

**ADDIS ABABA CITY ADMINISTRATION EDUCATION BUREAU**  
**ADDIS ABEBA**  
**GRADE 12 BIOLOGY MODEL EXAMINATIONS**  
**GINBOT 2013/MAY 2021**

**NUMBER OF QUESTIONS: 100**

**TIME ALLOWED:- 2 HOURS**

**GENERAL DIRECTIONS**

THIS BOOKLET 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 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 UNTIL YOU ARE TOLD TO DO SO.**

**DIRECTION: Each of the following questions is followed by four possible alternatives. Read each question carefully and BLACKEN the letter of your choice on the answer sheet provided.**

- Grade 12 students' wants to learn more about the feeding habits of ants. What steps should students take to best study the feeding patterns of ants?
  - Form a hypothesis, conduct an experiment, record data, make a conclusion
  - Conduct an experiment, form a hypothesis, make a conclusion, record data
  - Form a hypothesis, record data, conduct an experiment, make a conclusion
  - Record data, form a hypothesis, make a conclusion, conduct an experiment
- Mekdes grows the same bacteria in 20 petri dishes. She places 10 of the dishes in a container with a normal atmosphere. The remaining dishes she places in a container in which the oxygen level is double the normal level. She labels the first group "A" and the second group "B." Which statement best describes the groups?
  - Group A is the control group; Group B is the experimental group.
  - Group A is the experimental group; Group B is the control group.
  - Group A is the variable; Group B is the observation.
  - Group A is the theoretical group; Group B is the hypothetical group
- For an experiment, a scientist put lime at the base of tomato plant A and baking soda at the base of tomato plant B. She then sealed the plants in plastic bags. Tomato plant A eventually died, and tomato plant B stayed healthy. What was the dependent variable in this experiment?

A. A type of plant grown for the test	C. Response of the plants to each substance
B. Substance at the base of each plant	D. Plastic bags wrapped around each plant
- How do you check whether the data supports the hypothesis?

A. Analyze the data	C. Modify the experiment
B. Predict the outcome	D. Design the experiment
- When planning a scientific investigation, what is the first thing scientists do?

A. Conduct the experiment	C. Plan the experiment
B. State the hypothesis	D. Research the problem
- A student hypothesized that the amount of sunlight a sunflower plant receives determines the number of sunflower seeds the plant produces. In her experiment, the amount of sun light is the

A. independent variable.	C. dependent variable.
B. controlled variable.	D. uncontrolled variable.
- Which property of water keeps the bottoms of lakes and the life there being frozen top to down during cold winters in the temperate region?

A. its highest density at 4 <sup>0</sup> C	C. its high boiling point
B. Its high heat of vaporization	D. its high surface tension

8. An investigator is interested in seeing how tall a certain species of plant will grow if it is kept under red light for a month. What would be valid hypothesis for this experiment?
- If the light is red, then the plant will grow.
  - If the investigator uses pea plants, then there will be a lot of growth.
  - If plants are grown under different colored lights, they will grow different heights.
  - If a month passes, then the plant will grow under the red light.
9. Which of the following properties of water makes sweat an effective body cooler?
- High surface tension
  - High specific heat
  - Low density when frozen
  - High heat of vaporization
10. How many water molecules are formed when 200 monosaccharides joined to form a polysaccharide?
- 199
  - 200
  - 198
  - 197
11. In which of the following compound are both members of the pair are polymers of carbohydrates that are naturally occurring in plant?
- Starch and chitin
  - Glycogen and cellulose
  - Starch and cellulose
  - Glycogen and chitin
12. Phospholipids form bilayers in water because:
- the hydrophilic head is repelled by the water and the hydrophobic tail is attracted by it
  - the hydrophilic head is attracted by the water and the hydrophobic tail is repelled by it
  - both the hydrophilic head and the hydrophobic tail are attracted by the water
  - both the hydrophilic head and the hydrophobic tail are repelled by the water
13. Which of the following group is a functional group of fatty acids?
- A keton group
  - An amino group
  - An aldehyde group
  - A carboxyl group
14. Which of the following is formed by condensation of monosaccharides or hydrolysis of polysaccharides?
- Glucose
  - Glycogen
  - Starch
  - disaccharides
15. What make unsaturated fatty acid differ from saturated fatty acid?
- The presence of long chain of carbon
  - The presence of one or more double bond
  - The presence of large number of Hydrogen atom
  - There occurrence as solid at room temperature
16. What stabilize primary structure of protein?
- Ionic bonding
  - Hydrogen bonding
  - Disulphide Bridge
  - Peptide bond
17. What are the enzymes used to remove hair in tanning industries and process fruit juice
- Protease and Pectinase
  - Invertase and protease
  - Amylase and invertase
  - Lipase and amylase

18. Structurally lipids are very diverse group but they are all placed in one group because of what property?
- They are composed of glycerol and fatty acids
  - They are important as energy storage
  - They contain four interlocking rings
  - Insoluble in polar solvent like water
19. Sucrase has an optimum temperature of 37 C and an optimum pH of 6.2. What would happen if the pH changed to 3?
- Sucrase would continue to work the same
  - The reaction sucrase catalyzes would speed up
  - The reaction sucrase catalyzes would slow down
  - The activation energy of the reaction decrease
20. The main reason why rate of enzyme action increases with temperature initially is...
- The kinetic energy of enzymes and substrates increases
  - Time passing, allowing more collisions to occur
  - The enzymes become denatured
  - More substrate is produced, therefore the enzymes become saturated
21. Which of the statements regarding enzymes is false?
- Enzymes are proteins that function as catalysts.
  - Enzymes are specific in their action
  - Enzymes increase the activation energy of a reaction.
  - Enzymes may be used many times for a specific reaction.
22. The transition state of a catalyzed reaction is
- a highly-populated intermediate on the reaction pathway.
  - higher in energy than that of an uncatalyzed reaction.
  - lower in energy than that of an uncatalyzed reaction.
  - lower in energy than the reaction substrate.
23. Enzyme A digests proteins in the stomach (with a pH of 2). Enzyme B digests proteins in the small intestine (with pH of 8). Which of the following is NOT true:
- Enzyme A would be denatured in the small intestine.
  - Enzyme A works best in acidic conditions.
  - Enzyme A can also work in the small intestine.
  - Enzyme A helps in the hydrolysis of proteins
24. If piece of boiled potato is placed in a test tube containing hydrogen peroxide solution, no reaction observed. This is because boiling
- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>Removes necessary enzymes</li> <li>Changes the PH inside cells</li> </ol> | <ol style="list-style-type: none"> <li>Kills the cell</li> <li>Denatures enzymes</li> </ol> |
|--|---|

25. In which of the following point does lock-and- key model of enzyme action differ from induce fit model
- Enzyme lower energy of activation
  - Substrate bind at the active site of enzymes
  - During the reaction, enzyme substrate complex is formed
  - The substrate molecule and the active site are complementary
26. Which of the following mechanisms do cell use to regulate enzyme catalyse reactions in metabolic pathway
- Enzyme denaturation
  - End product inhibition
  - Irreversible inhibition
  - Competitive inhibition
27. Which type of enzyme inhibition its effect is reversed by increasing substrate concentration?
- Allosteric inhibition
  - Competitive inhibition
  - Non-competitive inhibition
  - End product inhibition
28. Enzyme are able to lower the activation energy of a chemical reaction by
- increasing the kinetic energy of a substrate molecules
  - decreasing the kinetic energy of a substrate molecules
  - creating tension on the covalent bond of substrate molecules
  - increasing the temperature of the reaction medium
29. Transverse diffusion ( **flip-flop**) in plasma membrane is the movement of
- Cholesterol
  - Protein
  - Amino acid
  - Phospholipid
30. The role of carbohydrate in cell membrane is
- cell adhesion.
  - assisting transport .
  - cell to cell recognition.
  - cell storage reserve.
31. Which of the following would be **MOST** directly affected if the mitochondria in a cell were **NOT** functioning properly?
- Absorption of fatty acid by the cell
  - The accumulation of sugar by the cell
  - Movement of water into and out of the cell
  - Movement of oxygen across the cell membrane
32. A carrier molecule in a cell membrane is a molecule
- moves in and out of a membrane through a pore
  - dissolves part of the membrane so that can get through
  - moves substance through the membrane by interacting with them
  - reacts with substance and propel the products through a membrane
33. The fluid mosaic model describes membrane as having
- A set of protein channel by phospholipid
  - A bilayer of phospholipid in which specialized protein embedded
  - A sugar phosphate back bone that that interconnects specific transport molecule
  - Two sheet of protein with a layer of phospholipids sandwich between them

34. At which stage most of the carbon dioxide released during aerobic respiration
- |                 |                       |
|-----------------|-----------------------|
| A. Glycolysis   | C. Electron transport |
| B. Chemiosmosis | D. Krebs cycle        |
35. In structural arrangement of cell membrane, the organic molecules which serves as the structural backbone and prevent uncontrolled movement of water soluble material are
- |                  |                       |
|------------------|-----------------------|
| A. Lipid bilayer | C. Carbohydrate       |
| B. Cholesterol   | D. Peripheral protein |
36. Which of the following processes would be the first affected by the lack of oxygen in a cell?
- |                     |                          |
|---------------------|--------------------------|
| A. Osmosis          | C. Diffusion             |
| B. Active transport | D. Facilitated diffusion |
37. Biological membranes are normally permeable to which substance using simple diffusion?
- |                                  |                                  |
|----------------------------------|----------------------------------|
| A. Large, hydrophilic molecules. | C. Small, hydrophilic molecules. |
| B. Large, hydrophobic molecules. | D. Small, hydrophobic molecules  |
38. What is the function of cholesterol within membranes functions through its interactions with both hydrophobic and hydrophilic parts of phospholipids?
- |                           |                    |
|---------------------------|--------------------|
| A. Water blocker          | C. pH buffer       |
| B. Temperature controller | D. Fluidity buffer |
39. What is meant by the term “fluid mosaic model”?
- It is the diffusion of lipid-soluble substances through the lipid bilayer.
  - It is the movement of lipids and integral proteins within the lipid bilayer.
  - It is the method of substance transport across the membrane.
  - It is the movement of surface proteins through the membrane.
40. The organelle of cell which is concerned with the synthesis of lipids in addition to being associated with carbohydrate metabolism?
- |                       |                                 |
|-----------------------|---------------------------------|
| A. Golgi Apparatus    | C. Rough endoplasmic reticulum  |
| B. Thylakoid membrane | D. Smooth endoplasmic reticulum |
41. Which one of the following products is formed in anaerobic respiration of one molecule of glucose in animal cell?
- |                                       |                                       |
|---------------------------------------|---------------------------------------|
| A. 2Ethanol, 2NAD <sup>+</sup> , 2ATP | C. 2Lactate, 2NAD <sup>+</sup> , 2ATP |
| B. 2Lactate, 2CO <sub>2</sub> , 2ATP  | D. 2 Ethanol, 2CO <sub>2</sub> , 2ATP |
42. If there is no free oxygen to breath, which one of the following steps of cellular respiration process can operates?
- |                  |                             |
|------------------|-----------------------------|
| A. Glycolysis    | C. Krebs cycle              |
| B. Link reaction | D. Electron transport chain |
43. Identify the correct statement about the role of NAD and FAD during aerobic respiration. They
- oxidise intermediate products of cellular respiration
  - are electron carriers that pump proton into inner membrane space
  - are terminal electron acceptors of electron transport chain
  - carry hydrogen atoms that will be split into proton and electron

44. The main advantage of C4 photosynthesis to prevent:
- |                   |                     |
|-------------------|---------------------|
| A. Transpiration  | C. Photorespiration |
| B. Photosynthesis | D. Transduction     |
45. What happen during electron transport chain? Protons
- Diffuse down concentration gradient to reduce NAD.
  - Build up in the Intermembrane space than matrix
  - Diffuse against concentration gradient through ATP synthesis
  - Build up in the matrix than the Intermembrane space
46. One of the following groups of plants carry out light dependent and light independent reaction of photosynthesis in separate cells of the leaf?
- |               |                    |
|---------------|--------------------|
| A. C-4 plants | C. Temperate plant |
| B. C-3 plants | D. CAM             |
47. Which of the following is supplied to the Calvin Cycle by the light reactions of photosynthesis
- |                            |                             |
|----------------------------|-----------------------------|
| A. CO <sub>2</sub> and ATP | C. ATP and NADPH            |
| B. ATP and NADH            | D. H <sub>2</sub> O and ATP |
48. A green plant is kept in a brightly lighted area for 48 hours. What will most likely occur if the light intensity is then reduced slightly during the next 48 hours?
- The rate at which nitrogen is used by the plant will increase.
  - Photosynthesis will stop completely.
  - The rate at which oxygen is released from the plant will decrease.
  - Glucose production inside each plant cell will increase.
49. Plants that follow CAM photosynthesis pathway carryout the two stages of photosynthesis at different times. Which of the following products are formed during the night?
- |                              |                            |
|------------------------------|----------------------------|
| A. ATP and NADPH             | C. Malate and sugar        |
| B. CO <sub>2</sub> and sugar | D. Oxaloacetate and malate |
50. During photosynthesis, which of the following acts as a reservoir for hydrogen ions?
- |                    |           |
|--------------------|-----------|
| A. Cristae         | C. Stroma |
| B. Thylakoid space | D. Matrix |
51. All of the following are gram negative bacteria differ from gram positive **except one**?
- |  |                                     |
|--|-------------------------------------|
| A. Have extra membrane outside cell wall | C. Produce more dangerous endotoxin |
| B. More resistant to antibiotic          | D. Have thick peptidoglycan         |
52. What is the enzyme plays vital role in HIV life cycle by chopping up long strands of protein into small pieces, which are used to construct a matured viral core?
- |              |                          |
|--------------|--------------------------|
| A. Integrase | C. Protease              |
| B. Ligase    | D. Reverse transcriptase |
53. In HIV replication reverse transcriptase responsible for
- assembly of viral parts
  - conversion of viral RNA to DNA
  - binding of HIV with the host cell
  - integration of Viral DNA into the host DNA

54. Which of the following happens during integration of virus in host cell?
- The virus takes over the host cell machinery
  - The viral DNA enters the host cell
  - The Viral DNA is inserted into the host cell DNA
  - The virus attaches to a host cell receptors
55. Which one of the following processes in carbon cycle carried out by all living things that add CO<sub>2</sub> to the air?
- Respiration
  - Combustion
  - Photosynthesis
  - Fossilization
56. Which of the following is **not** true about climax community?
- Has wide diversity of species
  - It is a final stable community
  - Colonise by pioneer population
  - The vegetation tolerant the environment
57. Which one of the following bacteria in sulphur cycle releasing hydrogen sulphide from dead bodies of organisms?
- Thiobacillus
  - Nitrobacter
  - Rhizobium
  - Desulphovibrio
58. One of the following statements **wrong** about an ecological succession as it passes from pioneer to climax community?
- Total biomass of the community increases
  - The number of ecological niches reduce
  - Food webs become more complex.
  - The community becomes more stable
59. Which one of the following in primary succession are extremely resilient organisms that able to colonise harsh environments and reproduce?
- Herbs
  - Shrubs
  - Lichens
  - Climax forest
60. What is the growth pattern in which a population growth rate slows or stops following a period of exponential growth?
- Logistic growth
  - Density dependent
  - Arithmetic growth
  - J shaped growth
61. In what stage in the demographic transition theory does death rate fall while birthrate remains high leading to rapid population growth?
- Pre-industrial stage
  - Mature industrial stage
  - Mechanization of urbanization
  - postindustrial stage
62. In addition to nitrogen fixing bacteria what other process will convert atmospheric nitrogen into a form of plant use?
- Burning fossil fuel
  - Precipitation
  - Lightening
  - photosynthesis
63. The final stable community in an ecological succession is called the
- final community
  - climax community
  - ultimate community
  - serial community



64. Which of the following process moves carbon stored in fossil fuel into the air?
- The denitrifying bacteria turns the fossil fuel into carbon dioxide,
  - Decomposer convert the fossil fuel into carbon dioxide
  - The fossil fuel reacts with the soil to produce carbonates and carbon dioxide
  - When fossil fuels are burned, carbon entered the atmosphere as carbon dioxide.
65. Growing legumes such as alfalfa or soy beans increase
- denitrification
  - ammonification
  - nitrogen fixation
  - nitrification
66. Which type of biome is characterized by dry hot summer and rainy cool winter?
- Thorn forest
  - Rain forest
  - Mountain forest
  - Deciduous forest
67. In demography transition, which one is the characteristic of postindustrial stage?
- High birthrate and death rate
  - Rapid increase in population
  - High population growth
  - Low birth rate and death rate
68. The most important result meiosis is the
- Production of four diploid gamete
  - Production of somatic cell
  - Production of haploid chromosome
  - Doubling of chromosome number in each cell
69. What is the relationship among DNA, a gene, and a chromosome?
- A chromosome contains hundreds of genes, which are composed of DNA.
  - A chromosome contains hundreds of genes, which are composed of protein.
  - A gene contains hundreds of chromosomes, which are composed of protein.
  - A gene is composed of DNA, but there is no relationship to a chromosome.
70. Human beings have diploid cells. What is indicated by this statement? human have
- homologous chromosome pair
  - both sex and somatic chromosome
  - two stage of cell division
  - two chromosome in each cell division
71. DNA fingerprinting recognizes the differences in
- satellite DNA
  - repetitive DNA
  - bulk DNA
  - code DNA
72. The fragments of DNA are joined together by which of the following enzymes?
- Endonuclease
  - DNA polymerase
  - Ligase
  - Helicase
73. If gene frequency between genes a and c is 2%; b and c is 13%; b and d 4%; a and b 15%; c and d 17 and a and d 19%. The sequence of genes in a chromosome is
- a,d,b,c
  - d,b,a,c
  - a,b,c,d
  - a,c,b,d
74. Red-green color blindness is a sex-linked recessive trait in humans. Two people with normal color vision have a color-blind son. What are the genotypes of the parents?
- $X^B X^B$  and  $X^{bY}$
  - $X^B X^B$  and  $X^{bY}$
  - $X^B X^b$  and  $X^B Y$
  - $X^B X^B$  and  $X^B Y$

75. here is good evidence for linkage when
- two genes occur together in the same gamete.
  - a gene is associated with a specific phenotype.
  - two genes work together to control a specific characteristic.
  - genes do not segregate independently during meiosis
76. Why mutations are considered important in evolution?
- They are usually related to the environment
  - They contribute to new variations in organisms
  - they become causes for species migration
  - they are always beneficial to the organism
77. The replacement glutamic acid by valine at specific position in the beta chain of hemoglobin leads to sickle cell anemia. This change represents which of the following mutational events
- DNA base pair addition
  - DNA base pair deletion
  - DNA base pair substitution
  - Chromosomal deletion
78. Which of the Following terms refers to the failure of sister chromatids to separate from one another during anaphase?
- Non-disjunction
  - Deletion
  - Replication
  - Double inversion
79. Which of the following features is **NOT** true about Klinefelter syndrome individuals (XXY)?
- Reduced facial and body hair
  - Infertile but have enlarged breast
  - Complete masculinized features
  - Broader hip compare to other boys
80. Genetic code translated the language of
- Amino acid into that of RNA
  - RNA into that of DNA
  - Protein into that of RNA
  - RNA into that of proteins
81. The following diagram shows a fragment of transcribed DNA, and the upper strand is the sense strand.
- 5' ATTGCC 3'  
3' TAACGG 5'
- The transcribed mRNA can be represented by:
- 3' UAACGG 5'
  - 5' AUUGCC 3'
  - 5' TAACGG 3'
  - 5' GGCAAU 3'
82. To which primates human are most distantly related?
- Bonobo
  - Gorilla
  - Orangutan
  - Chimpanzee
83. Which one of the following is relatively equal brain size to human?
- Home ergaster*
  - Homo erectus*
  - Homo neanderthalensis*
  - Homo habilis*
84. Theory of origin of life on Earth that states life has always existed in the Universe and always will
- Cosmozoan theory
  - Biochemical origin
  - Eternity of life
  - Special creation

85. Type of evolution that results in totally unrelated species evolving similar structures as a result of occupying similar niches
- A. Convergent  
B. Sympatric  
C. Allopatric  
D. Divergent
86. Process by which one species evolves into many to fill available niches
- A. Stabilizing selection  
B. Directional selection  
C. Adaptive radiation  
D. convergent evolution
87. One of the following is the result of convergent evolution?
- A. Finches on the Galapagos Islands  
B. Pentadactyl limbs of mammals  
C. The wing of bird and bat  
D. The forelimb of mammals.
88. Which of the following theories explains evolutionary changes of living things in terms of changes in their allele frequency?
- A. Darwin's natural selection  
B. Spontaneous generation  
C. Inheritance of acquired character  
D. Neo Darwinism
89. The evolutionary theory proposed by Charles Darwin was:
- A. Change in populations through time as a result of mutations  
B. The passing on of genes from one generation to the next  
C. Change in populations through time as a response to environmental change  
D. The development of characteristics by organisms in response to need
90. What is the type of selection that the longer beak finch are able to obtain insects out of trees bark than the average length beak finches and may not able to crush seed effective as that of shorter beak finches do.
- A. Disruptive  
B. Directional  
C. Stabilizing  
D. Sympatric
91. Stanley Miller performed an experiment to prove origin of life they took gas ammonia and hydrogen along with
- A.  $N_2$  and  $H_2O$   
B.  $CH_4$  and  $N_2$   
C.  $H_2O$  and  $CH_4$   
D.  $CO_2$  and  $NH_3$
92. In which of the following conclusion can be drawn from the structural similarity observed between the flipper of whales and the arm of human?
- A. The human species begin life in the ocean  
B. Whales have evolved from early humans that went back to ocean  
C. Whale are older than human species  
D. The human species and whale have common ancestor
93. From which species Lucy belongs
- A. *Australopithecus africanus*.  
B. *Australopithecus anamnesis*.  
C. *Australopithecus afarensis*  
D. *Ardipithecus ramidus*
94. Suppose a fossil initially contains 100,000 atoms of a certain radioactive elements whose half-life is 10,000 years, after how many years would the number of atoms be 12500?
- A. 10,000 years  
B. 30,000 years  
C. 20,000 years  
D. 40,000 years

