

INTERNATIONAL BACCALAUREATE

BIOLOGY

Subsidiary Level

Paper 1

Monday, 14 May 1990 (afternoon)

45 minutes

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INSTRUCTIONS

There are 30 questions in this paper and you should attempt them all.

For each question there are 4 suggested answers. Read each question carefully. When you have selected the answer you consider to be the best, indicate your choice on the answer sheet provided. Choose only one answer for each question.

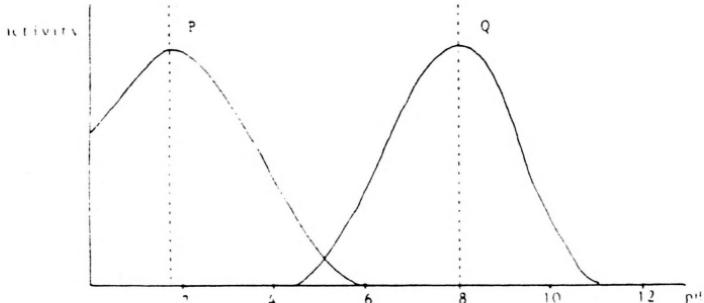
Your score for this paper will depend on the total number of correct answers given.

**ALL ANSWERS MUST BE GIVEN ON THE SPECIAL ANSWER SHEET**

1. Digestion of proteins produces

- A. alkanoic acids (fatty acids).
- B. nucleotides.
- C. monosaccharides.
- D. amino acids.

Questions 2 and 3 refer to the graph shown in the diagram below which shows the activity of two enzymes with respect to different values of pH.



2. The enzymes P and Q are respectively

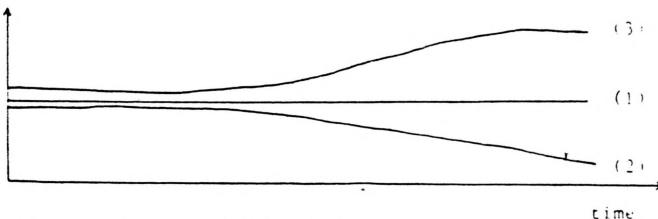
	P	Q
A.	Trypsin	Salivary amylase
B.	Trypsin	Pepsin
C.	Pepsin	Salivary amylase
D.	Pepsin	Rennin

3. Enzymes P and Q are respectively

	P	Q
A.	in the stomach	in the small intestine
B.	in the mouth	in the stomach
C.	in the small intestine	in the stomach
D.	in the stomach	in the mouth

4. Haemoglobin is responsible for the
- immune response of the organism.
  - transport of oxygen to the tissues.
  - blood clotting mechanism.
  - transport of  $\text{CO}_2$  to the tissues.
5. The process by which the blood glucose level is normally maintained, is an example of
- peristalsis.
  - homology.
  - homeostasis.
  - reflex action.
6. During an experiment a person breathes normal air and the rate of breathing is registered as curve 1, shown in the diagram below. The experiment is repeated using pure oxygen and curve 2 is obtained. A third experiment is performed using a mixture of 92 % oxygen and 8 % carbon dioxide, from which curve 3 is obtained. The data are shown in the graph below.

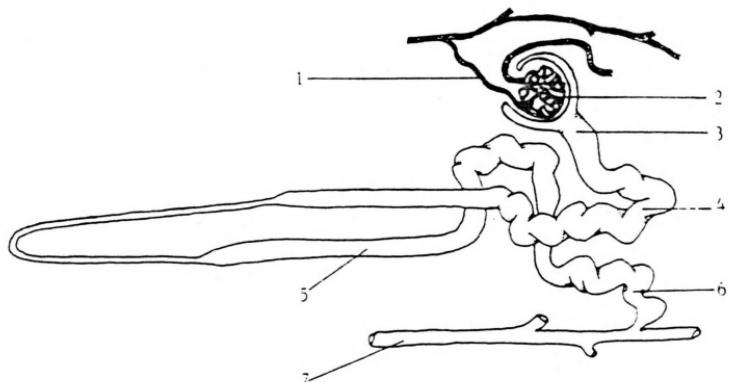
inspirations  
per  
minute



From this information it can be deduced that

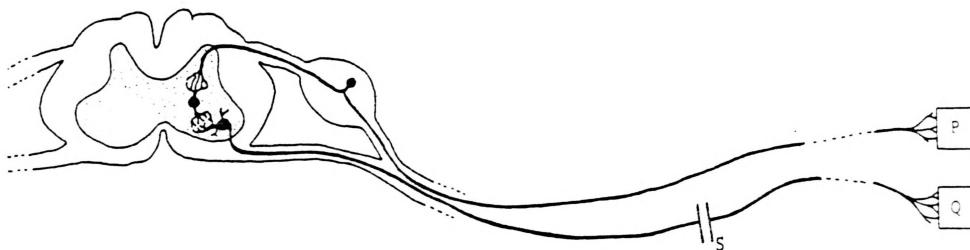
- the rate of breathing increases if carbon dioxide concentration increases beyond 0.03 %.
- the rate of breathing increases as oxygen concentration increases.
- an increase in carbon dioxide concentration decreases the rate of breathing.
- an increase of 8 % in oxygen concentration increases the rate of breathing.

Questions 7 and 8 refer to the diagram of a human nephron, shown below.



7. Which substance is present in structure 1 but not in structure 3 in a normally functioning nephron?
- A. Water
  - B. Urea
  - C. Sodium chloride
  - D. Fibrinogen
8. In a normally functioning nephron, glucose is
- A. present in structures 1, 2 and 3 but absent in structure 7.
  - B. absent in structures 1, 2 and 3 but present in structure 7.
  - C. present in structure 7 but absent in structures 5 and 6.
  - D. absent in structure 7 but present in structures 5 and 6.

9. A person whose diet is low in vitamin D may eventually suffer from
- poor night vision.
  - decalcified bones and teeth.
  - diarrhoea and a reduction in the number of red blood cells.
  - problems with nervous coordination.
10. The diagram below represents a transverse section of the human spinal cord and peripheral nerves.

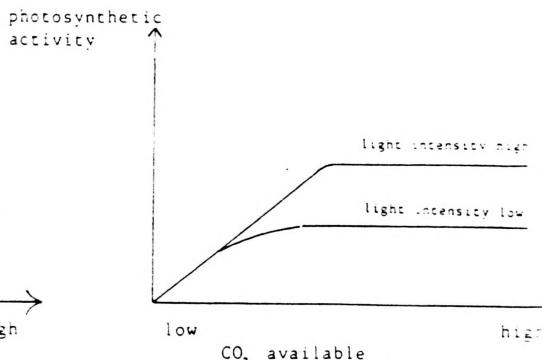
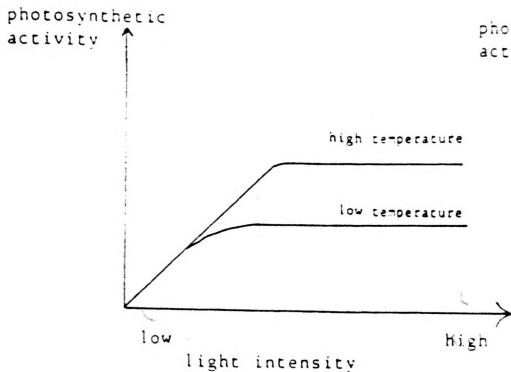


The nerves shown on the diagram connect to the tissues of the toe represented by two rectangles P and Q. The double line marked S indicates where the nerve has been accidentally cut. A possible consequence of this accident is that

- the person has feeling in his toe but cannot move it.
- the person can move his toe but has no feeling.
- if the toe is pricked with a pin, the toe moves but the person does not know it is moving.
- if the toe is pricked with a pin the toe does not move and the person does not know it is being pricked.

11. The thyroid gland produces substances that
  - A. regulate the activity of the adrenal cortex.
  - B. function in the metabolism of sodium ions.
  - C. stimulate the production of the hormones, FSH and LH.
  - D. regulate cellular metabolism.
12. The hydrolysis of an organic molecule produces phosphates, pentoses, adenine, cytosine, uracil and guanine molecules. The organic molecule is likely to be
  - A. DNA
  - B. RNA
  - C. ATP
  - D. NADP<sup>+</sup>
13. Energy is released when
  - A. ADP combines with inorganic phosphate to form ATP.
  - B. ATP releases inorganic phosphate to form ADP.
  - C. a molecule gains a hydrogen ion.
  - D. a molecule gains a phosphate group.
14. Which one of the following occurs during the light dependent reaction of photosynthesis?
  - A. ATP, CO<sub>2</sub> and H<sub>2</sub>O are produced.
  - B. CO<sub>2</sub> is combined with other molecules.
  - C. ATP, H<sup>+</sup> and O<sub>2</sub> are produced.
  - D. Carbohydrates, lipids and proteins are produced.

15. The following graphs refer to experiments in photosynthesis.



From the data given in the graphs it can be deduced that

- A. at low light intensities photosynthetic activity is limited by the speed at which water molecules split.
  - B. at low concentrations of CO<sub>2</sub> a rise in temperature will not affect the photosynthetic activity.
  - C. temperature and light are the only factors which influence photosynthetic activity.
  - D. if light intensity is high, there is a greater rate of photosynthesis at higher than at lower temperatures.
16. The salt concentration inside an animal cell is 0.9 %. The salt concentration in the surrounding medium is 10 %. In such a situation the cell is most likely to
- A. shrink.
  - B. gain salt from the medium.
  - C. remain unchanged.
  - D. gain water from the medium.

17. How many different combinations of chromosomes are possible in the gamete of an organism with four pairs of chromosomes?

- A. 4
- B. 12
- C. 16
- D. 32

Questions 18 and 19 refer to the diagrams shown below.

Diagram X represents the nucleus of a cell dividing into two cells P and Q. Diagram Y shows 4 different types of nucleus labelled I, II, III and IV.

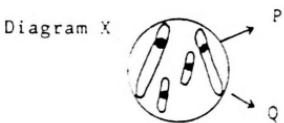
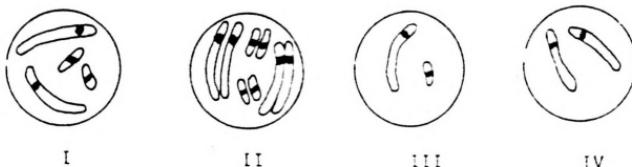


Diagram Y



18. If cells P and Q are spermatids their chromosomes are represented by the type of nucleus labelled

- A. I
- B. II
- C. III
- D. IV

19. If cells P and Q are neurones their chromosomes are represented by the type of nucleus labelled
- A. I
  - B. II
  - C. III
  - D. IV
20. An especially large number of mitochondria are to be found in
- A. erythrocytes.
  - B. epidermal skin cells.
  - C. bone cells.
  - D. muscle cells.
21. What is the probability that a family of four children will consist of four girls?
- A. 1/4
  - B. 1/2
  - C. 6/16
  - D. 1/16
22. Which of the following gametes will be produced by an individual with the genotype SSTt?
- A. SS and Tt'
  - B. ST and St
  - C. ST, SS, St, Tt
  - D. SS, Tt, TT, tt

23. In comparison with asexual reproduction, which of the following statements is an important advantage of sexual reproduction? Sexual reproduction
- A. ensures the survival of the species.
  - B. produces a greater number of offspring.
  - C. increases variation in the species.
  - D. perpetuates parental genotypes.
24. Which one of the following statements provides evidence that evolution could still be occurring at the present time?
- A. There are many natural barriers that cause the isolation of species.
  - B. Many birds make annual migrations.
  - C. There are no placental mammals originating in Australia.
  - D. New varieties of corn plants can be obtained by selective breeding.
25. For thirty generations the tails of new born mice are removed at birth and the mice allowed to reproduce at maturity. The most probable result after five further generations would be that
- A. all the mice will be born without a tail.
  - B. all the mice will be born with a tail.
  - C. some of the mice will be born without a tail.
  - D. a new species of mouse will develop.
26. All of the organisms living in and on a log could best be described as a
- A. climatic type.
  - B. community.
  - C. ecological niche.
  - D. population.

27. The presence of certain protozoa in the alimentary canal of termites prevents them from dying from starvation. This relationship is an example of
- commensalism.
  - parasitism.
  - symbiosis (mutualism).
  - predation.
28. Which one of the following statements defines a population?
- All the individuals of the same species at a given time.
  - All the individuals living in the same place at a given time.
  - All the individuals of the same species living in the same area at a given time.
  - All the organisms living in the same ecological niche.
29. Two healthy adult animals, one male and one female, are observed in a given environment. If they are of the same species they
- must be of very similar appearance when adults.
  - live together without competition.
  - must occupy the same ecological niche.
  - are incapable of producing fertile offspring.
30. Which one of the following phenomena CANNOT affect the amount of nitrogen in the atmosphere?
- The activity of bacteria in leguminous root nodules
  - The fermentation of sugar by bacteria
  - Electric discharges during a lightning storm
  - The activity of denitrifying bacteria in soil
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