

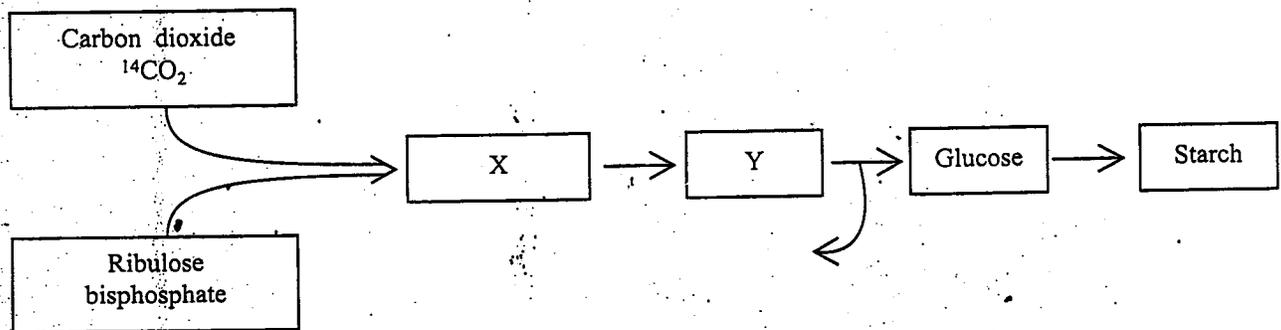
1. Which of the following combinations of functions correctly describes the role of a dicotyledonous leaf?

- I. Control of transpiration
 - II. Removal of poisonous gases from the air
 - III. Absorption of radiant energy
 - IV. Food storage
- (A) I and II only
 - (B) I, II and III only
 - (C) I, III and IV only
 - (D) I, II, III and IV

2. Which of the following are products of photophosphorylation?

- I. ATP
 - II. ADP
 - III. NADP
 - IV. NADPH
- (A) I and III only
 - (B) I and IV only
 - (C) II and III only
 - (D) III and IV only

Item 3 refers to the following diagram which outlines the events of the Calvin cycle.



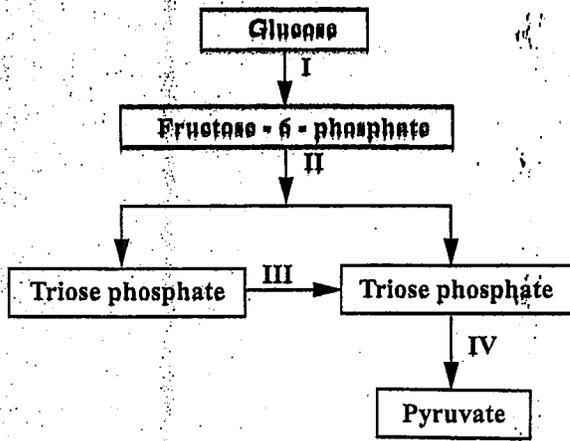
3. Which of the following correctly identifies the compounds, X and Y?

- | X | Y |
|--------------------------|----------------------|
| (A) Phosphoglyceric acid | Triose phosphate |
| (B) Triose phosphate | Phosphoglyceric acid |
| (C) Simple sugars | Proteins |
| (D) Acetyl CoA | Succinic acid |

4. On a warm, sunny day, photosynthesis is limited by

- (A) temperature
- (B) light intensity
- (C) oxygen availability
- (D) carbon dioxide availability

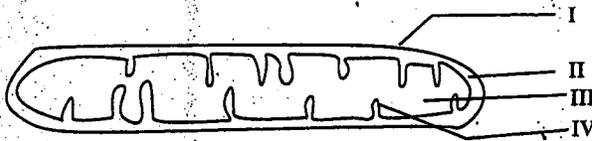
Item 5 refers to the following schematic diagram which summarizes the main steps in glycolysis.



5. At what stage does oxidative phosphorylation occur?

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

Item 6 refers to the following diagram of a mitochondrion.



6. Decarboxylation during respiration occurs at

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

7. Which of the following lists the chemical groupings found within an ATP molecule?

- (A) Base, sugar, phosphate group
- (B) Base, protein, phosphate group
- (C) Amino acid, base, phosphate group
- (D) Amino acid, sugar, phosphate group

8. Yeast is a key component in wine making. The MAIN purpose of the yeast is to

- (A) ferment starch to release ethanol and oxygen
- (B) promote carbon dioxide production to aerate wine
- (C) ferment sugar to form ethanol and carbon dioxide
- (D) promote glycerol production to make the wine sweeter

9. Which of the following contributes the MOST electrons to the electron transport chain?

- (A) Glycolysis
- (B) Kreb's cycle
- (C) Calvin cycle
- (D) Fermentation

10. When a species plays a role in its community, it is said to be in its

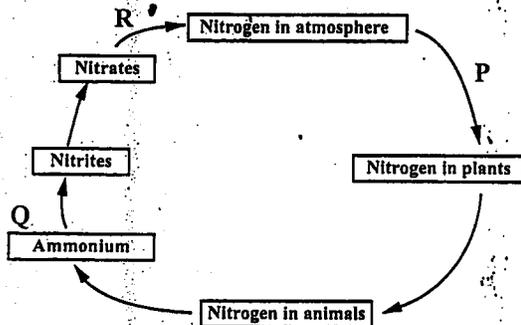
- (A) habitat
- (B) population
- (C) ecosystem
- (D) ecological niche

11. Which of the following combinations represent limitations of using pyramids of energy to describe relationships between trophic levels in ecosystems?

- I. A single grass plant has the same status as a tree.
- II. It requires combustion of representative samples which may be time-consuming.
- III. It may be difficult to assign a species to one trophic level, for example, omnivores.
- IV. True pyramid shapes are not always obtained as some may be inverted.

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

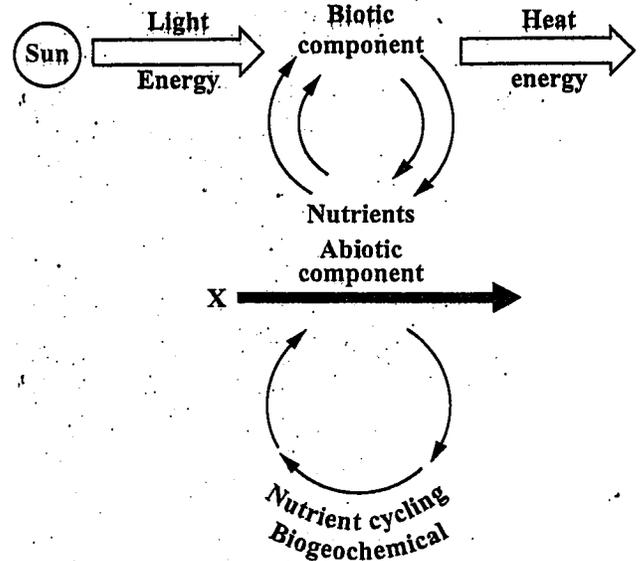
Item 12 refers to the following diagram, where P, Q and R represent bacteria that are active in the nitrogen cycle.



12. Which of the following combinations correctly identifies the bacteria P, Q and R?

	P	Q	R
(A)	Nitrifying	Denitrifying	Nitrogen-fixing
(B)	Nitrifying	Nitrogen-fixing	Denitrifying
(C)	Nitrogen-fixing	Denitrifying	Nitrifying
(D)	Nitrogen-fixing	Nitrifying	Denitrifying

Item 13 refers to the following diagram which is a schematic summary of the operational processes in an ecosystem.



13. The arrow labelled X MOST likely represents

- (A) energy flow
- (B) water flow
- (C) recycling of faecal wastes
- (D) positive feedback mechanisms

14. Which of the following does NOT explain how deforestation might increase the risk of flooding?

- (A) The water cycle is disrupted.
- (B) Tree roots bind soil particles.
- (C) Tree canopy prevents rain beating down on the soil.
- (D) Soil nutrients are lost through leaching and run-off water.

15. Which of the following is NOT a conservation method used to maintain biodiversity?

- (A) Sperm bank
- (B) Botanic garden
- (C) Protected reserve
- (D) Genetic engineering

16. The active uptake of many ions occurs at the roots of green plants. If the respiratory enzymes of the roots of a plant are poisoned, at which of the following tissues of the roots would the movement of ions be totally stopped?

- (A) Xylem
- (B) Epidermis
- (C) Endodermis
- (D) Cortex parenchyma

17. 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) darkness
- (B) humidity
- (C) temperature
- (D) wind speed

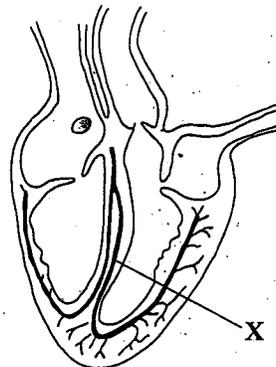
18. Companion cells are connected to sieve tube elements by

- (A) small plastids
- (B) protein fibres
- (C) plasmodesmata
- (D) polymer molecules

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 utilized, while a sink is a site where sugars are produced.
- (D) Water is actively transported from the intercellular spaces into the cell sap at the root end of the system.

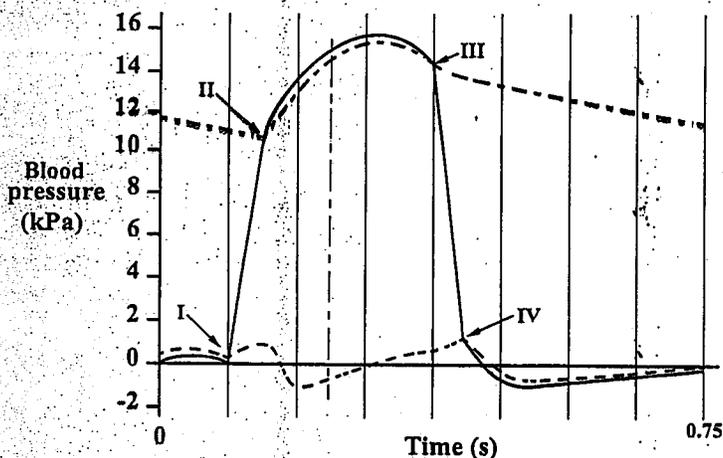
Item 20 refers to the following diagram of a longitudinal section of a mammalian heart.



20. Which of the following is true for the structure labelled X?

- (A) Receives impulses from the brain to initiate contraction of the atria
- (B) Delays impulses for a fraction of a second before they travel down into the ventricles
- (C) Separates the right ventricle from the left ventricle
- (D) Conducts impulses very rapidly to the base of the ventricles

Item 21 refers to the following graph which shows changes in blood pressure in the left ventricle during the cardiac cycle.



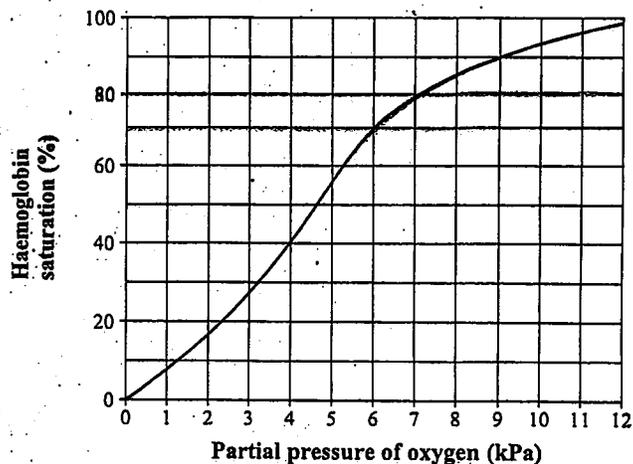
21. Valves open and close due to changes in pressure. Which of the labels, I, II, III and IV, correctly identifies the point on the graph when the aortic valve closes?

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

22. In the mammalian heart, heartbeat is initiated in the

- (A) Purkinje fibres
- (B) sinoatrial node
- (C) anterior vena cava
- (D) atrioventricular node

Item 23 refers to the following graph which shows the sigmoid (S-shaped) dissociation curve for haemoglobin of a human adult.



23. 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 Vein Leaving Muscle
(A)	0	12
(B)	2	12
(C)	6	6
(D)	12	2

24. Which of the following explains the physiological significance of the Bohr effect in mammalian muscle?

- (A) Myoglobin releases oxygen more rapidly to respiring cells.
- (B) Higher carbon dioxide partial pressures favour unloading of oxygen from haemoglobin.
- (C) Myoglobin becomes fully saturated at lower oxygen partial pressures.
- (D) Haemoglobin becomes fully saturated at lower oxygen partial pressures.

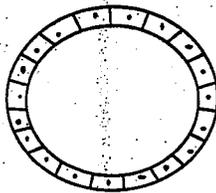
25. Which of the following are NOT regulated by a negative feedback mechanism?

- (A) Heart rate and blood pressure
- (B) Water balance and blood pH
- (C) Labour during birth and action potential
- (D) Blood glucose concentration and body temperature

26. Which of the following functions as an endocrine gland?

- (A) Testis
- (B) Liver
- (C) Kidney
- (D) Salivary gland

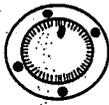
Item 27 refers to the following diagrams representing regions of a nephron as seen in a transverse section of the kidney when viewed under a light microscope.



I



II



III



IV

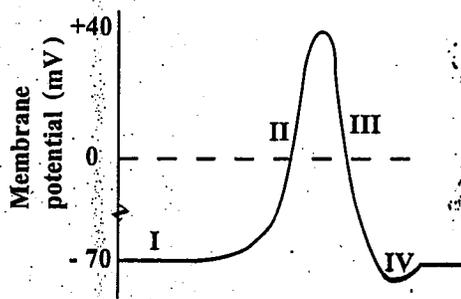
27. Which diagram represents the loop of Henlé?

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

28. The target cells of the antidiuretic hormone are cells of the

- (A) loop of Henlé and distal convoluted tubule
- (B) glomerular capillary and renal capsule
- (C) proximal convoluted tubule and collecting duct
- (D) collecting duct and distal convoluted tubule

Item 29 refers to the following diagram.



29. Diffusion of sodium ions into the axon occurs at

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

30. Which of the following are functions of a mammalian synapse?

- I. Acts as a junction
- II. Filters out low-level stimuli
- III. Passes impulses in both directions
- IV. Transmits information between neurones

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

31. Which of the following is an example of an infectious disease spread via blood or in semen?

- (A) AIDS
- (B) Diabetes
- (C) Bronchitis
- (D) Dengue fever

32. A highly malignant tumour linked to ultraviolet radiation is a

- (A) sarcoma
- (B) melanoma
- (C) lymphoma
- (D) papilloma

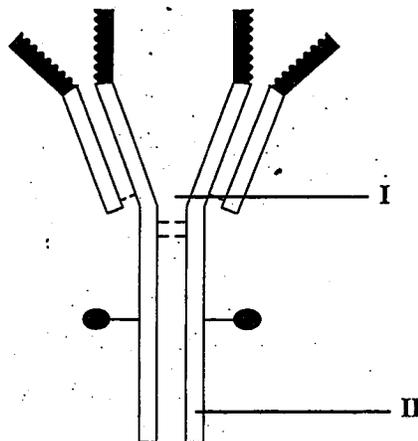
33. Which of the following is true for mast cells?

- (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.

34. Which of the following is NOT a function of phagocytes in the human body?

- (A) Secretion of antibodies
- (B) Removal of dead cells
- (C) Cleaning of debris in the plasma
- (D) Engulfing invading microorganisms

Item 35 refers to the following diagram of an antibody molecule.

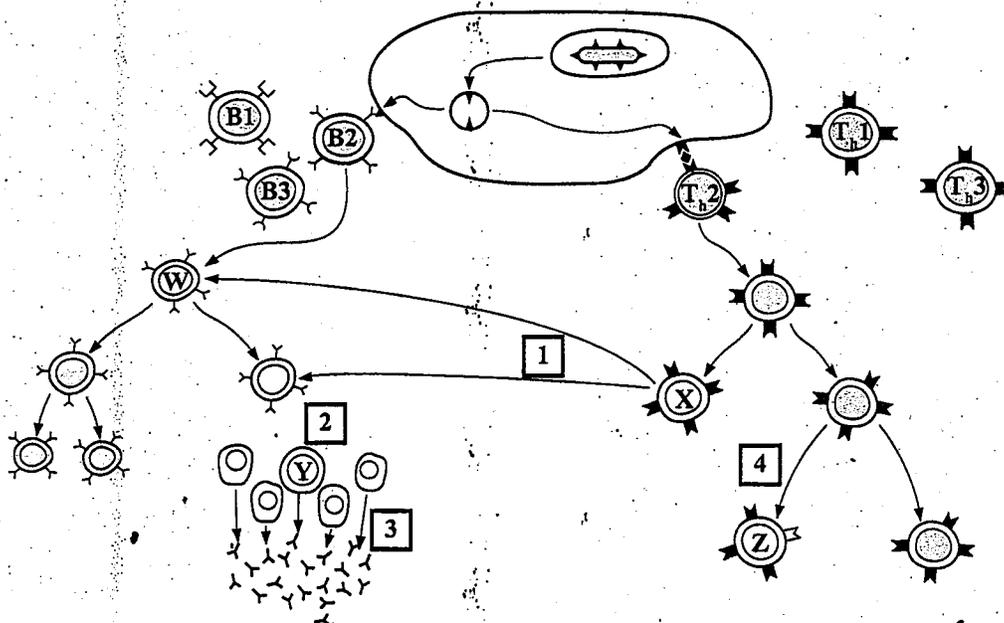


35. Which of the following combinations correctly identifies the labelled regions?

	I	II
(A)	Hinge region	Heavy polypeptide chain
(B)	Antigen binding site	Chain of sugar molecules
(C)	Heavy polypeptide chain	Light polypeptide chain
(D)	Hinge region	Variable region

36. Which of the following is NOT an appropriate definition of the immune response?
- (A) Involves specific and non-specific responses which attempt to destroy an invading pathogen
 - (B) Any response of the immune system to an antigenic stimulus
 - (C) Adverse effects on the functioning of the immune system due to allergens
 - (D) Involves responses that allow the body to distinguish self from non-self

Items 37–38 refer to the following diagram showing clonal selection and expansion as seen in the immune response.



37. Which of the cells, labelled W, X, Y or Z, are plasma cells?
- (A) W
 - (B) X
 - (C) Y
 - (D) Z
38. During which of the stages labelled 1, 2, 3 and 4, are cytokines involved?
- (A) 1
 - (B) 2
 - (C) 3
 - (D) 4

39. Which of the following is NOT an example of the use of monoclonal antibodies?

- (A) Locating tumours
- (B) Detecting pregnancy
- (C) Diagnosing AIDS
- (D) Diagnosing dengue fever

40. Which of the following are health benefits of exercise?

- I. Enhanced utilization of fat
- II. Speeding up of atherosclerosis
- III. Improved resistance to infection

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

41. Which of the following are the main cells infected by the human immunodeficiency virus?

- (A) T-helper cells
- (B) Erythrocytes
- (C) Platelets
- (D) Mast cells

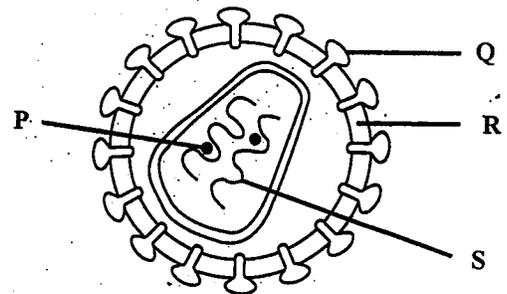
42. Body Mass Index (BMI) may be used as an indicator for obesity. Which of the following BMI values BEST reflects that of an obese individual?

- (A) 25
- (B) 27
- (C) 29
- (D) 31

43. Which of the following BEST describes the disease atherosclerosis?

- (A) Build-up of plaque in the walls of arteries
- (B) Calcification of the walls of arteries
- (C) Formation of large blood clots in arteries
- (D) Extensive damage to the endothelial lining of the arteries

Items 44–45 refer to the following diagram which shows the structure of the human immunodeficiency virus (HIV).



44. The parts labelled P and S are

	P	S
(A)	reverse transcriptase	RNA
(B)	reverse transcriptase	DNA
(C)	RNA polymerase	RNA
(D)	RNA polymerase	DNA

45. Which part would MOST likely be of importance in producing a vaccine for the virus?

- (A) P
- (B) Q
- (C) R
- (D) S

END OF TEST

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