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CANDIDATE - PLEASE NOTE!

You must sign below and return this booklet with the Answer Sheet. Failure to do so may result in disqualification.

Signature _____

TEST CODE **01207010**

MAY/JUNE 2004

FORM TP 2004045

**CARIBBEAN EXAMINATIONS COUNCIL
SECONDARY EDUCATION CERTIFICATE
EXAMINATION**

BIOLOGY

Paper 01 – General Proficiency

75 minutes

03 JUNE 2004 (a.m.)

READ THE FOLLOWING DIRECTIONS CAREFULLY

1. In addition to this test booklet, you should have an answer sheet.
2. Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.
3. On your answer sheet, find the number which corresponds to your item and shade the space having the same letter as the answer you have chosen. Look at the sample item below.

Sample Item

Which of the following diseases is due to a dietary deficiency?

- (A) Anaemia
- (B) Diabetes
- (C) Influenza
- (D) Malaria

Sample Answer



The best answer to this item is "Anaemia", so answer space (A) has been blackened.

4. If you want to change your answer, be sure to erase your old answer completely and fill in your new choice.
5. When you are told to begin, turn the page and work as quickly and as carefully as you can. If you cannot answer an item, omit it and go on to the next one. You can come back to the harder item later. Your score will be the total number of correct answers.
6. Figures are not necessarily drawn to scale.
7. This test consists of 60 items. You will have 75 minutes to answer them.
8. Do not be concerned that the answer sheet provides spaces for more answers than there are items in this test.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

↑ AFFIX SEAL HERE ↑

Item 1 refers to relationships between some organisms.

- I. Barnacles on a shark's back
- II. Shark/man
- III. Man/malaria protozoan

1. Which of the following groups, I to III, correctly identifies these relationships?

	I	II	III
(A)	Commensalism	Predator/prey	Mutualism
(B)	Commensalism	Predator/prey	Parasitism
(C)	Predator/prey	Commensalism	Mutualism
(D)	Predator/prey	Mutualism	Parasitism

2. Which of the following statements about a food chain is TRUE?

- (A) Energy from the sun is transferred from one organism to subsequent organisms.
- (B) Each of its members depends on heat energy obtained directly from the sun.
- (C) Energy changes from one type to another, that is, from heat to light to chemical.
- (D) The sun traps light energy at the start of the food chain.

4. Which of the following factors is NOT indicated by the direction of the arrows in a food chain?

- (A) The direction of the flow of energy.
- (B) The amount of food each animal eats.
- (C) The fact that plants start every food chain.
- (D) The animals that are predators.

3. Which of the following statements is NOT true about decomposers?

- (A) They release nutrients for recycling.
- (B) They prevent the accumulation of dead organic matter.
- (C) They are more abundant in damp places.
- (D) They are favoured by low temperatures.

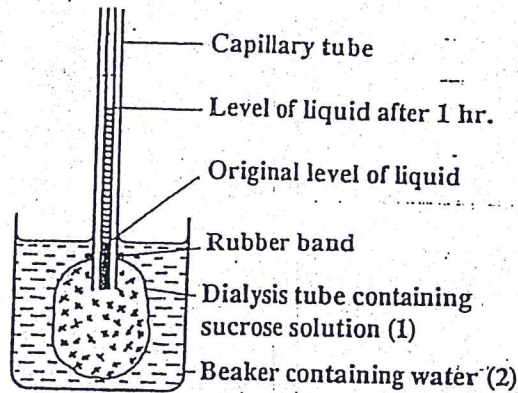
5. A dog, killed on the roadway by a vehicle, is left to decay. Which of the following organisms would be directly responsible for returning the carbon and nitrogen compounds of the dog's body to the environment?

- (A) Saprophytic fungi
- (B) Flesh-eating beetles
- (C) Maggots (fly larvae)
- (D) Vultures (corbeaux/John Crow)

6. 'Spaces' between the cells in the human body are filled with

- (A) tissue fluid
- (B) blood
- (C) serum
- (D) plasma fluid

7. The following diagram illustrates the result of an investigation.



The level of the solution in the capillary tube rose because there was a greater net movement of

- (A) solute molecules from 1 to 2
- (B) solute molecules from 2 to 1
- (C) water molecules from 1 to 2
- (D) water molecules from 2 to 1

Items 8-9 refer to the following table which shows how four tubes were set up to investigate the conditions for digestion of a fat.

Test-tube I	Test-tube II	Test-tube III
1 cm ³ Fat	1 cm ³ Fat	1 cm ³ Fat
10 cm ³ Enzyme	10 cm ³ Enzyme	10 cm ³ Enzyme
5 cm ³ Bile salts	5 cm ³ Dilute sodium hydroxide	5 cm ³ Dilute hydrochloric acid

8. Which of the following variables is being investigated?

- (A) pH
- (B) Temperature
- (C) Enzyme concentration
- (D) Fat particle size

9. Which of the following action is likely to have —

- (A) Hydrolysis
- (B) Oxidation
- (C) Glycolysis
- (D) Reduction

10. The variation in cellular structure found in any complex organism is due to a process called

- (A) growth
- (B) elaboration
- (C) metabolism
- (D) specialisation

11. One of the problems with nutrition for a vegetarian is that

- (A) fats and oils are not produced by plants
- (B) large quantities of food are needed to supply essential amino acids
- (C) vitamins produced by plants are of inferior quality
- (D) large quantities of food are needed to supply essential mineral nutrients

12. The rate at which respiration is occurring in a mammal can be indicated by the rate of

- (A) sweat production
- (B) urine excretion
- (C) carbon dioxide elimination
- (D) oxygen elimination

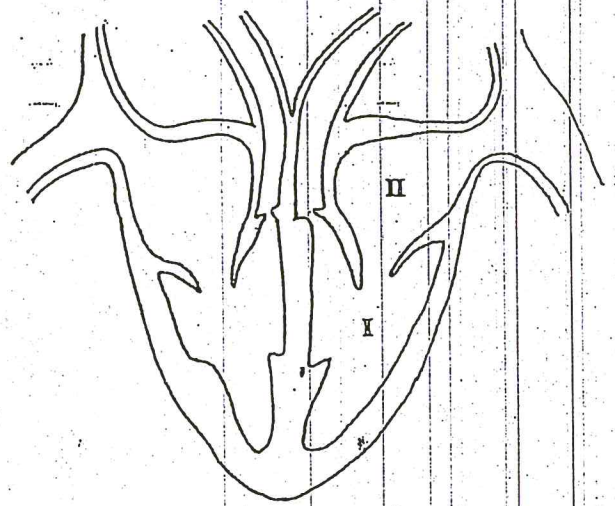
Item 13 refers to the following characteristics.

- I. Thin walled surfaces
- II. Excellent blood supply
- III. Always moist
- IV. Large surface area

13. Characteristics I to IV describe structures that are MOST likely to be associated with the

- (A) diffusion of gases
- (B) production of energy
- (C) movement of water
- (D) transport of digested food

Item 14 refers to the following diagram.



14. In a patient with a certain defective heart condition, it was found that blood flowed from Point I to Point II. This was MOST likely due to the malfunction of the

- (A) left atrium
- (B) left ventricle
- (C) semi-lunar valve
- (D) bicuspid valve

15. Large organisms cannot depend solely on diffusion for the uptake and transport of gases. This is because as organisms get larger the

- (A) surface area to volume ratio increases
- (B) surface area to volume ratio decreases
- (C) surface area and the volume both increase
- (D) surface area and the volume both decrease

16. Which of the following nutrients supplies most energy per gram?

- (A) Glucose
- (B) Starch
- (C) Protein
- (D) Fat

17. Which of the following substances can be found in high proportion in the nucleus?

- (A) ATP
- (B) ADP
- (C) AZT
- (D) DNA

Item 18 refers to the following table which shows approximate concentrations of some substances in the blood plasma and urine of a healthy man.

Substance	% in plasma	% in urine
Water	90 - 93	95.0
Protein	7.0	0
Glucose	0.1	0
Sodium	0.3	0.35
Chloride	0.4	0.6
Urea	0.03	2.0
Uric Acid	0.004	0.05

18. From the table above, determine which of the following statements is NOT true?

- (A) All the organic food is retained in the blood.
- (B) Uric acid is more concentrated in blood than in urine.
- (C) Water and salts are more concentrated in urine than in blood.
- (D) Urea is more concentrated in urine than in blood.

19. The normal function of the mammalian kidney is

- (A) deamination
- (B) storage of mineral salts
- (C) conversion of glucose to glycogen
- (D) removal of excess mineral salts

20. The reactants in aerobic respiration are

- (A) water and carbon dioxide
- (B) water and oxygen
- (C) glucose and oxygen
- (D) glucose and carbon dioxide

21. The alveoli of the lungs of a mammal

- (A) keep the lungs filled to capacity with air at all times
- (B) serve to increase the absorptive surface of the lungs
- (C) are filled with oxygen to keep the lungs in an expanded state
- (D) prevent the lungs from collapsing

22. Blood entering the glomerulus of the kidney differs from blood leaving it, since the blood entering has

- (A) more oxygen, more urea and more glucose
- (B) more oxygen, less urea and more glucose
- (C) less oxygen, more urea and less glucose
- (D) less oxygen, less urea and less glucose

23. Bones act as storage depots for minerals in the body. The MOST important of the minerals they store are

- (A) calcium and phosphorus
- (B) calcium and potassium
- (C) phosphorus and sodium
- (D) sodium and potassium

24. Which of the following groups of functions is performed by a rib?

- I. Blood formation
- II. Protection
- III. Locomotion
- IV. Support

- (A) I and II only
- (B) I and IV only
- (C) II and III only
- (D) I, II and IV only

25. The MAIN function of cartilage at the end of long bones is to
- (A) lubricate joints
 - (B) increase flexibility
 - (C) reduce friction
 - (D) protect nerves
26. Which of the following statements would NOT represent a form of excretion in plants?
- (A) Gases diffusing through stomata
 - (B) Tannins being stored in dead tissue
 - (C) Water vapour diffusing through the epidermis
 - (D) Stored calcium oxalate crystals in leaves during leaf fall
27. The primary function of the neural spine of the lumbar vertebra is for
- (A) attachment of muscles
 - (B) support of adjacent vertebrae
 - (C) protection of the spinal cord
 - (D) movement of bones
28. The eye is sometimes referred to as an effector organ because
- (A) the rods and cones are stimulated by light
 - (B) the pupil constricts in the presence of bright light
 - (C) images which fall on the retina are sent to the brain
 - (D) neurones from the eye lead to the central nervous system
29. Insulin (a protein) is never taken orally because it
- (A) is broken down by pepsin
 - (B) inhibits the action of salivary amylase
 - (C) is inactivated by bile salts
 - (D) takes too long to be absorbed into the blood
30. Which of the following conditions are necessary for germination to take place?
- I. Air
 - II. Food supply
 - III. Light
 - IV. Moisture
- (A) I and II only
 - (B) III and IV only
 - (C) I, II and IV only
 - (D) II, III and IV only
31. Which of the following conditions MOST correctly controls increase in size in the flowering plant?
- (A) Light intensity
 - (B) Auxin concentration
 - (C) Carbon dioxide concentration
 - (D) Oxygen concentration
32. Which of the following features is NOT a function of human skin?
- (A) Excretion
 - (B) Sensory perception
 - (C) Temperature regulation
 - (D) Vitamin B formation
33. Internal reflection of light within the eye is prevented by the
- (A) lens
 - (B) retina
 - (C) choroid layer
 - (D) sclerotic layer
34. If an object is thrown towards you, your eyes blink. The receptors and effectors for this reflex action are the
- (A) retina and the eyelid muscles
 - (B) retina and the ciliary muscles
 - (C) pupil and the eyelid muscles
 - (D) pupil and the ciliary muscles

35. Which of the following conditions is likely to promote a lowering of body temperature?
- (A) Increase in the metabolic rate
 - (B) Raising of the hairs on the skin
 - (C) Dilatation of blood vessels just under the skin
 - (D) Decrease in the evaporation of sweat
36. A seedling illuminated from one side, bends towards the light source because the concentration of auxins becomes
- (A) greater on the side away from the light
 - (B) greater on the side towards the light
 - (C) the same on both sides
 - (D) greatest at the tip of the shoot
37. When an athlete runs a long-distance race, which of the following changes would you expect to take place in his/her body?
- (A) An increase in the breakdown of maltose in the intestines
 - (B) A drop in the level of glycogen in the liver
 - (C) Constriction of the veins in the legs
 - (D) Dilatation of the blood vessels to the gut
38. Which of the following sequence of structures shows the route taken by a sperm cell when it leaves the testis?
- (A) Epididymis → sperm duct → urethra
 - (B) Sperm duct → urethra → epididymis
 - (C) Epididymis → urethra → sperm duct
 - (D) Urethra → sperm duct → epididymis
39. Which of the following features are examples of homeostasis in mammals?
- I. Control of the blood sugar level by insulin
 - II. Limiting temperature changes to slight fluctuations
 - III. Differences in the level of female hormones during the menstrual cycle
 - IV. Changes in the rate of breathing to suit the body's activities
- (A) I and IV only
 - (B) II and III only
 - (C) I, II and IV only
 - (D) I, III and IV only
40. Pollination is the process by which pollen is transferred from the
- (A) anther to the stigma
 - (B) stigma to the anther
 - (C) stamen to the ovary
 - (D) pistil to the anther
41. Some plants, such as Bryophyllum (Leaf of Life; Wonder-of-the-world), can be propagated from buds at the leaf margin. The buds develop into complete plantlets while still attached to the leaf margin. These plants also flower and produce seeds. The development of the plantlets and the seed
- (A) both take place by mitosis
 - (B) both take place by meiosis
 - (C) take place by mitosis for the seed and meiosis for the plantlets
 - (D) take place by meiosis for the seed and mitosis for the plantlets

42. Which of the following processes will produce clones?

- I. The growth of a fungus on a piece of bread
- II. The development of plantlets at the leaf margins of Bryophyllum
- III. Propagation of sugar cane from cuttings
- IV. Germination of seeds from the same pod

- (A) I and II only
- (B) II and III only
- (C) III and IV only
- (D) I and IV only

43. In which of the following organs does meiosis occur?

- (A) A developing embryo
- (B) The skin of a mammal
- (C) The testis of a mammal
- (D) The tip of the shoot of a plant

44. In which of the following parts of the plant would you expect the process of mitosis to occur?

In the region

- (A) of the phloem
- (B) of the xylem
- (C) behind the root hair
- (D) behind the root tip

45. Which of the following combinations of sex chromosomes is found in the nuclei of non-reproductive cells of humans?

	Male Chromosomes	Female Chromosomes
(A)	XY	YY
(B)	XX	XY
(C)	YY	XY
(D)	XY	XX

46. In a particular breed of dog, long hair (L) is dominant to short hair (Z). A certain cross produced some long-haired and some short-haired pups. Which of the following crosses would MOST likely have been the genotypes of the parents?

- (A) LL x LL
- (B) LL x ZZ
- (C) LZ x ZZ
- (D) LL x LZ

47. Which of the following processes may be used by man to change the characteristics of a particular organism in a short time?

- I. Genetic engineering
- II. Artificial selection
- III. Natural selection

- (A) I only
- (B) I and III only
- (C) II and III only
- (D) I, II and III

48. The same species of hibiscus plants were grown on two garden plots near to each other. One plot, which was well watered and manured, produced large plants. The other plot contained sandy soil and produced small plants with leaves that were reduced in size. The hibiscus plants

- (A) were clones from the same species of hibiscus
- (B) showed genetic variation
- (C) showed artificial selection
- (D) were responding to environmental differences

49. Pathogens are BEST described as organisms that

- (A) cause diseases
- (B) transmit diseases
- (C) are carried in contaminated food or water
- (D) can be seen with a microscope

5. Which of the following treatments does NOT provide a form of immunisation?

- (A) Inoculation with a mild form of the disease
- (B) Inoculation with antibodies
- (C) Isolation of the infected person
- (D) Breast-feeding of the infant

51. Which of the following statements is TRUE of antigens?

- (A) They are produced by white blood cells.
- (B) They cause the production of antibodies.
- (C) They get rid of antibodies.
- (D) They are used to treat diseases.

52. Which of the following consequences are a direct result of disease in man?

- I. Loss of man hours and productivity
- II. Loss of human life
- III. Loss of livestock and crops

- (A) II only
- (B) I and II only
- (C) II and III only
- (D) I, II and III

53. Water logging of soil results in the death of soil organisms because

- (A) bacteria multiply rapidly and crowd them out
- (B) water decreases the temperature of the soil
- (C) the organisms cannot respire due to a lack of air
- (D) nutrients are washed out of the soil

54. Which of the following factors is NOT associated with rapid increase in human populations?

- (A) Faster utilization of natural resources
- (B) Greater demands on food resources
- (C) Less pollution from household and industries
- (D) Less space available for housing

55. Which of the following features is an advantage of using inorganic fertilizers rather than organic manure?

- (A) They help to hold water in the soil.
- (B) They improve the crumb structure of soil.
- (C) They make nutrients available more quickly.
- (D) They do not affect the soil pH.

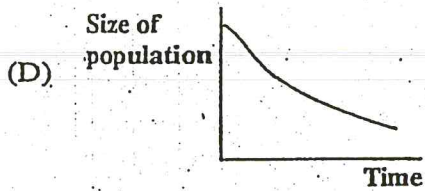
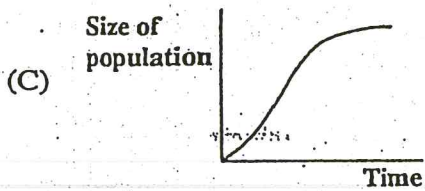
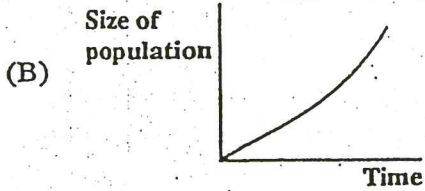
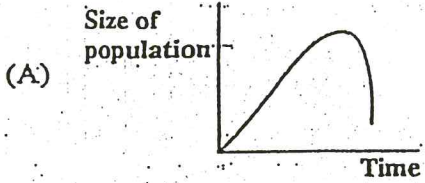
56. An open field was investigated using metre quadrats. In 5 random throws species A occurred as shown in the table below.

Throws	No. of Species A	Total No. of plants in the quadrat
1	2	22
2	8	46
3	10	42
4	0	37
5	12	21

This data can be used to determine.

- (A) cover only
- (B) cover and density
- (C) frequency and cover
- (D) density and frequency

Items 57 - 58 relate to the following graphs which show the growth pattern of several populations.



Match the following statements about the population, to one of the options above. Each option may be used once, more than once, or not at all.

- 57. Has a good food supply and is NOT subject to environmental stress.
- 58. Has reached its equilibrium and there is a delicate balance between the rate of births and deaths.

Item 59 refers to the following characteristics.

- I. Thick hairy leaves
- II. Concealed stomata
- III. Deeply penetrating root system

59. These characteristics MOST likely belong to a plant which grows in a region that is

- (A) warm and dry
- (B) warm and shady
- (C) cool and exposed
- (D) cool and wet

60. All the individuals of a particular species living in a defined area or location are referred to as

- (A) a niche
- (B) a population
- (C) a community
- (D) an environment

IF YOU FINISH BEFORE TIME IS CALLED, CHECK YOUR WORK ON THIS TEST.