



22126010



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BIOLOGY
STANDARD LEVEL
PAPER 1

Thursday 17 May 2012 (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.
- The maximum mark for this examination paper is *[30 marks]*.

1. The mean height for adult men in the United States is 1.78 m with a standard deviation of 8 cm. Which statement is true?
 - A. The tallest man in the United States is 1.86 m tall.
 - B. 68% of men in the United States are between 1.74 m and 1.82 m tall.
 - C. 68% of men in the United States are between 1.70 m and 1.86 m tall.
 - D. 100% of men in the United States are within two standard deviations of 1.78 m.

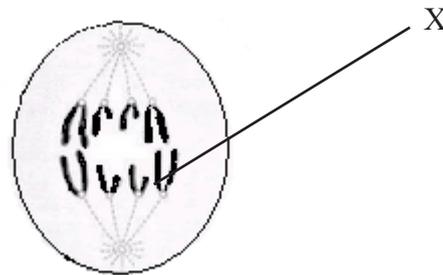
2. Which property makes stem cells suitable for therapeutic use?
 - A. They can divide by meiosis to form gametes.
 - B. They contain chemicals that can kill bacteria.
 - C. Their chromosomes are suitable for gene transfer and cloning.
 - D. They can differentiate into specialized cells.

3. Which features are present in prokaryotic cells?
 - A. DNA, plasma membrane and mitochondria
 - B. DNA, cell wall and pili
 - C. ribosomes, chloroplasts and cell wall
 - D. cytoplasm, ribosomes and rough endoplasmic reticulum

4. Where in the cell do condensation reactions involving amino acids occur?
 - A. Nucleus
 - B. Golgi apparatus
 - C. Ribosomes
 - D. Lysosome

5. Which process is possible due to the fluidity of cell membranes?
- A. Endocytosis
 - B. Osmosis
 - C. ATP production
 - D. Cell recognition

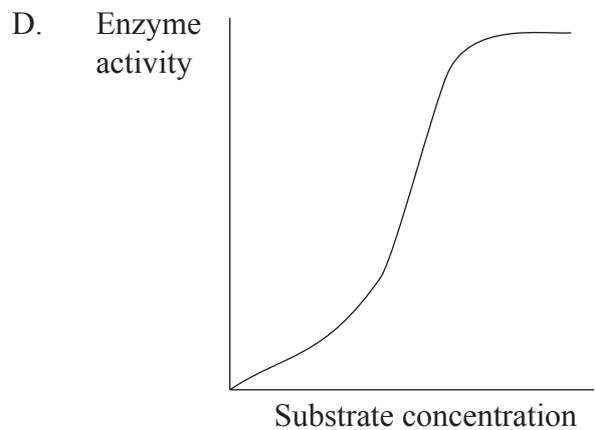
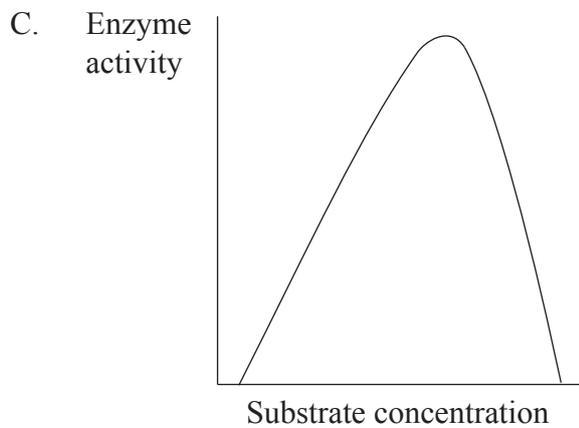
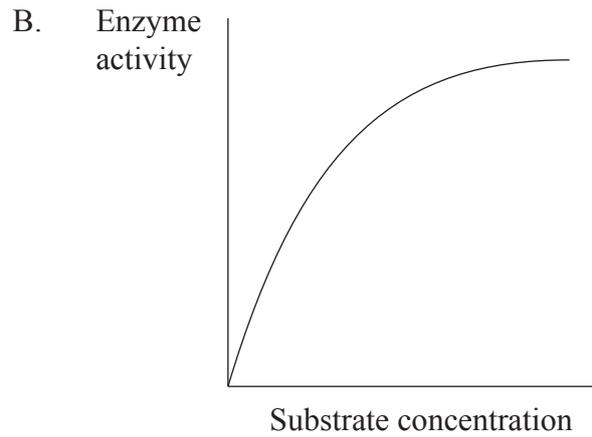
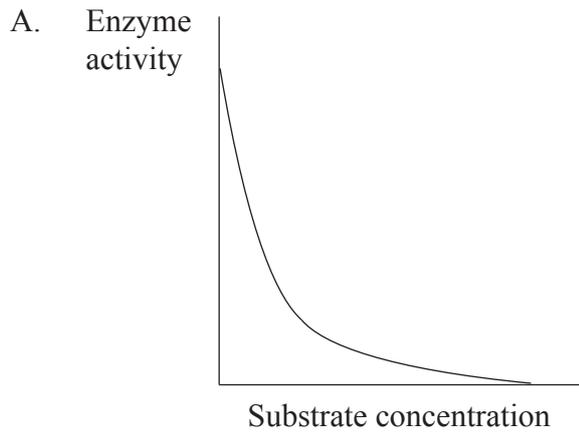
6. In which stage of mitosis is the cell labelled X?



- A. Anaphase
 - B. Interphase
 - C. Metaphase
 - D. Prophase
7. Between which atoms do hydrogen bonds form in water?
- A. Oxygen and hydrogen atoms in the same water molecule
 - B. Oxygen and hydrogen atoms in different water molecules
 - C. Hydrogen atoms in the same water molecule
 - D. Oxygen atoms of different water molecules

8. Which carbon compound produced by living organisms is inorganic?
- A. DNA
 - B. Cellulose
 - C. Glucose
 - D. Carbon dioxide
9. What occurs during DNA replication?
- A. DNA polymerase separates the two DNA strands.
 - B. DNA molecules containing nucleotides from the original molecule are produced.
 - C. Adenine forms a base pair with either thymine or uracil.
 - D. New bases attach to the original sugar-phosphate backbone.

10. Which graph shows the effect of increasing the substrate concentration on enzyme activity?



11. Which chemical is produced during both aerobic and anaerobic respiration in humans?

- A. Carbon dioxide
- B. Pyruvate
- C. Water
- D. Lactate

12. How is oxygen produced during photosynthesis?
- A. Water molecules are split with energy from ATP.
 - B. Water molecules are split with energy from light.
 - C. Carbon dioxide molecules are split with energy from ATP.
 - D. Carbon dioxide molecules are split with energy from light.
13. The sequence of the first six amino acids of the normal β hemoglobin (Hb^A) chain are listed.

valine – histidine – leucine – threonine – proline – glutamic acid

Which sequence of amino acids could there be in the first six amino acids of the sickle-cell β hemoglobin (Hb^S) chain?

- A. glutamic acid – histidine – leucine – threonine – proline – valine
 - B. valine – valine – histidine – leucine – threonine – proline
 - C. glutamic acid – histidine – leucine – threonine – proline – glutamic acid
 - D. valine – histidine – leucine – threonine – proline – valine
14. If there are 16 chromosomes in a cell that is about to divide, what will be the number of chromosomes in a daughter cell after division by mitosis or meiosis?

	Mitosis	Meiosis
A.	16	16
B.	16	8
C.	8	16
D.	8	8

Questions 15 and 16 refer to the following information.

A man has hemophilia, a condition caused by a recessive sex-linked allele carried on the X chromosome.

15. Which of his grandparents must be a carrier if none of them had the disease?

- A. Maternal grandmother (his mother's mother)
- B. Maternal grandfather (his mother's father)
- C. Paternal grandmother (his father's mother)
- D. Paternal grandfather (his father's father)

16. His wife does not carry the hemophilia allele. What would be expected in their children?

	Sons	Daughters
A.	all normal	all carriers
B.	half hemophiliac	all carriers
C.	all normal	half carriers
D.	half hemophiliac	all normal

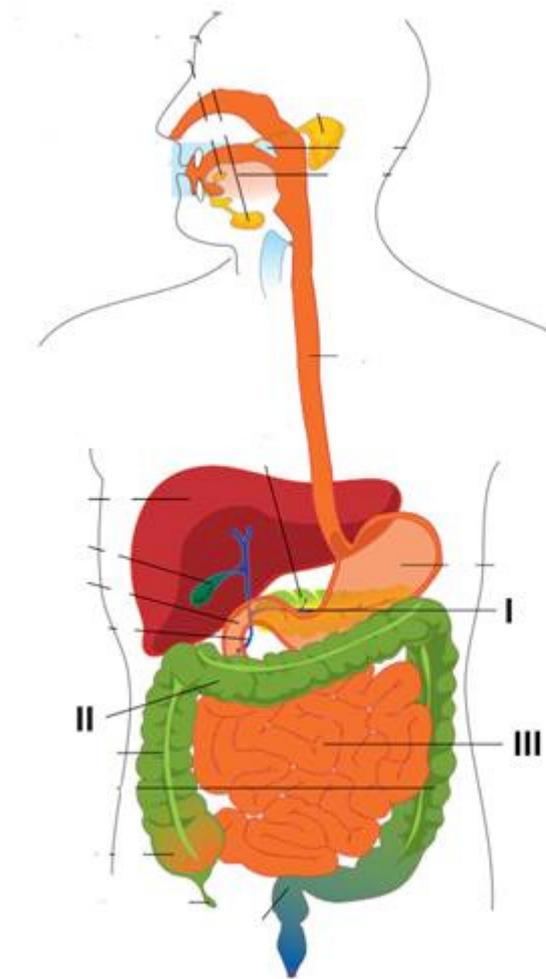
17. What makes gene transfer between species possible?

- A. All species use the same genetic code.
- B. All species have the same genetic material.
- C. All species produce the same polypeptides.
- D. All species transcribe genes using plasmids.

18. In a pond, two species of fish feed on insects and worms. The insects feed on the green plants that live in the water. What constitutes a population in this ecosystem?
- A. All the living organisms
 - B. All the animals
 - C. All the fish
 - D. All the fish of one species
19. What is recycled in an ecosystem?
- A. Nitrogen, carbon and energy are all recycled.
 - B. Nitrogen and carbon are recycled but not energy.
 - C. Nitrogen is recycled but not carbon or energy.
 - D. Nitrogen, carbon and energy are not recycled.
20. In a population of rabbits studied over a period of six months, it was found that natality was greater than mortality and emigration was greater than immigration. What can be concluded about the final population of rabbits?
- A. It will have increased.
 - B. It will have decreased.
 - C. It will be exactly the same.
 - D. There is not enough information to make a valid conclusion.
21. What characteristics describe homologous structures?
- A. They have the same ancestral origin but may have different functions.
 - B. They have the same ancestral origin and always have the same function.
 - C. They have different ancestral origins and may have different functions.
 - D. They have different ancestral origins but always have the same function.

22. The Atlantic cod (*Gadus callarias*) is a fish which lays about 5 000 000 eggs in its lifetime. On average, only two of these eggs survive to become adult cod. How does this promote evolution?
- A. All offspring are genetically identical, so become better adapted.
 - B. Laying many eggs provides food for other species to survive and become better adapted.
 - C. Some young cod change to become adapted to the environment and survive and pass on their genes.
 - D. Offspring with favourable variations survive and pass on their genes.
23. Based on binomial nomenclature, which two species are most closely related?
- I. Common barberry (*Berberis vulgaris*)
 - II. Canadian bunchberry (*Cornus canadensis*)
 - III. Smooth blackberry (*Rubus canadensis*)
 - IV. Canadian barberry (*Berberis canadensis*)
- A. I and IV
 - B. II and III
 - C. II and IV
 - D. III and IV

24. The diagram below shows the human digestive system.



In which parts of the digestive system are most water and glucose absorbed?

	Water	Glucose
A.	II	I
B.	II	III
C.	III	II
D.	III	III

25. What is the condition of the valves of the heart when the right ventricle is contracting?

	Atrio-ventricular valve	Semilunar valve
A.	open	open
B.	open	closed
C.	closed	closed
D.	closed	open

26. What effect does HIV have on the immune system?

- A. It prevents leucocytes from fighting bacteria by phagocytosis.
- B. It causes excessive production of leucocytes in bone marrow.
- C. It destroys antibodies produced by leucocytes.
- D. It lowers the number of leucocytes, reducing antibody production.

27. What is a similarity between arteries and capillaries?

- A. They both have elastic tissue.
- B. They both have smooth muscle cells.
- C. Neither has collagen fibres in their walls.
- D. Neither has valves.

28. What is a characteristic of axons in motor neurons?

- A. When there is a resting potential, the outside of the axon is negative relative to the inside.
- B. During an action potential, Na⁺ ions diffuse out of the axon.
- C. K⁺ ions diffusing out of the axon repolarizes it.
- D. Impulses in the axon travel towards the cell body.

29. Which response takes place when blood glucose levels are low?
- A. Glucagon is released from the α cells of the pancreatic islets.
 - B. Glucagon is released from the β cells of the pancreatic islets.
 - C. Insulin is released from the α cells of the pancreatic islets.
 - D. Insulin is released from the β cells of the pancreatic islets.
30. During the menstrual cycle, what occurs in response to a fall in the progesterone level?
- A. Growth of the uterus lining
 - B. Growth of the follicle surrounding the egg
 - C. Ovulation
 - D. Menstruation
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