

**BIOLOGY
STANDARD LEVEL
PAPER 1**

Wednesday 10 November 2004 (afternoon)

45 minutes

INSTRUCTIONS TO CANDIDATES

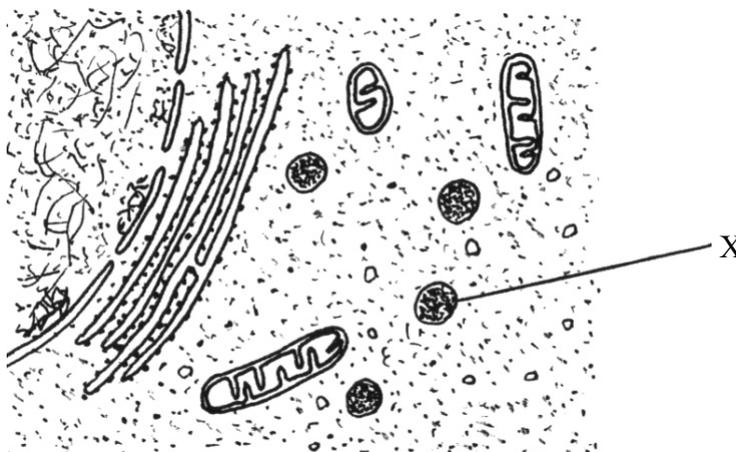
- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

1. What are visible under an electron microscope but **not** under a light microscope?
 - A. Bacteria
 - B. Nuclei
 - C. Sugar molecules
 - D. Viruses

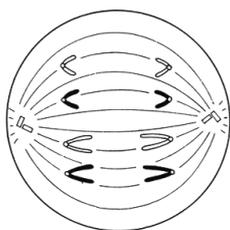
2. If a red blood cell has a diameter of 8 μm and a student shows it with a diameter of 40 mm in a drawing, what is the magnification of the drawing?
 - A. $\times 0.0002$
 - B. $\times 0.2$
 - C. $\times 5$
 - D. $\times 5000$

3. In which kingdom are organisms that can fix nitrogen found?
 - A. Animalia
 - B. Fungi
 - C. Prokaryotae
 - D. Protoctista

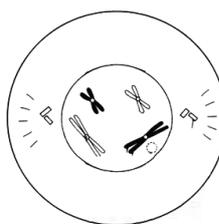
4. The diagram shows part of an animal cell as seen in an electron micrograph. What is the structure labelled X?



- A. Golgi apparatus
 - B. Lysosome
 - C. Mitochondrion
 - D. Nucleus
5. Which phases of mitosis are shown in diagrams I and II?



I

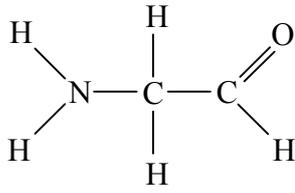


II

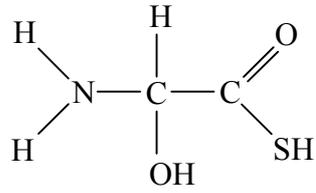
	I	II
A.	metaphase	prophase
B.	metaphase	telophase
C.	anaphase	prophase
D.	anaphase	metaphase

6. Which structure represents an amino acid?

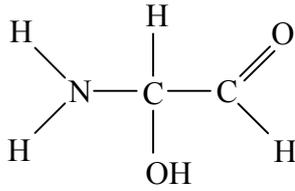
A.



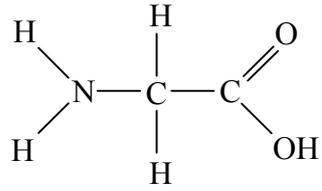
B.



C.



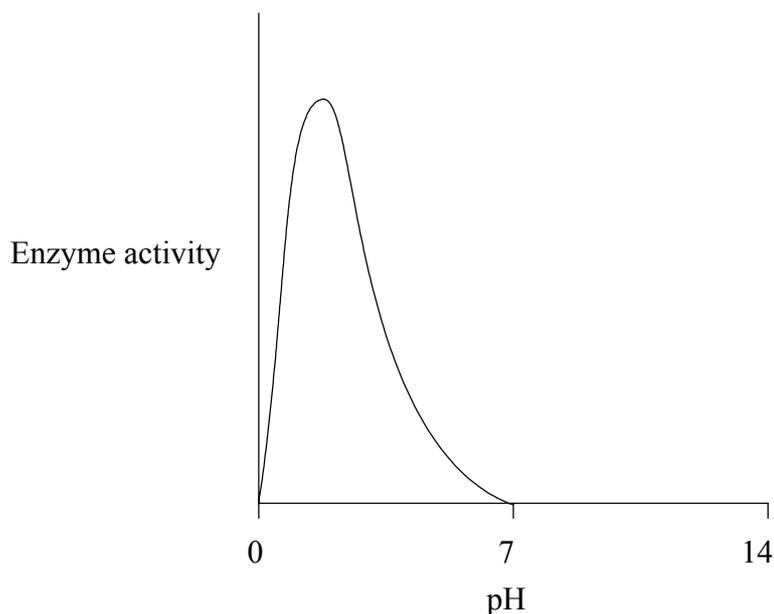
D.



7. What is a function of lipids in the human body?

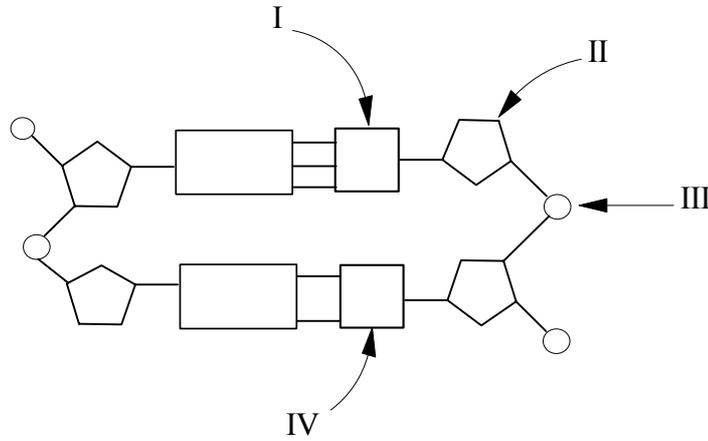
- A. Energy storage
- B. Lubrication of joints
- C. Making the lining of arteries smooth
- D. Forming part of the cell wall

8. The graph shows the effect of pH on the activity of an enzyme. What conclusion can be drawn about the enzyme?



- A. The enzyme does not work in acid conditions.
- B. There is a negative correlation between pH and enzyme activity.
- C. There is a positive correlation between pH and enzyme activity.
- D. The enzyme does not work in alkaline conditions.
9. What is the advantage of using pectinase in fruit juice production?
- A. The pectin content of the fruit is increased, making the nutritional value of the juice higher.
- B. The pectin content of the fruit is reduced, making the energy content of the juice lower.
- C. The pectin content of the fruit is reduced, making the juice easier to extract.
- D. The pectin content of the fruit is increased, giving the juice a thicker texture.

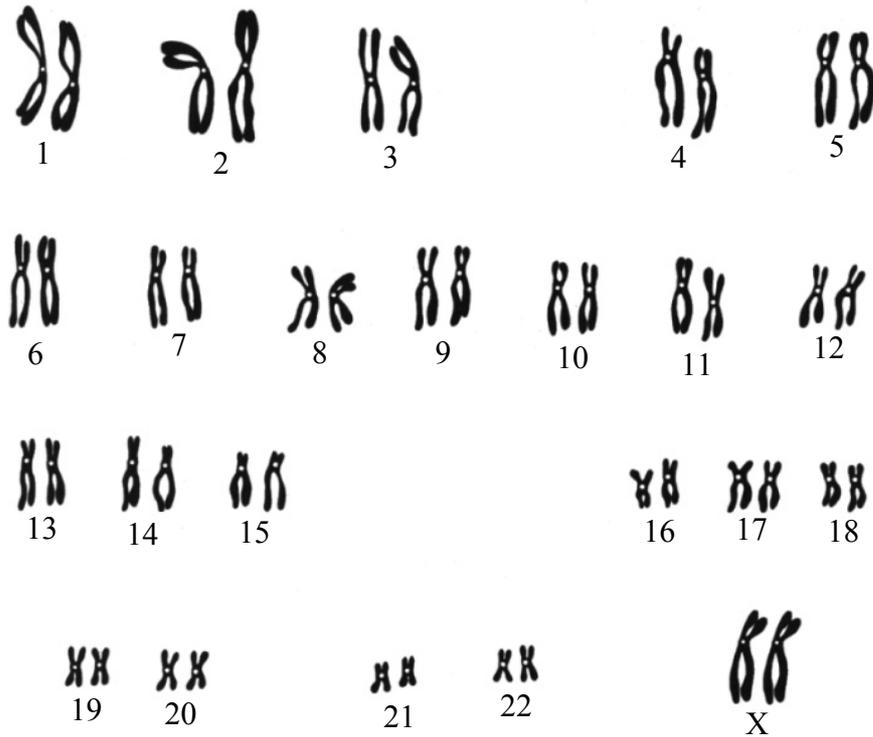
10. The diagram below represents a short section of DNA. If the sub-unit labelled I is cytosine, what could the sub-units labelled II, III and IV be?



	II	III	IV
A.	G (guanine)	sugar	C (cytosine)
B.	G (guanine)	phosphate	C (cytosine)
C.	phosphate	sugar	T (thymine)
D.	sugar	phosphate	T (thymine)

11. What is needed in photosynthesis to convert carbon dioxide into organic molecules?
- A. Light and hydrogen from the splitting of water
 - B. Light and oxygen from the splitting of water
 - C. ATP and hydrogen from the splitting of water
 - D. ATP and oxygen from the splitting of water

12. The diagram below shows the karyotype of a fetus.



What conclusion can be drawn from it?

- A. There was non-disjunction during meiosis in the mother.
 - B. There was non-disjunction during meiosis in the father.
 - C. The fetus is male.
 - D. The fetus is female.
13. What is a genome?
- A. All of the genetic information in a chromosome
 - B. All of the genetic information in an organism
 - C. All of the genetic information in a population
 - D. All of the genetic information in a species

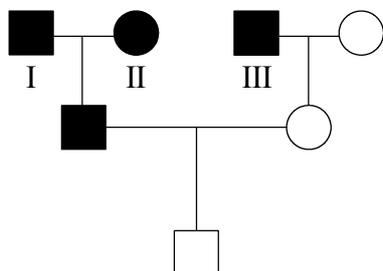
14. Palomino horses are the result of crosses between horses with black coats and white coats. The alleles for black coats and white coats are codominant.

Which of the following crosses could give palomino offspring?

- I. palomino × palomino
- II. palomino × white
- III. white × white

- A. I only
- B. I and II only
- C. II and III only
- D. I, II and III

15. The pedigree below shows which members of a family were Rhesus positive (■ and ●) and Rhesus negative (□ and ○). The allele for Rhesus positive blood (Rh^+) is dominant over the allele for Rhesus negative blood (Rh^-).

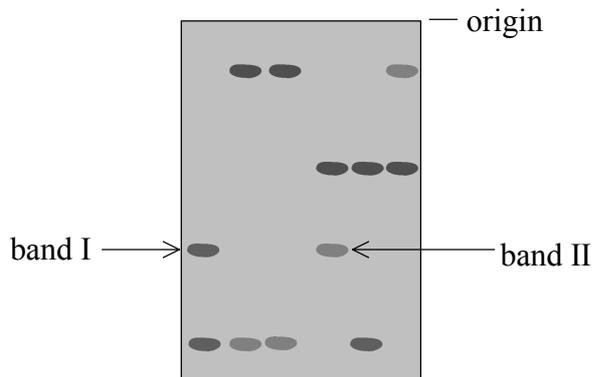


- Rhesus positive male
- Rhesus negative male
- Rhesus positive female
- Rhesus negative female

Which are possible genotypes of the individuals numbered I, II and III?

	I	II	III
A.	$Rh^+ Rh^+$	$Rh^+ Rh^+$	$Rh^+ Rh^-$
B.	$Rh^+ Rh^+$	$Rh^+ Rh^-$	$Rh^+ Rh^+$
C.	$Rh^+ Rh^+$	$Rh^+ Rh^-$	$Rh^+ Rh^-$
D.	$Rh^+ Rh^-$	$Rh^+ Rh^-$	$Rh^+ Rh^+$

16. The diagram below shows the results of DNA profiling using gel electrophoresis.



What conclusion can be drawn about the DNA in bands I and II?

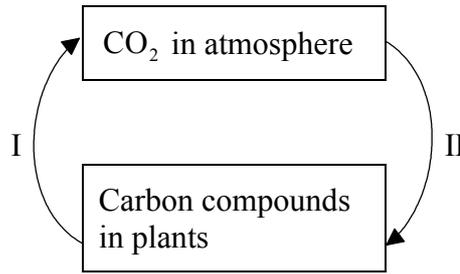
- A. The DNA in the two bands has the same base sequence.
 - B. The DNA in the two bands consists of fragments of the same length.
 - C. The DNA in the two bands has the same ratio of bases.
 - D. The DNA in the two bands came from the same source.
17. What are the effects of DNA ligase and restriction enzymes?

	DNA ligase	Restriction enzymes
A.	Splices DNA molecules together	Cut DNA molecules at specific sites
B.	Adds sticky ends to DNA molecules	Splice DNA molecules together
C.	Splices DNA molecules together	Add sticky ends to DNA molecules
D.	Cuts DNA molecules at specific sites	Splice DNA molecules together

18. At which trophic level is most energy available in ecosystems?

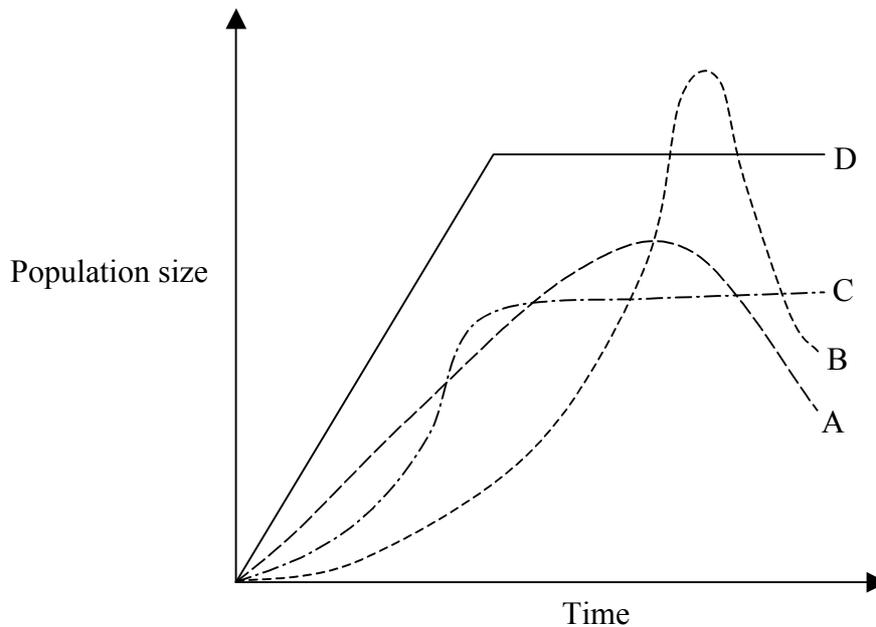
- A. Primary consumers
- B. Top consumers
- C. Saprotrophs
- D. Producers

19. The diagram below shows a carbon cycle involving only plants. What could processes I and II be?



	I	II
A.	photosynthesis	combustion
B.	respiration	decomposition
C.	respiration	photosynthesis
D.	decomposition	respiration

20. The graph shows the changes in the numbers of a bird species on an island, after a small number of the birds migrated to the island. Which curve shows the changes if the resources for the bird on the island were abundant but the population increased until it reached the carrying capacity of the island?



21. Which factors promote evolution in a species?

- I. Sexual reproduction
- II. Environmental change
- III. Overproduction of offspring

- A. I and II only
- B. II and III only
- C. I and III only
- D. I, II and III

22. Classification in biology involves putting organisms that share characteristics together in groups. In which type of group do the organisms share most characteristics?

- A. Class
- B. Family
- C. Genus
- D. Order

23. What is the source, the optimum pH and the products of lipase in the human digestive system?

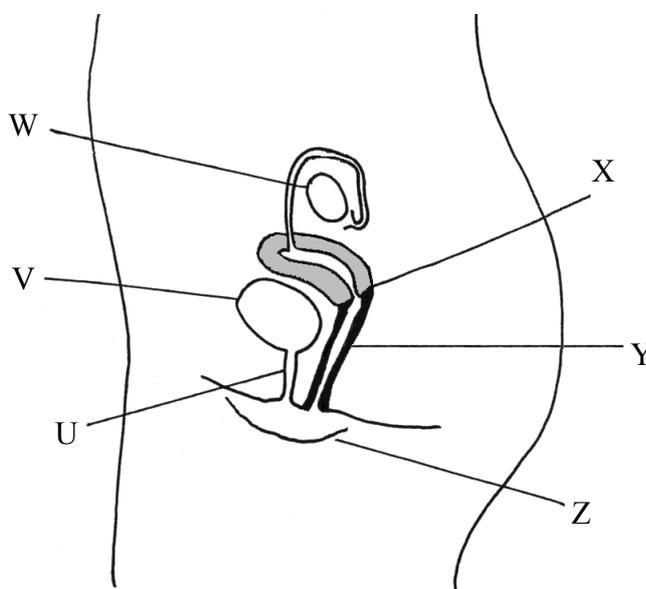
	Source	Optimum pH	Products
A.	salivary glands	5.0	fatty acids and glycerol
B.	stomach	1.5	lipids
C.	pancreas	7.0	fatty acids and glycerol
D.	small intestine	7.0	lipids

24. What is the function of the right ventricle?
- A. Pumping blood into the pulmonary artery
 - B. Pumping blood into the pulmonary vein
 - C. Pumping blood into the aorta
 - D. Pumping blood into the coronary artery
25. What is a feature of the structure and function of a blood capillary?
- A. It has a thin wall with pores to allow fluid to leak out.
 - B. It has a thin layer of circular muscle that contracts to reduce blood flow.
 - C. It has a 10 μm thick wall that allows rapid diffusion in and out.
 - D. It has a thin layer of longitudinal muscle fibres that contract to increase blood pressure.
26. Phagocytic leucocytes are found inside the alveoli. What is their function?
- A. Ingestion of disease-causing microorganisms
 - B. Secretion of water to keep the lining of the alveolus moist
 - C. Increasing the surface area for gas exchange
 - D. Division by mitosis to form more phagocytic leucocytes
27. Which best describes the role of the kidney in homeostasis?
- A. Storage of urine
 - B. Producing urine at a constant rate
 - C. Removing urea from the blood
 - D. Maintaining the water content of the blood between narrow limits

28. Which condition causes glucagon secretion in a healthy human body?

- A. High insulin levels
- B. Low blood glucose levels
- C. High body temperature
- D. Low body fat reserves

29. The diagram below shows the human female reproductive system and associated organs.



Which of the labelled structures are the bladder, cervix and vagina?

	Bladder	Cervix	Vagina
A.	W	Z	U
B.	V	Z	Y
C.	W	X	U
D.	V	X	Y

30. When conception is assisted by conventional IVF treatments, the percentage of multiple births is higher than with unassisted conception. What is the reason?
- A. High doses of HCG are used.
 - B. The sperm in the semen is processed and concentrated.
 - C. The mixture of eggs and sperm are incubated at the optimum temperature.
 - D. Two or three embryos are placed in the uterus at the same time.
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