



FORM T P 2009 149

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MAY/JUNE 2009

CARIBBEAN EXAMINATIONS COUNCIL
ADVANCED PROFICIENCY EXAMINATION
BIOLOGY - UNIT 2

Paper 01

90 minutes

12 JUNE 2009 (a.m.)

READ THE FOLLOWING INSTRUCTIONS CAREFULLY.

1. This test consists of 45 items. You will have 90 minutes to answer them.
2. In addition to this test booklet, you should have an answer sheet.
3. 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.
4. 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 is NOT a form of energy storage?

- (A) ATP
- (B) Lipid
- (C) Alcohol
- (D) Lactic acid

Sample Answer



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

5. If you want to change your answer, erase it completely and fill in your new choice.
6. 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. Your score will be the total number of correct answers.
7. You may do any rough work in this booklet.
8. Figures are not necessarily drawn to scale.
9. 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.

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1. The electrons from non-cyclic photophosphorylation pass into the Calvin cycle via
 - (A) ATP
 - (B) NADH_2
 - (C) FAD
 - (D) NADP

2. During photosynthesis P_{680} emits electrons that
 - (A) can be recycled directly to P_{680}
 - (B) fall back directly to P_{680}
 - (C) will generate ATP
 - (D) will generate reduced NAD

3. Which of the following combinations correctly describes the MAIN factors affecting the rate of photosynthesis?
 - I. Light intensity and temperature
 - II. Carbon dioxide concentration and state of the stomata
 - III. NAD and ATP availability
 - IV. Phytochromes and the availability of ions
 - (A) I and II only
 - (B) I and III only
 - (C) I, II and III only
 - (D) I, II, III and IV

4. In muscle tissue undergoing strenuous contractions, the formation of lactate is due to the
 - (A) low concentration of glucose
 - (B) low concentration of oxygen
 - (C) high concentration of glycogen
 - (D) high concentration of carbon dioxide

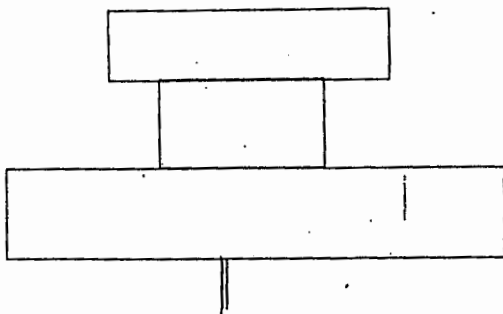
5. In aerobic respiration, the maximum number of ATP molecules that may be produced from a molecule of glucose is
 - (A) 2
 - (B) 4
 - (C) 34
 - (D) 38

6. Two substances which enter the mitochondrial cristae and are oxidised are
 - (A) ADP and phosphate
 - (B) NADH_2 and FADH
 - (C) Phosphate and acetyl CoA
 - (D) ADP and pyruvate

7. The two MAIN products of oxidative phosphorylation in the mitochondrion are
 - (A) ATP and water
 - (B) oxygen and water
 - (C) NAD and FAD
 - (D) hydrogen and oxygen

8. The oxygen consumed during cellular respiration is directly involved in
 - (A) phosphorylation of ADP
 - (B) conversion of citrate to oxaloacetate
 - (C) oxidation of pyruvate to acetyl CoA
 - (D) accepting electrons in electron transport chain reaction

Item 9 refers to the following pyramid of numbers.



9. Which of the following food chains would create the pyramid of numbers represented above?

- (A) Decayed leaf → earthworms → small birds → large birds
- (B) Tree → aphids → birds → fleas
- (C) Tree → ants → lizards → birds
- (D) Tree → birds → fleas → bacteria

10. Which of the following statements about the electron transport chain are correct?

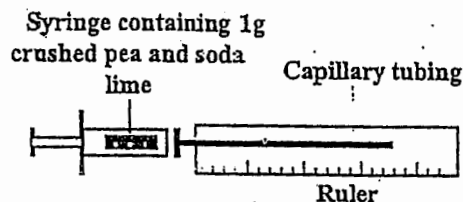
- I. Located in the mitochondria and chloroplasts.
- II. Involved in the production of ATP.
- III. Located on the membranes.
- IV. Oxygen is always the final electron acceptor.

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

11. Net primary production in an ecosystem over a given period may be BEST defined as the total amount of

- (A) organic matter produced by all organisms in the ecosystem
- (B) new organic matter produced only by green plants
- (C) organic matter used in respiration and metabolism by all organisms in the ecosystem
- (D) new organic matter remaining after respiration and metabolism has been finished

Item 12 refers to the following diagram.



12. An experiment is set up as shown above to calculate the rate of respiration in red pea. After 50 seconds, the indicator fluid in the capillary tubing moved 85 mm. The diameter of the capillary tubing is 0.4 mm. What is the rate of respiration in the red pea?

- (A) $0.2 \text{ mm}^3 \text{ g}^{-1} \text{ s}^{-1}$
- (B) $0.68 \text{ mm}^3 \text{ g}^{-1} \text{ s}^{-1}$
- (C) $1.7 \text{ mm}^3 \text{ g}^{-1} \text{ s}^{-1}$
- (D) $8.6 \text{ mm}^3 \text{ g}^{-1} \text{ s}^{-1}$

13. Which of the following are the substrate and product(s) of anaerobic respiration?

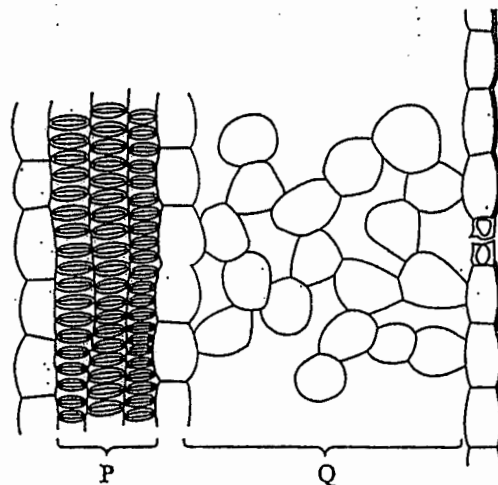
	Substrate	Product
(A)	Glucose	Lactic acid + CO ₂
(B)	Glucose	Ethanol + CO ₂
(C)	Pyruvate	Ethanol + CO ₂
(D)	Pyruvate	Lactic acid

14. Which of the following combinations may be applied to the term biodiversity?
- I. Variety of species on earth
 - II. Can be defined at the genetic level
 - III. May be defined at the ecosystem level
 - IV. Relates only to endangered species
- (A) I, II and III only
 (B) I, II and IV only
 (C) I, III and IV only
 (D) II, III and IV only

15. Which of the following statements describes the function of denitrifying bacteria in the nitrogen cycle?
- (A) Split the nitrogen molecule to form nitrites
 - (B) Convert nitrates to atmospheric nitrogen
 - (C) Convert ammonium compounds to nitrates
 - (D) Split nitrogen molecules to form ammonium

16. In an experiment, the water potential of the water in a soil, is found to be -40 kPa, while that of pure water is 0 kPa. This difference is due to the
- (A) presence of mineral ions in the soil water
 - (B) greater kinetic energy of the soil water molecules
 - (C) small size of the mineral ions in the soil water
 - (D) water potential of soil water being positive

Item 17 refers to the diagram below which shows some of the cells involved in loss of water from part of a plant.



17. Which of the following combinations correctly identifies the regions labelled P and Q?

	Region P	Region Q
(A)	Phloem	Palisade
(B)	Phloem	Stem cortex
(C)	Xylem	Mesophyll cells
(D)	Xylem	Root cortex

18. In a study of water movement in plants, the cut end of a leafy shoot is placed in a dilute solution of a dye. After a few hours, deposits of the dye accumulate in the leaves.

The rate of movement of the dye up the stem is NOT increased by

- (A) humidity
- (B) wind speed
- (C) temperature
- (D) availability of water

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19. Which of the following statements is true according to the mass (pressure) flow hypothesis?
- (A) Sucrose moves in the phloem against a concentration gradient.
 - (B) The loading of sugars into the phloem in the leaf is achieved by osmosis.
 - (C) A source is a site where sugars are produced, while a sink is a site where sugars are utilized.
 - (D) Water is actively transported from the intercellular spaces into the cell sap at the root end of the system.

20. Which of the following combinations correctly describes systolic and diastolic blood pressure?

	Systolic Blood Pressure	Diastolic Blood Pressure
(A)	Produced by contraction of the atria	Pressure in the arteries after the atria contract
(B)	Pressure in the arteries after the atria contract	Produced by contraction of the atria
(C)	Produced by contraction of the ventricles	Pressure in the arteries after the ventricles relax
(D)	Pressure in the arteries after the ventricles relax	Produced by contraction of the ventricles

21. In the human heart, what is the point of initiation of the mammalian heartbeat?

- (A) Purkyne fibres
- (B) Sinoatrial node
- (C) Node of Ranvier
- (D) Atrioventricular node

Item 22 refers to the following diagram which shows the heart and associated blood vessels.

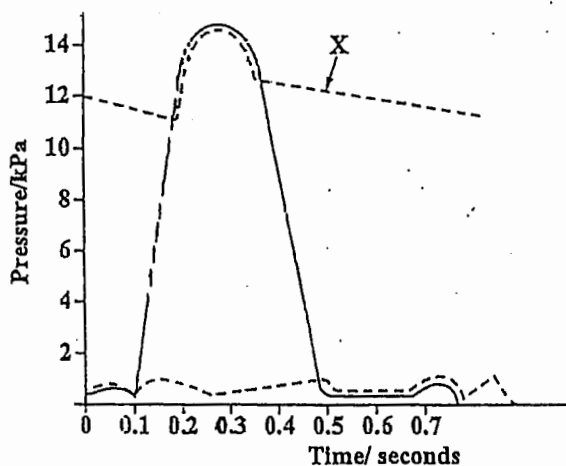


22. The region labelled X is the

- (A) aorta
- (B) pulmonary artery
- (C) inferior vena cava
- (D) superior vena cava

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Item 23 refers to the following diagram which shows the pressure changes to the left side of the heart and the aorta during the cardiac cycle.



23. The section labelled X represents the
- (A) pressure in the ventricles as the heart fills
 - (B) pressure in the aorta as the heart empties
 - (C) atrial pressure as the heart empties
 - (D) ventricular pressure as the heart fills

24. Which of the following is true concerning the effect of insulin on target cells?
- (A) Decreased glucose metabolism
 - (B) Increased gluconeogenesis
 - (C) Increased blood glucose concentration
 - (D) Increased glucose permeability of cell membranes

Item 25 refers to the table below which gives the pulse rate of humans at different stages of their growth and development to adulthood.

	Pulse rate (beats/min)
I.	110 - 140
II.	80 - 90
III.	50 - 85
IV.	50 - 70

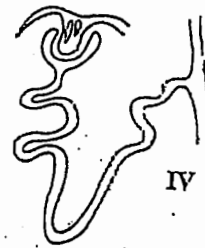
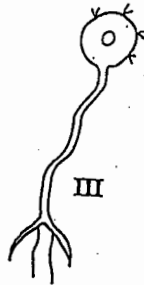
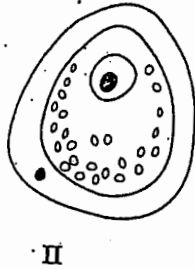
25. Which group BEST represents infants?
- (A) I
 - (B) II
 - (C) III
 - (D) IV

26. Which of the following statements about glucagon is INCORRECT?
- (A) Acts in opposition to insulin
 - (B) Acts primarily on liver cells
 - (C) Raises blood glucose levels
 - (D) Is synthesized by islet Beta cells

27. A healthy person has recently drunk a large quantity of (pure) water. Which statement BEST describes the result of this action?
- (A) The production of ADH increases.
 - (B) The water potential of the urine becomes less negative.
 - (C) The solute concentration of the urine becomes more negative.
 - (D) The permeability of the collecting ducts increases.

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28. Which of the following cells and structures possesses myelin sheaths?

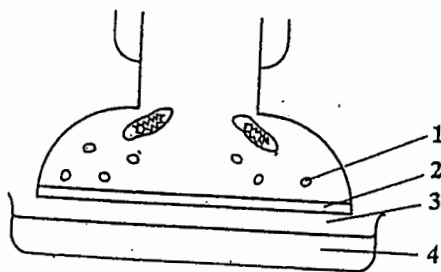


- (A) I
- (B) II
- (C) III
- (D) IV

29. The speed of transmission of a nerve impulse is affected by the

- (A) strength of the impulse
- (B) concentration of acetyl choline
- (C) presence of the myelin sheath
- (D) amount of Na^+ that enters the neurone

Item 30 refers to the diagram below showing the gap between two neurones.



30. The protein receptors for the neurotransmitter are located at

- (A) 1
- (B) 2
- (C) 3
- (D) 4

31. In which of the following ways can an individual become infected with HIV from an infected person?

- I. Exchange of saliva during kissing
- II. Blood transfusion
- III. Breastfeeding
- IV. Sharing hypodermic needles

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

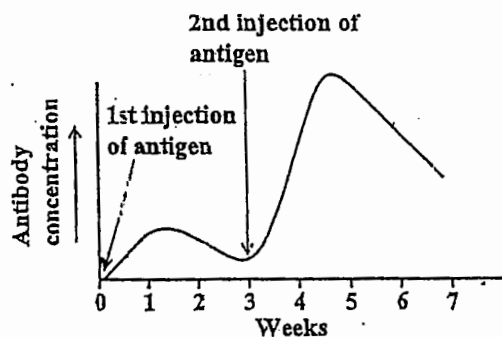
32. Which of the following is true for mast cells?

- (A) They are found in lymph nodes only.
- (B) They are the smallest circulating granulocytes.
- (C) They are large granulocytes which engulf pathogens.
- (D) They contain many granules rich in histamine and heparin.

33. Which of the following is a feature of B lymphocytes?

- (A) They bind only to whole antigen molecules via receptors on their cell surfaces.
- (B) They must pass through the thymus gland before they can become fully functional.
- (C) They release cytokines when activated.
- (D) They suppress the activity of phagocytes.

Item 34 refers to the graph below which shows the changes in antibody concentration in serum during the primary and secondary response to an antigen.



34. What type of cell is responsible for initiating the increase in antibody production after the second injection of antigen?

- (A) B-cells
- (B) T-cells
- (C) Macrophages
- (D) Memory cell

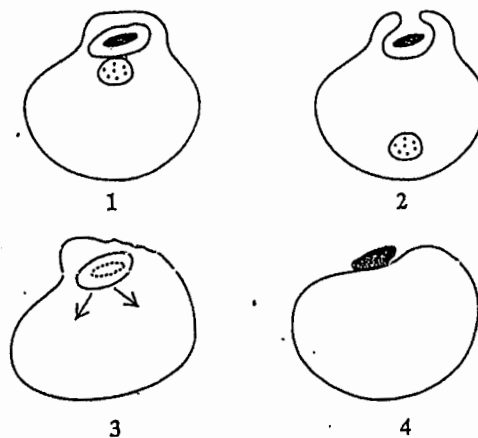
35. Which of the following combinations correctly describes the pathogens responsible for dengue fever and AIDS?

	Dengue Fever	AIDS
(A)	Bacterium	Retrovirus
(B)	Single stranded RNA	Double stranded DNA
(C)	Infects B lymphocytes	Infects T lymphocytes
(D)	Parasitic disease	Infectious disease

36. The monomers that make up the heavy and light chains of an antibody molecule are joined by

- (A) disulphide bonds
- (B) hydrogen bonds
- (C) glycosidic bonds
- (D) peptide bonds

Item 37 refers to the diagrams below which show the stages of phagocytosis of a bacterium by a neutrophil.



37. Which of the following shows the correct sequence of the phagocytosis process?

- (A) 1 3 2 4
- (B) 2 1 3 4
- (C) 4 2 1 3
- (D) 4 2 3 1

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38. Which of the following is correct regarding the use of monoclonal antibodies in pregnancy testing?

- (A) If a test is negative, mouse monoclonal anti-HCG antibodies do not bind to polyclonal anti-mouse antibodies in the control region.
- (B) If the test is positive, mouse monoclonal anti-HCG antibodies bind to HCG only at the control region.
- (C) Mouse monoclonal anti-HCG antibodies can detect low levels HCG.
- (D) Mouse monoclonal anti-HCG antibodies cannot detect low levels HCG.

39. A baby receives antibodies from its mother via the placenta. This is called

- (A) artificial passive immunity
- (B) natural passive immunity
- (C) artificial active immunity
- (D) natural active immunity

40. Which of the following is true for Body Mass Index (BMI)?

- (A) It cannot be used to measure obesity in children.
- (B) It is a perfect method for measuring a person's weight.
- (C) It is calculated using both height and weight measurements.
- (D) It measures the distribution of excess fat in the body.

41. A key feature of monoclonal antibodies is that they are manufactured by

- (A) most cells
- (B) cancer cells
- (C) one type of T cell
- (D) one type of B cell

42. Which of the following combinations correctly identifies the causative agent and the mode of transmission of dengue fever?

	Causative Agent	Mode of Transmission
(A)	Virus	Vector
(B)	Bacterium	Vector
(C)	Virus	Airborne
(D)	Bacterium	Airborne

43. With regular consumption of alcohol, fat accumulates in the liver because

- (A) fat absorbs alcohol and detoxifies it
- (B) liver cells use alcohol instead of fat as an energy source
- (C) alcohol is used in the synthesis of fat molecules in the liver
- (D) alcohol suppresses the ability of liver cells to secrete fat molecules

44. Which of the following is a mutagen and can cause lung cancer?

- (A) Tar
- (B) Alcohol
- (C) Nicotine
- (D) Carbon monoxide

45. Which of the following BEST describes tolerance, a form of physical drug dependence?

- (A) A severe craving for a drug which interferes with a person's ability to function normally
- (B) Characterized by the continued desire for a drug, even after physical dependence is gone
- (C) Develops in persons who have used large quantities of substances such as alcohol and barbiturates
- (D) Occurs when the body becomes accustomed to a drug and requires ever-increasing amounts to achieve the same effect

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