



BIOLOGY
HIGHER LEVEL
PAPER 1

Thursday 11 May 2000 (afternoon)

1 hour

INSTRUCTIONS TO CANDIDATES

- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

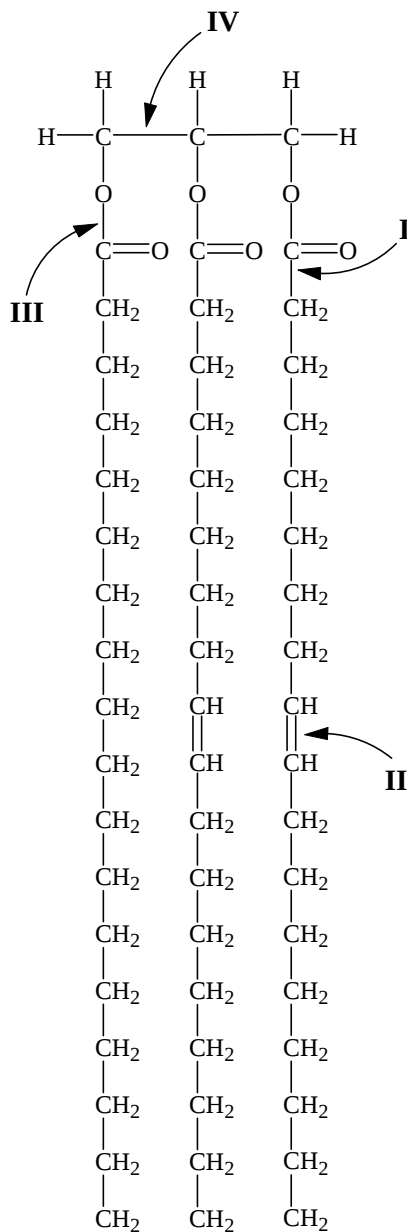
1. Which function is carried out by the flagellum of the prokaryote?
 - A. Movement of food towards the cell
 - B. Movement of the whole cell from one place to another
 - C. Movement of naked nucleic acid inside the cell
 - D. Movement of water around the cell to speed up gas exchange

2. What is needed for osmosis to occur?
 - I. A concentration gradient of solutes
 - II. A partially permeable membrane
 - III. A supply of ATP
 - A. I only
 - B. I and II only
 - C. I and III only
 - D. I, II and III

3. What causes the chromosomes of an animal cell to move to opposite ends of the cell during mitosis?
 - A. Microtubules
 - B. Mesosomes
 - C. Nuclear membranes
 - D. Mitochondria

4. Which property of water is most important to plants living below the surface of water in ponds?
 - A. Cohesion
 - B. Oxygen solubility
 - C. Surface tension
 - D. Transparency

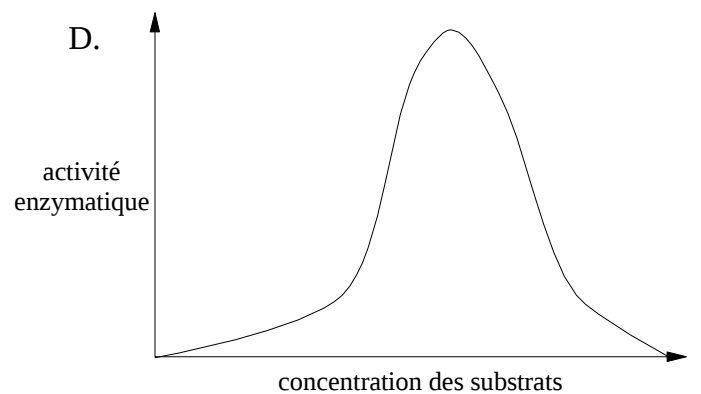
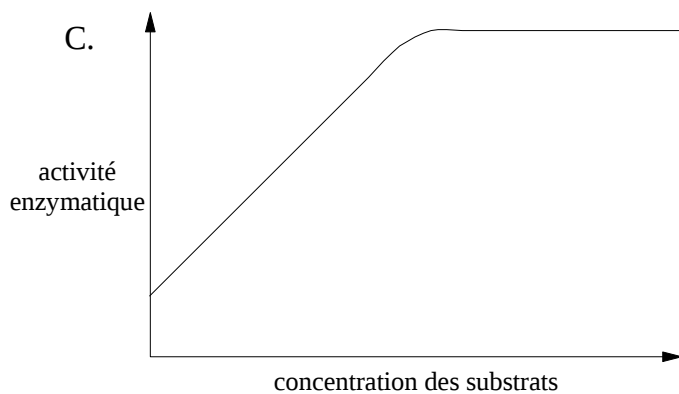
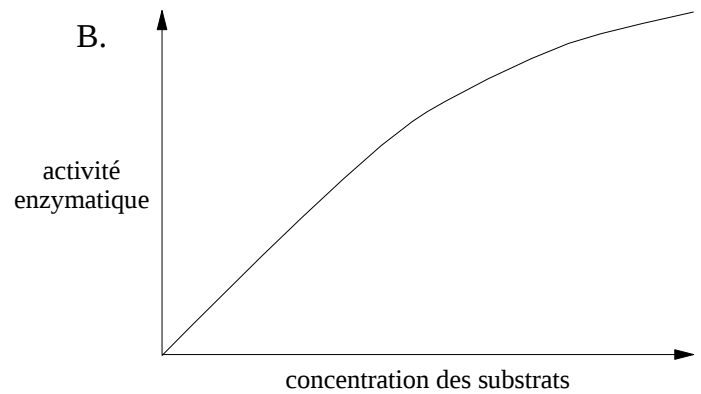
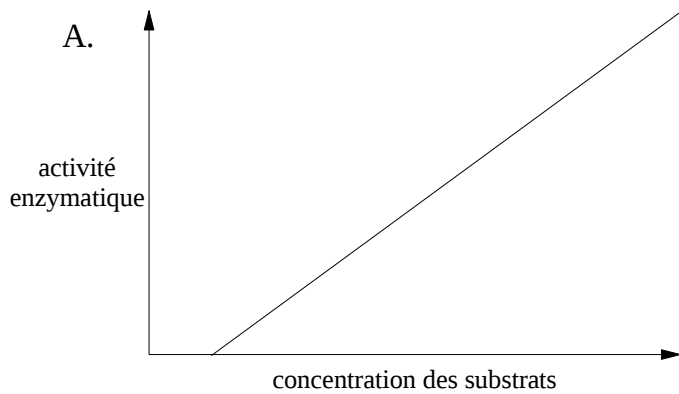
5. The diagram below shows a triglyceride.



Which arrow points to a bond formed by condensation between a fatty acid and a glycerol?

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

6. Which graph shows the effect of substrate concentration on enzyme activity?



7. DNA is made up of three components: deoxyribose, phosphate and bases. What is the maximum number of components that deoxyribose is linked to in a DNA molecule?

- A. One phosphate and one base
- B. Two phosphates and one base
- C. One phosphate and two bases
- D. Two phosphates and two bases

8. What technique is used in DNA profiling?

- A. Gene transfer
- B. Gene therapy
- C. Gel electrophoresis
- D. Electron microscopy

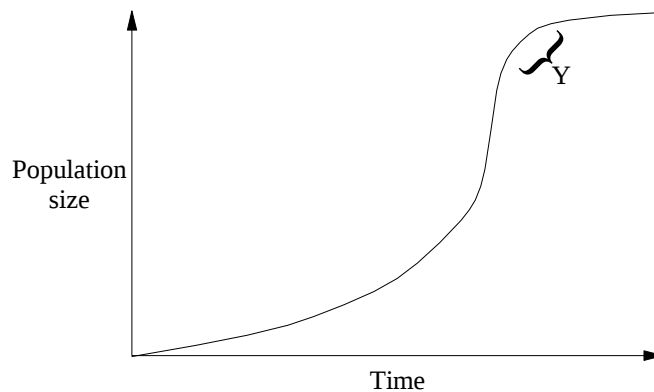
9. In which stage in meiosis is the chromosome number reduced from diploid to haploid?
- During pairing of chromosomes in the first division of meiosis
 - During pairing of chromosomes in the second division of meiosis
 - When chromosomes move to opposite ends of the cell during the first division of meiosis
 - When chromosomes move to opposite ends of the cell during the second division of meiosis
10. Huntington's chorea is a rare degenerative disease which usually develops when a person is between 30 and 45 years of age and leads to death within a few years. It is caused by a dominant allele. If one parent of two children develops Huntington's chorea, but the other parent does not, what is the probability that both of the children will develop the disease?
- $\frac{1}{16}$
 - $\frac{1}{4}$
 - $\frac{9}{16}$
 - $\frac{3}{4}$
11. The pattern of inheritance of sex-linked genes is the same in *Drosophila* as in humans. Eye colour in *Drosophila* is controlled by a sex-linked gene. The allele for red eye is dominant over the allele for white eye. A red eyed male mates with a white eyed female. Which eye colours are found in the offspring?

	Male offspring	Female offspring
A.	all red	all red
B.	all red	all white
C.	all white	all red
D.	50 % red and 50% white	50 % red and 50 % white

12. *Lathraea clandestina* is an unusual plant because it contains no chlorophyll. It grows on the roots of living trees including *Populus* (poplar) and *Salix* (willow) and obtains all its organic matter from them. What is the trophic level of *Lathraea clandestina*?
- Producer
 - Primary consumer
 - Secondary consumer
 - Saprotroph

13. Plants living in water can cause a pH change in the water when they carry out photosynthesis. What is the pH change and what causes it?
- A. The pH falls because oxygen is released
 - B. The pH rises because carbon dioxide is absorbed
 - C. The pH falls because carbon dioxide is absorbed
 - D. The pH rises because oxygen is released

14. The graph below shows a sigmoid population growth curve, for a population in which there was no migration.



Which statement correctly describes the population during the phase marked Y?

- A. Natality is decreasing or mortality is increasing
 - B. Mortality is decreasing or natality is increasing
 - C. Mortality and natality are both increasing but natality is increasing more rapidly
 - D. Mortality and natality are both decreasing but mortality is decreasing more rapidly
15. Why is it necessary to capture animals on two occasions when the capture–mark–release–recapture method is used to estimate the size of a population?
- A. The second occasion increases the chance of catching every animal.
 - B. The second occasion shows what proportion of the total population was caught on the first occasion.
 - C. Catching the animals on two occasions allows a mean population size to be calculated.
 - D. Catching the animals on two occasions allows the standard deviation of the estimate to be calculated.

16. Two of the chambers of the heart have relatively thin walls, one has thick walls and one has very thick walls. What is the relative thickness of the walls of each of the chambers?

	Thin walls	Thick walls	Very thick walls
A.	left and right ventricles	left atrium	right atrium
B.	left and right ventricles	right atrium	left atrium
C.	left and right atria	left ventricle	right ventricle
D.	left and right atria	right ventricle	left ventricle

17. Why is infection with HIV (human immunodeficiency virus) associated with many different **symptoms**?
- A. People infected with HIV have different lifestyles.
 - B. HIV attacks many different cells in the body causing many of the body's systems to stop functioning properly.
 - C. The immune system stops functioning properly so many different disease-causing organisms can invade the body.
 - D. People infected with HIV do not always develop AIDS.
18. How is the loss of heat from exposed parts of the human body such as fingers, toes and nose reduced in cold weather?
- A. Less blood flows to these parts of the body.
 - B. Capillaries move further away from the skin in exposed parts.
 - C. Heat is generated elsewhere in the body by shivering.
 - D. The fat layer becomes thinner.
19. What is placed into the uterus, after the process of *in vitro* fertilisation (IVF)?
- A. Eggs
 - B. Sperm
 - C. Embryos
 - D. Fetuses

20. Which hormones control the contraction of the muscle in the uterus wall?

- A. Oestrogen inhibits it and progesterone stimulates it.
- B. Progesterone inhibits it and oxytocin stimulates it.
- C. Oxytocin inhibits it and FSH stimulates it.
- D. FSH inhibits it and oestrogen stimulates it.

21. What are characteristics of animal cells during mitosis and cytokinesis but not plant cells?

	Mitosis	Cytokinesis
A.	Centrioles present	Cell plate forms
B.	Centrioles absent	Cell plate forms
C.	Centrioles present	Cell membrane pulled inwards at the equator
D.	Centrioles absent	Cell membrane pulled inwards at the equator

22. What are the differences between introns and exons?

A.	Introns are translated but exons are not	Introns are excised from mRNA but exons remain part of it
B.	Exons are translated but introns are not	Exons are excised from mRNA but introns remain part of it
C.	Introns are translated but exons are not	Exons are excised from mRNA but introns remain part of it
D.	Exons are translated but introns are not	Introns are excised from mRNA but exons remain part of it

23. The amino acid leucine can be coded for by six different codons. How many different kinds of tRNA could bind to it?

- A. Only one
- B. Not more than six
- C. Twelve
- D. Eighteen

24. Which statements about the structure of eukaryotic ribosomes are both correct?

	Chemical composition	Size
A.	RNA and proteins	70S
B.	Proteins only	70S
C.	RNA and proteins	80S
D.	Proteins only	80S

25. Which processes are coupled to the synthesis of ATP in aerobic respiration?

- A. Electron transport and oxidative decarboxylation
- B. Oxidative decarboxylation and fermentation of glucose
- C. Fermentation of glucose and movement of protons
- D. Movement of protons and electron transport

26. The diagram below shows the structure of a chloroplast.

Where is ATP synthetase (ATPase) located in the chloroplast?

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

27. What is the product of the reaction catalysed by ribulose biphosphate (RuBP) carboxylase?
- A. Glycerate 3-phosphate (GP)
 - B. 2-oxopropanoate (pyruvate)
 - C. Propanoate 2-phosphate (PEP)
 - D. Triose phosphate (TP)
28. The chi-squared statistical test is often used in genetics. What can geneticists do using this test?
- A. Find out whether the results of a genetic cross test are significantly different from the expected ratio
 - B. Calculate the expected numbers of offspring of each phenotype in a genetic cross
 - C. Find out the probability of an error in a genetic cross
 - D. Calculate the degrees of freedom in a genetic cross
29. What observation gives evidence that the inheritance of skin colour in humans is polygenic?
- A. Ultra-violet light causes skin to become darker.
 - B. Children with one dark skinned parent and one light skinned parent have an intermediate skin colour.
 - C. More than two haploid sets of chromosomes control skin colour.
 - D. There is a continuous range of skin colours in the human population.
30. Which of the following is an example of inbreeding?
- I. Test crossing a pea plant by crossing it with one of its parents
 - II. Self pollination of an F_1 pea plant, so that it acts as both the male and the female parent of the F_2 offspring
 - III. Cloning of animal embryos
- A. I only
 - B. I and II only
 - C. II and III only
 - D. I, II and III

31. Which of the following are characteristics of spermatogenesis?

- I. All four products of meiosis become functional
- II. Only one product of meiosis becomes functional
- III. Millions of gametes are released at one time
- IV. Generally one gamete is released at a time

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

32. What substances are present in clotted blood but not in unclotted blood?

- A. Thrombin and fibrinogen
- B. Fibrinogen and prothrombin
- C. Prothrombin and fibrin
- D. Fibrin and thrombin

33. What is the sequence of processes in the development of immunity to a disease after antigenic challenge?

	First process	Second process	Third process
A.	Antibody production	Clonal selection	Circulation of memory cells in the blood
B.	Circulation of memory cells in the blood	Clonal selection	Antibody production
C.	Antibody production	Circulation of memory cells in the blood	Clonal selection
D.	Clonal selection	Antibody production	Circulation of memory cells in the blood

34. The key below can be used to classify organisms into the five kingdoms.

1. The organism's DNA is naked and is located in the cytoplasm kingdom I
 The organism's DNA is associated with protein
 and is inside a nuclear membrane 2
2. The cells of the organisms have cell walls made of cellulose
 and the organism has an embryo stage in its development kingdom *Plantae*
 Not as above 3
3. The cells of the organisms have no cell wall and the organism
 has a blastocyst stage in its development kingdom II
 Not as above 4
4. The organisms has cell walls made of chitin kingdom III
 Not as above kingdom IV

Which kingdom is the Protocista?

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

35. What is the difference between parasitic fungi and saprotrophic fungi?

- A. Parasites feed on living material and saprotrophs feed on dead material.
- B. Parasites feed on animals and saprotrophs feed on plants.
- C. Parasites feed in the light and saprotrophs feed in the dark.
- D. Parasites use aerobic respiration and saprotrophs use anaerobic respiration.

36. What is the function of each of the tendons in the human elbow joint?
- A. Reducing friction between the humerus and the radius and ulna
 - B. Sealing the joint to hold in the synovial fluid
 - C. Transmitting force from a muscle above the joint to a bone below the joint
 - D. Preventing damage to the joint by acting as a shock absorber
37. What process moves toxic waste products from the blood to the dialysis fluid in a kidney dialysis machine?
- A. Active transport
 - B. Diffusion
 - C. Osmosis
 - D. Ultrafiltration
38. What part of the human body has the same function as the spongy mesophyll layer in a leaf?
- A. Alveoli in the lungs
 - B. Erythrocytes in the blood
 - C. Villi in the small intestine
 - D. Sweat glands in the skin
39. Which conditions will cause the most rapid transpiration in a terrestrial, mesophytic plant?

A.	No wind	20° C	0 % humidity	bright light
B.	Strong wind	20° C	100 % humidity	bright light
C.	Strong wind	10° C	0 % humidity	darkness
D.	No wind	10° C	100 % humidity	darkness

40. What are the changes in the amounts of water, gibberellin and amylase in the cotyledons of a starchy seed during the early stages of germination?

	Amount of water	Amount of gibberellin	Amount of amylase
A.	Increases	Increases	Increases
B.	Decreases	Increases	Decreases
C.	Increases	Decreases	Increases
D.	Decreases	Decreases	Decreases
