



22116010



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BIOLOGY
STANDARD LEVEL
PAPER 1

Wednesday 18 May 2011 (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. The table below shows the level of hemoglobin measured in two different groups of athletes.

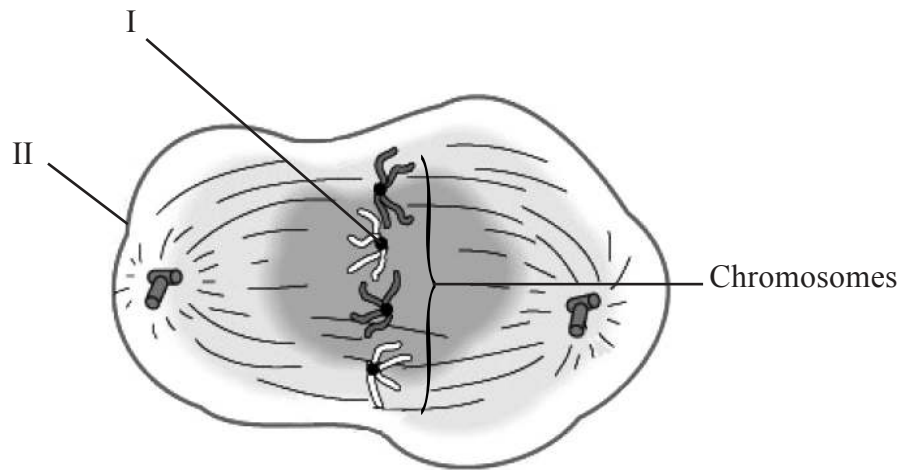
	Hemoglobin / grams per 100 cm³	Number of athletes tested	Standard deviation / grams per 100 cm³
Group A	12.6	200	0.8
Group B	11.9	220	3.2

Which of the following statements is correct?

- A. Results from group B are more accurate because more athletes were tested.
 - B. Results from group B are more reliable because it has a higher standard deviation.
 - C. More athletes have their hemoglobin concentration close to the mean in group A than in group B.
 - D. These results indicate that the level of hemoglobin follows a normal distribution.
2. Which of the following will contribute to the cell theory?
- I. Living organisms are composed of cells.
 - II. All cells come from pre-existing cells by mitosis.
 - III. Cells are the smallest units of life.
- A. I only
 - B. II only
 - C. I and III only
 - D. I, II and III

3. A red blood cell is $8\ \mu\text{m}$ in diameter. If drawn 100 times larger than its actual size, what diameter will the drawing be in mm?
- A. 0.08 mm
 - B. 0.8 mm
 - C. 8 mm
 - D. 80 mm
4. A cell has cytoplasm, a cell wall, naked DNA and ribosomes. Based on this information, what type of cell could this be?
- A. A cell from a pine tree
 - B. A grasshopper cell
 - C. A human red blood cell
 - D. A bacterium
5. What do diffusion and osmosis have in common?
- A. They only happen in living cells.
 - B. They require transport proteins in the membrane.
 - C. They are passive transport mechanisms.
 - D. Net movement of substances is against the concentration gradient.

6. The diagram below shows a cell during mitosis.



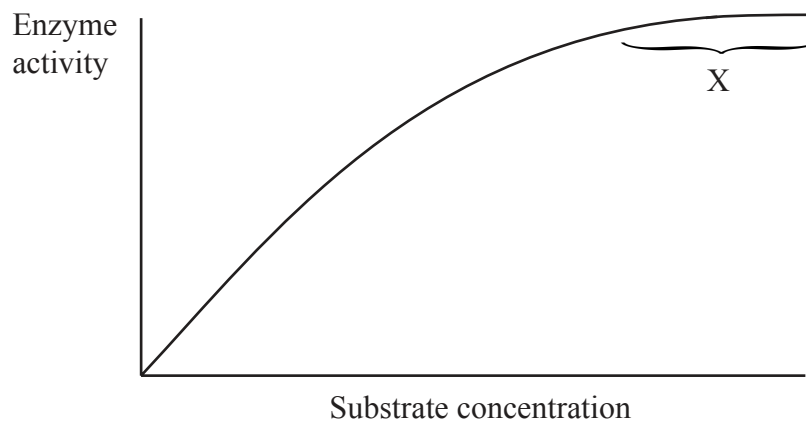
What are the structures and stage of mitosis?

	Stage of mitosis	Structure I	Structure II
A.	metaphase	chromatid	nuclear membrane
B.	anaphase	centromere	plasma membrane
C.	anaphase	chromatid	nuclear membrane
D.	metaphase	centromere	plasma membrane

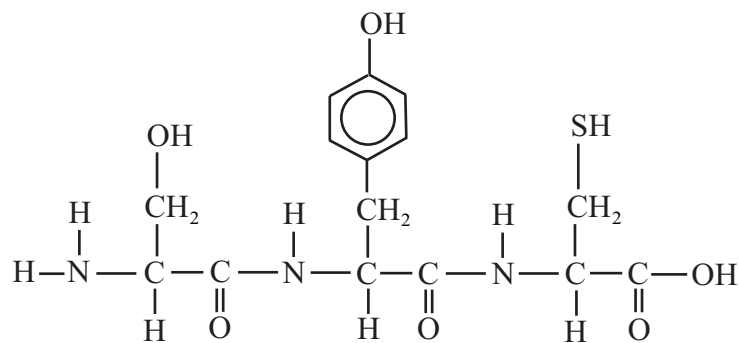
7. Which of the following are connected by hydrogen bonds?

- A. Hydrogen to oxygen within a molecule of water
- B. Phosphate to sugar in a DNA molecule
- C. Base to sugar in a DNA molecule
- D. Hydrogen to oxygen between two different molecules of water

8. The graph below shows the effect of substrate concentration on enzyme activity. What conclusion can be drawn about section X of the graph?



- A. The enzyme has started to denature and the reaction slows down.
 - B. The reaction has finished and the substrate has been used up.
 - C. The enzyme is saturated and is working at its maximum reaction rate.
 - D. Some of the enzyme has been consumed and the reaction has reached a plateau.
9. Which type of molecule is shown in the diagram below?

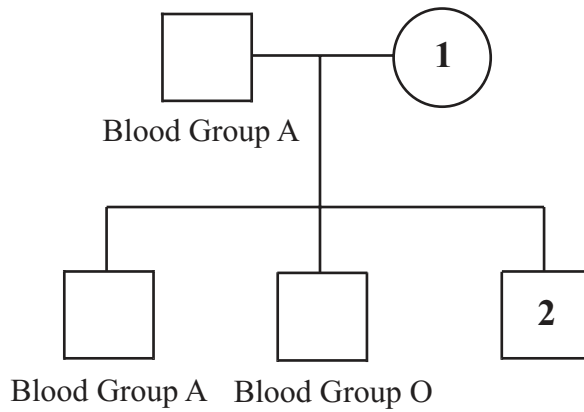


- A. Peptide
- B. Carbohydrate
- C. Lipid
- D. Nucleic acid

10. The percentage of thymine in the DNA of an organism is approximately 30%. What is the percentage of guanine?
- A. 70%
 - B. 30%
 - C. 40%
 - D. 20%
11. What is denaturation?
- A. A structural change of a protein that results in the loss of its biological properties
 - B. A change in the genetic code of an organism
 - C. A change in the amino acid sequence of a protein causing a disruption of its 3D shape
 - D. The process by which amino acids are broken down and ammonia is released
12. How do cells capture the energy released by cell respiration?
- A. They store it in molecules of carbon dioxide.
 - B. They produce glucose.
 - C. The energy is released as pyruvate.
 - D. They produce ATP.
13. What is the source of the oxygen released into the air as a product of photosynthesis?
- A. Chlorophyll
 - B. Carbon dioxide only
 - C. Water only
 - D. Both water and carbon dioxide

14. Which of the following statements about homologous chromosomes is correct?
- A. Each gene is at the same locus on both chromosomes.
 - B. They are two identical copies of a parent chromosome which are attached to one another at the centromere.
 - C. They always produce identical phenotypes.
 - D. They are chromosomes that have identical genes and alleles.
15. What happens in crossing over?
- A. Exchange of genetic material between homologous chromosomes
 - B. Exchange of genes during metaphase of mitosis
 - C. Random distribution of chromosomes during meiosis
 - D. Homologous chromosomes fail to separate during meiosis

16. The pedigree chart below shows the blood types of three members of a family.



Which could be the blood types of individuals 1 and 2?

	Individual 1	Individual 2
A.	A	AB
B.	AB	B
C.	O	B
D.	B	A

17. Which of the following types of information are needed to construct a karyotype?

- I. Size of the chromosomes
- II. Gene mutations of the chromosomes
- III. Age of the individual

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

18. A woman who is a carrier for hemophilia and a man who does not have hemophilia have a child. What is the probability that the child will have hemophilia?

	If it is a girl	If it is a boy
A.	0%	50%
B.	0%	0%
C.	50%	50%
D.	50%	0%

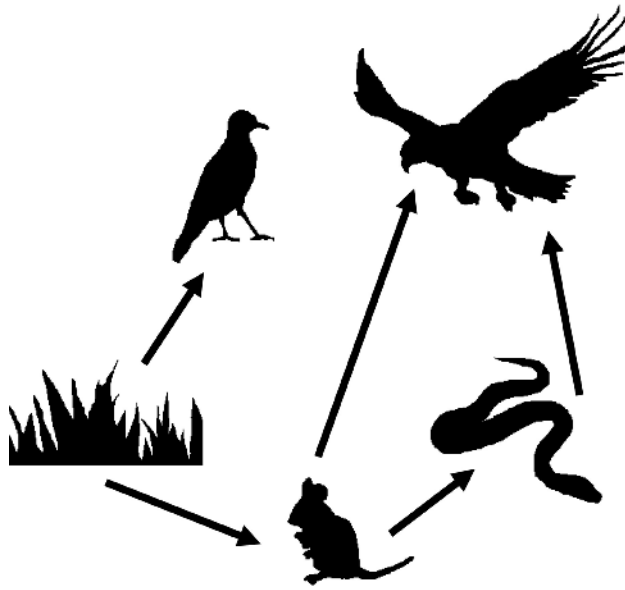
19. Which enzymes are needed to produce recombinant plasmids to be used in gene transfer?

- A. DNA polymerase and DNA ligase
- B. DNA polymerase and restriction enzyme (endonuclease)
- C. Transcriptase and RNA polymerase
- D. Restriction enzyme (endonuclease) and DNA ligase

20. Which of the following is the best definition of a population?

- A. A group of individuals that can interbreed and produce fertile offspring
- B. The number of individuals of the same species in a given area
- C. A group of species living and interacting with each other in a given area
- D. The total number of individuals in a given area

21. The diagram below shows a simplified food web.

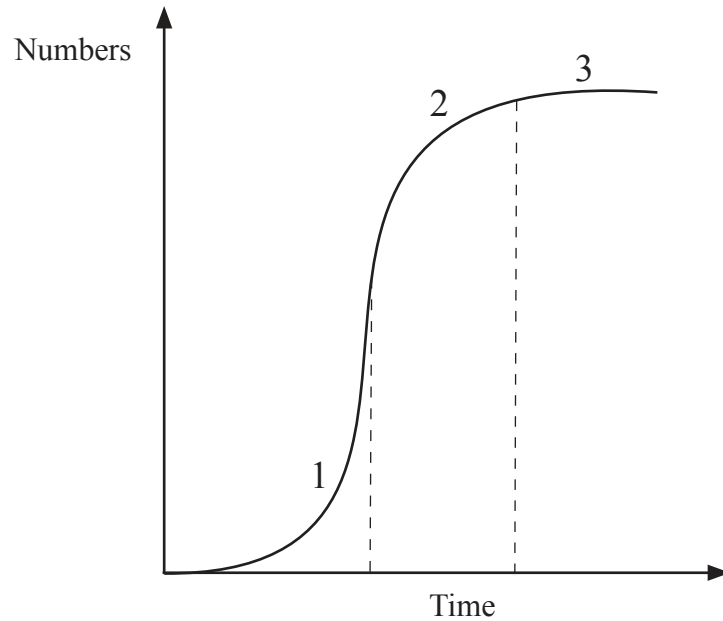


What is the role of the snake in this food web?

- A. Primary consumer
- B. Secondary consumer
- C. Tertiary consumer
- D. Producer

22. The graph below represents a sigmoid (S-shaped) population growth curve. Three sections of the curve are indicated (1, 2 and 3).

In which of the sections is natality plus immigration greater than mortality plus emigration?



- A. 1 only
- B. 2 only
- C. 1 and 2 only
- D. 3 only
23. What is evolution?
- A. A measure of the relative survival and reproductive success of an individual
- B. A cumulative change in the genetically controlled characteristics of a population
- C. A physical change during an organism's life that is inherited by its offspring
- D. A random change in the proportions of alleles from generation to generation

24. Two different trees have been classified as *Pinus pinea* and *Pinus nigra*. Which of the following statements is correct?
- A. Both trees belong to the same class but a different genus.
 - B. Both trees belong to the same family and same genus.
 - C. The species name of both trees is *Pinus*.
 - D. The family names are *pinea* and *nigra*.
25. Celiac disease causes the destruction of the villi cells. Which of the following is most likely to happen to people with celiac disease?
- A. Incomplete digestion of fats
 - B. Poor absorption of calcium
 - C. Increased levels of glucose in blood
 - D. Damage in the esophagus caused by increase in acid content of the stomach
26. Is the blood in the aorta, left ventricle and pulmonary artery oxygenated or deoxygenated?

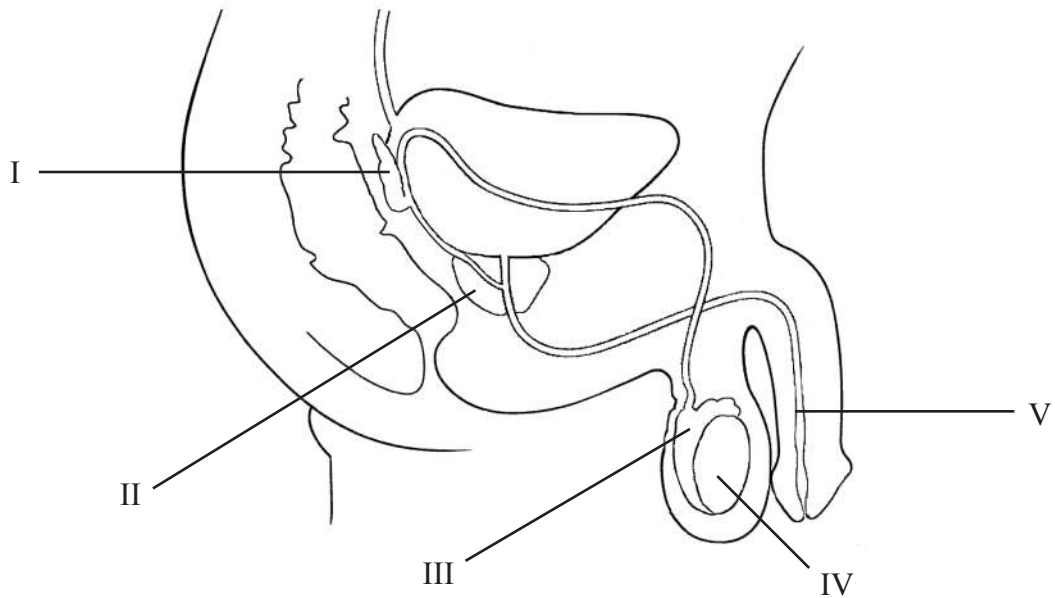
	Aorta	Left ventricle	Pulmonary artery
A.	oxygenated	deoxygenated	deoxygenated
B.	deoxygenated	oxygenated	oxygenated
C.	oxygenated	oxygenated	deoxygenated
D.	oxygenated	oxygenated	oxygenated

27. Which of the following statements about antibodies is correct?
- A. Antibodies are polypeptides.
 - B. Antibodies are produced by the bone marrow.
 - C. Antibodies are pathogenic foreign substances.
 - D. Antibodies kill bacteria but not viruses.
28. What normally prevents the membranes of the alveoli from sticking together during expiration?
- A. The thickness of the single-cell layer of alveoli membranes
 - B. The secretion of fluids in the inner surface of the alveoli
 - C. The pressure within the thoracic cavity
 - D. The dense net of capillaries covering the alveoli
29. Which words from the table below complete the sentence correctly?

In the pancreas, I secrete glucagon, which II blood glucose levels.

	I	II
A.	α cells	raises
B.	β cells	raises
C.	α cells	lowers
D.	β cells	lowers

30. The diagram below shows the male reproductive system.



Which are the epididymis and the seminal vesicle in the diagram?

	Epididymis	Seminal vesicle
A.	IV	I
B.	III	II
C.	I	V
D.	III	I