immune response are

(a) memory cells.
(b) helper T cells.
(c) activated T cells.
(d) plasma cells.

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39. The skull of *Homo sapiens neanderthalensis* ...e distinguished from that of *Homo sapiens sapiens* because the Neanderthal skull has

(a) a larger cranial capacity.
(b) a flatter face.
(c) less pronounced brow ridges.
(d) a more prominent, defined chin.

40. Which of the following is true about **active immunity**?

(a) The antibody formed will attack any pathogen.
(b) Both B and T lymphocytes can play a role.
(c) It is short-lived because no memory cells are involved.
(d) Prepared immunoglobulins activate this type of immunity.

END OF PART I

PART II (80 marks)

Write answers to ALL questions on the ruled lines after each question or in the spaces provided within each table. Write your answers in blue or black ballpoint or ink pen.

QUESTION 41 (Total 6 marks)

(a) Bipedalism is a trait that distinguishes human from pongid skeletons. In the table below, list **one** distinctive feature of each anatomical region that is most important in permitting this distinction.

Region	Pongids	Humans
(i) Foot		
(ii) Shape of spine		
(iii) Angle of femur to vertical		

(3)

(b) The robust Australopithecines are thought to have had a diet with a high content of fibre and coarse material to process by chewing. List **three** features of the skull that support this hypothesis.

_____

_____

_____

_____

_____ (3)

QUESTION 42 (Total 3 marks)

A man is lost without water in the desert when the ... me temperature is around 40°C and humidity is low. He survives for a while but his urine becomes progressively more concentrated. List the sequence of events that cause the kidneys to produce more concentrated urine.

_____

_____

_____

_____

_____ (3)

QUESTION 43 (Total 6 marks)

(a) Explain how a hormonal message affects only its target cells.

_____

_____

_____

_____ (2)

(b) Name the particular cell clusters of the pancreas that secrete insulin.

_____

_____ (1)

(c) Describe **three** cellular effects of insulin in response to an increased blood concentration of glucose.

_____

_____

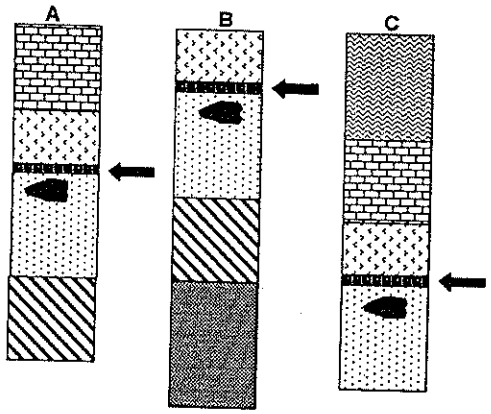
_____

_____

_____ (3)

SEE NEXT PAGE

QUESTION 44 (Total 5 marks)



The three sets of layers from different archaeological dig sites shown above have suffered differing amounts of surface erosion. A layer of volcanic ash (arrowed) has been dated to approximately 200,000–300,000 years ago. Crudely-made stone tools are found in all sites in a discrete layer, immediately **below** the ash layer. Immediately **above** the volcanic ash is a layer with an unusual collection of fossilized bones, from animals living on an ancient shoreline.

(a) What name is given this method of studying rock layers in archaeology?

_____ (1)

(b) Which of the dig sites, A, B or C, contains the youngest layer?

_____ (1)

(c) How do you know this is the youngest?

_____

_____ (1)

(d) What name is given to such a group of fossils that is found in different parts of the world and that indicates a specific period of time?

_____ (1)

(e) Name a member of the genus ***Homo*** who could **NOT** have made the stone tools.

_____ (1)

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QUESTION 45 (Total 6 marks)

The term "Neolithic (Agricultural) Revolution" is applied to a set of changes that occurred in human lifestyles, which had major impacts on the environment. These commenced about 11,000 years ago in the Fertile Crescent of the Middle East and then spread out from there. List the major changes that occurred in the following.

(a) Pattern of human habitation

_____

_____ (1)

(b) Use of grain plants

_____

_____ (1)

(c) Forest cover

_____

_____ (1)

(d) Associations with animals

_____

_____ (1)

(e) Soil fertility

_____

_____ (1)

(f) New crafts

_____

_____ (1)

QUESTION 46 (Total marks)

(a) A person whose thyroid gland is damaged may be unable to make thyroid hormone. Considering the normal actions of this hormone, what might happen to a person who is unable to make it?

_____

_____ (1)

(b) What would you predict about the amount of TSH released in a person with an inactive, damaged thyroid gland, compared to a healthy person? Explain why you make this prediction about TSH.

_____

_____

_____

_____

_____ (2)

(c) You are designing an experiment to test a new drug to be used as a replacement hormone for people with damaged thyroid glands. There are 100 such people in the experiment and you divide them into two groups, a Control group and an Experimental group, to test your drug. Explain how you will choose who goes in which group, and why you have chosen in this way.

_____

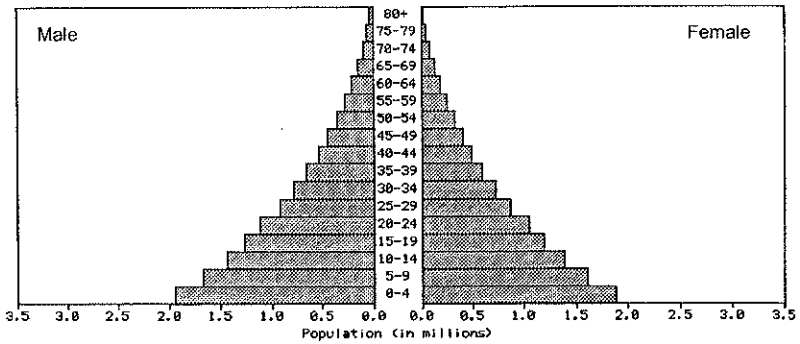
_____

_____

_____ (2)

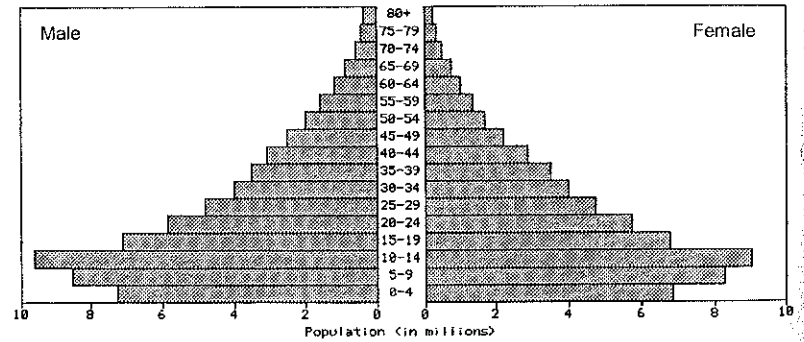
QUESTION 47 (Total 10 marks)

Population A
Age in years



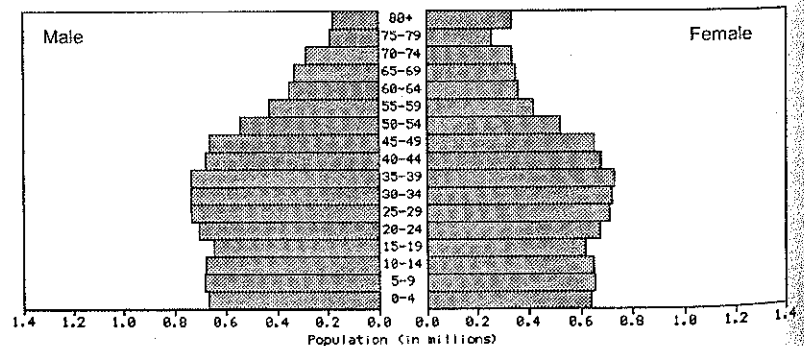
Source: U.S. Census Bureau, International Data Base.

Population B
Age in years



Source: U.S. Census Bureau, International Data Base.

Population C
Age in years



Source: U.S. Census Bureau, International Data Base.

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QUESTION 47

(a) Consider the three population pyramids representing Country A, B and C on the previous page and answer the following questions.

(i) What do you interpret has been happening in Country B compared with Country A regarding the numbers of children in the population aged under 10 years?

_____

_____

_____

_____ (2)

(ii) Which country do you predict has the longest life expectancy? Give one reason why life expectancy may be better in that country.

_____

_____

_____

_____ (2)

(iii) Which country would you predict to have the highest rate of natural increase in population?

_____ (1)

(iv) In Country B, approximately how many more males are there in the age group 30–34 years, compared with in the age group 50–54?

_____ (1)

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QUESTION 47 (continued)

Mean height (cm) of boys and girls according to age and origin

Origin of children	Boys aged 10	Boys aged 18	Girls aged 10	Girls aged 18
Japan, 1900	123	161	123	147
Japan 1954	131	166	131	153
Japanese-Americans 1957	136	169	137	156

Data adapted from Greulich, WW (1976).

(b) The table above shows mean heights in centimetres for large groups of children aged 10 and 18 years, calculated from three sets of measurements. One set was taken in Japan in 1900, one in Japan in 1954 and one in children of Japanese origin living in North America in 1957. This last group of children were born in America to parents who had migrated from Japan.

(i) What is the difference in mean height between the Japanese-American girls at age 18 and those who were measured at the same age in Japan in 1900?

_____ (1)

(ii) Which group of boys shows the greatest difference in height between ages 10 to 18?

_____ (1)

(iii) What **general** trend is apparent for the children of immigrants compared with those born in Japan?

_____ (1)

(iv) What is the most likely reason for this change in phenotype?

_____ (1)

SEE NEXT PAGE

QUESTION 48 (Total 6 marks)

(a) (i) Sometimes people become so upset that they hyperventilate. What effect does hyperventilation have on the concentration of carbon dioxide in the blood?

_____

_____ (1)

(ii) Explain why a person who is hyperventilating may feel dizzy or faint.

_____

_____

_____

_____ (2)

(b) Explain why we cannot voluntarily hold our breath for a very long time, without spontaneously taking a breath.

_____

_____

_____

_____

_____

_____ (3)

SEE NEXT PAGE

QUESTION 49 (Total 12 marks)

(a) Sensory impulses are physiologically identical regardless of the type of receptor involved. However, they give us completely different sensations. State briefly how this is accomplished.

_____

_____ (1)

(b) Answer this part with reference to the diagram of an ear, below.

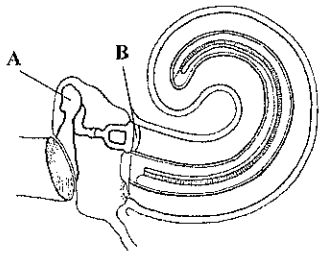


Diagram adapted from Newton and Joyce "Human Perspectives" 2nd Edition 1990.

(i) Describe the function of structure **A**.

_____

_____ (1)

(ii) If structure **B** were to harden and become rigid, describe the effect this could have on the hearing process.

_____

_____

_____

_____ (1)

QUESTION 49

(c) Describe why death could result if a small area of the medulla oblongata is damaged, while similar damage to the cerebrum may not be fatal.

_____

_____

_____

_____ (2)

(d) Cells located in the brain have limited storage capacity for energy giving molecules. Since these cells function continuously how is this problem solved?

_____

_____

_____ (1)

(e) The internal environment must be kept relatively constant for our body cells to function properly. Name the fastest method of responding to a stimulus to maintain homeostasis.

_____ (1)

(f) Cerebrospinal fluid is formed from the blood. It circulates throughout the Central Nervous System, and is gradually reabsorbed into the blood. Why does cerebrospinal fluid circulate in this manner?

_____

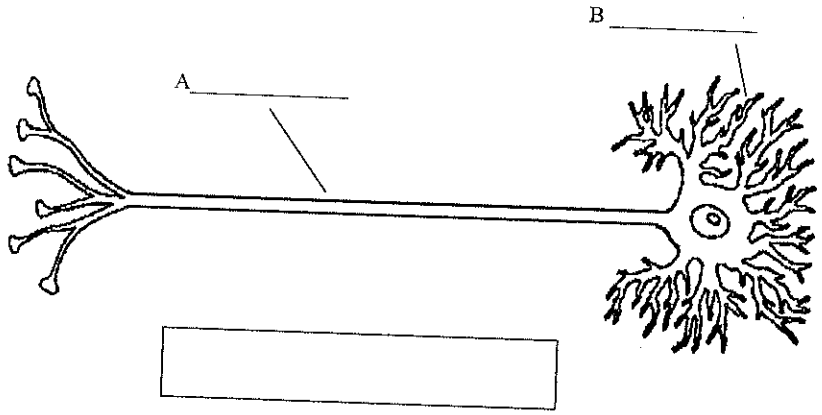
_____

_____

_____ (2)

QUESTION 49 (continued)

(g) Label the structures A and B of the neuron drawn below. Draw an arrow in the box provided to indicate the direction of the nerve impulse.



(3)

QUESTION 50 (Total 11 marks)

(a) A married couple has blood types **A** and **B** respectively.

(i) In the space provided below, show how you would work out the different possible blood genotype(s) their children might inherit. (4)

(ii) Other than the blood phenotypes of the parents, name the other possible blood phenotypes the children may inherit.

_____

_____ (2)

(b) Blood typing can be used in paternity suits when the identity of the father is questioned. Briefly, explain why a blood test can only suggest who is **not** the father.

_____

_____

_____

_____ (2)

(c) A married couple have three children who have free ear lobes, an autosomal dominant trait, and one child that has attached ear lobes. Using **F** to represent the allele for free lobes and **f** for attached lobes, what are the most likely genotypes of the parents?

_____ (1)

(d) The comparative study of proteins has provided evidence of evolution. The protein haemoglobin, which carries oxygen, is used in this type of study.

(i) For the structure of the haemoglobin molecule to be used in a comparative study, what must be determined?

_____ (1)

(ii) What results would indicate only a "distant" relationship between a pongid and a human?

_____

_____ (1)

QUESTION 51 (Total 5 marks)

(a) Even if they show a good immune response to vaccination, some people will still get the flu (influenza) year after year. Explain how this could happen.

_____

_____

_____ (1)

(b) A person who has just been stung by the deadly box jellyfish faces certain death without fast treatment. An injection is given and the person makes a complete recovery.

(i) What did the injection contain?

_____ (1)

(ii) Name the type of immunity this provided.

_____ (1)

(iii) Why was this sort of treatment used?

_____ (1)

(c) Even though we have never been exposed to a different blood type, we carry the antibodies against them in our blood. State how we could have acquired these antibodies.

_____

_____ (1)

QUESTION 52 (Total 5 marks)

(a) Explain how the provision of clean water and sanitation in a developing country can reduce the death rate of its population.

_____

_____

_____

_____

_____ (3)

(b) List **two** long term health problems that may result from smoking tobacco.

_____

_____

_____

_____ (2)

END OF PART II

PART III (40 marks)

Answer **ONE** question from **SECTION A** and **ONE** question from **SECTION B**. Illustrate your answers with diagrams where appropriate. Up to **TWO MARKS** may be deducted for poorly structured answers: that is, answers in point form or diagrams not explained in the text of your answers. **DO NOT WRITE ANSWERS IN PENCIL**. Write your answers on the lined pages in your Question/Answer booklet following the end of the questions.

SECTION A

ANSWER EITHER QUESTION 53 OR QUESTION 54—NOT BOTH

QUESTION 53 (Total 20 marks)

Since HIV was first recognised in 1981 as the cause of AIDS, over 40 million people have been infected with this virus. The medical profession is under extreme pressure to investigate and cure this problem. Consider the various aspects of the virus using the following sections.

(a) Describe how the infectious agent is transmitted and relate this transmission to **three** associated risk groups. (4)

(b) What symptoms may a person show in the first two months after HIV infection, and how can the initial infection be detected? (6)

(c) Full-blown AIDS may not occur for many years following the initial infection with the virus. Describe the effect of long-term AIDS on the immune system and predict **three** likely natural causes of death of people with the disease. (6)

(d) Discuss **two** methods used to prevent the spread of the HIV virus. (4)

OR

QUESTION 54 (Total 20 marks)

(a) An athlete wearing a brief swim-suit competed in a summer triathlon in Western Australia that consisted of a swim in the ocean, followed by a bicycle ride, and then finished with a run. During the exercise, the working muscles generated excess heat.

Explain the body's response to the excess heat and describe the main ways in which heat is lost from the athlete's body during:
(i) the swim;
(ii) the bicycle ride;
(iii) the run. (12)

(b) Many athletes monitor their heart as they exercise. Describe what changes are expected to occur with the heart during exercise, why these changes are necessary for continued exercise, and how the changes in heart function occur. (8)

SEE NEXT PAGE

SECTION B

ANSWER EITHER QUESTION 55 OR QUESTION 56—NOT BOTH

QUESTION 55 (Total 20 marks)

(a) Evolution by natural selection is a commonly accepted theory for the appearance of diverse forms of life on earth. Discuss the evidence that suggests all vertebrates may have arisen from a common ancestor. (12)

(b) You have just constructed a family pedigree chart for a particular characteristic. After studying the pedigree, you recognise that the trait shows an autosomal pattern of inheritance. Explain what information the pedigree would contain for a dominant characteristic and what information it would contain if it was recessive. (8)

OR

QUESTION 56 (Total 20 marks)

(a) Urbanisation can have negative influences on a population, particularly in developing countries, as increasing numbers of people move to cities that are not ready to cope with the huge numbers. Describe **five** problems that may occur in crowded cities, and explain how these problems can be linked to poor health in the people. (10)

(b) With the evolution of ***Homo sapiens***, humans started to develop a culture. Some aspects of the culture of early humans can be assumed, by the study of remains and artefacts.

(i) Define the term "culture", as used by anthropologists investigating the life of early humans. (2)

(ii) Describe **four** examples of cultural traits that are assumed for humans living about 35,000 years ago. For each trait, describe the archaeological evidence and how this evidence indicates the evolution of culture. (8)

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END OF PAPER