

Addis Ababa City Government Yeka Subcity 2013 Biology Model Exam for Grade 12

Direction: Each of the following questions is followed by four possible alternatives.

Read each question and carefully blacken only the letter of your choice on the separate answer sheet provided

1. One of the following is **NOT** the relevance and promise of biological science

- | | |
|--------------------|----------------|
| A. Food production | C. Medicine |
| B. Agriculture | D. Engineering |

2. Which of the following structures is missing in a prokaryotic cell?

- | | |
|--------------------|---------------------|
| A. Cytoplasm | C. Nuclear membrane |
| B. plasma membrane | D. Ribosome |

3. Among the elements listed below select the one that is **NOT** found in carbohydrates

- | | |
|-------------|-----------|
| A. Hydrogen | C. Carbon |
| B. Nitrogen | D. Oxygen |

4. Which of the following are absent in prokaryotic cells?

- | | |
|----------------|--------------|
| A. Ribosomes | C. DNA |
| B. chromosomes | D. Cytoplasm |

5. Which of the following is evolved into the endoplasmic reticulum of eukaryotic cells?

- | | |
|------------------------------------|--|
| A. photosynthetic prokaryotic cell | C. Ribosome |
| B. Respiring prokaryotic cell | D. plasma membrane of prokaryotic cell |

6. Which one of the following organelles of the cells is involved in the energy release of eukaryotic cells?

- | | |
|--------------------------|------------------|
| A. Chloroplast | C. Nucleus |
| B. Endoplasmic reticulum | D. Mitochondrion |

7. Which of the following is **NOT** a carbohydrate?

- | | |
|----------------|-------------|
| A. Cholesterol | C. Starch |
| B. Cellulose | D. Glycogen |

8. All fatty acids contain

A. nitrogen

C. phosphorus

B. a carboxyl group

D. an amino group

9. The type of bond formed between the glycerol and fatty acids to form a triglyceride molecule is called

A. a hydrogen bond

C. an ester bond

B. glycosidic bond

D. a peptide bond

10. An organelle that contains digestive enzymes that break down cellular waste and debris is

A. Endoplasmic reticulum

C. Lysosome

B. Ribosome

D. Golgi apparatus

11. In microscopic measurements a micrometer is equal to

A. 10000 mm

C. 1/10000 mm

B. 1000 mm

D. 1/1000 mm

12. Which of these groups contains a carboxyl functional groups?

A. $\text{R}-\text{C}-\text{H}$

C. $\text{R}-\text{N}-\text{H}$

$\text{O} \parallel$

$\text{H} \parallel$

B. $\text{R}-\text{OH}$

D. $\text{R}-\text{C}-\text{OH}$

$\parallel \text{O}$

13. A compound with the chemical formula $\text{C}_5\text{H}_{11}\text{COOH}$ would be classified as

A. a fatty acid

C. an amino acid

B. a nucleic acid

D. a glycerol

14. Which of the following eukaryotic organelles are believed to have been originated through endosymbiosis?

A. Nucleus and ribosome

C. Nucleus and cytoplasm

B. Endoplasmic reticulum and lysosome

D. Mitochondria and chloroplast

15. The induced fit model proposed that

- A. an enzyme has a particular shape into which the substrate fits exactly
- B. the shape of the substrate is complementary to the active site
- C. the active site and the substrate are not exactly complementary in shape
- D. the intermediate product reduces the activation energy

16. According to the fluid mosaic model of the membrane the

- A. proteins are dispersed and inserted into the phospholipid bilayer
- B. the proteins are sandwiched between the phospholipid bilayer
- C. the non-polar tails are faced towards the water and the polar heads are faced away from the water when the phospholipids are placed in water
- D. the phospholipid bilayer is sandwiched between two layers of globular proteins

17. Which of the following models of material transport across the cell membrane is **NOT** governed by the concentration gradient of the transported material?

- | | |
|--------------------------|---------------------|
| A. Facilitated diffusion | C. Simple diffusion |
| B. Active transport | D. osmosis |

18. Which of the following are the protein and the non-protein parts of enzymes respectively?

- | | |
|-----------------------------|------------------------------|
| A. Apoenzymes and coenzymes | C. Coenzymes and cofactors |
| B. Cofactors and apoenzymes | D. Cofactors and holoenzymes |

19. The structure of the cell membrane was best explained by

- | | |
|--------------------------|-------------------------|
| A. Davson and Danielli | C. Singer and Nicholson |
| B. Schleiden and Schwann | D. Watson and Crick |

20. The field tools used to collect and study insects are

- | | |
|------------------|----------------|
| A. Pitfall traps | C. Sweep nets |
| B. Quadrats | D. Theodolites |

21. The functional group of a fatty acid molecule is

- A. a ketone group
- B. a carboxyl group
- C. an aldehyde group
- D. an amino group

22. One of the following is **NOT** the living component of a cell.

- A. Cytoplasm
- B. cell membrane
- C. Cell wall
- D. Nucleus

23. Which of the following is the structural component of a fungal cell wall?

- A. Cellulose
- B. Glycogen
- C. Peptidoglycan
- D. Chitin

24. Which of the following is an inorganic compound?

- A. CH_3OOH
- B. $\text{C}_6\text{H}_{12}\text{O}_6$
- C. CO_2
- D. $\text{C}_5\text{H}_{11}\text{O}_5$

25. RNA differs from DNA in that it

- A. is much larger
- B. is stable
- C. replicates itself
- D. is single stranded

26. Which chemical process is involved in the synthesis of polymers?

- A. Condensation
- B. Hydrolysis
- C. Dehydrogenation
- D. Hydrogenation

27. What is the theory that states that living things originate from non-living things?

- A. Biogenesis theory
- B. Germ theory
- C. Spontaneous generation
- D. Endosymbiont theory

28. Which organic molecules of the body are used as antigens and antibodies of the immune system?

- A. Nucleic acids
- B. Proteins
- C. Carbohydrates
- D. Lipids

29. Which molecules of the plasma membrane are used for the cell signaling and cell recognition?

- A. Peripheral proteins
- B. Integral proteins
- C. Carrier proteins
- D. Glycoproteins

30. Which part of a phospholipid molecule is considered as a hydrophobic region?

- A. Fatty acid tails
- B. Phosphate head
- C. Glycerol head
- D. Carboxyl group

31. Which of the following is found in DNA but not in RNA?

- A. Adenine
- B. Guanine
- C. Thymine
- D. Cytosine

32. Materials maybe taken into cells by the following processes except

- A. Pinocytosis
- B. phagocytosis
- C. Facilitated diffusion
- D. Exocytosis

33. In osmosis, water is passing

- A. Only from a less concentrated solution to a more concentrated solution
- B. In both directions with more water passing into the more concentrated solution
- C. Only from a more concentrated solution to a less concentrated solution
- D. In both directions with equal amount

34. Which of the following statements is **NOT** true about enzymes?

- A. Enzymes work at specific PH and temperature
- B. One enzyme catalyzes only one type of reaction
- C. They are destroyed in the process of the reaction
- D. They do not start chemical reactions

35. Which of the following processes requires ATP?

- A. Contraction of muscles
- B. Absorption of water by roots
- C. Diffusion of oxygen to cells
- D. Facilitated diffusion

36. Where does the production of ATP and NADPH take place? In the

- A. Fluid matrix
- B. Cytoplasm
- C. Granna
- D. Stroma

37. The number of nucleotide chains that make up a DNA molecule is

- A. Four
- B. Two
- C. Three
- D. One

38. Which of the following is **NOT** a component of a nucleotide?

- A. Pentose sugar
- B. Organic nitrogen containing base
- C. Phosphate group
- D. Amino acid group

39. Which of the following biologists does **NOT** contribute to develop the germ theory?

- A. Robert Hooke
- B. Louis Pasteur
- C. Joseph Lister
- D. Robert Koch

40. In which of the following structure of protein molecules the polypeptide chain folds when adjacent amino acids in a chain are linked by hydrogen bonds to produce a spiral alpha-helix or a beta-plated sheet?

- A. Primary structure
- B. Secondary structure
- C. Tertiary structure
- D. Quaternary structure

41. All of the following are structural carbohydrate molecules except

- A. Cellulose
- B. Chitin
- C. Starch
- D. Peptidoglycan

42. All are functional proteins except

- | | |
|-------------|-------------|
| A. Keratin | C. Enzymes |
| B. Antigens | D. Hormones |

43. Which one of the following is **NOT** common to all amino acids?

- | | |
|-------------------|------------------|
| A. Carboxyl group | C. Hydrogen atom |
| B. R- group | D. Amino group |

44. Anti-retroviral drugs that prevent the assembly of virus particles the assembly of virus particles are called

- | | |
|-------------------------------------|-------------------------|
| A. Entry inhibitors | C. Protease inhibitors |
| B. Reverse transcriptase inhibitors | D. Integrase inhibitors |

45. Vectors that are used to transfer foreign genes into animal cells are

- | | |
|-----------------|-------------|
| A. Plasmids | C. Viruses |
| B. Agrobacteria | D. Gene gun |

46. The geographical region with a specific climate, soil type, animals and plants adapted to the abiotic conditions within a certain area is

- | | |
|-----------------|------------|
| A. an ecosystem | C. a niche |
| B. a habitat | D. a biome |

47. Which of the following is an RNA virus?

- | | |
|--|-------------------|
| A. Retrovirus | C. HIV virus |
| B. H ₁ N ₁ Virus | D. Herpes simplex |

48. Which of the following is a kind of a fresh water biome?

- | | |
|---------------|------------|
| A. Estuarine | C. Ocean |
| B. Coral reef | D. Wetland |

49. The structure found in all bacteria is a

- | | |
|--------------|--------------|
| A. Plasmid | C. capsule |
| B. Flagellum | D. Cell wall |

50. The average rate of loss of biodiversity every 50 years is

- | | |
|--------|--------|
| A. 5% | C. 20% |
| B. 50% | D. 10% |

51. The population growth curve where the population increases rapidly due to plentiful resources is the

- | | |
|---------------------|------------------|
| A. Log phase | C. Lag phase |
| B. Stationary phase | D. Decline phase |

52. Which of the following is the product of anaerobic respiration of yeast cells?

- | | | | |
|----------|------------|----------|----------------|
| A. Water | B. Alcohol | C. Sugar | D. Lactic acid |
|----------|------------|----------|----------------|

53. Which of the following enzymes unwind DNA strand during DNA replication?

- | | |
|-------------------|-------------------|
| A. DNA polymerase | C. DNA ligase |
| B. DNA helicase | D. RNA polymerase |

54. In which stage of meiosis homologous pairs of chromosomes become arranged at the equator of the cell?

- | | |
|-----------------|----------------|
| A. Metaphase II | C. Metaphase I |
| B. Anaphase II | D. Prophase I |

55. Which of the following varieties of garden peas noticed by Mendel is dominant?

- | | |
|------------------------|-----------------------------|
| A. Purple flower color | C. Terminal flower position |
| B. Green seed color | D. Yellow pod color |

56. In which phase of meiosis the pairing of homologous chromosomes and exchange of segments take place?

- | | |
|----------------|----------------|
| A. Prophase I | C. Prophase II |
| B. Anaphase II | D. Metaphase I |

57. Which of the following can a couple with blood group O and AB can produce in their children?

- A. Type A and O
- B. Type A and B
- C. Type O only
- D. Type AB

58. The Conversion of ammonia into nitrates is called

- A. Ammonification
- B. Denitrification
- C. Nitrification
- D. Nitrogen fixation

59. The substance found in the cell membrane which makes the membrane impermeable to certain molecules is

- A. Glycoprotein
- B. Phospholipid
- C. Cholesterol
- D. Glycolipid

60. Which of the following is correctly matched?

- A. Baldness-Sex-Linked trait
- B. Hemophilia-Sex-influenced trait
- C. Lactation-Sex-influenced
- D. Red-Green color blindness-sex- linked trait

61. What is the probability of getting the gamete Ab from the genotype AaBb?

- A. 25%
- B. 50%
- C. 5%
- D. 100%

62. The enzyme that assembles free DNA nucleotides in the nucleus into a new strand of DNA is

- A. DNA helicase
- B. DNA ligase
- C. DNA polymerase
- D. DNA transferase

063. What percentage of the F₂ plants of a monohybrid cross is expected to have the recessive trait?

- A. 25%
- B. 50%
- C. 75%
- D. 100%

64. Which of the following terms refers to the failure of sister chromatids to separate from one another during anaphase?

- A. Crossing over
- B. Synapsis
- C. Non-disjunction
- D. Replication

65. The two alternative forms of a gene are referred to as

- A. Alleles
- B. phenotype
- C. Genotypes
- D. homologous chromosomes

66. If a cell having 40 chromosomes enters meiosis, it will produce four daughter cells each with chromosomes number of

- A. 10
- B. 20
- C. 15
- D. 40

67. Which of the following parts of the DNA ladder make up the cross bars?

- A. Sugars
- B. Acids
- C. Bases
- D. Phosphates

68. The hereditary phenomenon which was not discovered by Gregor Mendel is

- A. Independent assortment of gens
- B. Dominance of genes
- C. Linkage of genes
- D. Segregation of genes

69. Which of the following is **NOT** correct about crossing over? It

- A. occurs between sister chromatids
- B. results in genetic recombination
- C. occurs when the homologous chromosomes pair up and undergo synapsis during meiosis
- D. occurs between non sister chromatids of homologous chromosomes

70. Individuals with two alleles of a pair are dissimilar are called

- A. dominant
- B. recessive
- C. heterozygous
- D. homozygous

71. The genotype of the organism showing the dominant trait can be determined by carrying out a

- A. Dihybrid cross
- C. Trihybrid cross
- B. Monohybrid cross
- D. Back cross

72. The DNA of a certain organism has guanine as 30 percent of its bases. What percentage of its bases would be accounted for by adenine?

- A. 10%
- C. 30%
- B. 15%
- D. 20%

73. Which of the following is NOT true about meiosis?

- A. Meiosis is used for gamete formation
- B. Four gametes are produced at the end of meiosis
- C. Meiosis reduces the chromosome number by half
- D. Meiosis produces genetically identical daughter cells

74. The number of different types of phenotypes formed when a dihybrid is selfed is

- A. 2
- C. 9
- B. 4
- D. 3

75. Suppose a heterozygous round yellow pea plant of RrYy genotype is selfed and produced 128 seeds, how many of the seeds are expected to be round yellow?

- A. 72
- C. 32
- B. 64
- D. 16

76. Amino acids that are found in bacteria, humans and algae are identical; this shows that the genetic code is

- A. Universal
- C. Non-overlapping
- B. Transcription
- D. Degenerative

77. The process that converts mRNA containing genetic code to a polypeptide chain is referred to as

- A. Translation
- C. Genetic expression
- B. Transcription
- D. Gene silencing

78. Which of the following indicates the flow of genetic information in the body of living things?

- A. DNA → tRNA → mRNA
- B. DNA → polypeptide chain → mRNA
- C. DNA → mRNA → polypeptide chain
- D. RNA → DNA → protein

79. Transcription in prokaryotic cells occurs

- A. only in the ribosomes
- B. in the nucleus
- C. in the cytoplasm
- D. in the endoplasmic reticulum

80. Which of the following types of gene mutations results in frame shift-mutation?

- A. Substitution
- B. Addition
- C. translocation
- D. Inversion

81. Which of the following couples can produce children with A, B, AB and O blood group types?

- A. OO and AB
- B. BO and AA
- C. BB and AO
- D. BO and AO

82. The strand that is complementary to the DNA sequence given as TAACCG is

- A. AUUGGC
- B. ATTGGC
- C. TAACCG
- D. GCCAAT

83. The transfer of genes from the DNA of one organism into the DNA of another organism is known as

- A. Tissue culture
- B. Hybridization
- C. Transplantation
- D. Genetic engineering

84. Which of the following is referred to as the first law of Mendel?

- A. The occurrence of alleles in pairs
- B. The dominance of one allele over the other
- C. The equal distribution of alleles by both parents

D. The separation of alleles during gamete formation

85. If after dividing materials into two groups, an experimenter has applied a fertilizer to group A plants and not to group B plants, what are group B plants called?

A. Control group

C. Test group

B. Experimental group

D. Variable group

86. One of the following pattern is **FALSE** about viral genome replication

A. RNA $\longrightarrow$ DNA $\longrightarrow$ RNA

C. DNA $\longrightarrow$ DNA

B. DNA $\longrightarrow$ RNA $\longrightarrow$ DNA

D. RNA $\longrightarrow$ RNA

87. Glucose is a stable unreactive molecule. It is activated in the process of glycolysis an initial step of

A. Oxidation

C. Reduction

B. Hydrolysis

D. Phosphorylation

88. How many carbon dioxide molecules will be given off during ten turns of the Krebs cycle?

A. 10

C. 30

B. 20

D. 40

89. The number of ATP molecules produced from the complete respiration of one molecule of glucose to carbon dioxide and water is

A. 2

C. 36

B. 24

D. 12

90. In the dark reactions of photosynthesis

A. ATP is synthesized

C. Oxygen is produced

B. Water is split

D. Carbon dioxide is incorporated into an organic molecule

91. What is the primary action of light energy in photosynthesis?

A. Produces ATP

C. Splits water molecules

B. Fixes carbon dioxide

D. Excites electrons from chlorophyll

92. Which of the following molecules enters the Krebs cycle during cellular respiration?

- A. Acetyl CoA
- B. Glucose
- C. Pyruvic acid
- D. Lactic acid

93. Which of the following is the best way of preventing self-pollination in plant hybridization experiment?

- A. Cover the flower with bags
- B. Remove the stamens
- C. Cross pollinate flowers
- D. Make reciprocal crosses

94. When individuals of genotype AaBb were crossed with individuals of genotype AaBb, 3200 Offspring are produced. How many of the offspring would be expected to have aabb genotype?

- A. 800
- B. 600
- C. 200
- D. 400

95. The term which includes all the rest in the list is

- A. Polysaccharide
- B. Disaccharide
- C. Carbohydrate
- D. Monosaccharide

96. How many chromosomes do humans inherit from each of their parents?

- A. 23 pairs of chromosomes
- B. 23 chromosomes
- C. 46 chromosomes
- D. 46 pairs of chromosomes

97. Which one of the following is a genetic disease?

- A. Hemophilia
- B. Pneumonia
- C. Cholera
- D. Kwashiorkor

98. The point at which crossing over occurs is known as

- A. Chiasmata
- B. Centromere
- C. Centrioles
- D. Spindle fiber

99. Which type of dominance is involved in the human ABO blood group system?

- A. Complete dominance
- B. Incomplete dominance
- C. Over dominance
- D. Codominance

100. A gene is a portion of

A. a protein molecule

C. a DNA molecule

B. a histone molecule

D. an RNA molecule