



INTERNATIONAL BACCALAUREATE

BIOLOGY

Subsidiary Level

Thursday 4 May 1995 (afternoon)

Paper 1

45 minutes

This examination paper consists of 30 questions.

Each question offers 4 suggested answers.

The maximum mark for this paper is 30.

This examination paper consists of 9 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

Electronic calculator (programmable and/or graphic display calculators are not allowed)

Allowed/Optional:

A simple translating dictionary for candidates not working in their own language

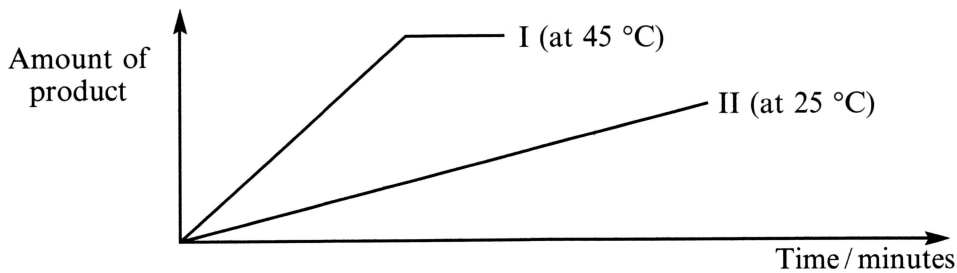
1. The basic building blocks of nucleic acids are
 - A. nucleosides.
 - B. nucleotides.
 - C. nitrogenous bases.
 - D. glucose phosphate groups.

2. When two amino acids are linked to form a dipeptide, the new resulting molecule differs from the original two in that it has
 - A. two more hydrogen atoms.
 - B. one fewer H^+ and one fewer OH^- .
 - C. two fewer OH^- groups.
 - D. two more OH^- groups.

3. Cells do **not** use ATP for
 - A. pinocytosis.
 - B. exocytosis.
 - C. osmosis.
 - D. endocytosis.

4. Ribosomes are cytoplasmic organelles which are the sites of
 - A. protein synthesis.
 - B. mRNA synthesis.
 - C. DNA synthesis.
 - D. tRNA synthesis.

The graph below refers to question 5. It represents the progress of an enzyme catalysed reaction at two different temperatures.

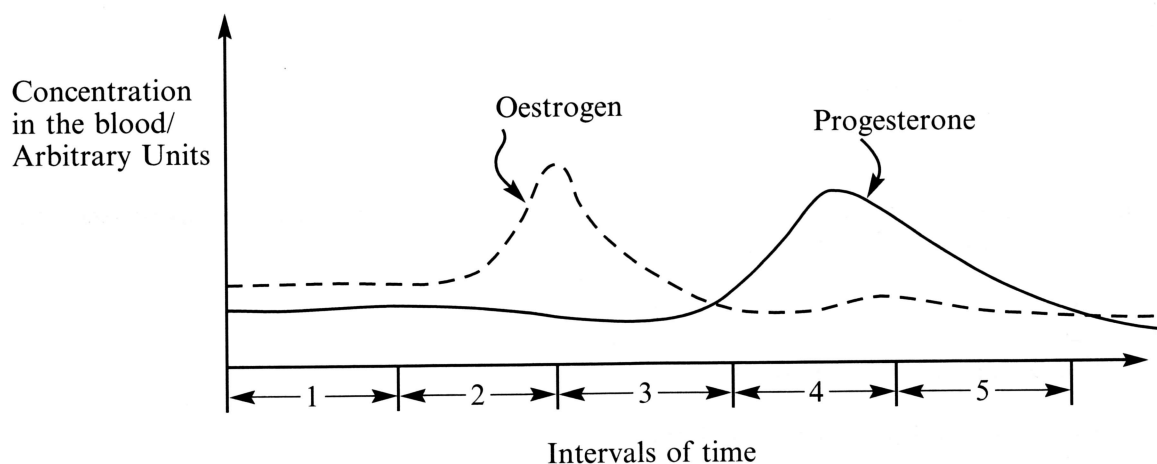


5. The most probable reason for the levelling off of **reaction I** is that
- A. all the substrate has been transformed.
 - B. the enzyme is being inhibited.
 - C. the enzyme is being denatured by the high temperature.
 - D. the rate of the reaction has become constant.
6. A skin cell of an organism has 28 chromosomes. How many chromatids are there in a cell of the same organism during prophase I of **meiosis**?
- A. none
 - B. 14
 - C. 28
 - D. 56
7. Which of the following statements is correct?
- A. All of the DNA molecules in a given organism are translated into RNA molecules.
 - B. A change in the sequence of DNA bases may result in a different enzyme.
 - C. All DNA molecules of organisms of the same species are identical.
 - D. A change in the sequence of DNA bases always results in a different enzyme.

8. In living cells, the enzymes involved in electron transport are located in the
- A. cytoplasm and mitochondrial stroma.
 - B. cell membrane and mitochondrial stroma.
 - C. mitochondria and chloroplasts.
 - D. cell membrane, cytoplasm, mitochondria and chloroplasts.
9. Which of the following blood components is **not** normally present in lymph?
- A. Plasma
 - B. Lipids
 - C. White cells
 - D. Red cells
10. When mammals inspire, air enters the lungs because the
- A. higher pressure in the lungs forces the thorax to expand.
 - B. higher pressure in the thorax forces the lungs to expand.
 - C. air pressure in the lungs becomes lower than the atmospheric pressure.
 - D. air pressure in the lungs becomes higher than the atmospheric pressure.
11. Organs that receive stimuli and send messages responsible for maintaining balance and posture are the
- A. cochlea, incus and ear drum.
 - B. utriculus, sacculus and semiçircular canals.
 - C. cochlea, endolymph and perilymph.
 - D. malleus, incus and semicircular canals.

12. If a person drinks a large volume of water
- A. the hypothalamus will react to the change and cause the pituitary (hypophysis) to release less ADH.
 - B. the hypothalamus will react to the change and cause the pituitary (hypophysis) to release more ADH.
 - C. osmotic detectors in the kidney will react increasing cell membrane permeability making the urine become more concentrated.
 - D. osmotic receptors in the kidney will react increasing water reabsorption.

Questions 13 and 14 refer to the following diagram. It illustrates the variations in the levels of oestrogen and progesterone



13. Menstruation is most likely to occur during time interval
- A. 1
 - B. 2
 - C. 3
 - D. 5
14. Fertilisation is most likely during time interval
- A. 1
 - B. 2
 - C. 3
 - D. 5

15. In mammals, fertilised eggs start their development in the
- A. ovary.
 - B. oviduct.
 - C. uterus.
 - D. vagina.
16. Carbon dioxide is transported in blood in
- A. plasma only.
 - B. red cells only.
 - C. red cells and white cells.
 - D. red cells and plasma.
17. The environment surrounding the guard cells in plant epidermis becomes **hypertonic** (that is, more concentrated). The guard cells will
- A. gain water and the stomata will close.
 - B. lose water and the stomata will close.
 - C. gain water and the stomata will open.
 - D. lose water and the stomata will open.
18. The part of a flower that becomes a mature fruit after fertilisation is the
- A. stigma.
 - B. style.
 - C. ovary.
 - D. stamen.

19. Which of the following events is regarded as the first step in the light-dependent stage in photosynthesis?
- A. Photolysis of water molecules
 - B. Fixation of carbon dioxide molecules
 - C. Production of ATP molecules
 - D. Excitation of chlorophyll molecules by light
20. Which of the following factors affects the rate of ion transport in xylem?
- A. The amount of ATP present in xylem cells
 - B. The structure of the companion cells
 - C. The rate of transpiration
 - D. The relationship between root size and height of the plant

What follows is a sequence of nucleotides in a section of a particular DNA molecule. It refers to Question 21.

Thymine – Thymine – Adenine – Cytosine – Guanine

21. After **transcription**, the corresponding sequence of nucleotides in the RNA molecule is
- A. Adenine – Adenine – Uracil – Guanine – Cytosine.
 - B. Uracil – Uracil – Adenine – Guanine – Cytosine.
 - C. Adenine – Adenine – Thymine – Cytosine – Guanine.
 - D. Thymine – Thymine – Uracil – Guanine – Cytosine.
22. Colour blindness in people is known to be a recessive sex-linked characteristic. A woman whose father was colour blind has a son. The father of this son has normal vision. What is the probability that this son is colour blind?
- A. 1.0 (100%)
 - B. 0.5 (50%)
 - C. 0.25 (25%)
 - D. 0

23. A natural process which can separate two linked genes is
- A. independent assortment.
 - B. non-disjunction.
 - C. gene mutation.
 - D. crossing over.
24. A genetic cross is made between two organisms who possess the genotypes **AaBb** and **aabb**. Only two genotypes are produced. This is possible if
- A. crossing-over occurred.
 - B. the genes are completely linked.
 - C. independent assortment occurred.
 - D. a mutation took place.
25. Radiocarbon dating is a technique used frequently by scientists. At the moment a plant died it contained 8g of ^{14}C . It became fossilised and today it contains 1g of ^{14}C . The half-life of ^{14}C is 5 700 years. Using this data the approximate age of the fossil is
- A. 2 850 years.
 - B. 5 700 years.
 - C. 12 400 years.
 - D. 17 100 years.
26. Two groups of frogs are believed to be the same species. Which of the following observations provides the strongest evidence for this belief?
- A. They are of similar size and have similar patterns and colours in their skin.
 - B. The fossil records show evidence that they have a common ancestor.
 - C. Given the opportunity, they interbreed producing fertile offspring.
 - D. Both are Amphibians and have a very similar internal organisation.

27. *Biston betularia* (peppered moth) has two forms; the light speckled and the dark melanic. The light form is common in non-polluted areas. The melanic form is common in industrial regions. The differences in the moth population density in the two areas can be best explained by:
- A. selective breeding.
 - B. selective predation.
 - C. different rates of mutation.
 - D. changes in feeding behaviour.
28. In a defined area, a population of deer increases beyond the available food supply. Which of the following is most likely to occur **first**?
- A. All the deer will leave the area.
 - B. Fewer deer will be born each reproductive season.
 - C. The number of predators (on the deer) will decrease.
 - D. Large numbers of deer will die.
29. In a pyramid of numbers, there are generally fewer organisms at each successive trophic level because
- A. energy is lost at each step of the pyramid.
 - B. fewer omnivores can survive at each higher level.
 - C. organisms in higher levels do not live for very long.
 - D. reproductive capacity decreases at each higher level.
30. Bacteria in a mutualistic relationship with the roots of leguminous plants are responsible for
- A. removing nitrogen from the plant.
 - B. fixing nitrogen from the surrounding air.
 - C. converting nitrites (NO_2^-), into nitrates (NO_3^-).
 - D. converting proteins into urea.
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