



**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 **02207010**  
**MAY/JUNE 2011**

**FORM TP2011146**

**CARIBBEAN EXAMINATIONS COUNCIL**  
**ADVANCED PROFICIENCY EXAMINATION**  
**BIOLOGY - UNIT 2**

Paper 01  
 90 minutes

**MAY/JUNE 2011 (e.m.)**

**READ THE FOLLOWING INSTRUCTIONS CAREFULLY.**

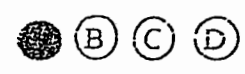
1. This test consists of 45 items. You will have 90 minutes to answer them.
2. In addition to this test booklet, you should have an answer sheet.
3. Do not be concerned that the answer sheet provides spaces for more answers than there are items in this test.
4. Each item in this test has four suggested answers lettered (A), (B), (C), (D). Read each item you are about to answer and decide which choice is best.
5. 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

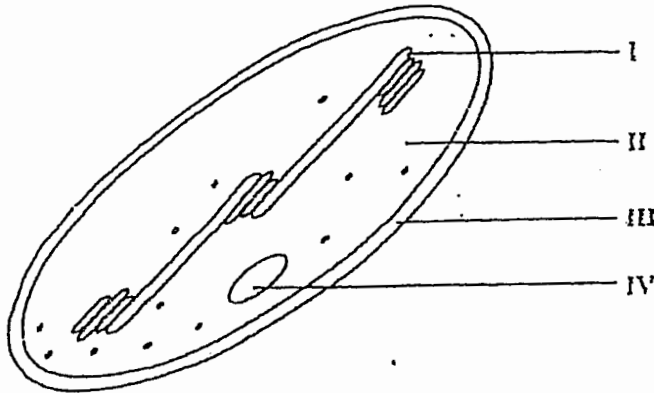


The best answer to this item is "ATP", so answer space (A) has been shaded.

6. If you want to change your answer, erase it completely and fill in your new choice.
7. 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.
8. You may do any rough work in this booklet.
9. Figures are not necessarily drawn to scale.

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

Item 1 refers to the following diagram which represents a chloroplast.



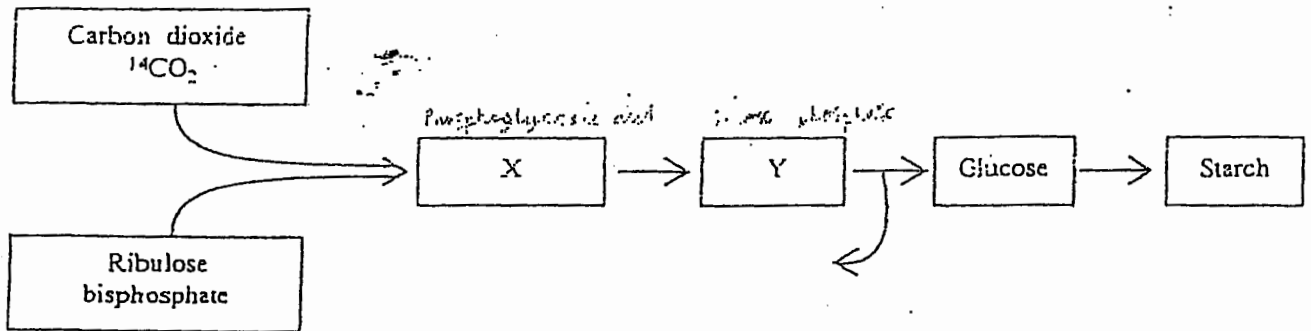
2. The electrons from non-cyclic photophosphorylation pass into the Calvin Cycle via

- (A) ATP
- (B) FAD
- (C) NADP
- (D) NADH<sub>2</sub>

1. Ribulose biphosphate carboxylase can be found in Region

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

Item 3 refers to the reaction scheme below which shows the dark reaction pathway of the Calvin Cycle occurring for about 20 seconds.



3. Which of the following correctly identifies the compounds, X and Y?

- |   | X                    | Y                    |
|---|----------------------|----------------------|
| <input checked="" type="checkbox"/> (A) | Phosphoglyceric acid | Triose phosphate     |
| (B)                                     | Triose phosphate     | Phosphoglyceric acid |
| (C)                                     | Simple sugars        | Proteins             |
| (D)                                     | Acetyl CoA           | Succinic acid        |

The yield of greenhouse crops is higher than that of field crops, due to increased photosynthetic activity by the plants. Which of the following factors may contribute to this?

- I. Constant application of farmyard manure
- II. Rotation of plants
- III. Humid air and moist soil conditions
- IV. Higher than average carbon dioxide levels

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

5. Which of the following substances are present in the matrix of a mitochondrion?

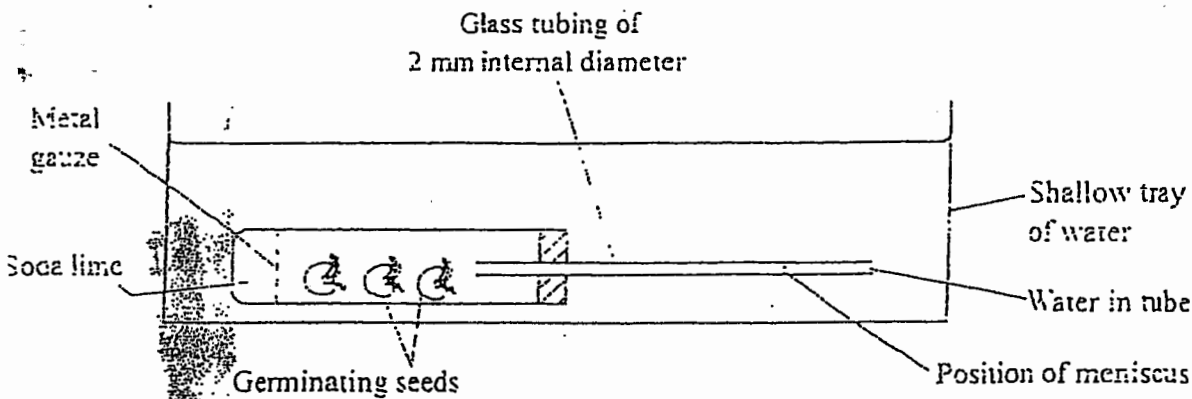
- I. Glucose
- II. Adenosine diphosphate
- III. Adenosine triphosphate
- IV. Acetyl co-enzyme A

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

6. During aerobic respiration in mammals, pyruvic acid is

- (A) used in the Krebs's Cycle
- (B) converted to lactic acid
- (C) used to synthesise glycogen
- (D) one of the products of the Krebs's Cycle

Items 7 & 8 refer to the apparatus below which is set up to determine the rate of respiration of germinating seeds.



Which of the following statements explain why the apparatus is left in the water for five minutes before readings are taken?

- I. To allow water to fill the capillary tube.
- II. To stabilise the pressure of the apparatus.
- III. To stabilise the temperature of the apparatus.
- IV. The seeds needed to adjust to experimental temperature.

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

8. Another set of apparatus is set up in exactly the same way but glass beads are used instead of germinating peas. The purpose of the apparatus with the beads is to

- (A) serve as a control
- (B) measure oxygen taken up
- (C) measure carbon dioxide produced
- (D) show that germinating seeds absorb carbon dioxide

Item 9 refers to the diagram below which shows how energy flows in an ecosystem.

Sunlight



Grass → Grasshopper → Lizard → Hawk

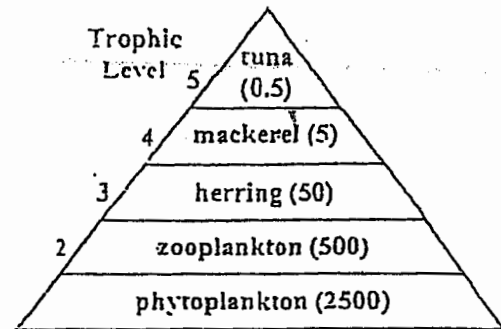
9. At which of the following stages is the MOST energy lost?

- (A) Lizard → hawk
- (B) Sunlight → grass
- (C) Grass → grasshopper
- (D) Grasshopper → lizard

10. In the 1950's, G. F. Gause observed that two species of flour beetle, *Tribolium confusum* and *Tribolium castaneum*, survived well on their own. However, when they were put together, only one of the species survived. This resulted in the hypothesis called Gause's Competitive Exclusion Principle which states that no two species can co-exist if they occupy the same

- (A) niche
- (B) habitat
- (C) ecosystem
- (D) environment

Item 11 refers to an ocean food pyramid. The number in brackets represents the weight of the organism.



11. The percentage of energy available for transfer to a person eating 0.5 kilograms of tuna is approximately

- (A) 1 %
- (B) 5 %
- (C) 10 %
- (D) 20 %

12. Which sequence correctly represents the action of nitrifying bacteria?

- (A) Ammonium → nitrite → nitrate
- (B) Nitrite → nitrate → ammonium
- (C) Nitrogen → nitrate → nitrite
- (D) Nitrate → ammonium → nitrogen

13. The number and range of different species found in an ecosystem are called its

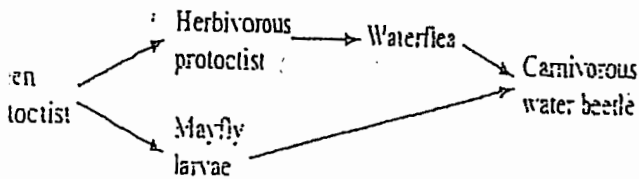
- (A) biotic factors
- (B) abiotic factors
- (C) species diversity
- (D) community

Which of the following are NOT conservation methods used to maintain biodiversity?

- I. Gene bank
- II. Botanic garden
- III. Protected reserve
- IV. Endangered species

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

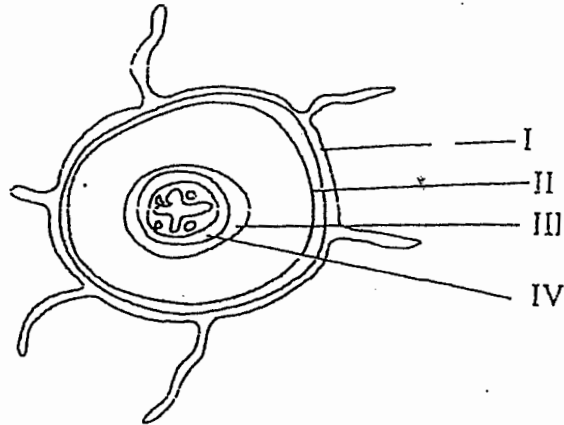
Item 15 refers to the diagram below that shows a simple food web.



Which of the following organisms is INCORRECTLY identified with its trophic level?

- (A) Green protist - primary producer
- ~~(B)~~ Herbivorous protist - primary producer
- (C) Carnivorous water beetle - secondary consumer
- (D) Carnivorous water beetle - tertiary consumer

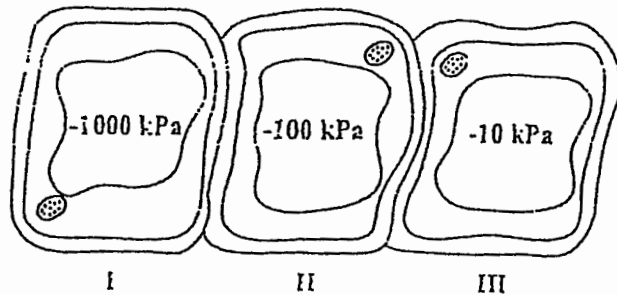
Item 16 refers to the diagram below which shows a transverse section of a typical dicotyledonous root.



16. The Casparian strip is found in the layer labelled

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

Item 17 refers to the diagram below which shows three adjacent plant cells, I, II and III. The values of their water potentials are given in kPa.



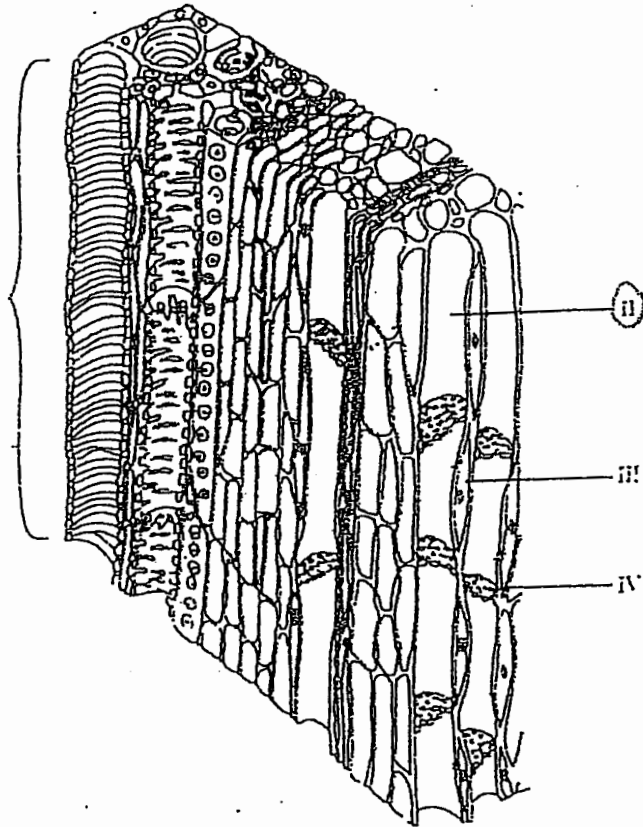
17. In which direction would there be a NET flow?

- (A) I → II and II → III
- ~~(B)~~ II → I and III → I
- (C) II → III and II → I
- (D) III → II and II → I

18. The function of the companion cell in mature phloem tissue is to

- (A) provide structural support for the sieve tubes
- (B) provide a nucleus needed for cell division of the sieve tube elements
- (C) move sucrose against a concentration gradient into the xylem
- (D) actively move sucrose out of neighbouring photosynthesizing cells to the sieve tubes

Item 19 refers to the following three-dimensional diagram of part of a plant stem.



19. Which labelled part is living but lacks a nucleus?

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

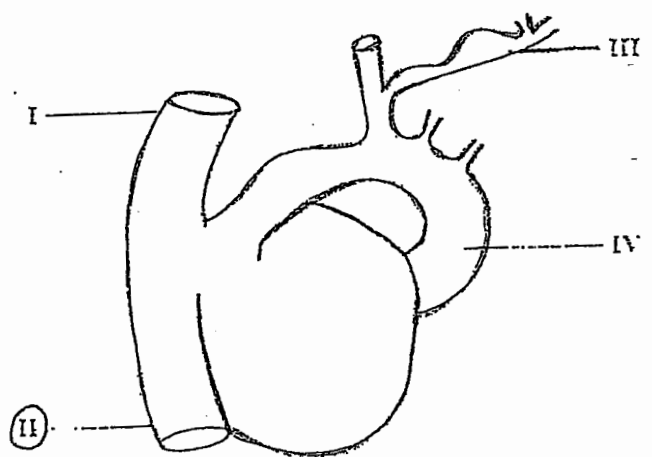
20. The tunica externa found in the walls of certain blood vessels is made up of MAINLY

- (A) elastic fibres
- (B) collagen fibres
- (C) smooth muscle
- (D) squamous epithelium

21. The first sound in the cardiac cycle is caused by the

- (A) closing of the semi-lunar valves
- (B) opening of the semi-lunar valves
- (C) closing of the atrio-ventricular valves
- (D) opening of the atrio-ventricular valves

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



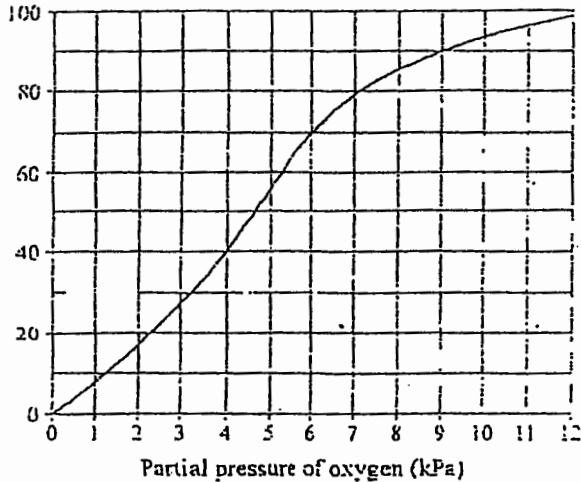
22. The inferior vena cava is represented by

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

23. Which of the following structures must be stimulated to increase heart rate?

- (A) Vena cava
- (B) Cardiac muscle
- (C) Sino-atrial node
- (D) Atrio-ventricular node

Item 24 refers to the graph below which shows the sigmoid (S-shaped) dissociation curve for haemoglobin of a human adult.



During cycling, the partial pressure of oxygen found in the pulmonary vein leaving the lungs and in a vein leaving a muscle is MOST likely

	$pO_2$ (kPa) in pulmonary vein leaving lungs	$pO_2$ (kPa) in pulmonary vein leaving muscle
(A)	0	12
(B)	2	12
(C)	6	6
<input checked="" type="checkbox"/> (D)	12	2

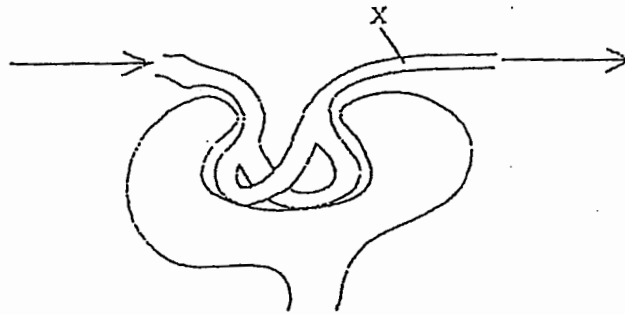
A diabetic administers an injection of insulin into the body. How does this lead to a lowering of blood glucose concentration?

- (A) By decreasing the permeability of cells to glucose ✗
- (B) By increasing the excretion of glucose in the urine ✗
- (C) By promoting the formation of the hormone glucagon in the pancreas ✗
- (D) By promoting the synthesis of polysaccharides from absorbed glucose ✓

26. Bananas produced in the Caribbean are exported to markets all over the world. The bananas are harvested mature but still green, yet must arrive at the markets ready to eat. Which of the following procedures ensures that the fruit is still marketable after shipping?

- (A) Ethylene application and chilling during shipping
- (B) Storage of the fruit in chillers with minimum lighting
- (C) Use of carbon dioxide during shipping and ethylene application later
- (D) Storage of the fruit in chillers followed by increased temperature when approaching port

Item 27 refers to the following diagram of the glomerulus and Bowman's capsule of a nephron.



27. If the diameter of the blood vessel is made smaller at X, a possible outcome is that

- (A) the rate of ultrafiltration will be increased
- (B) the rate of ultrafiltration will be decreased
- (C) water re-absorption will be decreased
- (D) the rate of urine production will be reduced

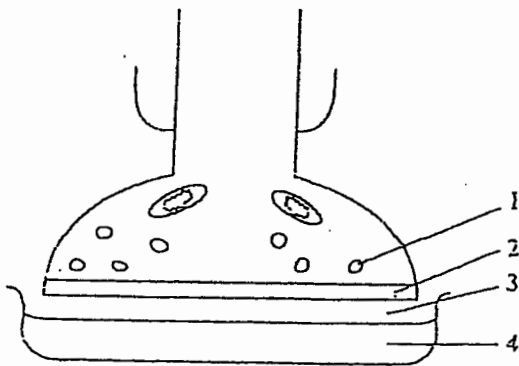
Item 28 refers to the table below which shows volume of water reabsorbed in the different regions of the human kidney nephrons. The total volume of filtrate produced by the glomerulus is 180 litres per day.

Region	Volume of water (litres) reabsorbed per day
Proximal tubules	147.0
Loop of Henlé	10.0
Distal tubules	19.2
Collecting ducts	2.2

28. What is the volume of urine produced per day, in litres?

- (A) 1.5
- (B) 2.2
- (C) 21.4
- (D) 178.4

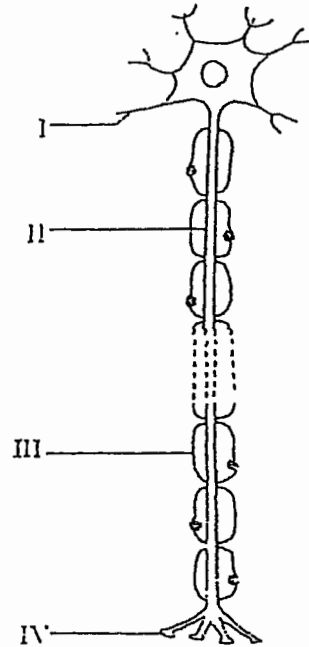
Item 29 refers to the diagram below showing the gap between two neurones.



29. Where is acetyl choline stored and secreted?

- |     | Stored | Secreted into |
|-----|--------|---------------|
| (A) | 1      | 3             |
| (B) | 1      | 4             |
| (C) | 2      | 3             |
| (D) | 2      | 4             |

Item 30 refers to the following diagram of a neurone.



30. Which region assists in speeding up the conduction of nerve impulses?

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

31. AIDS is caused by a

- (A) retrovirus
- (B) rhinovirus
- (C) bacterium
- (D) protozoan

32. A disease that develops slowly and persists for a long time is BEST described as

- (A) acute
- (B) chronic
- (C) degenerative
- (D) self-inflicted



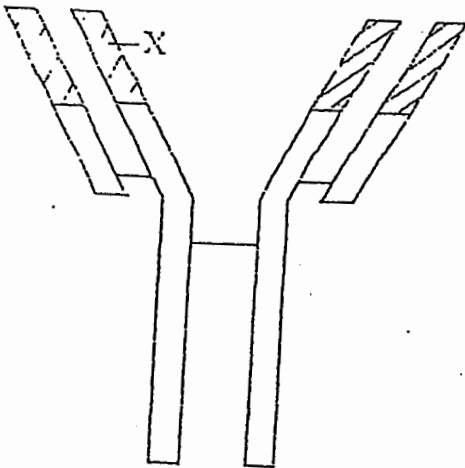
33. The organism that causes AIDS infects and destroys cells of the body's immune system so that their number gradually decreases. These cells are known as

- (A) B lymphocytes
- (B) plasma cells
- (C) T helper lymphocytes
- (D) T memory lymphocytes

34. Which of the following statements is NOT an explanation of the way in which antibodies work to protect the body from pathogens?

- (A) They cause agglutination of bacteria.
- (B) They combine with viruses preventing them from damaging cells.
- (C) They coat bacteria preventing phagocytes from ingesting them.
- (D) They attach to flagella of the bacteria making them easier for phagocytes to digest.

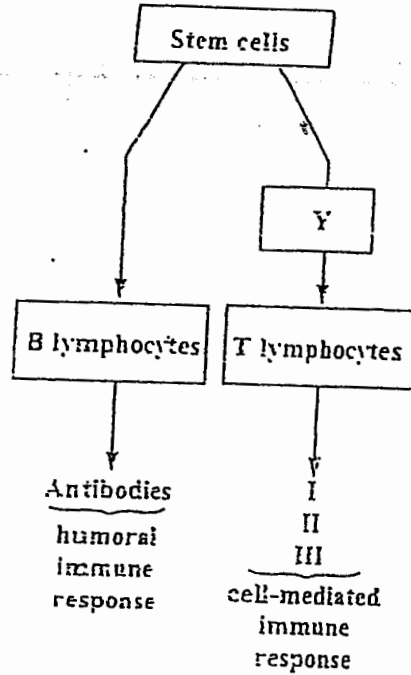
Item 35 refers to the following diagram.



35. Which of the following correctly identifies the structure labelled X in the diagram?

- (A) Hinge region
- (B) Variable region
- (C) Disulphide bridge
- (D) Light polypeptide chain

Item 36 refers to the following diagram.



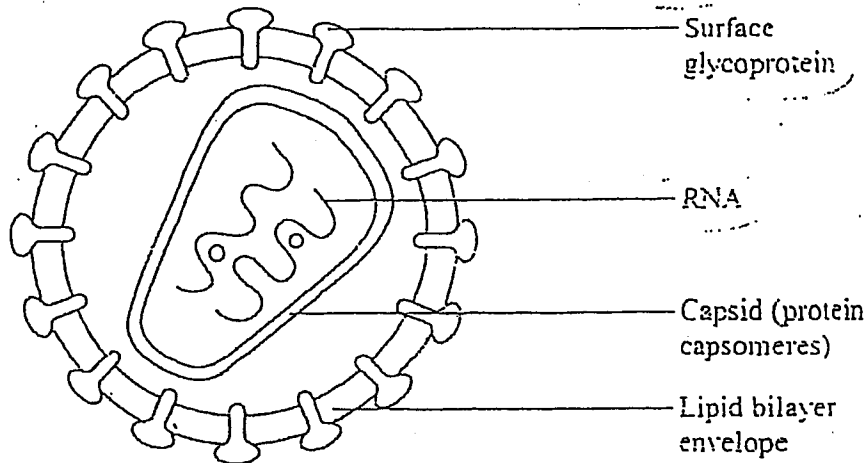
36. The structure labelled Y is

- (A) a lymph node
- (B) the thymus gland
- (C) the hypothalamus
- (D) red bone marrow

37. 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.

Item 38 refers to the following diagram of the structure of the human immunodeficiency virus.



38. The components of the virus which are considered to be important in producing a vaccine against the virus are the

- (A) RNA and capsid
- (B) RNA and surface glycoprotein
- (C) capsid and lipid bilayer envelope
- (D) surface glycoprotein and the lipid bilayer envelope

39. A runner prepares for six months to run a marathon, by exercising for three hours daily. This MOST likely results in an increase in

- I. cardiac output ✓
  - II. tidal volume ✓
  - III. muscle strength ✓
  - IV. blood pressure ✓
- (A) I, II and III only
  - (B) I, II and IV only
  - (C) I, III and IV only
  - (D) II, III and IV only

40. Body Mass Index (BMI) is now used as a simple means of assessing obesity. Which of the following formulae is used to calculate BMI?

- (A)  $\frac{\text{Height (m)}}{\text{Body mass}^2 (\text{kg}^2)}$
- (B)  $\frac{\text{Body mass (kg)}}{\text{Height (m)}}$
- (C)  $\frac{\text{Body mass (kg)}}{\text{Height}^2 (\text{m}^2)}$
- (D)  $\frac{\text{Body mass (kg)}}{\text{Age of individuals (yrs)}}$

41. Injecting virus antigens into the body results in

- (A) natural immunity
- (B) artificial immunity
- (C) an antigenic drift
- (D) an antigenic shift

42. Which of the following is NOT a possible cause of hypertension?

- (A) Arthritis
- (B) Kidney disease
- (C) Atherosclerosis
- (D) High levels of aldosterone

43. One effect of alcohol consumption is that it

- (A) inhibits the release of ADH
- (B) increases the release of ADH
- (C) increases sexual performance
- (D) increases muscular coordination

44. It is believed that tar in cigarette smoke causes

- (A) the blood platelets to become sticky
- (B) more adrenaline to be released into the blood
- (C) blockage in blood vessels, resulting in less oxygen being transported
- (D) increased secretion of mucus from goblet cells in the epithelium

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.

Endes |