

**BIOLOGY  
HIGHER LEVEL  
PAPER 1**

Wednesday 7 May 2003 (afternoon)

1 hour

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**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 is/are the advantage(s) of using an electron microscope?

- I. Very high resolution
- II. Very high magnification
- III. The possibility of examining living material

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

2. Which structural feature(s) is/are characteristic of viruses?

- I. DNA or RNA
- II. A protein coat
- III. Ribosomes

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

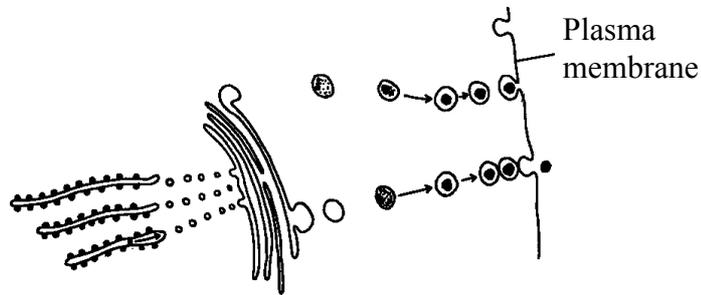
3. What is essential for diffusion?

- A. A concentration gradient
- B. A selectively permeable membrane
- C. A source of energy
- D. A protein

4. Which of the following reactions occurs when a dipeptide is formed from amino acids?

- A. Hydrolysis
- B. Denaturation
- C. Condensation
- D. Oxidation

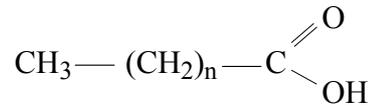
5. In the diagram below macromolecules are being transported to the exterior of a cell.



What is the name of this process?

- A. Exocytosis
  - B. Pinocytosis
  - C. Endocytosis
  - D. Phagocytosis
6. Which statement best describes a role of mitosis?
- A. It increases genetic variation.
  - B. It facilitates growth of unicellular organisms.
  - C. It facilitates reproduction of some unicellular organisms.
  - D. It repairs damaged cells.

7. What molecule does the following diagram represent?



- A. An amino acid
  - B. A fatty acid
  - C. A phospholipid
  - D. A monosaccharide
8. What is the function of helicase?
- A. It forms bonds between DNA nucleotides.
  - B. It adds new nucleotides to the DNA helix.
  - C. It forms the DNA helix.
  - D. It separates DNA strands.
9. What is true about eukaryotic DNA?
- A. It contains the complementary base pair adenine-uracil.
  - B. It is naked.
  - C. The majority consists of repetitive sequences.
  - D. The majority codes for genes.
10. What is removed to form mature eukaryotic mRNA?
- A. RNA primers
  - B. Exons
  - C. RNA polymerases
  - D. Introns

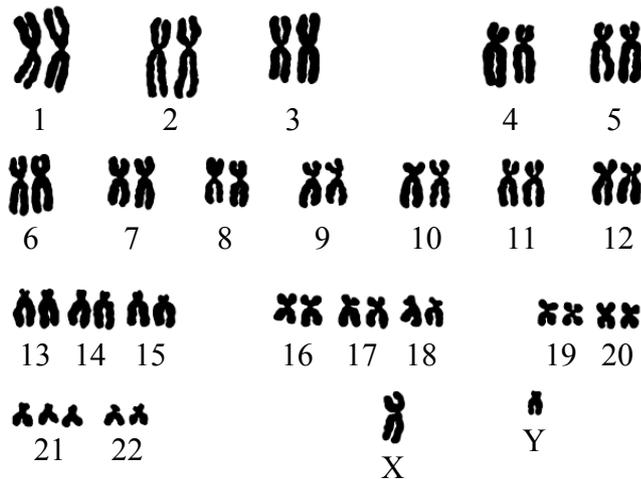
11. Which enzymes are needed to produce recombinant plasmids that are used in gene transfer?
- A. DNA polymerase and ligase
  - B. DNA polymerase and restriction enzymes
  - C. Restriction enzymes and ligase
  - D. Helicase and restriction enzymes
12. Which molecule is involved in the process of transcription?
- A. DNA polymerase
  - B. Helicase
  - C. DNA ligase
  - D. mRNA
13. Which mammalian protein is produced by ribosomes free in the cytoplasm?
- A. Insulin
  - B. A glycolytic enzyme
  - C. A lysosomic enzyme
  - D. An antibody
14. Which statement about anaerobic cell respiration is correct?
- A. It makes more ATP than aerobic cell respiration.
  - B. It makes less ATP than aerobic cell respiration.
  - C. It only occurs in yeast.
  - D. It only occurs in the mitochondrion.

15. What is acetyl (ethanoyl) CoA?

- I. An intermediate in carbohydrate metabolism under aerobic conditions
- II. A product of the oxidation of fatty acids in lipid metabolism
- III. An intermediate in carbohydrate metabolism under anaerobic conditions

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

16. The diagram below is a karyotype of a human.



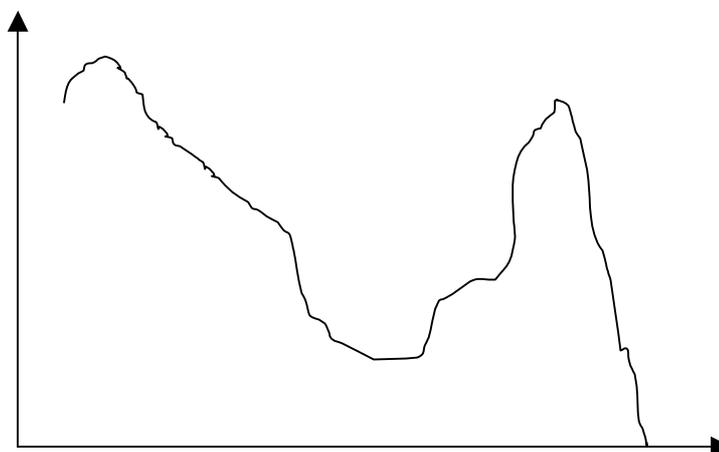
Which statement about the karyotype is correct?

- A. Non-disjunction has occurred and the individual is female.
- B. Non-disjunction has not occurred and the individual is female.
- C. Non-disjunction has occurred and the individual is male.
- D. Non-disjunction has not occurred and the individual is male.

17. What is the **minimum** number of alleles that may be present for a given genotype controlled by a single gene?

- A. One
- B. Two
- C. Three
- D. Four

18. The graph below shows the action spectrum of photosynthesis.



What are the labels for the y and x axes?

	<b>y axis</b>	<b>x axis</b>
A.	Light absorbed	Wavelength of light
B.	Wavelength of light	Light intensity
C.	Wavelength of light	Rate of photosynthesis
D.	Rate of photosynthesis	Wavelength of light

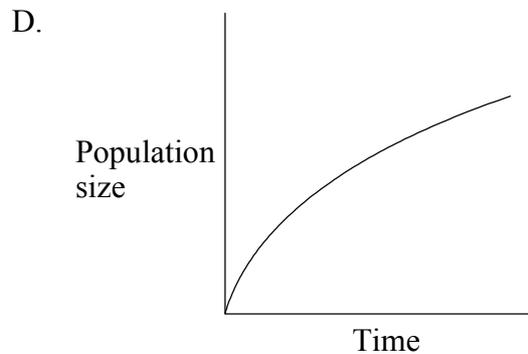
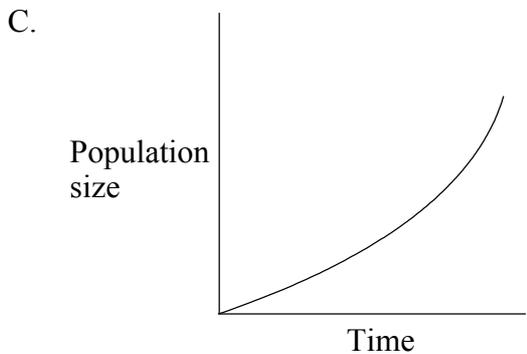
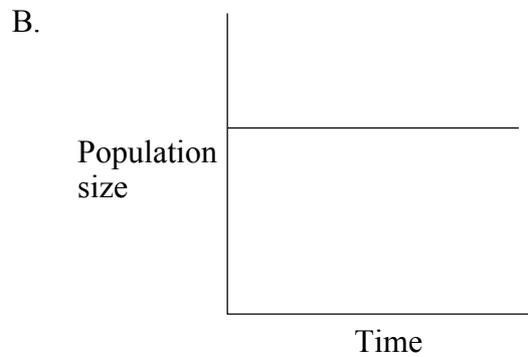
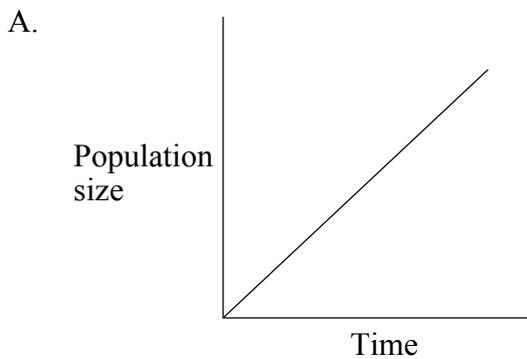
19. What name is given to an organism that ingests dead organic matter?

- A. Autotroph
- B. Detritivore
- C. Herbivore
- D. Parasite

20. Which series of ecological units is in the correct order of decreasing biomass?

- A. Ecosystem, population, community, individual
- B. Biosphere, ecosystem, population, individual
- C. Community, biosphere, population, individual
- D. Biosphere, ecosystem, population, community

21. Which graph correctly shows the increase in the size of a population during the exponential growth phase?



22. Which substances increase the greenhouse effect the most?

- A. Oxygen and CFCs
- B. Methane and CFCs
- C. Sulfur dioxide and nitrogen
- D. Nitrogen and methane

23. What statement can be made about members of the same order?

- A. They all belong to the same genus.
- B. They all belong to the same class.
- C. They all belong to the same family.
- D. They can all interbreed successfully.

24. Which response describes the behaviour of chromosomes in metaphase I and anaphase II of meiosis?

	<b>Metaphase I</b>	<b>Anaphase II</b>
A.	Chromosomes line up at the equator	Separation of homologous chromosomes
B.	Tetrads (bivalents) line up at the equator	Separation of homologous chromosomes
C.	Chromosomes line up at the equator	Separation of sister chromatids
D.	Tetrads (bivalents) line up at the equator	Separation of sister chromatids

25. In garden peas, the pairs of alleles coding for seed shape and seed colour are unlinked. The allele for smooth seeds (S) is dominant over the allele for wrinkled seeds (s). The allele for yellow seeds (Y) is dominant over the allele for green seeds (y).

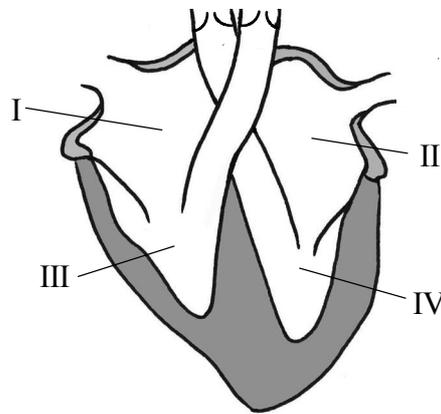
If a plant of genotype Ssyy is crossed with a plant of genotype ssYy, which offspring are recombinants?

- A. SsYy and Ssyy
  - B. SsYy and ssYy
  - C. SsYy and ssyy
  - D. Ssyy and ssYy
26. What constitutes a linkage group?
- A. Genes carried on the same chromosome
  - B. Genes whose loci are on different autosomes
  - C. Genes controlling a polygenic characteristic
  - D. Alleles for the inheritance of ABO blood groups
27. Where would a digestive enzyme with an optimum pH of 2 be found?
- A. Large intestine
  - B. Small intestine
  - C. Stomach
  - D. Pancreas
28. Which process decreases when the human body temperature decreases?
- A. Blood flow to the internal organs
  - B. Secretion of sweat
  - C. Secretion of insulin
  - D. Shivering

29. A synthetic hormone, syntocin, has the same effect on the body as oxytocin. For what purpose would syntocin be used?

- A. Control of blood glucose levels
- B. Inhibition of the menstrual cycle
- C. Regulation of the heart rate
- D. Stimulation of uterine contraction

30. Which chamber pumps blood to the lungs?



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

31. Which process results in inhalation?

- A. An increase in volume of the chest cavity
- B. An increase in pressure in the chest cavity
- C. Relaxation of the external intercostal muscles
- D. Relaxation of the diaphragm

**32.** Which of the following are barriers against the entry of pathogens into the body?

- I. Skin
- II. Mucous membranes
- III. Phagocytic leucocytes

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

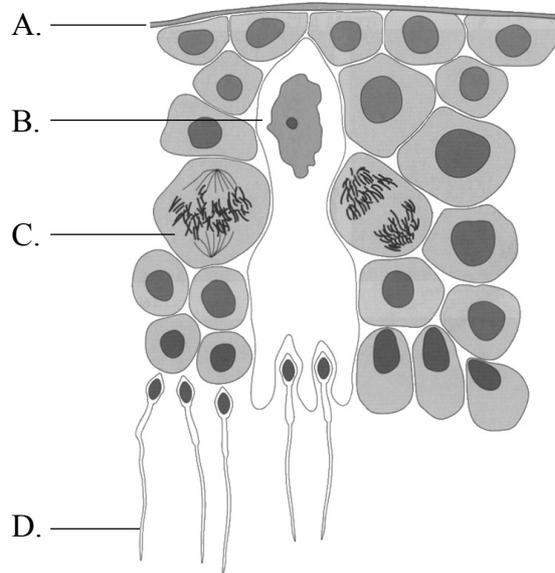
**33.** What is the correct sequence of events during blood clotting?

- A. Thrombin formation → clotting factor release → fibrin formation
- B. Thrombin formation → fibrin formation → clotting factor release
- C. Clotting factor release → fibrin formation → thrombin formation
- D. Clotting factor release → thrombin formation → fibrin formation

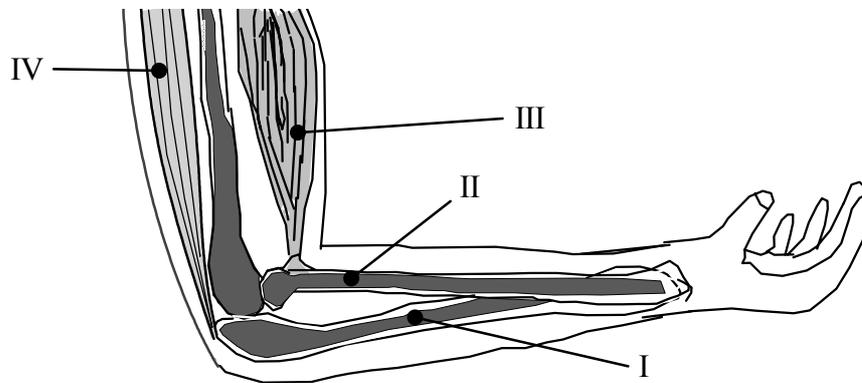
**34.** Which cell destroys viral-infected cells?

- A. Macrophage
- B. T-helper
- C. B-lymphocyte
- D. Cytotoxic T-cell

35. The diagram below shows the structure of testis tissue as seen using a light microscope.  
Which is the primary spermatocyte?



36. The diagram below shows a human elbow joint.



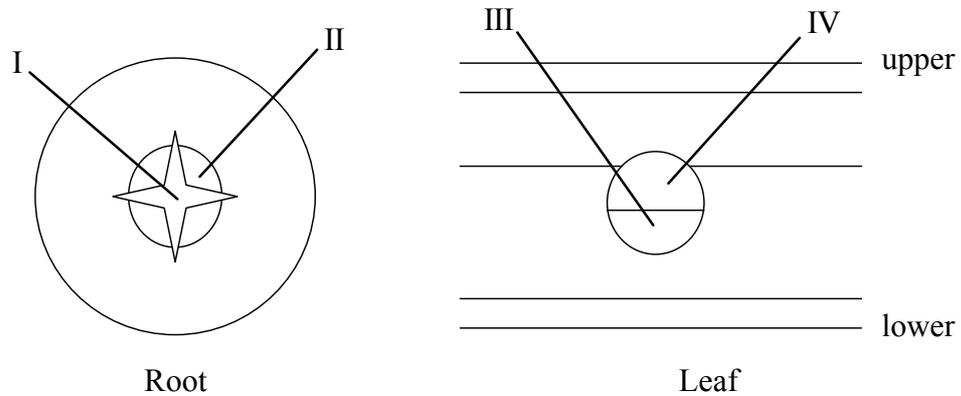
Which response correctly identifies the ulna and the extensor muscle?

	<b>Ulna</b>	<b>Extensor muscle</b>
A.	I	III
B.	I	IV
C.	II	IV
D.	II	III

37. Which substances are found in the glomerular filtrate but are usually absent in urine?

- A. Amino acids and glucose
- B. Water, pigments and salts
- C. Urea and hormone metabolites
- D. Large plasma proteins and red blood cells

38. The diagrams below show the distribution of tissues in the root and in the leaf of a dicotyledonous plant.



Which tissues are phloem?

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

39. Which response describes uptake of mineral ions into roots?

	<b>Movement of ions</b>	<b>Need for a membrane protein</b>	<b>ATP requirement</b>
A.	Following a concentration gradient	Yes	Yes
B.	Against a concentration gradient	Yes	Yes
C.	Following a concentration gradient	No	Yes
D.	Against a concentration gradient	No	Yes

40. When is gibberellin formed in the germination of a typical starchy seed?
- A. After water absorption
  - B. Before water absorption
  - C. After the production of amylase
  - D. During the production of amylase
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