

ADDIS ABABA CITY ADMINISTRATION EDUCATIONAL BUREAU

BIOLOGY MODEL EXAM FOR GRADE 12 (JANUARY, 2023)

TIME ALLOWED: 2 HOURS

GENERAL DIRECTIONS

THIS EXAM PAPER CONTAINS **BIOLOGY EXAMINATION**.

IN THIS EXAMINATION, THERE ARE A TOTAL OF **100 MULTIPLE CHOICE QUESTIONS**. CAREFULLY SELECT THE BEST ANSWER AND BLACKEN ONLY THE LETTER OF YOUR CHOICE ON THE SEPARATE ANSWER SHEET PROVIDED. FOLLOW THE INSTRUCTIONS ON THE ANSWER SHEET AND THE EXAMINATION PAPER CAREFULLY. USE ONLY **PENCIL** TO MARK YOUR ANSWERS. YOUR ANSWER MARK SHOULD BE **HEAVY AND DARK**, COVERING THE ANSWER SPACE COMPLETELY. PLEASE ERASE ALL UNNECESSARY MARKS COMPLETELY INCLUDING ANSWERS YOU HAVE CHANGED FROM YOUR ANSWER SHEET

YOU ARE ALLOWED TO WORK ON THE EXAM FOR **2 HOURS**. WHEN TIME IS CALLED, YOU MUST IMMEDIATELY STOP WORKING, PUT YOUR PENCIL DOWN, AND WAIT FOR FURTHER INSTRUCTIONS.

ANY FORM OF CHEATING OR AN ATTEMPT TO CHEAT IN THE EXAMINATION WILL RESULT IN AN AUTOMATIC DISMISSAL FROM THE EXAMINATION HALL AND CANCELLATION OF YOUR SCORE(S).

PLEASE MAKE SURE THAT YOU HAVE WRITTEN ALL THE REQUIRED INFORMATION ON THE ANSWER SHEET BEFORE YOU START TO WORK ON THE EXAMINATION.

DO NOT TURN THIS PAGE OVER UNTIL YOU ARE TOLD TO DO SO.

1. To be useful in science, a hypothesis must be:
 - A. measurable
 - B. testable
 - C. observable
 - D. correct
2. Which of the following statements about a controlled experiment is true?
 - A. All the variables must be kept the same
 - B. Only one variable is tested at a time
 - C. Everything can be studied by setting up a controlled experiment
 - D. Controlled experiments cannot be performed on living things
3. Which of the following is **NOT** true a polymer?
 - A. Lipid
 - B. Protein
 - C. Starch
 - D. Nucleic acid
4. The purpose of peer review in science is to ensure that
 - A. all scientific research is funded
 - B. the results of experiments are correct
 - C. all scientific results are published
 - D. published results meet standards set by the scientific community
5. The enzyme amylase can break glycoside linkages between glucose monomers only if the monomers are in the form. Which of the following could amylase break down?
 - A. Glycogen, starch, and amylopectin
 - B. Glycogen and cellulose
 - C. Cellulose, chitin, and starch
 - D. Starch, amylopectin and cellulose
6. If data from repeated experiments do not support the hypothesis, what is the scientist's next step?
 - A. Give up
 - B. repeat the experiment
 - C. revise the hypothesis
 - D. overturn the theory
7. A hypothesis that is supported many times become:
 - A. an experiment
 - B. a theory
 - C. a conclusion
 - D. an observation

8. Which of the following laboratory equipment is used to separate the organelles of the cell according to their density?
- A. Centrifuge
 - B. Measuring cylinder
 - C. Filter paper with fine pores
 - D. Incubator
9. Amino acids are the subunits of
- A. carbohydrates
 - B. nucleic acids
 - C. lipids
 - D. proteins
10. For which of the following is a theodolite used in biology education?
- A. Measuring the pH of water or soil
 - B. Recording position where the species is found
 - C. Measuring the height of trees
 - D. Measuring the rate of flow of water in a cell
11. Pitfall traps are used to catch
- A. small ground-dwelling animals
 - B. small birds in the forest
 - C. flying insects
 - D. damaged plants
12. Compared to most other substances, a great deal of heat is needed to raise the temperature of water by a given amount. This because water
- A. Readily forms solutions
 - B. has a high heat capacity
 - C. acts as a buffer
 - D. acid
13. The organic molecule tightly bound to the enzyme and required for the activity of enzyme is grouped as
- A. apoenzyme
 - B. activator
 - C. coenzyme
 - D. prosthetic group
14. Which of the following is an example of a qualitative data?
- A. The temperature decreased from 20⁰C to 15⁰C.
 - B. The plants height is 25 centimeters (cm).
 - C. The fish swam in a zigzag motion.
 - D. The six pairs of robins hatched an average of three chicks.

15. The single factor that can be altered in an experiment is the:
- A. control
 - B. hypothesis
 - C. dependent variable
 - D. independent variable
16. Which of the following is NOT an organic molecule found in living organisms?
- A. Protein
 - B. Sodium chloride
 - C. Nucleic acid
 - D. Lipid
17. A woman is homozygous for “A” blood type. A man has “AB” blood type. What is the probability that the couple’s child will have type B⁺ blood?
- A. 0%
 - B. 50%
 - C. 75%
 - D. 100%
18. Which joins amino acids together?
- A. Peptide bonds
 - B. Hydrogen bonds
 - C. Van der Waals forces
 - D. Ionic bonds
19. Which of the following is a hydrophobic material?
- A. Table salt
 - B. wax
 - C. Sugar
 - D. Pasta
20. Many mammals control their body temperature by sweating. Which property of water is most directly responsible for the ability of sweat to lower body temperature?
- A. Water’s change in density when it condenses
 - B. Water’s ability to dissolve molecules in the air.
 - C. The release of heat by the formation of hydrogen bonds
 - D. The absorption of heat by the breaking of hydrogen bonds
21. Which of the following categories includes all others in the list?
- A. Monosaccharide
 - B. Carbohydrate
 - C. Disaccharides
 - D. Polysaccharide
22. Which of the following statements concerning unsaturated fatty acids is true?
- A. They are more common in animals than in plants
 - B. They have double bonds in the carbon chains of their fatty acids
 - C. They generally solidify at room temperature
 - D. They contain more hydrogen than do saturated fats having the same number of carbon atoms

23. To ensure that a scientific work is free of bias and meet standards set by the scientific community, a research group's work is peer reviewed by
- A. anonymous scientific experts
 - B. the researchers friends
 - C. the general public
 - D. lawmakers
24. The structural level of a protein least affected by a disruption in hydrogen bonding is the
- A. primary level
 - B. tertiary level
 - C. secondary level
 - D. quaternary level
25. Compared to most other substances, a great deal of heat is needed to raise the temperature of water by a given amount. This is because water
- A. is an acid
 - B. readily forms solution
 - C. has a high heat capacity
 - D. acts as a buffer
26. When two amino acids bond
- A. a dipeptide is formed through a condensation reaction
 - B. water is taken in by the product
 - C. a triglyceride is formed
 - D. hydrolysis occurs
27. Which of the following is not a structural polysaccharide?
- A. Cellulose
 - B. Chitin
 - C. Ribose
 - D. Murein
28. An enzyme speeds up a reaction by
- A. lowering activation energy
 - B. raising the activation energy
 - C. releasing energy
 - D. absorbing energy
29. If an enzyme in solution is saturated with substrate, the most effective way to obtain a faster yield of products is to
- A. add more of the enzyme
 - B. add more substrate
 - C. heat the solution to 90°C
 - D. add an allosteric inhibitor
30. The rate of an enzyme catalyzed reaction becomes stable after some time due to
- A. increased temperature
 - B. increased pH
 - C. saturation of enzymes
 - D. accumulation of products

31. The nucleus includes all of the following structures EXCEPT
- A. cytoplasm
 - B. DNA
 - C. a nuclear membrane
 - D. a nucleolus
32. If an enzyme is added to a solution where its substrate and product are in equilibrium, what will occur?
- A. Additional product will be formed
 - B. Additional substrate will be formed
 - C. The reaction will change from endergonic to exergonic
 - D. Nothing; the reaction will stay at equilibrium
33. Most CO₂ from catabolism is released during
- A. Glycolysis
 - B. The citric acid cycle
 - C. electron transport
 - D. oxidative phosphorylation
34. An enzyme sucrase is an example of
- A. transferases
 - B. hydrolases
 - C. lyases
 - D. oxidoreductases
35. Which two elements are always found in amino acids?
- A. Nitrogen and sulfur
 - B. Sulfur and oxygen
 - C. Carbon and oxygen
 - D. Hydrogen and phosphorus
36. In an enzyme catalyzed reaction, addition of a certain substance to the reaction mixture decreases the reaction. The substance added must be
- A. substrate
 - B. coenzyme
 - C. enzyme
 - D. inhibitor
37. The elements or compounds that enter into a chemical reaction are called
- A. catalyst
 - B. substrate
 - C. product
 - D. active site
38. Which of the following cell types can be rich in lysosomes?
- A. Red blood cells
 - B. White blood cells
 - C. Phagocytic cells
 - D. Nerve cells
39. Cell membranes consists mainly of
- A. lipid bilayer
 - B. carbohydrates
 - C. protein pumps
 - D. Proteins

40. In a chemical reaction, a reactant binds to an enzyme at a region known as
- A. catalyst
 - B. substrate
 - C. product
 - D. active site
41. The nucleolus:
- A. produces and assembles the cell's ribosomes
 - B. stores genetic information
 - C. is the site where protein is synthesized
 - D. is the control center of the cell
42. The movement of water molecules across a selectively permeable membrane is known as
- A. exocytosis
 - B. Endocytosis
 - C. phagocytosis
 - D. osmosis
43. Some enzymes are metabolically active in hot springs because
- A. they are able to maintain a lower internal temperature
 - B. high temperatures make catalysis unnecessary
 - C. their enzymes have high optimal temperatures
 - D. their enzymes are completely insensitive to temperatures
44. Which of the following is an example of active transport?
- A. Facilitated diffusion
 - B. Diffusion
 - C. Osmosis
 - D. Endocytosis
45. The principal chemical compound that living things use to store energy is
- A. DNA
 - B. H₂O
 - C. ATP
 - D. CO₂
46. Most cells cannot harness heat to perform work because
- A. heat is not a form of energy
 - B. cells do not have much heat; they are relatively cool
 - C. temperature is usually uniform throughout a cell
 - D. heat can never be used to do work
47. Which of the following is common to plant and animal cells?
- A. Chloroplast
 - B. Central vacuole
 - C. Centriole
 - D. Mitochondria

- AACAEB, MODEL EXAM 2015E.C/2023G.C

56. Which of the following processes includes all others?
- A. Osmosis
 - B. Diffusion of a solute across a membrane
 - C. Facilitated diffusion
 - D. Passive transport
57. In addition to light and chlorophyll, photosynthesis requires
- A. water and oxygen
 - B. water and sugars
 - C. oxygen and carbon dioxide
 - D. water and carbon dioxide
58. The first process in light-dependent reactions of photosynthesis is
- A. light absorption
 - B. electron transport
 - C. oxygen production
 - D. ATP formation
59. CAM plants are specialized to survive under what conditions that would harm most other kinds of plants?
- A. Low temperature
 - B. Excess water
 - C. Hot, dry conditions
 - D. Long day lengths
60. In a typical plant, all of the following factors are necessary for photosynthesis EXCEPT
- A. chlorophyll
 - B. oxygen
 - C. light
 - D. water
61. The net gain of energy from glycolysis is
- A. 4 ATP molecules
 - B. 8ADP molecules
 - C. 2 ATP molecules
 - D. 3 pyruvic acid molecules
62. The Krebs cycle takes place within the:
- A. chloroplast
 - B. mitochondria
 - C. nucleus
 - D. cytoplasm
63. Suppose 1000 pea plants are produced from Tt and tt crosses, how many of them are expected to be tall?
- A. 750
 - B. 500
 - C. 50
 - D. 250
64. The process carried out by yeast that causes bread dough to rise is
- A. alcoholic fermentation
 - B. oxygen debt
 - C. cellular respiration
 - D. the Krebs cycle

65. During the Krebs cycle:
- A. hydrogen ions and oxygen form water
 - B. the cell releases small amount of energy through fermentation
 - C. each glucose molecule is broken down into two molecules of pyruvic acid
 - D. Acetyl is broken down into carbon dioxide in a series of molecules
66. The molecular formula for glucose is $C_6H_{12}O_6$. What would be the molecular formula for a polymer made by linking ten glucose molecules together by dehydration reaction?
- A. $C_{60}H_{120}O_{60}$
 - B. $C_{60}H_{102}O_{51}$
 - C. $C_6H_{12}O_6$
 - D. $C_{60}H_{111}O_{51}$
67. The light reactions of photosynthesis supply the Calvin cycle with
- A. light energy
 - B. water and NADPH
 - C. CO_2 and ATP
 - D. ATP and NADPH
68. Which metabolic pathway is common to both fermentation and cellular respiration of a glucose molecule?
- A. The citric acid cycle
 - B. The electron transport chain
 - C. Glycolysis
 - D. Synthesis of acetyl CoA from pyruvate
69. Some bacteria, when faced with unfavorable environmental conditions, produce structures called:
- A. pili
 - B. endospores
 - C. capsules
 - D. toxins
70. During a lytic cycle, after a virus enters the cell, the virus _____ .
- A. forms a provirus
 - B. becomes inactive
 - C. replicates
 - D. dies
71. _____ is never a part of a virus.
- A. nucleic acid
 - B. protein coat
 - C. viral envelope
 - D. cell wall

72. What does reverse transcriptase do?
- A. It synthesizes protein from RNA
 - B. It synthesizes DNA from RNA
 - C. It synthesizes protein from amino acids
 - D. It synthesizes RNA from DNA
73. Which of the following descriptions applies to most protists?
- A. Unicellular prokaryotes
 - B. Unicellular eukaryotes
 - C. Multicellular prokaryotes
 - D. Multicellular eukaryotes
74. Which illness is caused by a bacterium?
- A. AIDS
 - B. Diphtheria
 - C. Polio
 - D. Common cold
75. What is a capsid?
- A. Viral DNA that inserts into a host's DNA
 - B. A type plant virus
 - C. A protein coat surrounding a virus
 - D. A rod-shaped bacterium
76. What characteristics do viruses share with all living organisms?
- A. Respiration
 - B. Replication
 - C. Metabolism
 - D. Movement
77. Producers in aquatic food chains include
- A. protozoa
 - B. slime molds
 - C. algae
 - D. amoeba
78. Most fungi function as _____ in their environment
- A. consumers
 - B. decomposers
 - C. producers
 - D. autotrophs
79. Cell walls of fungi contain:
- A. cellulose
 - B. hyphae
 - C. spores
 - D. chitin
80. If a cell has 12 chromosomes, how many chromosomes will each of its daughter cells have after mitosis and cytokinesis?
- A. 4
 - B. 6
 - C. 12
 - D. 24

81. The feeding relationships among the species in a community determine the community's:
- A. secondary succession
 - B. species richness
 - C. ecological niche
 - D. trophic structure
82. Which method is NOT used to protect food against microorganisms?
- A. Heating
 - B. Sterilization
 - C. Freezing
 - D. vaccination
83. The electron transport chain uses the high-energy electrons from the Krebs cycle to
- A. Produce glucose
 - B. Move H^+ ions across the inner mitochondrial membrane
 - C. Covert acetyl-CoA to citric acid
 - D. Convert glucose to pyruvic acid
84. Prokaryotic cells that have a spherical shape are:
- A. cocci
 - B. spirilli
 - C. bacilli
 - D. methanogens
85. Which of the following organisms is **incorrectly** paired with its trophic level?
- A. Cyanbacterium — primary producer
 - B. Grasshopper — primary consumer
 - C. Zooplankton — primary producer
 - D. Fungus — detritivore
86. The water in an estuary is:
- A. salt water only
 - B. poor in nutrients
 - C. fresh water only
 - D. a mixture of fresh water and salt water
87. An increase in the greenhouse effect causes an increase in
- A. Carbon dioxide
 - B. Oxygen
 - C. Temperature
 - D. Water
88. Permafrost characterizes the biome called:
- A. taiga
 - B. savanna
 - C. boreal forest
 - D. tundra

89. The maximum number of organisms of a particular species that can be supported by an environment is called
- A. Logistic growth
 - B. Exponential growth
 - C. Carrying capacity
 - D. Population density
90. The demographic transition is considered complete when
- A. Population growth stops
 - B. The birth rate is greater than death rate
 - C. The death rate begins to fall
 - D. The death rate is greater than the birth rate
91. In the presence of unlimited resources and in the absence of disease and predation, what would probably happen to a bacterial population?
- A. Logistic growth
 - B. Endangerment
 - C. Exponential growth
 - D. Extinction
92. If the number of female population is greater than the male population in a given country, its human population tends to:
- A. disappear
 - B. increase
 - C. decrease
 - D. remain constant
93. Which of the following aquatic biomes have many strata like that of equatorial rain forest?
- A. Wetland
 - B. Estuarine
 - C. Pelagic zone
 - D. Coral reef
94. A plant has a genotype AaBb. If there is no linkage of genes, the gametes it produces are:
- A. AB and ab
 - B. AA, aa, BB, and Bb
 - C. Aa and Bb
 - D. AB, Ab, aB, and ab
95. Fresh water biome includes:
- A. ponds, lakes, rivers and wetlands
 - B. estuaries, ponds, lakes, and rivers
 - C. wetlands, estuaries and rivers
 - D. pelagic zone, wetlands, and estuaries

96. Before DNA could definitely be shown to be genetic material in cells, scientists had to show that it could:
- A. tolerate high temperature
 - B. carry and make copies of information
 - C. be taken down into small sub units
 - D. be modified in response to environmental conditions
97. A limiting factor that depends on a population size is called:
- A. density-dependent limiting factor
 - C. density-independent limiting factor
 - B. predator-prey relationship
 - D. parasitic relationship
98. Two parents of genotype Aa are cross-bred. The alleles show complete dominance. What proportion of the offspring will genotypically look like their parents?
- A. 1/2
 - B. 3/4
 - C. 1/4
 - D. 2/3
99. Tropical rain forest is characterized by
- A. low precipitation and low temperature
 - B. low precipitation and high temperature
 - C. high precipitation and low temperature
 - D. high precipitation and high temperature
100. Group of different species that live together in a defined area make up a (an):
- A. population
 - C. community
 - B. ecosystem
 - D. biosphere