

SOUTH PLAINS MATH & SCIENCE COMPETITION

BIOLOGY 2

General Information:

- Check to see that you have written your name on the label and that the test name on the label matches the name on this booklet.
- **DO NOT** open the test booklet and **DO NOT** start until the proctor says "begin."
- Each individual exam period will be 45 minutes and each exam contains 40 multiple choice questions.
- Students are allowed to use a non-programmable battery operated calculator during the individual and team exams.
- Students are encouraged to write on the exam booklet. Scratch paper and pencils will also be provided.
- Students will not be permitted to leave the test room while the test is in progress. If a student finishes early, he/she must remain in the test room until the exam period is completed.
- If you need to ask a question during the test, raise your hand and the proctor will come to you.
- There is no penalty for skipping a problem. The exam scores will be determined by the number of correct answers. All ties will be broken by awarding the place to the contestant who has the most consecutive correct answers before a problem is missed.
- **Students may NOT keep the test booklet.**

BIOLOGY 2

1. The Danielli model differs from the fluid mosaic model in that _____.
 - a. The proteins are embedded in the fluid mosaic model whereas the proteins are to the exterior of the phospholipids in the Danielli model.
 - b. There are no phospholipids in the Danielli model.
 - c. The phospholipids in the fluid mosaic model have the fatty acid tails facing together, whereas the fatty acid tails away from each other in the Danielli model.
 - d. The Danielli model explains the cellular membrane of plant cells, whereas the fluid mosaic model explains the membranes of animal cells.
 - e. None of the above

2. A plasmid usually carries what information?
 - a. Antibiotic resistance
 - b. Protein conformation
 - c. Enzyme inhibitors
 - d. Bacterial compatibility
 - e. None of the above

3. The primary function of the endosperm is _____.
 - a. To make the precursor for sperm
 - b. To waterproof cotyledons
 - c. To maintain homeostasis
 - d. To nourish a growing embryo
 - e. None of the above

4. In which of the following situations would tylosis most likely occur?
 - a. Sawing off a tree branch
 - b. Disrupting pressure in the inner ear
 - c. Imbalance of chemicals in the hypothalamus
 - d. Guttation of leaves
 - e. None of the above

5. Damage to a cell's nucleolus will most likely lead to _____.
 - a. The inability to produce ribosomes
 - b. The inability to produce smooth ER
 - c. The inability to wind chromosomes around histone proteins
 - d. The inability to undergo mitosis
 - e. None of the above

6. Which ribosomal subunit promotes the binding of amino acids?
 - a. 40S
 - b. 60S
 - c. 70S
 - d. 90S
 - e. None of the above

7. The primary role of ligase is _____.
- Creating a replication fork
 - Base pairing nucleotides in the lagging strand
 - Removing the RNA primer
 - Joining the Okazaki fragments
 - None of the above
8. Which of the following enzymes is best described as an endonuclease?
- Restriction enzyme
 - Catalytic enzyme
 - Anabolic enzyme
 - Reverse transcriptase
 - None of the above
9. As temperatures increase, enzyme activity decreases. What is the most likely explanation for this?
- Heat slows down the activity of any molecule.
 - The enzyme becomes denatured.
 - The system does not require an enzyme.
 - Temperature has little bearing on activity. The results may not be accurate.
 - None of the above
10. Which of the following best describes the origin of eukaryotes?
- Mutation
 - Endosymbiosis
 - Parasitism
 - Mimicry
 - None of the above
11. The paramecium is most likely to use which organ to remove carbon dioxide?
- Cell membrane
 - Contractile vacuole
 - Lysosome
 - All of the above
 - None of the above
12. The Ames test is best used to detect _____.
- Drug resistance
 - Mutation
 - Bacterial conjugation
 - Transformation
 - None of the above
13. Without periods of tetany, muscles will have a tendency to _____.
- Atrophy
 - Produce increased levels of lactic acid
 - Require less energy to prompt an action potential
 - Excite groups of muscles uncontrollably
 - None of the above

14. Which of the following best represents a roan phenotype?
- Incomplete dominance
 - Multiple alleles
 - Co-dominance
 - Mendelian genetics
 - None of the above
15. Damage to one's cerebrum is most likely going to impair _____.
- Thought
 - Balance and coordination
 - Metabolism
 - Breathing
 - None of the above
16. Why is the primary function of chymotrypsin?
- Converts polysaccharides into monosaccharides
 - Converts polypeptides into amino acids
 - Converts fats into fatty acids
 - Converts nucleic acids into nitrogen bases
 - None of the above
17. Which of the following is not a component of the virus?
- Ribosome
 - Capsid
 - Nucleic acid
 - Tail
 - none of the above
18. Cytochrome complexes are most commonly found in _____.
- Krebs cycle
 - Glycolysis
 - Electron transport chain
 - ATP synthase
 - None of the above
19. An acidic solution in lab has a pH of 2. What is the hydrogen ion concentration of this solution?
- 10^{-2}
 - 2%
 - 102
 - 2.0
 - 0.02
20. During translation, elongation continues until _____.
- No more amino acids are left in the cytoplasm
 - tRNA molecules disassemble
 - The allosteric site changes shape
 - The stop codon is reached
 - None of the above

21. Meselson and Stahl proposed which of the following ideas?
- DNA replication is conservative.
 - DNA replication is not conservative.
 - DNA replication is semi-conservative.
 - DNA replication follows Chargaff's rules.
 - None of the above
22. An organism that has the genotype AABbCCDd has how many possible allelic combinations?
- 4
 - 6
 - 8
 - 16
 - None of the above
23. Turner's syndrome is likely to result from which of the following?
- Nondisjunction
 - Translocation
 - Frame shift mutation
 - Insertion
 - None of the above
24. The neurohypophysis secretes which of the following molecules?
- Vasopressin
 - Glycogen
 - LH
 - Adrenaline
 - None of the above
25. What evidence supports evolution?
- Fossil record
 - Observed natural selection
 - DNA
 - None of the above
 - All of the above
26. Which **is not** a function of the nephrons?
- Na-H₂O balance
 - Body fluid pH
 - Removing waste products
 - Disrupting homeostasis
 - None of the above
27. Which of the following phyla does not have coelomates?
- Aschelminthes
 - Annelida
 - Arthropoda
 - Mollusca
 - None of the above

28. In what order is a Gram stain produced?
- Crystal violet → Ethanol → Iodine → Safranine
 - Safranine → Iodine → Crystal violet → Ethanol
 - Ethanol → Iodine → Safranine → Crystal violet
 - Crystal violet → Iodine → Ethanol → Safranine
 - None of the above
29. Which of the following plant families is most likely to have nodules?
- Apiaceae
 - Euphorbiaceae
 - Fabaceae
 - Lamiaceae
 - None of the above
30. Which of the following is not a domain?
- Archae
 - Bacteria
 - Eukarya
 - Protista
 - None of the above
31. What occurs when rods in the eye are exposed to light?
- Rhodopsin stabilizes
 - cis*-retinene is converted to *trans*-retinene
 - trans*-retinene is converted to *cis*-retinene
 - Opsin and retinene form Rhodopsin
 - None of the above
32. Lac Z, lac Y, and lac A respectively produce which of the following products?
- Permease, transacytelase, B-galactose
 - Transacytelase, B-galactose, permease
 - B-galactose, permease, transacytelase
 - Permease, B-galactose, transacytelase
 - None of the above
33. What is the developmental difference between B-cell and T-cell lymphocytes?
- B-cells mature in the thymus, whereas the T-cells mature in the hypothalamus.
 - B-cells mature in the thymus, whereas the T-cells mature in the bone marrow.
 - B-cells mature in the bone marrow, whereas the T-cells mature in the thymus.
 - B-cells mature in the bone marrow, whereas the T-cells mature in the thalamus.
 - None of the above
34. The correct order for nitrogen fixation is _____.
- Nitrogen → ammonia → nitrite → nitrate
 - Nitrogen → nitrate → nitrite → ammonia
 - Nitrate → nitrite → ammonia → nitrogen
 - Nitrite → ammonia → nitrogen → nitrate
 - None of the above

35. In what order are the following molecules needed to form a clot?
- Prothrombin + prothrombinase + calcium → thrombin
 - Thrombin + thrombinase + calcium → prothrombin
 - Prothrombin + prothrombinase → thrombin + ATP
 - Prothrombin + thrombinase + ATP → thrombin + calcium
 - None of the above
36. Which of the following is a primary consumer?
- Termite
 - Cattle
 - Koala
 - All of the above
 - None of the above
37. Which of the following refers to the sacs in which photosynthesis occurs?
- stroma
 - grana
 - thylakoid
 - Both **B** and **C**
 - Both **A** and **C**
38. In eukaryotes, where does transcription occur?
- In mitochondrial membranes
 - In the cytoplasm
 - In the nucleus
 - In the rough endoplasmic reticulum
 - None of the above
39. Which of the following protists are responsible for the red tides?
- Rhodophyta
 - Dinoflagellate
 - Chlamydomonas
 - Rotifer
 - None of the above
40. Organic evolution proposes that organisms obtain nutrition through _____.
- Primordial soup
 - Water
 - Sulfur
 - Nitrogen
 - None of the above

End of Test