



BIOLOGY
STANDARD LEVEL
PAPER 1

Monday 14 May 2007 (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. Which structure is found in all prokaryotic cells?
 - A. Flagella
 - B. Ribosomes
 - C. Mitochondria
 - D. Vacuoles

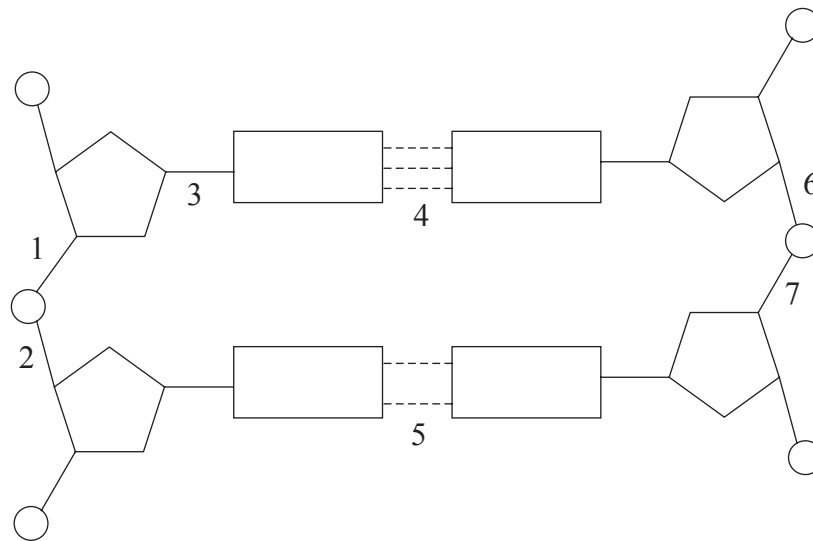
2. Which combination of features is found in most plant and animal cells?
 - A. plasma membrane, lysosome, Golgi apparatus
 - B. cytoplasm, mitochondria, ribosomes
 - C. rough ER, nucleus, centrioles
 - D. plastids, cytoplasm, nucleus

3. What is the size range for the diameters of most plant and animal cells?
 - A. 100 nm to 1 μm
 - B. 1 μm to 10 μm
 - C. 10 μm to 100 μm
 - D. 100 μm to 1 mm

4. During endocytosis, what change will most likely occur in the plasma membrane of a cell?
 - A. It will form two phospholipid monolayers.
 - B. It will become electrically charged.
 - C. It will partially dissolve.
 - D. It will form vesicles.

5. Which of the following could be a function of a membrane protein?
- A. Energy storage
 - B. Enzymatic activity
 - C. Oxygen uptake
 - D. Thermal insulation
6. In which compounds would a double bond link carbon to oxygen (C=O)?
- I. Amino acid
 - II. Fatty acid
 - III. Glycerol
- A. I and II only
 - B. II and III only
 - C. I and III only
 - D. I, II and III

7. During the process of replication, which bond(s) in the diagram of DNA below is/are broken?



- A. 3
 - B. 4, 5
 - C. 1, 2, 6, 7
 - D. 1, 7, 4, 5
8. Why is the genetic code described as degenerate?
- A. Some codons can cause translation to stop.
 - B. More than one codon can represent one amino acid.
 - C. The genetic code is the same in all organisms.
 - D. Codons can change through mutation.
9. What is the maximum number of fatty acids that can be condensed with glycerol?
- A. One
 - B. Two
 - C. Three
 - D. Four

10. Which row in the table describes the first stage of cellular respiration?

	Substrate	Location	Product	Product
A.	pyruvate	mitochondria	oxygen	water
B.	pyruvate	cytoplasm	carbon dioxide	ATP
C.	glucose	mitochondria	pyruvate	water
D.	glucose	cytoplasm	pyruvate	ATP

11. Which environmental factor limits the rate of photosynthesis most?

- A. Soil
- B. Temperature
- C. Carbon dioxide concentration
- D. pH

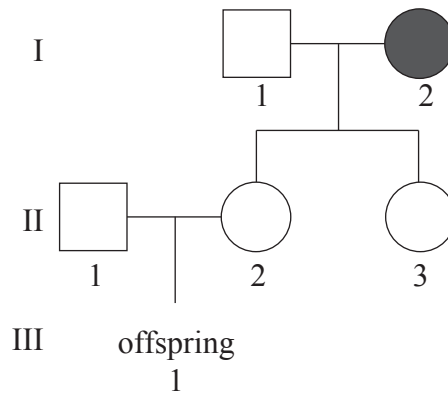
12. Which of the following represents a test cross to determine if phenotype T is homozygous **or** heterozygous? (**Note:** allele T is dominant to allele t.)

- A. Phenotype T crossed with another phenotype T
- B. Phenotype T crossed with a phenotype T which is homozygous
- C. Phenotype T crossed with a phenotype T which is heterozygous
- D. Phenotype T crossed with phenotype t

13. Which of the following blood group phenotypes always has a homozygous genotype?

- A. A
- B. B
- C. AB
- D. O

14. In the pedigree shown below, the female, labelled I-2, is a carrier for colour blindness, however neither male (I-1 or II-1) is colour blind.



What is the probability that offspring III-1 will be colour blind?

- A. 50%
 - B. 25%
 - C. 12.5%
 - D. 0%
15. What happens to the unfertilized egg used in the cloning process of a differentiated cell?
- A. It becomes fertilized.
 - B. Its nucleus is replaced by the nucleus of the differentiated cell.
 - C. Its nucleus is fused with the nucleus of the differentiated cell.
 - D. Its nucleus is exchanged with the nucleus of the sperm.

16. A tiny amount of DNA was obtained from a crime scene and amplified. Following digestion with restriction enzymes, which laboratory technique would be used to separate the fragments of DNA?
- A. Karyotyping
 - B. Genetic screening
 - C. Gel electrophoresis
 - D. Polymerase chain reaction
17. What was the original goal of the Human Genome Project?
- A. To determine the function of genes
 - B. To determine the nucleotide sequence of all human chromosomes
 - C. To determine how genes control biological processes
 - D. To understand the evolution of species
18. What is considered to be a characteristic of the members of a Genus?
- A. They belong to a closed gene pool.
 - B. Members can interbreed freely under normal conditions.
 - C. They share a common ancestral species.
 - D. They are limited to certain geographic areas.
19. In ecology, what is meant by the term *community*?
- A. A group of populations living and interacting in the same area
 - B. A group of organisms of the same species living and interacting in the same area
 - C. A group of organisms which can interbreed and produce fertile offspring
 - D. The environment in which a species normally lives

20. The capture-mark-release-recapture method was used to determine the number of Sandhill Cranes (*Grus canadensis nesiototes*), an endangered species of bird, living on an island.

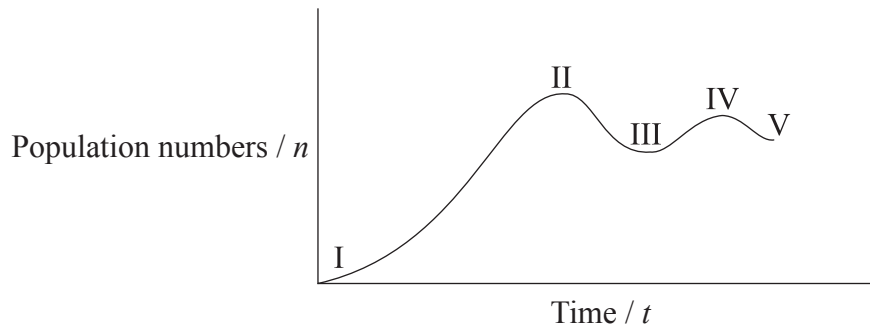
The following data were obtained:

- number of Sandhill Cranes initially caught, marked and released = 22
- total number of Sandhill Cranes caught in second sample = 14
- number of marked Sandhill Cranes in the second sample = 2

What is the population size of the Sandhill Cranes on the island?

- A. 77
 - B. 154
 - C. 308
 - D. 616
21. Which factors could be important for a species to evolve by natural selection?
- I. Environmental change
 - II. Inbreeding
 - III. Variation
- A. I only
 - B. I and II only
 - C. I and III only
 - D. I, II and III

22. In the graph below, what could be causing the population change in the region II → III?



- A. natality > mortality, immigration = emigration
 - B. natality > mortality, immigration > emigration
 - C. natality > mortality, immigration < emigration
 - D. natality = mortality, immigration < emigration
23. Two cellular activities that support human life are absorption and assimilation. What is needed for assimilation but **not** for absorption?
- A. Enzymes to synthesize new molecules
 - B. Blood capillaries
 - C. Dissolved nutrients
 - D. Microvilli
24. Which sequence of events correctly describes the destruction of pathogens in body tissues by phagocytic leucocytes?
- A. amoeboid motion → endocytosis → chemical recognition → enzymatic digestion
 - B. chemical recognition → amoeboid motion → enzymatic digestion → endocytosis
 - C. amoeboid motion → chemical recognition → enzymatic digestion → endocytosis
 - D. chemical recognition → amoeboid motion → endocytosis → enzymatic digestion

25. What is happening in the heart when the semi-lunar valves are closed?

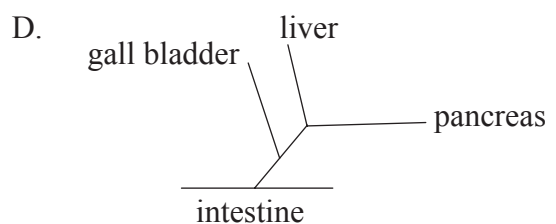
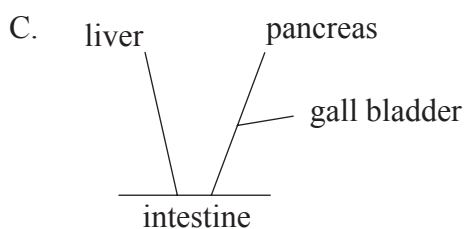
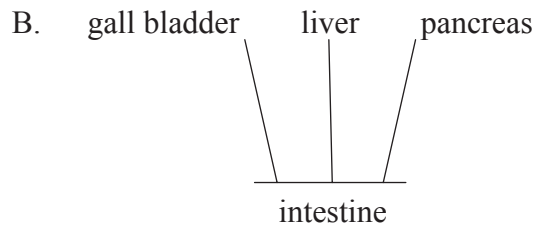
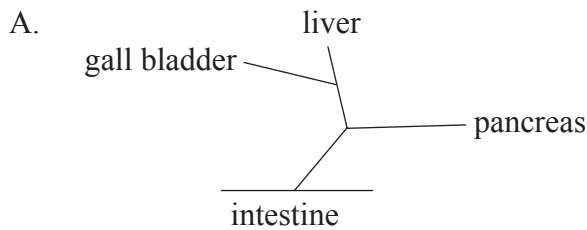
- I. Blood is entering the aorta.
- II. Blood is entering the pulmonary artery.
- III. Blood is entering the ventricles.
- IV. The ventricles are contracting.

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

26. How many times does an oxygen molecule cross a plasma membrane when moving from inside an alveolus to the hemoglobin of a red blood cell?

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

27. Ducts connect the liver, gall bladder and pancreas to the alimentary canal. Which diagram shows the correct pattern of duct connections?



28. How does fertilization differ from copulation?
- A. Fertilization always produces a zygote.
 - B. Only fertilization involves gametes.
 - C. Fertilization is a conscious event.
 - D. Fertilization can spread HIV.
29. Why is amniotic fluid collected during prenatal testing for abnormal chromosomes?
- A. To obtain uterine cells
 - B. To obtain fetal cells
 - C. To obtain dissolved chemical by-products of fetal development
 - D. To replace it with fluid containing special growth hormones
30. Women should periodically have a Pap smear test performed to detect cervical cancer. Which letter indicates the cervix in the diagram below?

