IB DIPLOMA PROGRAMME
PROGRAMME DU DIPLÔME DU BI
PROGRAMA DEL DIPLOMA DEL BI

BIOLOGY
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PAPER 1

Tuesday 11 May 2004 (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 structure(s) is/are present in both animal cells and plant cells?

I. Plasma membrane

II. Ribosomes

III. Cell wall

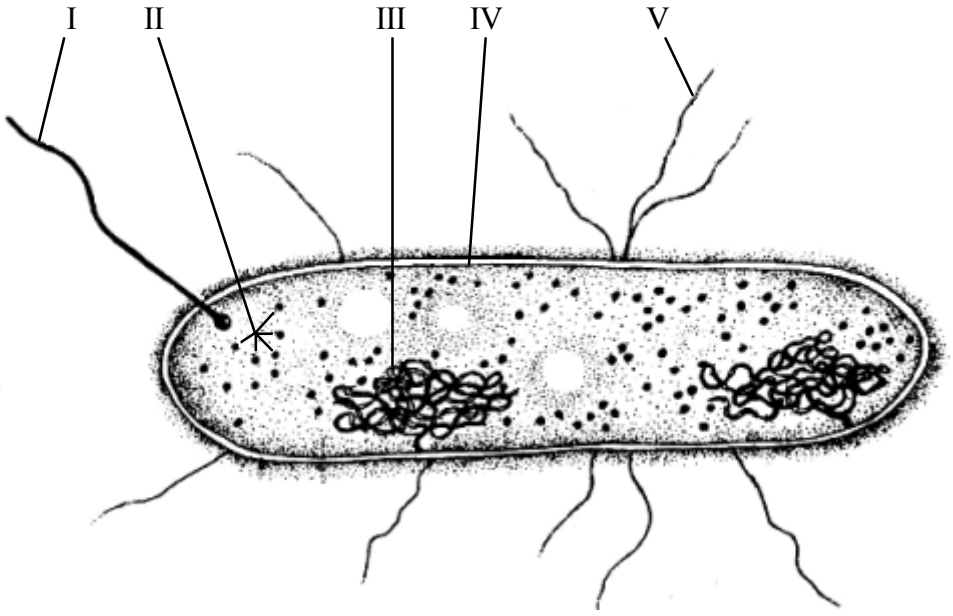
A. I only

B. I and II only

C. II and III only

D. I, II and III

The following diagram of a prokaryote refers to questions 2 and 3.



2. What is the function of structure II?

A. Passing of hereditary information to offspring

B. Movement of the organism

C. Regulation of the entry and exit of materials

D. Production of proteins

3. Which structures are found in **all** eukaryotic and prokaryotic cells?

A. I and II only

B. II and IV only

C. II and V only

D. III and V only

4. Which component gives the plasma membrane its fluid quality?

A. Glycolipids

B. Phospholipids

C. Integral proteins

D. Peripheral proteins

5. Which feature of water determines its solvent properties?

A. Peptide bonds

B. Hydrophobic interactions

C. Ionic bonds

D. Polarity

6. Which statement about atoms and ions is correct?

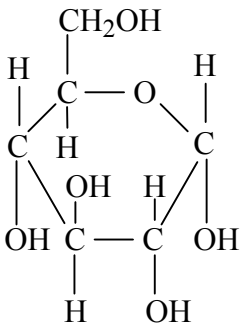
A. Atoms are charged ions.

B. Ions are atoms or groups of atoms that are charged.

C. Neither atoms nor ions are charged.

D. Atoms can only be made from ions.

7. What is the molecule shown in the diagram below?



A. Deoxyribose

B. Glucose

C. Glycerol

D. Ribose

8. Which function(s) is/are carried out by lipids?

I. Long-term energy storage

II. Active transport across membranes

III. Catalysing chemical reactions in the cell

A. I only

B. I and II only

C. II and III only

D. I, II and III

9. What is the enzyme that is used in commercial fruit juice production?

A. Catalase

B. Helicase

C. Pectinase

D. Polymerase

10. What fact helped to explain Mendel's law of segregation?

A. Dominance

B. Gametes

C. Mitosis

D. Meiosis

11. A woman who is a carrier of hemophilia marries a man who is not affected. What are the possible genotypes of their children?

A. X^HX^h, X^HX^H, X^HY, X^hY

B. X^HX^h, X^HX^H, X^HY^h, X^HY^H

C. X^HX^h, X^hX^h, X^HY^h, X^hY^h

D. X^HX^h, X^hX^h, X^HY, X^hY

12. A couple have children of blood type O, AB and A. What are the genotypes of the couple?

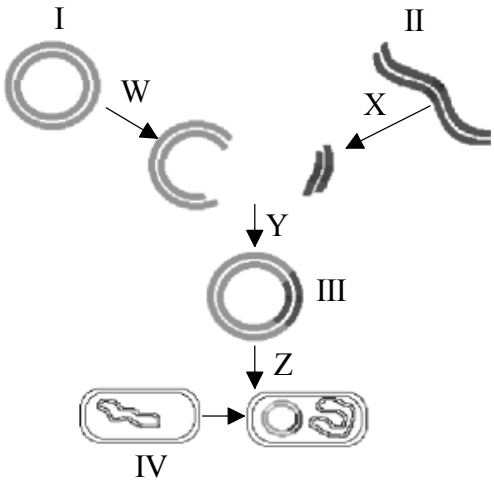
A. I^AI^B and ii

B. I^AI^B and I^AI^B

C. I^Ai and I^Bi

D. I^AI^A and I^BI^B

The following diagram illustrates gene transfer and refers to questions 13 and 14.



13. At which step(s) are restriction enzymes (endonucleases) employed?

A. W only

B. X only

C. W and X only

D. Y and Z only

14. Which structure is a recombinant plasmid?

A. I

B. II

C. III

D. IV

15. What term refers to a community and its abiotic environment?

A. Biosphere

B. Ecosystem

C. Habitat

D. Niche

16. Which organisms externally digest dead organic matter and then absorb the nutrients?

A. Autotrophs

B. Detritivores

C. Heterotrophs

D. Saprotrophs

17. Which factor(s) is/are essential for evolution to occur within a population?

I. Inheritance of characteristics

II. Variation in the population

III. Natural selection

A. I only

B. I and II only

C. II and III only

D. I, II and III

18. Which series of groups contains organisms with increasing diversity?

A. species → genus → family → order

B. phylum → order → family → genus

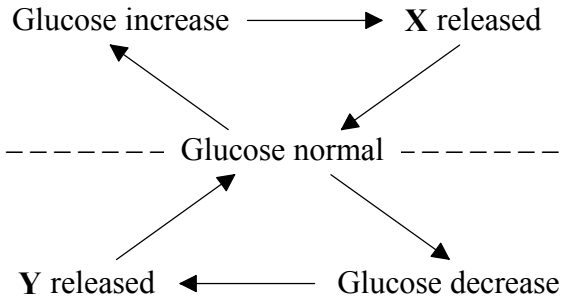
C. kingdom → genus → species → family

D. genus → family → order → species

19. Which of the following is correct regarding the enzymes listed in the table?

		Enzyme		
		Amylase	**Lipase**	**Protease**
A.	**Substrate**	polysaccharide	emulsified fat	dipeptide or polypeptide
B.	**Substrate**	emulsified fat	dipeptide or polypeptide	polysaccharide
C.	**Product**	amino acids	small polysaccharides or monosaccharides	fatty acids and glycerol
D.	**Product**	small polysaccharides or monosaccharides	amino acids	fatty acids and glycerol

20. The diagram shows how the body regulates glucose levels in the blood.



What is **Y**?

A. Amylase

B. Insulin

C. Glucagon

D. Glycogen

21. What is transported by the blood?

I. Carbon dioxide
II. Antibodies
III. Urea

A. I only

B. I and II only

C. II and III only

D. I, II and III

22. Which features of alveoli make them well suited to gas exchange?

I. Dense arterial network
II. Moist lining
III. Walls consisting of a single layer of flattened cells

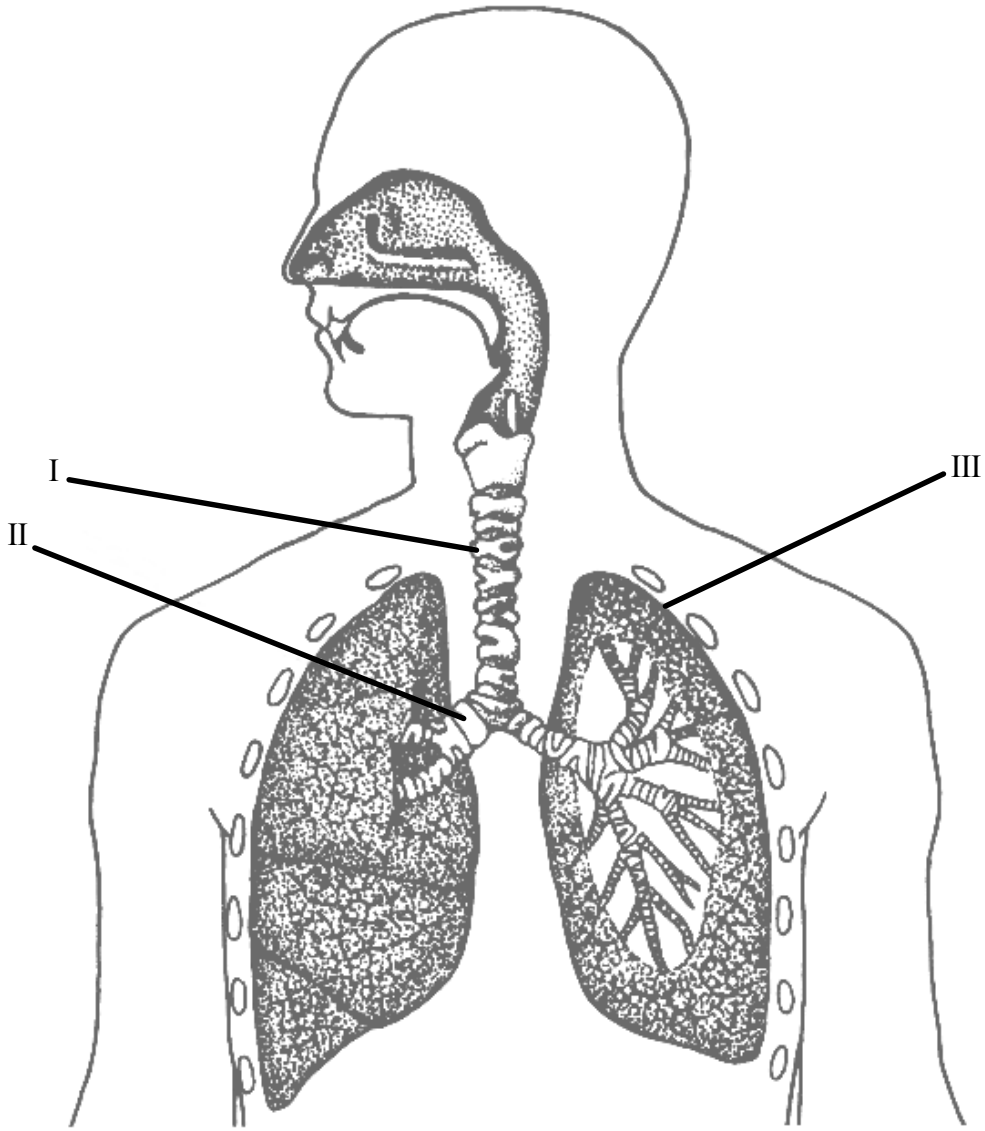
A. I and II only

B. I and III only

C. II and III only

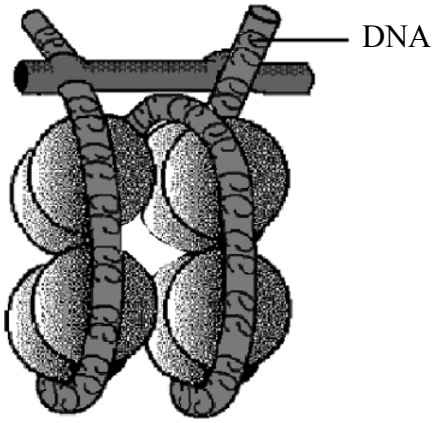
D. I, II and III

23. What are the structures labelled I, II and III in the diagram below?



	I	II	III
A.	Oesophagus	Bronchiole	Ribs
B.	Trachea	Oesophagus	Bronchus
C.	Oesophagus	Trachea	Lung
D.	Trachea	Bronchus	Lung

24. What is the structure shown in the diagram below?



A. A centromere

B. A nucleosome

C. A ribosome

D. A polysome

25. What part of eukaryotic RNA is removed after transcription?

A. Codons

B. Exons

C. Introns

D. Operons

26. What can reduce the effect of a competitive inhibitor of an enzyme?

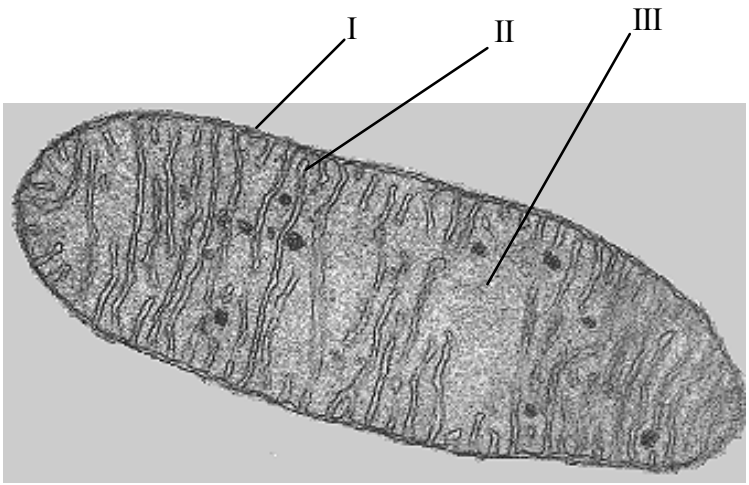
A. Decrease the temperature at which the reaction takes place.

B. Increase the temperature at which the reaction takes place.

C. Increase the substrate concentration.

D. Add a non-competitive inhibitor.

27. What are the structures labelled I, II and III in the diagram below?



	I	II	III
A.	Outer membrane	Crista	Matrix
B.	Outer membrane	Crista	Stroma
C.	Plasma membrane	Inner membrane	Matrix
D.	Plasma membrane	Inner membrane	Stroma

28. What accumulates in the inter-membrane space of the mitochondrion during electron transport?

A. ATP

B. Electrons

C. Protons (hydrogen ions)

D. Oxygen

29. What are the events in the stages of meiosis shown in the table below?

	Prophase I	Metaphase I	Anaphase I
A.	Alignment of chiasmata at the equator	Separation of homologous chromosomes	Formation of gametes
B.	Alignment of chiasmata at the equator	Alignment of pairs of chromosomes at the equator	Formation of gametes
C.	Crossing over	Separation of sister chromatids	Separation of homologous chromosomes
D.	Crossing over	Alignment of pairs of chromosomes at the equator	Separation of homologous chromosomes

30. A cross is performed between two organisms with the genotypes AaBb and aabb.

What genotypes in the offspring are the result of recombination?

A. Aabb, AaBb

B. AaBb, aabb

C. aabb, Aabb

D. Aabb, aaBb

31. What does Mendel's law of independent assortment relate to?

A. The independent separation of alleles of a gene

B. The independent separation of a pair of homologous chromosomes

C. The independent separation of alleles of different genes

D. The formation of new combinations of chromosomes

32. Where does human fertilization most frequently occur?

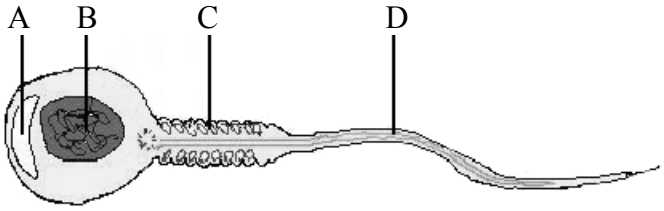
A. Ovary

B. Oviduct

C. Uterus

D. Vagina

33. Which part of the structure below is most directly involved in the acrosome reaction?



34. Which type of immunity usually results from vaccination?

A. active, natural

B. active, artificial

C. passive, natural

D. passive, artificial

35. Which type of cell is responsible for secondary immune responses to a pathogen?

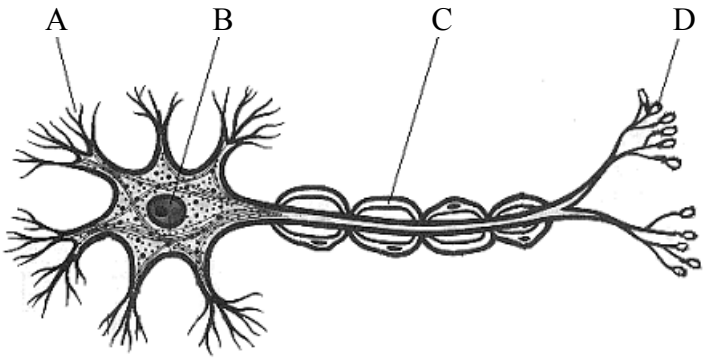
A. Cytotoxic T-cells

B. Phagocytes

C. Macrophages

D. Memory cells

36. Which structure is responsible for passing messages directly to effector organs?



37. The movement of which ion initiates an action potential?

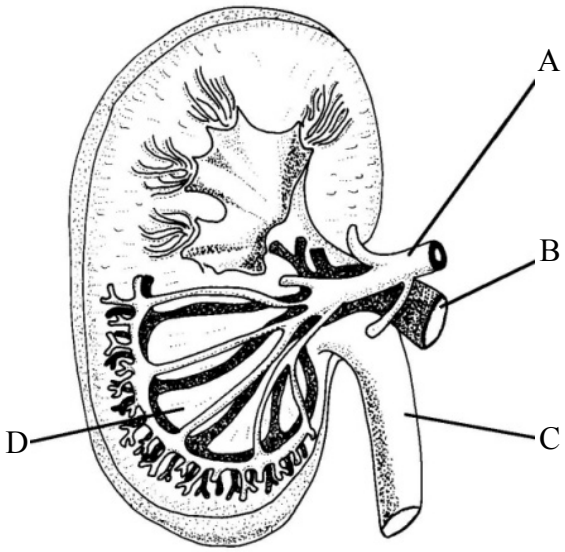
A. Calcium

B. Magnesium

C. Sodium

D. Potassium

38. Which structure transports blood with the highest concentration of urea?



39. What is a characteristic of xerophytes?

A. Absence of roots

B. Absence of vascular tissue

C. Leaves with very small surface area

D. Large number of stomata

40. What causes movement of water through the xylem?

A. Active transport in the root tissue

B. Evaporation of water from leaves

C. Active translocation

D. Gravity