M94/410/S(1)

INTERNATIONAL BACCALAUREATE

BIOLOGY

Subsidiary Level

Wednesday 4 May 1994 (afternoon)

Paper 1 — 45 minutes

This examination paper consists of thirty questions.

Each question offers four suggested answers.

The maximum mark for this paper is 30.

This examination paper consists of thirteen pages.

INSTRUCTIONS TO CANDIDATES

DO NOT open this examination paper until instructed to do so.

Answer ALL questions.

For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

EXAMINATION MATERIALS

Required/Essential:

Optically Mark Read (OMR) answer sheet
4 figure mathematical tables and/or slide rule or electronic calculator

Allowed/Optional:

A simple translating dictionary for candidates not working in their own language
Millimetre square graph paper

1. The electron microscope is required for the study of

   A. the fine structure of cilia and flagella.

   B. the karyotype of a cell.

   C. the frequency of crossing over between two genes on a chromosome.

   D. the RNA content of ribosomes.

2. Which of the following cell structures is the location for the process in which amino acids are joined together by peptide links?

   A. Nucleus

   B. Nucleolus

   C. Mitochondria

   D. Ribosomes

3. A process by which materials can be secreted from a cell is

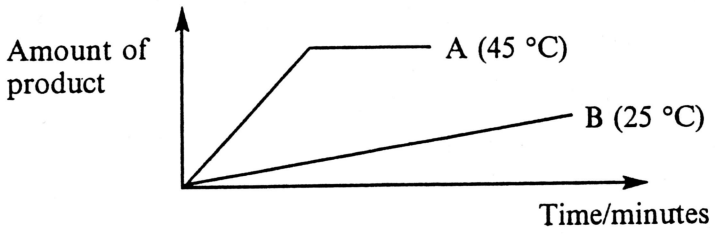
   A. endocytosis.

   B. pinocytosis.

   C. phagocytosis.

   D. exocytosis.

4. *This question refers to the following graph which shows the progress of an enzyme-catalysed reaction at two different temperatures.*



From the graph it is **true** to say that

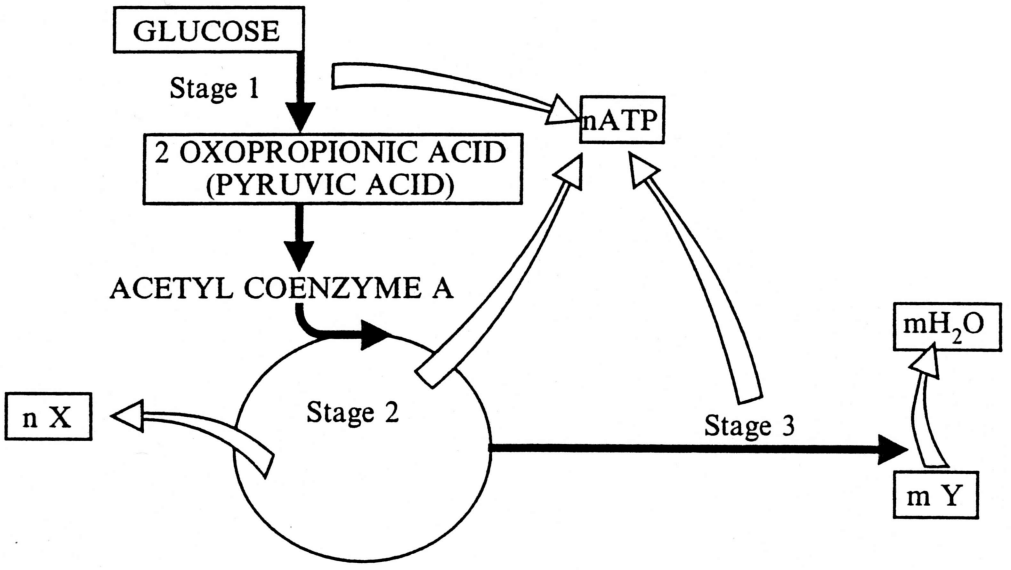
A. reaction A is slower than reaction B.

B. the optimum temperature for reaction A is 45 °C.

C. the lower the temperature the slower the rate of the reaction.

D. the enzymes in reaction A become activated at lower temperatures than the enzymes in reaction B.

uestions 5 and 6 refer to the following diagram of a cell process.



. For stage 3 the 'n' number of molecules of ATP derived from a single glucose molecule would be

A. 2

B. 4

C. 34

D. 42

. X and Y represent

A. hydrogen and oxygen.

B. carbon dioxide and hydrogen.

C. carbon dioxide and oxygen..

D. water and carbon dioxide.

7. In photosynthesis some reactions are enzyme controlled. The best evidence for this would be that

   A. at maximum light intensity an increase in temperature will increase the rate of photosynthesis.

   B. at maximum light intensity a decrease in temperature will increase the rate of photosynthesis.

   C. photosynthesis does not occur in the light at low temperatures.

   D. photosynthesis does not occur in the dark at high temperatures.

8. One difference between mitosis and meiosis is that in **meiosis**

   A. chromosomes divide into chromatids.

   B. fibres of the spindle attach to the centromeres.

   C. homologous chromosomes pair.

   D. sister chromatids separate during anaphase I.

9. The primary spermatocyte has

   A. one of each kind of chromosome.

   B. two of each kind of chromosome.

   C. one of each kind of chromatid.

   D. two of each kind of chiasma.

10. The enzyme amylase is secreted in the

   A. mouth and stomach.

   B. stomach and small intestine.

   C. mouth and small intestine only.

   D. mouth and pancreas.

11. In humans, which of the following transfusions may be safely performed?

A. From an AB, Rh^- donor to an AB, Rh^+ recipient

B. From an A, Rh^+ donor to an O, Rh^- recipient

C. From a B, Rh^+ donor to an AB, Rh^- recipient

D. From an AB, Rh^- donor to an O, Rh^+ recipient

12. The heart beat rate is determined by

A. nerve impulses from the cardio accelerator centre in the medulla.

B. an impulse from the sinu-atrial node.

C. the depolarisation of the atrio-ventricular node.

D. an impulse from the parasympathetic nervous system.

13. An increase in the respiratory rate can be produced by

A. an increase in atmospheric and blood oxygen concentration.

B. a decrease in both oxygen concentration in blood and in atmospheric carbon dioxide.

C. a decrease in both oxygen concentration in inspired air and in carbon dioxide in blood.

D. an increase in atmospheric and blood carbon dioxide concentration.

14. A hormone that quickens the heart beat, diverts blood to muscles, dilates the pupil and increases the metabolic rate is

A. adrenaline.

B. insulin.

C. thyroxine.

D. cortisone.

15. The hormone that causes the lining of the uterus to thicken and increase its vascularisation in preparation for pregnancy is

A. progesterone.

B. oestrogen.

C. prostaglandin.

D. oxytocin.

16. *This question refers to the following diagram of a pregnant uterus.*

Foetal and maternal blood exchange nutrients and waste products at **X**. Foetal protection against knocks and sudden jolts is given by **Y**. Which answer correctly identifies **X** and **Y**?

	X	Y
A.	I	I
B.	I and II	III
C.	II	IV
D.	I, II and III	V

17. Which of the following is **not** true for plants?

A. They can be habitats for animals

B. They depend on heterotrophs for their existence

C. They are important for soil formation

D. They have influenced the modern climate

18. The light-independent reactions of photosynthesis depend on a supply of

A. chlorophyll, ATP and CO_2.

B. water, ATP and CO_2.

C. ATP, $NADPH^+$ ($NADPH + H^+$) and CO_2.

D. ATP, $NADPH^+$ ($NADPH + H^+$) and water.

19. Seed plants show an evolutionary advance because the pollen tube

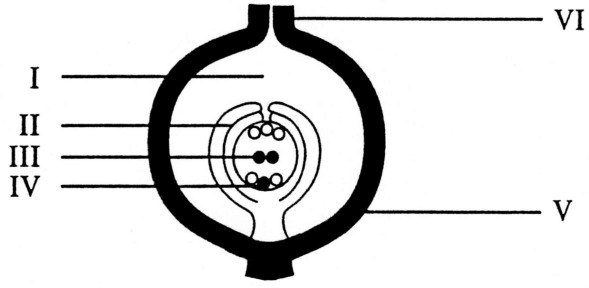
A. makes fertilisation independent of external water.

B. ensures close fertilisation.

C. makes the presence of sperms unnecessary.

D. ensures nutrients for the future seed.

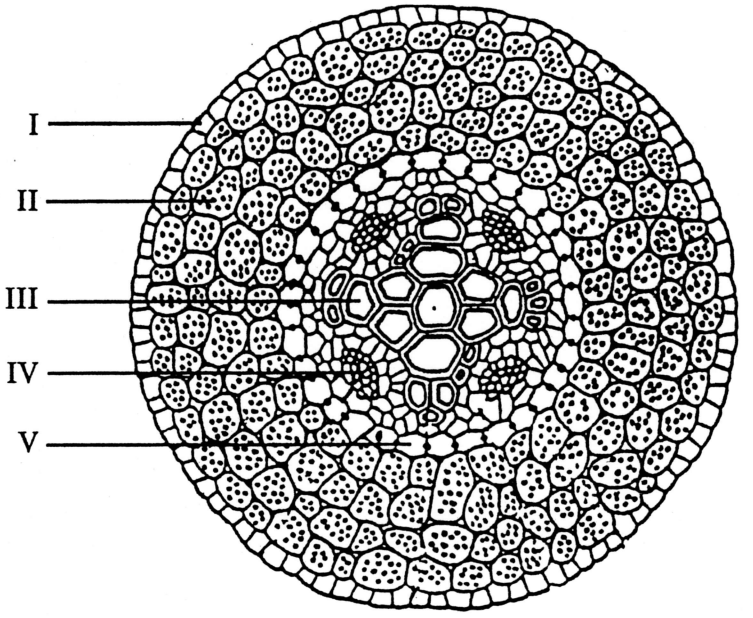
20. *This question refers to the following diagram of the ovary of a plant flower containing a single ovule.*



Structures of the embryo sac are **X**. A triploid structure will result from the fertilisation of **Y**. Which option correctly identifies **X** and **Y**?

	X	Y
A.	III and IV	IV
B.	III and IV	III
C.	V and VI	IV
D.	I and II	III

21. The following diagram represents a cross section of a dicotyledonous root.



Structures responsible for the translocation of the soluble products of photosynthesis through the plant are labelled

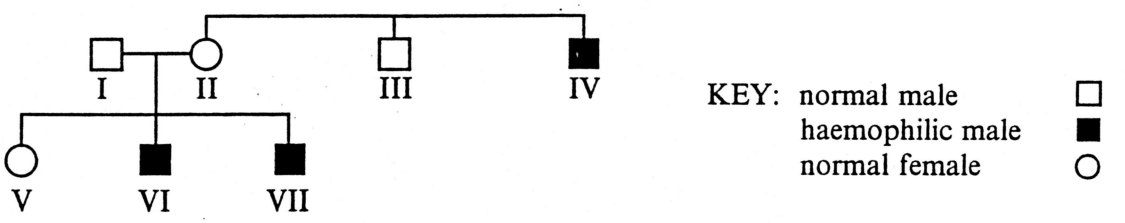
A. I and V

B. II

C. III and IV

D. IV

Questions 22 and 23 are based on the following pedigree that shows the incidence of haemophilia in a family.



22. If X^h represents the gene for haemophilia and X^+ its normal allele, the genotype of individual II is

A. X^hX^h

B. X^hX^+

C. X^+X^+

D. X^h

23. The probability that individual V carries a gene for haemophilia is

A. 0

B. 0.25

C. 0.50

D. 1.0

24. In a certain plant, red flower is dominant to white flower and tall stem is dominant to short stem. If a plant heterozygous for both of the characters is self-pollinated, what proportion of the offspring will have white flowers and short stems?

A. $\frac{1}{16}$

B. $\frac{3}{16}$

C. $\frac{9}{16}$

D. All

*Questions 25 and 26 are based on the following information. In Drosophila red eye (**R**) is dominant to purple eye(**r**), and normal body (**N**) is dominant to fat body (**n**).*

25. A series of crosses between flies with the genotype **NnRr** and flies with the genotype **nnrr** produce the following offspring:

48 % fat body, purple eye

48 % normal body, red eye

2 % normal body, purple eye

2 % fat body, red eye

These results illustrate

A. independent assortment.

B. polyploidy.

C. non disjunction.

D. crossing-over.

26. Another series of crosses between a small number of the same flies (**NnRr** with **nnrr**) produces the following:

50 % normal body, red eye

50 % fat body, purple eye

These results illustrate

A. linkage.

B. polyploidy.

C. non disjunction.

D. crossing-over

27. In the absence of competition, species evolve to fill all the niches they can occupy. This statement correctly defines

A. homology.

B. convergence.

C. adaptive radiation.

D. adaptive analogy.

28. Resistance in flies to DDT, in bacteria to penicillin and in rats to some poisons are examples of

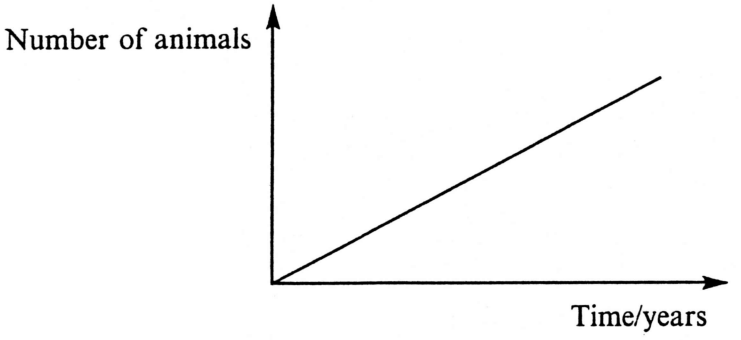
A. selective breeding.

B. niche adaptation.

C. natural selection.

D. genetic equilibrium.

29. The following graph illustrates the change in a given isolated population on an island.



The straight line indicates that for the population

A. the rate of growth is constant.

B. the rate of growth is increasing.

C. the natality rate is decreasing.

D. the mortality rate is increasing.

30. For terrestrial ecosystems which one of the following groups of organisms always has the greatest biomass?

A. Decomposers

B. Autotrophs

C. Heterotrophs

D. Carnivores