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TERTIARY ENTRANCE EXAMINATION, 1989

QUESTION/ANSWER BOOKLET

HUMAN BIOLOGY

Please place one of your student identification labels in this box

STUDENT SEA NUMBER—In figures

In words

TIME ALLOWED FOR THIS PAPER

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

MATERIAL REQUIRED/RECOMMENDED FOR THIS PAPER

TO BE PROVIDED BY THE SUPERVISOR

This Question/Answer Booklet comprising	PART I	Pages 3-15
	PART II	Pages 16-31
	PART III	Pages 32-33
Essay sheets for	PART III	Pages 34-41
Space for rough work		Page 42
Spare graph sheet		Page 43

Separate Multiple Choice Answer Sheet

TO BE PROVIDED BY THE CANDIDATE

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

Special Items
A '2B' pencil for the Separate Multiple Choice Answer Sheet

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 items of a non-personal nature in the examination room. Please check carefully, and if you have any unauthorised material with you, hand it to the supervisor BEFORE reading any further.

SEE PAGE 2

INSTRUCTIONS TO CANDIDATES

PART I — Questions 1-40 80 marks
This part consists of multiple choice questions, which should be answered on the separate Multiple Choice Answer Sheet.
USE A '2B' PENCIL.
DO NOT USE A BALL POINT OR INK PEN.

PART II — Questions 41-46 80 marks
This part consists of six (6) diagram and short answer questions. These should be answered in the spaces provided in the Question/Answer Booklet.
Write your answers in blue or black ball point or ink pen.
Plot the graph in question 45b using a '2B' pencil.

PART III — Questions 47-50 40 marks
This part consists of four (4) essay questions.
Answer ANY TWO (2) questions in PART III.
The essays for PART III should be written on pages 34-41 of the question paper in blue or black ball point pen or ink pen. Draw any diagrams in pencil.

At the end of the examination carefully check that you have placed your Student Identification Label, and that you have written your student SEA number in figures and words, in the spaces provided on the front cover of this Question/Answer Booklet.

SEE PAGE 3

PART I

MARK YOUR ANSWERS TO QUESTIONS 1-40 ON THE SEPARATE MULTIPLE CHOICE ANSWER SHEET, USING A "2B" PENCIL. IF YOU MAKE AN ERROR FOLLOW THE INSTRUCTIONS GIVEN TO YOU ON THE ANSWER SHEET.

IN EACH QUESTION CHOOSE THE BEST ALTERNATIVE.

1. Apart from the genus *Homo* the only other genus in the family Hominidae was

   (a) *Australopithecus.*
   (b) *Ramapithecus.*
   (c) *Afarensis.*
   (d) *Neanderthalensis.*

2. Dating by means of fluorine analysis

   (a) allows the ages of fossils at the same site to be compared.
   (b) gives an absolute date for a fossil bed.
   (c) only gives an accurate date for fossils less than 70,000 years old.
   (d) can only be done on fossil teeth.

3. The first hominid to regularly use fire was

   (a) *Homo sapiens sapiens.*
   (b) *Homo habilis.*
   (c) *Homo erectus.*
   (d) Neanderthal man.

4. On present evidence the migration of *Homo sapiens* into North America was achieved by

   (a) canoeing from the Sunda continental shelf to the Sahul continental shelf.
   (b) rafting and island hopping across the Atlantic Ocean from Africa.
   (c) walking over a land bridge that once joined Asia and North America.
   (d) crossing from South America through the central American land bridge.

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5. Classifying humans into racial groups

(a) means that only some humans alive today belong to *Homo sapiens sapiens*.
(b) demonstrates evolutionary relationships.
(c) is based entirely on ABO blood group frequencies around the world.
(d) proves that some races are more highly evolved than others.

6. The Neanderthals

(a) had a primitive stone tool culture.
(b) did not bury their dead.
(c) never hunted big game.
(d) had a brain that was, on average, at least as large as that of modern humans.

7. The biological name for "Neanderthal man" is

(a) *Homo sapiens neanderthalensis*.
(b) *Homo sapiens sapiens*.
(c) *Homo neanderthalensis*.
(d) *Homo erectus*.

8. Humans started practising agriculture

(a) about 15,000 years ago in the Mesolithic age just after the end of the last ice age.
(b) approximately 11,000 years ago at the beginning of the Neolithic age.
(c) shortly after the appearance of modern humans about 30,000 years ago.
(d) about 5,000 years ago at the beginning of recorded history.

9. Fossilized remains of *Homo erectus* have **NOT** been found in

(a) Indonesia.
(b) Australia.
(c) China.
(d) Europe.

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10. A kitchen midden is

(a) a prehistoric site containing evidence of food preparation.
(b) layers of charcoal from campfires that had been used to cook meat.
(c) a collection of stone tools.
(d) a mound composed entirely of animal remains.

11. Artefacts are

(a) stone tools.
(b) pottery and fine bone tools.
(c) objects deliberately made by hominids.
(d) works of art left by our ancestors.

12. Considerable archeological evidence demonstrates that humans first began to sow seeds in an area that is now

(a) China.
(b) Mexico.
(c) the Middle East.
(d) Peru.

13. Potassium-argon dating of volcanic lava would depend upon the fact that

(a) molten lava contains little or no argon.
(b) potassium breaks down to calcium as well as argon.
(c) the mass of potassium in lava increases as argon decays.
(d) at the time of death organisms stop consuming potassium so the quantity of potassium in a fossil shows how long it has been dead.

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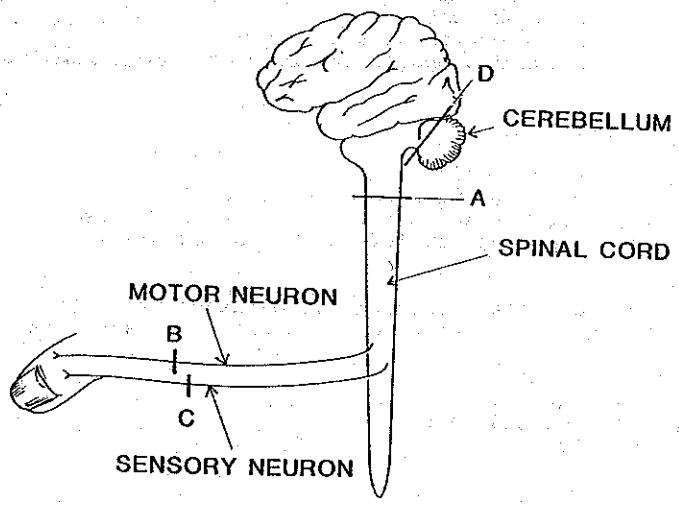
Questions 14 and 15 refer to the simplified diagram below of the nerve supply to a toe. Lines **A**, **B**, **C** and **D** show regions of the nervous system which might be blocked.



14. If the skin over the toe is stimulated and the stimulus can be felt but the toe cannot be moved then the block is at

(a) A.
(b) B.
(c) C.
(d) D.

15. If the toe is stimulated it moves, but neither this movement nor the stimulation can be felt, then the block is at

(a) A.
(b) B.
(c) C.
(d) D.

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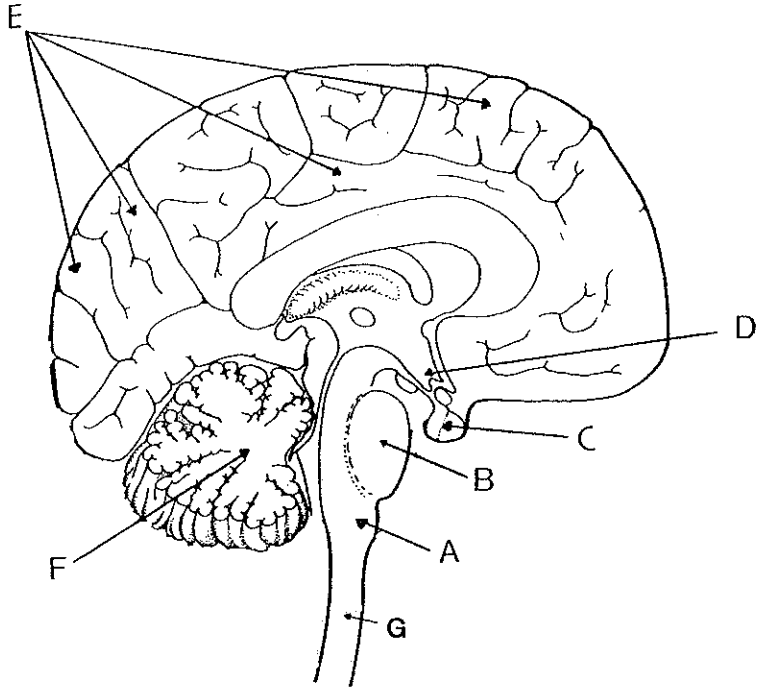
Question 16 refers to the section of the brain illustrated below.



16. Which of the following is **CORRECT** ?

(a) **D** is the hypothalamus, **F** is the cerebral cortex and **G** is the spinal cord.
(b) **A** is the medulla, **B** is the pons and **F** is the cerebellum.
(c) **B** is the hypothalamus, **C** is the pituitary gland and **E** is the cerebrum.
(d) **C** is the hypothalamus, **F** is the cerebellum and **G** is the spinal cord.

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17. A motor neuron has its cell body located in

(a) gray matter of the spinal cord.
(b) gray matter of the cerebrum.
(c) white matter of the spinal cord.
(d) a dorsal root ganglion.

18. Which of the following statements about the autonomic nervous system is **INCORRECT** ?

(a) It regulates the activities of smooth muscle, cardiac muscle and glands.
(b) It usually operates without conscious control.
(c) It is regulated by centres in the cerebral cortex, hypothalamus and the medulla.
(d) It contains motor and sensory nerve fibres.

19. Which of the following **DOES NOT** occur after stimulation of the sympathetic division of the autonomic nervous system.

(a) Increased secretion from sweat glands.
(b) Decreased motility of the gut.
(c) Constriction of the pupil.
(d) Dilation of the bronchial tubes in the lungs.

20. A sample of fluid taken from a healthy person was analysed. The fluid was found to contain water, glucose, urea and salts and therefore this fluid could **NOT** have been.

(a) intercellular fluid.
(b) cerebrospinal fluid.
(c) glomerular filtrate.
(d) urine.

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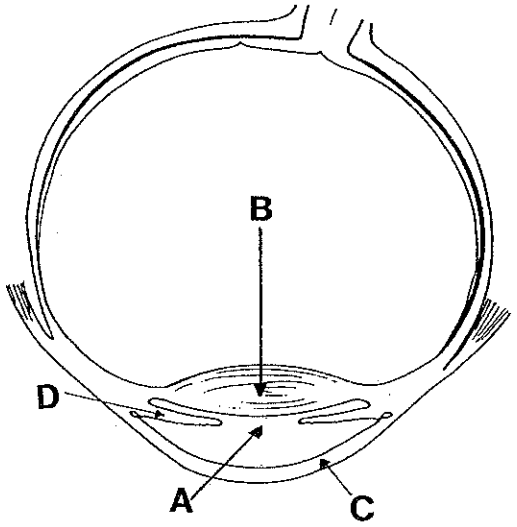
Question 21 refers to the diagram of the eye below.



21. What labelled part of the eye is principally concerned with controlling the amount of light falling on the retina ?

(a) A.
(b) B.
(c) C.
(d) D.

22. Many nerve fibres consist of an axon and its myelin sheath. This myelin sheath

(a) is responsible for the colour of the gray matter in the brain and spinal cord.
(b) is produced by Schwann cells located along the axon.
(c) is continuous all the way along the axon.
(d) all of the above.

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23. Which of the following statements about **ALL** hormones is correct ?

(a) They change the activities of cells.
(b) Their activity is monitored by the pituitary gland.
(c) Their activity is monitored by the hypothalamus.
(d) Each hormone can act on only one specific target organ.

24. It is important that mucous membranes resist the invasion of bacteria and viruses because

(a) they form capsules around many of the vital organs in the body.
(b) they line all the body cavities that connect with the outside of the body.
(c) once bacteria or viruses penetrate through them there are few defence mechanisms remaining.
(d) they are not capable of repair so once they become infected they lose their function permanently.

25. Leukocytes

(a) function only as phagocytes.
(b) circulate in blood capillaries and lymph vessels.
(c) are produced by the thymus gland.
(d) are produced by the thyroid gland.

26. Which of the following statements about lymph nodes is **INCORRECT** ?

(a) They contain cells that can eliminate antigens.
(b) They produce lymphocytes.
(c) They are located within most body organs.
(d) They contain macrophages which can phagocytose bacteria.

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27. A low pH value in a body fluid

(a) increases all enzyme activity in the fluid.
(b) increases antibody concentration in the blood.
(c) indicates acidic conditions in the fluid.
(d) inhibits the respiratory centre in the medulla.

28. Fluoride is added to drinking water in Perth because it is believed to reduce the incidence of tooth decay. What would be the best method of determining whether fluoride does actually reduce tooth decay ?

(a) Carry out a survey of people who drink fluoridated water to find out whether they think the amount of tooth decay has decreased.
(b) Perform an experiment with two different groups of people, one group taking fluoride tablets, the other not.
(c) Compare the incidence of tooth decay in Perth with that in a country town which has unfluoridated water.
(d) Compare the amount of tooth decay in two groups of people in Perth, one consuming fluoridated water, the other not.

29. Which of the following **BEST** defines pathogens ?

(a) Bacteria and fungi.
(b) Bacteria, fungi and viruses.
(c) Bacteria, fungi and viruses that cause disease.
(d) Organisms that cause disease.

30. Which of the following would provide active, acquired immunity to a baby ?

(a) Receiving antibodies through the mother's breast milk.
(b) Ability to develop antibodies as a result of inheritance.
(c) Receiving injections of antibodies produced by another animal.
(d) Receiving injections of antigens which stimulate production of antibodies.

SEE NEXT PAGE

Question 31 refers to the experiment described below.

Calcitonin and parathyroid hormone are hormones involved in the regulation of blood calcium levels in some animals. The results of an experiment to determine the nature of this regulation are presented in Table 1 below.

At time 0, Group 1 animals were injected with calcitonin and Group 2 animals were injected with an equivalent amount of parathyroid hormone. Blood samples were taken to determine blood calcium level during the next 24 hours.

TIME (hours)	BLOOD CALCIUM LEVEL (mg/100 mL of blood)		
	Group 1	Group 2	Control Group
0	10	10	10
1	8	12	10
2	6	14	10
4	5	13	10
8	3	10	10
24	1	10	10

Table 1: Average blood calcium levels for three groups of animals over a 24 hour period.

31. Which of the following statements is a CORRECT interpretation of the data ?

(a) Parathyroid hormone lowers blood calcium levels.
(b) Blood samples were taken from the animals every hour.
(c) The effect of the injection of calcitonin was longer lasting than the effect of the injection of parathyroid hormone.
(d) The control animals would have been injected with both calcitonin and parathyroid hormone.

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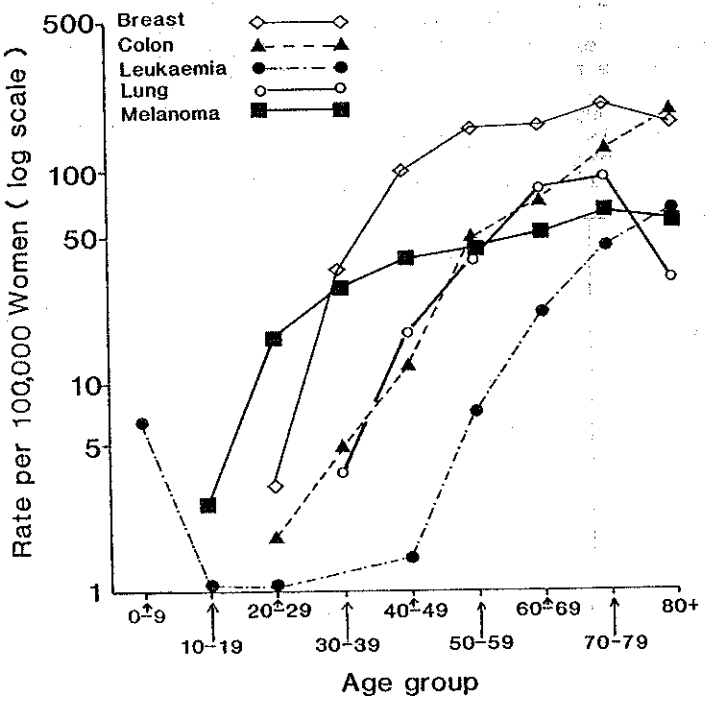
Question 32 refers to the graph shown below.



Graph 1: Incidence of cancer in females of different ages.

32. This 1982 data shows that for females in the 60 to 69 year age group

(a) melanoma was more common than cancer of the colon.
(b) the incidence of breast cancer was more than twice that of melanoma.
(c) the rate of leukaemia was 15 cases per 100,000 women.
(d) cancer of the colon was more common than lung cancer.

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33. Which of the following statements about malignant cancers is **CORRECT** ?

(a) Malignant cancers tend to spread to parts of the body distant from the tissue in which they originate.
(b) Malignant cancers can only be treated by radiotherapy.
(c) All forms of malignant cancers are more common in males than in females.
(d) Diagnosis of malignant cancer is difficult because most cancerous cells appear very similar to normal cells.

34. Which of the following does **NOT** cause cancer ?

(a) Bacteria.
(b) Viruses.
(c) Radiation.
(d) Chemicals.

35. Analgesics are drugs which are prescribed

(a) to reduce anxiety.
(b) as sleeping tablets.
(c) to stimulate the activity of the central nervous system.
(d) to relieve pain.

36. The disease caused by the organism *Salmonella* is

(a) poliomyelitis.
(b) tuberculosis.
(c) cholera.
(d) food poisoning.

37. Which of the following diseases is normally transmitted by a vector ?

(a) Malaria.
(b) Influenza.
(c) Cancer of the cervix.
(d) Pneumonia.

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38. Demographic transition is a change

(a) from a rural to an urban society.
(b) from an agricultural to a manufacturing economy.
(c) in population distribution which involves falling birth rate and falling death rate.
(d) involving development of huge urban complexes with high population densities.

39. World population between 30,000 and 10,000 years ago was probably between 5 and 10 million. By 2,000 years ago it had risen to about 250 million. The reason for this large increase would have been the

(a) development of cooperative hunting.
(b) development of agriculture.
(c) development of more sophisticated tools and weapons.
(d) colonisation of previously uninhabited parts of the earth.

40. Scientists normally publish reports on their research so that

(a) other scientists can verify their results.
(b) other scientists can build on the new knowledge.
(c) there is a permanent record of the method used and the results obtained.
(d) all of the above.

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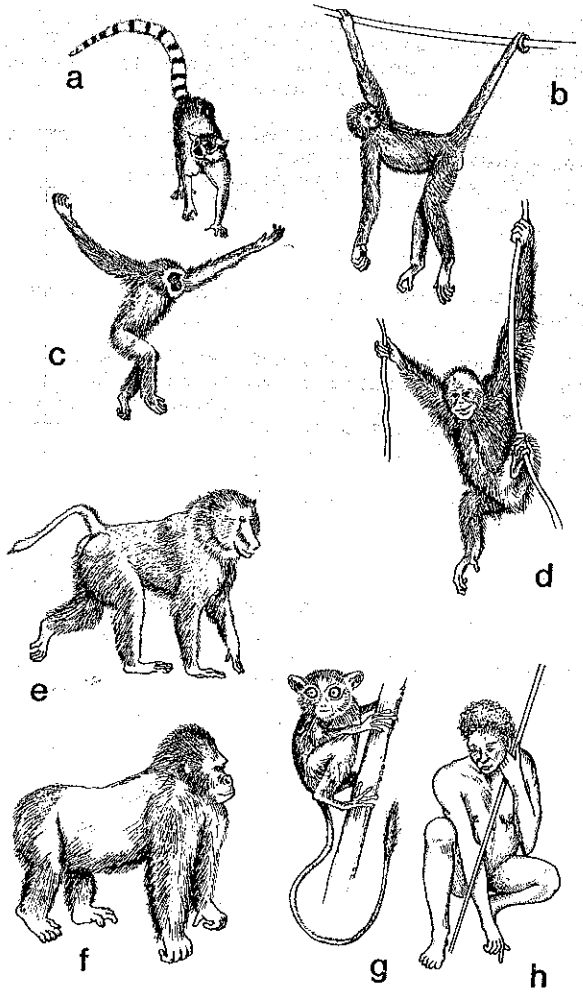
PART II **ANSWER ALL QUESTIONS**

QUESTION 41.

Question 41 refers to the diagram below of eight primates.



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41. (continued)

(a) Using the diagram of the eight primates on the opposite page (page 16), complete the following table by inserting the appropriate letter(s) in the column labelled PRIMATE(S).

DESCRIPTION	PRIMATE(S)
1. Moves by striding bipedalism	
2. Classified as Prosimian(s)	
3. Have/has ischial callosities	
4. Classified as Ceboid(s)	
5. Classified as Ape(s)	
6. Classified as Anthropoid(s)	
7. Move(s) by true (fast) brachiation	

9 marks

SEE NEXT PAGE

41. (continued)

(b) True (fast) brachiators have anatomical features that are essential for this form of locomotion. Identify **THREE** of these features and explain how they are essential for true (fast) brachiation.

6 marks

SEE NEXT PAGE

41. (continued)

(c) Within the Primate Order there is an evolutionary trend towards improved vision. Why has this happened ?

2 marks

(d) State **ONE** characteristic of human vision that gives humans better vision than prosimians and then explain how this characteristic improves human vision.

2 marks

SEE NEXT PAGE

QUESTION 42.

(a) Studies made on pre-agricultural people show there is a division of labour between the sexes when obtaining food. Describe the division of labour between pre-agricultural male and female hominids when obtaining food.

2 marks

(b) Why would the pre-agricultural hominids have adopted such a division of labour between the sexes when obtaining food.

2 marks

(c) The adoption of agricultural practices resulted in new varieties of wheat which were more suited to sowing and harvesting. Explain how these new varieties developed.

2 marks

SEE NEXT PAGE

42. (continued)

(d) The adoption of agriculture by *Homo sapiens sapiens* led to the development of vastly more complex societies. Give **TWO** reasons why this happened and explain each reason.

4 marks

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QUESTION 43.

Explain how a decreased volume of tissue fluid, and thus cellular dehydration, stimulates drinking **AND** water retention by the kidney.

8 marks

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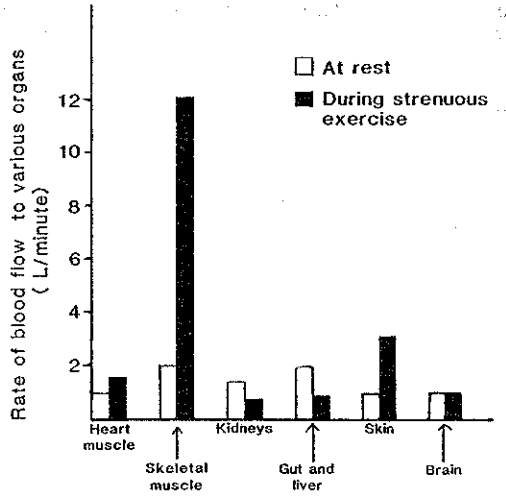
QUESTION 44.

Question 44 refers to the graph below.



Graph 2: Volume of blood flowing per minute to each of the organs when the body is at rest, and when the body is undergoing strenuous exercise.

(a) What volume of blood per minute is being pumped by the heart to all of these organs when the body is:

(i) at rest ?

1 mark

(ii) undergoing strenuous exercise ?

1 mark

SEE NEXT PAGE

44. (continued)

(b) During strenuous exercise why is there such an increase in blood flow to the skin ?

1 mark

(c) (i) During exercise, what is happening to the blood vessels in the kidneys, gut and liver ?

1 mark

(ii) Why is this happening in these organs ?

1 mark

(d) Define "cardiac output"

2 marks

SEE NEXT PAGE

44. (continued)

(e) Describe the mechanisms which cause breathing rate to increase during exercise.

4 marks

SEE NEXT PAGE

44. (continued)

(f) Describe how blood sugar (glucose) levels are maintained during exercise. In your answer refer to each of a stimulus, receptor, modulator, effector, response and feedback.

6 marks

SEE NEXT PAGE

QUESTION 45.

Two men each ran for 15 minutes on a treadmill, during which time the volume of air moving through their lungs (pulmonary ventilation) was recorded. One of the men was a trained athlete, the other was a person who engaged in little physical activity.

(a) Suggest what hypothesis the experiment was designed to test.

1 mark

(b) Name THREE variables which would have to be kept constant in this experiment.

3 marks

(c) Assuming all relevant variables were controlled, how could you improve the experiment to make the results more reliable ?

1 mark

SEE NEXT PAGE

45. (continued)

The results of the experiment described at the beginning of this question are shown in table 2 below.

TIME (minutes)	PULMONARY VENTILATION (L/minute)	
	SUBJECT A	SUBJECT B
0	5.9	5.7
2	8.3	9.3
5	7.5	9.6
8	8.1	9.5
10	8.0	9.5
12	8.2	9.2
15	8.1	9.6

Table 2: Pulmonary ventilation during 15 minutes running.

(d) Graph these results on the grid provided on the next page (PAGE 29).

9 marks

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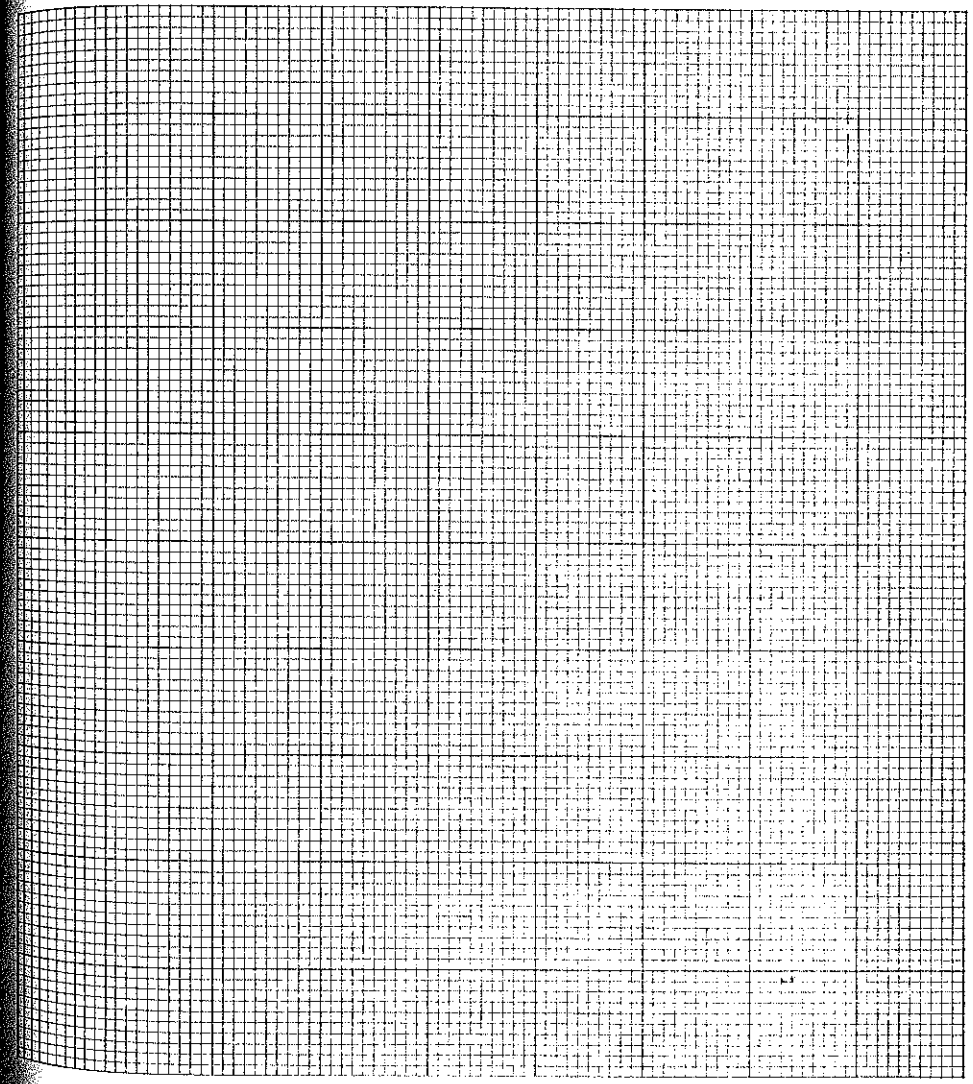
45. (continued)

***** NOTE:A SPARE GRAPH SHEET IS PROVIDED ON THE BACK PAGE OF THIS ANSWER BOOKLET.*



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QUESTION 46.

In Western Australia average life expectancy for both men and women has increased over the last 25 years largely due to a decline in death rates from cardiovascular diseases such as heart attack and stroke.

(a) What is the difference between heart attack and stroke ?

2 marks

(b) The decline in deaths from cardiovascular diseases has been attributed to changes in our lifestyle over the past 25 years. Name **TWO** changes in our lifestyle which would account for declining death rate from cardiovascular diseases and explain why **EACH** reduces the risk of such disease.

4 marks

SEE NEXT PAGE

46. (continued)

(c) Explain why it is not possible to immunise people against most cardiovascular diseases.

2 marks

(d) Mental illness is very prevalent in our society. Name **TWO** common mental disorders.

2 marks

(e) Describe **TWO** positive steps that individuals can take to reduce the likelihood of them developing mental illness.

2 marks

SEE NEXT PAGE

PART III

ANSWER ANY TWO QUESTIONS FROM THIS SECTION.

ILLUSTRATE YOUR ANSWER WITH DIAGRAMS, WHERE APPROPRIATE. UP TO TWO MARKS MAY BE DEDUCTED FOR POORLY STRUCTURED ESSAYS ie. ANSWERS IN POINT FORM OR DIAGRAMS NOT EXPLAINED IN THE TEXT OF THE ESSAY.

DO NOT WRITE YOUR ANSWER IN PENCIL.

QUESTION 47.

(a) Describe how a new species can be formed during the course of evolution.

7 marks

(b) Describe THREE ways in which the human jaw and teeth differ from the jaws and teeth of monkeys and apes. Why did the human jaw and teeth evolve each of these different features ?

9 marks

(c) Human proteins differ from the proteins of other primates. How can these differences be used to measure relationships between humans and other primates ?

4 marks

QUESTION 48.

(a) Explain how the lifestyle of Australian Aborigines before European settlement was shaped by the Australian environment.

8 marks

(b) Describe THREE different homeostatic mechanisms that enable the human body to lose excessive heat.

6 marks

(c) Discuss syphilis under the following headings:

(i) Causative agent.
(ii) Symptoms.
(iii) Prevention.

6 marks

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QUESTION 49.

(a) Compare the population in a third world (developing) country, like India, with the population of an industrialised country like Australia. Use the following headings in your answer:

Death rate.
Birth rate.
Age structure (proportion of population in various age groups).
Population growth.

8 marks

(b) In the middle of 1987 the world population passed 5,000 million and is predicted to reach 7,000 million by the year 2010. Four problems associated with rising world population are:

The greenhouse effect.
Destruction of the ozone layer.
Adequate food supply.
Dwindling energy reserves.

For **EACH** of these problems explain:

(i) The nature of the problem.
(ii) The consequences of the problem.
(iii) Measures which can be used to control or minimise the problem.

12 marks

QUESTION 50

(a) Describe how sound waves that reach the ear are converted to nerve impulses in the cochlea. Include in your answer the role of structures within the external, middle and inner ear.

10 marks

(b) Name the structures in the inner ear involved in the detection of head position and head movement then explain how each of these structures function.

10 marks

END OF QUESTIONS

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1989