

**BIOLOGY  
STANDARD LEVEL  
PAPER 1**

Friday 14 November 2003 (afternoon)

45 minutes

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**INSTRUCTIONS TO CANDIDATES**

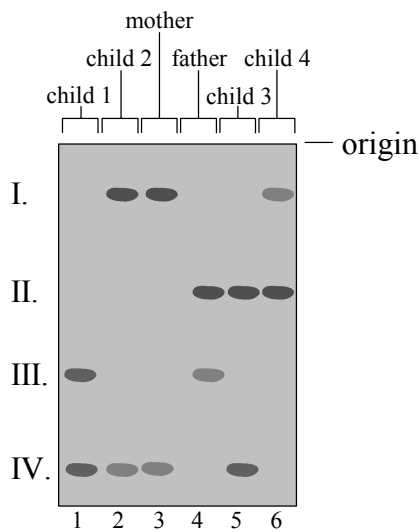
- Do not open this examination paper until instructed to do so.
- Answer all the questions.
- For each question, choose the answer you consider to be the best and indicate your choice on the answer sheet provided.

1. Which statement about facilitated diffusion is correct?
  - A. It requires a protein.
  - B. It refers to the diffusion of water.
  - C. It requires ATP.
  - D. It involves movement against a concentration gradient.
  
2. Which raw material is utilized by ribosomes?
  - A. Nucleotides
  - B. Amino acids
  - C. Glycogen
  - D. Phospholipids
  
3. Which cellular structure(s) is (are) found in both a plant cell and an animal cell?
  - I. Cell wall
  - II. Chloroplast
  - III. Mitochondrion
  - A. I only
  - B. I and II only
  - C. I and III only
  - D. III only
  
4. How do the ribosomes of prokaryotic and eukaryotic cells differ?
  - A. Their size
  - B. Their function
  - C. The raw materials they utilize
  - D. The process by which they are synthesized

5. Which of the following is **not** found in a prokaryotic cell?
- A. Cytoplasm
  - B. A nuclear membrane
  - C. DNA
  - D. Enzymes
6. Which is the variable part of the DNA nucleotide?
- A. The sugar molecule
  - B. The phosphate molecule
  - C. The nitrogen base
  - D. The ribose molecule
7. A certain gene codes for a polypeptide that is 120 amino acids long. Approximately how many nucleotides long is the mRNA that codes for this polypeptide likely to be?
- A. 30
  - B. 40
  - C. 360
  - D. 480
8. The codons CGU and CGC both code for the addition of the amino acid arginine to a growing polypeptide chain. What term is used to describe this property of the genetic code?
- A. Universal
  - B. Degenerate
  - C. Redundant
  - D. Complementary

9. Of the following products, which is produced by both anaerobic respiration and aerobic respiration in humans?
- I. Pyruvate
  - II. ATP
  - III. Lactate
- A. I only
  - B. I and II only
  - C. I, II and III
  - D. II and III only

10. The following is a DNA gel. The results are from a single probe showing a DNA profile for a man, a woman and their four children.



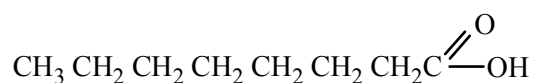
[Source: *The Biology Project*, University of Arizona]

Which fragment of DNA is the smallest?

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

11. Which two colours of light does chlorophyll absorb most?
- A. Red and yellow
  - B. Green and blue
  - C. Red and green
  - D. Red and blue
12. What is the initial purpose of sequencing the human genome?
- A. To determine the order of genes in a chromosome
  - B. To determine the number of genes in the nucleus
  - C. To determine the order of bases in DNA
  - D. To determine the type of chromosomes in offspring
13. A couple has four children whose blood types are A, B and AB. What is the likely combination of the parents' genotypes?
- A.  $I^A i$  and  $I^B i$
  - B.  $I^A i$  and  $I^B I^B$
  - C.  $I^B i$  and  $ii$
  - D.  $I^A i$  and  $ii$

14. What does the following molecule represent?

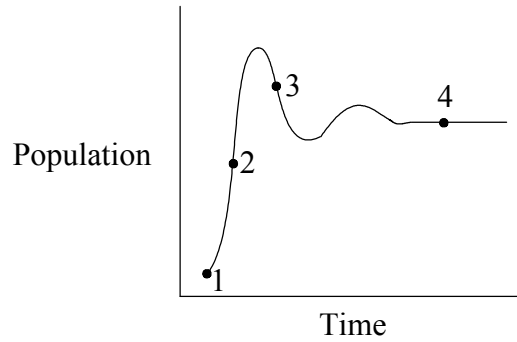


- A. A protein
- B. A monosaccharide
- C. A fatty acid
- D. A polysaccharide

15. Which information is used when constructing a karyotype?
- I. Size of chromosomes
  - II. Position of the centromere of the chromosome
  - III. DNA content of the chromosome
- A. I only
  - B. II only
  - C. I and II only
  - D. I, II and III
16. The amount of DNA in a haploid cell of an organism can be represented by X. What would be the quantity of DNA in a cell from the same organism at the start of meiosis?
- A. 0.5X
  - B. X
  - C. 2X
  - D. 4X
17. A parent organism of unknown genotype is mated in a test cross. Half of the offspring have the same phenotype as the parent. What can be concluded from this result?
- A. The parent is heterozygous for the trait.
  - B. The trait being inherited is polygenic.
  - C. The parent is homozygous dominant for the trait.
  - D. The parent is homozygous recessive for the trait.

18. A researcher captures 100 sparrows (a small bird), tags them and then releases them. One week later, the researcher recaptures 50 sparrows, 20 of which have tags on them. What is the size of the sparrow population?
- A. 50 birds
  - B. 100 birds
  - C. 250 birds
  - D. 500 birds
19. Carbon dioxide enters the carbon cycle of an ecosystem through which group of organisms?
- A. Decomposers
  - B. Detritus feeders
  - C. Producers
  - D. Secondary consumers
20. Which process results in the greatest genetic variation in a population?
- A. Meiosis
  - B. Mitosis
  - C. Cytokinesis
  - D. Natural selection

21. Consider the following diagram of a population growth curve.



At what point is mortality greater than natality?

- A. 1
  - B. 2
  - C. 3
  - D. 4
22. Which process has the greatest effect in determining which members of a population are most likely to survive until reproductive age?
- A. Speciation
  - B. Natural selection
  - C. Meiosis
  - D. Hybridization
23. In which structure are most of the products of digestion absorbed?
- A. Mouth
  - B. Stomach
  - C. Small intestine
  - D. Large intestine



24. Which organ secretes enzymes that are active at a low pH?
- A. Mouth
  - B. Pancreas
  - C. Stomach
  - D. Liver
25. Which vessel carries deoxygenated blood?
- A. The pulmonary artery
  - B. The coronary artery
  - C. The aorta
  - D. The pulmonary vein
26. What name is given to the molecules that bind to foreign proteins that enter the body?
- A. Antigens
  - B. Antibodies
  - C. Allergens
  - D. Antibiotics
27. What occurs during inhalation?
- A. The diaphragm relaxes.
  - B. The external intercostal muscles contract.
  - C. The volume of the lungs decreases.
  - D. The abdominal muscles contract.

28. Under which conditions would insulin be secreted?
- A. After a day of fasting
  - B. After a meal high in protein
  - C. After eating chocolate
  - D. When blood sugar is low
29. What effect would the continued presence of estrogen and progesterone have in the human female?
- A. It would prevent menstruation.
  - B. It would cause an increase in the production of FSH.
  - C. It would stimulate maturation of ovarian follicles.
  - D. It would cause the release of oxytocin.
30. Which of the following plasma components is **not** normally removed from the blood by ultrafiltration in the kidney?
- A. Urea
  - B. Salts
  - C. Water
  - D. Proteins
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