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BIOLOGY
STANDARD LEVEL
PAPER 1

Wednesday 16 November 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.

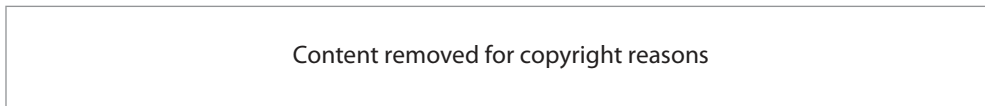
1. What is the purpose of calculating the standard deviation?
 - A. To represent graphically the variability of data
 - B. To give a measure of the spread of values around the mean
 - C. To represent the range of 50% of the data
 - D. To give a measure of the correlation between two variables

2. Which statement is part of the cell theory?
 - A. All cells have a cell wall.
 - B. Every cell shows emergent properties.
 - C. Every cell carries out all the functions of life.
 - D. All cells come from pre-existing cells.

3. What is the principal mode of division for the prokaryote *Escherichia coli*?
 - A. Endocytosis
 - B. Binary fission
 - C. Cytokinesis
 - D. Meiosis

4. Where can 70S ribosomes be found?
 - A. On membranes of the Golgi apparatus
 - B. In prokaryotic cells
 - C. On membranes of the rough endoplasmic reticulum
 - D. In nuclei

Questions 5 and 6 refer to the following image of a liver cell.



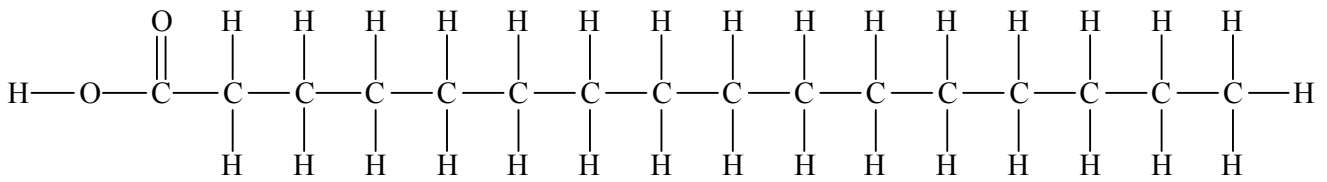
5. What is the function of the organelles labelled X?

- A. Glycolysis
- B. Polypeptide formation
- C. Aerobic cell respiration
- D. Protein transport

6. What is the approximate size of the nucleus?

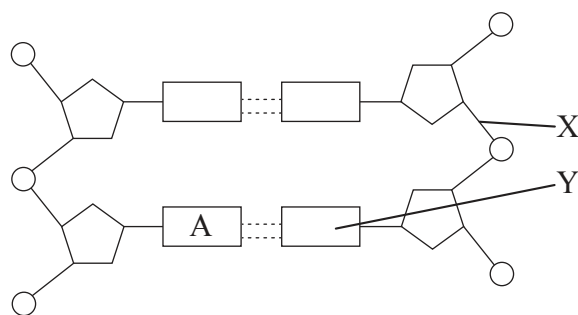
- A. 2 μm
- B. 5 μm
- C. 9 μm
- D. 24 μm

7. What substance is represented by this structure?



- A. Glycerol
 - B. Fatty acid
 - C. Cellulose
 - D. Glycogen
8. What is a function of cellulose in plants?
- A. To form a mesh of fibres in the cell wall
 - B. To prevent mineral ions from diffusing out of the cell
 - C. To prevent water loss
 - D. To capture blue and red light photons
9. Why do crop plants dry out when a field is irrigated with water contaminated by sea water?
- A. The plants lose water by active transport.
 - B. The plants gain salt by osmosis.
 - C. The plants gain salt by diffusion.
 - D. The plants lose water by osmosis.

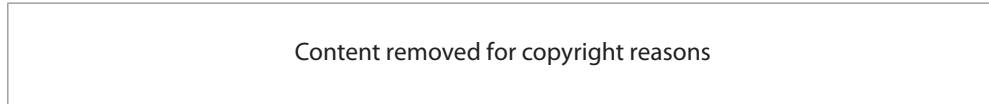
Questions 10 and 11 refer to the following diagram of DNA.



10. What does the structure labelled X represent?
- A. Hydrogen bond
 - B. Phosphate
 - C. Covalent bond
 - D. Base
11. What does the structure labelled Y represent?
- A. Ribose
 - B. Thymine
 - C. Guanine
 - D. Deoxyribose
12. Which statement describes glycogen?
- A. It is a hormone involved in the control of blood glucose.
 - B. It is a component of the cell wall in plants.
 - C. It is a monosaccharide converted to pyruvate during cell respiration.
 - D. It is a polysaccharide found in animals.

13. Which of the following is a role of ATP in photosynthesis?
- A. It provides the energy to make carbohydrate molecules.
 - B. It splits water molecules to form oxygen and hydrogen.
 - C. It breaks down pyruvate into carbon dioxide.
 - D. It converts light energy into chemical energy.
14. Which statement is a definition of a gene?
- A. The whole of the genetic information of an organism
 - B. The factor that affects the phenotype in the homozygous state
 - C. A heritable factor that controls a specific characteristic
 - D. The factor that affects the phenotype in the heterozygous state
15. Which of the following statements relate(s) to Down syndrome (trisomy 21)?
- I. It can be detected in chorionic villus samples.
 - II. It results from non-disjunction in meiosis.
 - III. It is caused by gene mutation.
- A. I and II only
 - B. I and III only
 - C. II only
 - D. III only

16. The following diagram shows a stage of meiosis.

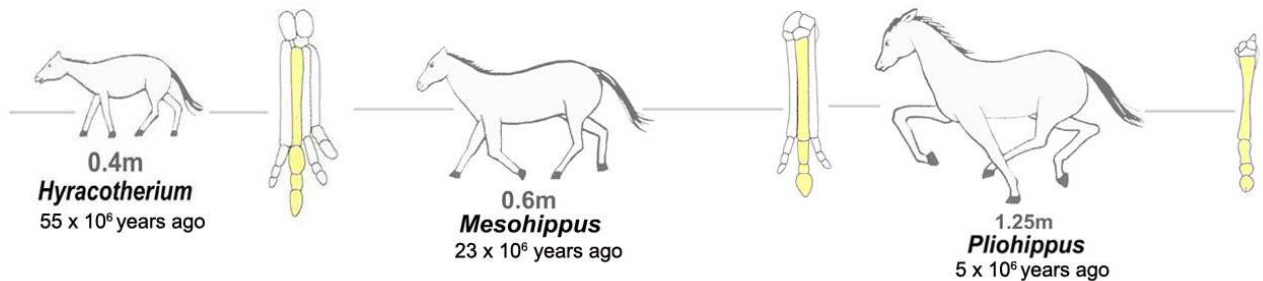


What stage is represented in the diagram?

- A. Anaphase I
 - B. Metaphase I
 - C. Metaphase II
 - D. Anaphase II
17. In humans a V-shaped hair line is dominant to a straight hair line. A woman with a V-shaped hair line and a man with a straight hair line have children. The woman has a mother with a straight hair line. What is the proportion of children who are likely to have a V-shaped hair line?
- A. Half of the children
 - B. A quarter of the children
 - C. All of the children
 - D. None of the children
18. Which technique causes fragments of DNA to move in an electric field?
- A. Polymerase chain reaction (PCR)
 - B. Genetic modification
 - C. Therapeutic cloning
 - D. Gel electrophoresis

19. Which organisms have flowers?
- A. Bryophyta
 - B. Porifera
 - C. Angiospermophyta
 - D. Cnidaria
20. Which of the following trophic groups include fungi?
- A. Detritivores
 - B. Autotrophs
 - C. Saprotrophs
 - D. Producers
21. Which term best defines a group of populations living and interacting with each other in an area?
- A. Ecology
 - B. Community
 - C. Species
 - D. Ecosystem
22. Which of the following statements relates to the precautionary principle?
- A. Those responsible for an action that may be catastrophic must prove that it will not harm before proceeding.
 - B. Politicians have been warned by scientists about the impacts of global warming on ocean levels.
 - C. Rich countries must help less fortunate countries to build structures that will reduce the impact of higher ocean levels due to global warming.
 - D. Those who are concerned about an action that may be catastrophic must prove that it will do harm in order to stop the action from taking place.

23. What is most likely to result in a species if there is increased immigration?
- A. Decrease in emigration
 - B. Decrease in mortality
 - C. Increase in natality
 - D. Increase in population
24. The following diagrams (not to scale) represent the fossilized forelimbs of three horses living at different times, none of which are alive today.



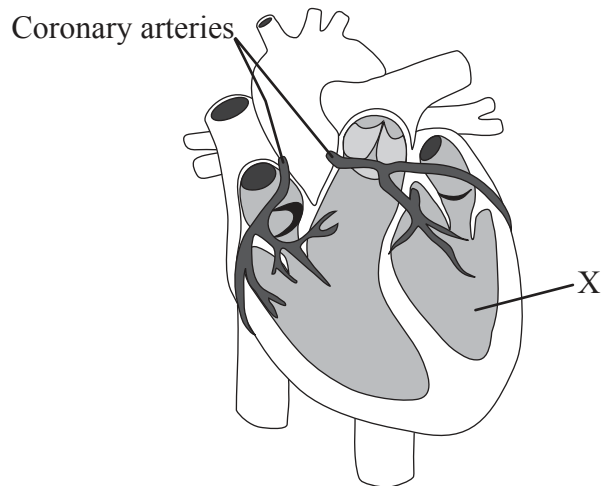
Images by Alex Brollo

The diagrams provide evidence for which of the following?

- A. Pentadactyl limb
 - B. Domestication of animals
 - C. Homologous structures
 - D. Change in the characteristics of species
25. Between which structures do sensory neurons carry nerve impulses?
- A. From effectors to the central nervous system (CNS)
 - B. From effectors to receptors
 - C. From receptors to effectors
 - D. From receptors to the central nervous system (CNS)

26. Which term describes the phase of rapid entry of sodium ions (Na^+) into an axon during an action potential?
- A. Active transport
 - B. Depolarization
 - C. Ion pumping
 - D. Repolarization
27. Which of the following is a characteristic of type I but **not** type II diabetes?
- A. β cells in the pancreas are destroyed.
 - B. Insulin injections are required.
 - C. α cells in the pancreas are destroyed.
 - D. Sugar intake control is required.
28. Which hormone triggers ovulation?
- A. FSH
 - B. Testosterone
 - C. Progesterone
 - D. LH

Questions 29 and 30 refer to the following diagram of the heart.



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29. What is the structure labelled X?
- A. Right ventricle
 - B. Right atrium
 - C. Left atrium
 - D. Left ventricle
30. What is a role of the coronary arteries?
- A. To transport oxygen from the lungs directly to the heart muscle
 - B. To remove deoxygenated blood from the heart muscle
 - C. To supply the heart muscle with nutrients
 - D. To remove cholesterol from the heart muscle