

Poorna Foundation



Biology

Summer Packet

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Section 1: Biomolecules & Cellular Structures (Questions 1–15)

1. Which biomolecule serves as a quick energy source and provides structural support in cells?
A) Proteins B) Carbohydrates C) Lipids D) Nucleic acids
2. What are the building blocks of nucleic acids like DNA and RNA?
A) Amino acids B) Nucleotides C) Monosaccharides D) Fatty acids
3. The primary function of lipids in living organisms is to:
A) Store genetic information B) Act as catalysts C) Provide insulation and long-term energy storage D) Transport oxygen
4. Which cellular structure is responsible for the translation of mRNA into proteins?
A) Nucleus B) Mitochondria C) Ribosome D) Golgi apparatus
5. What is the primary difference between prokaryotic and eukaryotic cells?
A) Prokaryotes have a nucleus B) Eukaryotes lack membrane-bound organelles C) Prokaryotes lack a membrane-bound nucleus D) Eukaryotes are always unicellular
6. Enzymes are a type of _____ that act as catalysts to speed up chemical reactions.
7. ATP is the primary _____ carrier in cells, providing fuel for cellular processes.
8. The _____ controls the movement of substances in and out of the cell and provides structural support.
9. The _____ is the organelle known as the powerhouse of the cell because it generates most of the cell's ATP.
10. Plant cells contain a rigid _____ outside their cell membrane which provides extra support.
11. A phospholipid consists of a hydrophilic (water-loving) head and two hydrophobic (water-hating) tails. (True/False) _____
12. All living things are composed of one or more cells, which come from pre-existing cells. (True/False) _____

13. Viruses are considered living cells because they can reproduce independently. (True/False) _____

14. The nucleus contains the genetic material (DNA) in eukaryotic cells. (True/False) _____

15. Plant cells contain large central vacuoles, whereas animal cells have smaller vacuoles. (True/False) _____

Section 2: DNA, RNA & Protein Synthesis (Questions 16–30)

16. What is the process by which genetic information in DNA is copied into mRNA?

- A) Translation B) Transcription C) Replication D) Mutation

17. Which of the following is NOT a main type of RNA?

- A) mRNA B) tRNA C) rRNA D) dRNA

18. The central dogma of molecular biology describes the flow of genetic information from:

- A) RNA to DNA to protein B) Protein to RNA to DNA C) DNA to RNA to protein D) RNA to protein to DNA

19. What molecule brings specific amino acids to the ribosome during translation?

- A) mRNA B) tRNA C) DNA D) rRNA

20. Which nitrogenous base is found in RNA but NOT in DNA?

- A) Adenine B) Thymine C) Uracil D) Cytosine

21. CRISPR technology allows for precise editing of _____ sequences in organisms.

22. Gel electrophoresis separates DNA, RNA, or proteins based on their size and _____.

23. A sequence of three nucleotides on mRNA that codes for an amino acid is called a _____.

24. The two strands of a DNA double helix are held together by _____ bonds between the nitrogenous bases.

25. The enzyme responsible for copying a DNA sequence into an RNA sequence during transcription is RNA _____.

26. A frameshift mutation alters the reading frame of the genetic code, leading to a different amino acid sequence. (True/False) _____
27. PCR (Polymerase Chain Reaction) is a technology used to amplify millions of copies of a specific DNA segment. (True/False) _____
28. Recombinant DNA technology involves combining DNA from the exact same organism. (True/False) _____
29. In DNA, Adenine always pairs with Cytosine. (True/False) _____
30. DNA sequencing is used to determine the exact order of nucleotides in a DNA molecule. (True/False) _____

Section 3: Cell Cycle & Mitosis (Questions 31–45)

31. During which phase of the cell cycle does DNA replication occur?
A) G1 phase B) S phase C) G2 phase D) M phase
32. What is the main purpose of mitosis in multicellular organisms?
A) Production of gametes B) Increasing genetic variation C) Growth and repair of somatic cells D) Energy production
33. Programmed cell death, which plays a crucial role in maintaining homeostasis, is known as:
A) Cytokinesis B) Apoptosis C) Transcription D) Synapsis
34. Which of the following is the correct order of the stages of mitosis?
A) Prophase, Metaphase, Anaphase, Telophase B) Metaphase, Prophase, Telophase, Anaphase C) Anaphase, Telophase, Prophase, Metaphase D) Telophase, Anaphase, Metaphase, Prophase
35. The division of the cytoplasm that occurs at the end of cell division is called:
A) Interphase B) Cytokinesis C) Mitosis D) Meiosis
36. The cell cycle consists of _____ (G1, S, G2), Mitosis, and Cytokinesis.

37. Checkpoints in the cell cycle ensure the cell progresses correctly and prevent errors such as _____ damage.
38. Disruptions in the cell cycle can lead to uncontrolled cell division, commonly known as _____.
39. During Metaphase, chromosomes align along the _____ of the cell.
40. The process of cell specialization through gene expression changes is called cell _____.
41. Meiosis is a type of cell division that reduces the chromosome number by half to create gametes. (True/False) _____
42. Mitosis produces two genetically identical daughter cells. (True/False) _____
43. Crossing-over occurs during mitosis to increase genetic diversity. (True/False) _____
44. The G₀ phase is a resting state where cells are not actively preparing to divide. (True/False) _____
45. Somatic cells are haploid, meaning they contain only one set of chromosomes. (True/False) _____

Section 4: Genetics & Heredity (Questions 46–60)

46. The observable physical traits of an organism are referred to as its:
A) Genotype B) Phenotype C) Allele D) Karyotype
47. If an organism has two identical alleles for a particular trait, it is said to be:
A) Heterozygous B) Homozygous C) Dominant D) Recessive
48. Which process contributes to genetic diversity during meiosis?
A) Independent assortment B) Crossing-over C) Chromosome reduction D) All of the above
49. A trait that is controlled by a gene located on a sex chromosome is known as a:
A) Codominant trait B) Polygenic trait C) Sex-linked trait D) Multiple allele trait

50. In a monohybrid cross between two heterozygous parents ($Aa \times Aa$), what is the expected phenotypic ratio for a simple dominant/recessive trait?

- A) 1:1 B) 1:2:1 C) 3:1 D) 9:3:3:1

51. A _____ square is a diagram used to predict the genetic outcomes of a cross between two individuals.

52. A _____ allele is an allele that expresses its trait even when a recessive allele is present.

53. The genetic makeup of an organism, specifically the alleles it possesses, is called its _____.

54. In _____ dominance, the heterozygous phenotype is an intermediate blend of the two homozygous phenotypes.

55. Different versions of the same gene are called _____.

56. A recessive allele only shows its trait when two copies are present. (True/False) _____

57. Genetic variation refers to the diversity in gene frequencies among individuals within a population. (True/False) _____

58. In codominance, both alleles are fully and separately expressed in the heterozygous phenotype. (True/False) _____

59. A dihybrid cross tracks the inheritance of a single trait. (True/False) _____

60. Human blood type is an example of a trait controlled by multiple alleles. (True/False) _____

Section 5: Plants & Photosynthesis (Questions 61–75)

61. What are the main products of photosynthesis?

- A) Carbon dioxide and water B) Glucose and oxygen C) ATP and carbon dioxide D) Lactic acid and ATP

62. Which vascular tissue transports water and minerals from the roots to the rest of the plant?

- A) Phloem B) Xylem C) Stomata D) Epidermis

63. The process of water vapor evaporating from plant leaves is called:
A) Condensation B) Transpiration C) Respiration D) Guttation
64. Which of the following is a characteristic of monocots?
A) Two cotyledons B) Net-like leaf veins C) Taproot system D) Parallel leaf veins
65. What is the primary function of roots in plants?
A) Perform photosynthesis B) Transport sugars C) Anchor the plant and absorb water D) Produce seeds
66. Pores on the leaf surface that regulate gas exchange and transpiration are called _____.
67. The primary component of a plant cell wall is _____, which provides structural support.
68. _____ is the growth of a plant in response to a light stimulus.
69. _____ cells surround stomata and regulate their opening and closing.
70. The plant hormone _____ acid inhibits growth and promotes dormancy during times of stress.
71. Chlorophyll is a green pigment that absorbs light energy for photosynthesis. (True/False) _____
72. Phloem transports sugars produced by photosynthesis to other parts of the plant. (True/False) _____
73. Chloroplasts are the organelles where cellular respiration takes place. (True/False) _____
74. Seed germination typically requires water, oxygen, and a suitable temperature. (True/False) _____
75. Dicots have floral parts usually in multiples of three. (True/False) _____

Section 6: Human Body Systems (Questions 76–90)

76. Which human body system regulates bodily functions through hormones?
A) Nervous System B) Circulatory System C) Endocrine System D) Integumentary System
77. The skin doubles as part of the integumentary and _____ systems.
A) Nervous B) Excretory C) Respiratory D) Skeletal
78. The primary function of the circulatory system is to:
A) Control body activities B) Digest food C) Transport blood, nutrients, and gases D) Filter waste products
79. Which system is responsible for the exchange of oxygen and carbon dioxide between the body and the environment?
A) Respiratory B) Digestive C) Muscular D) Urinary
80. The nervous system controls and coordinates body activities by transmitting signals. What are the main components?
A) Heart and blood vessels B) Brain, spinal cord, and nerves C) Lungs and trachea D) Stomach and intestines
81. The maintenance of a stable internal environment in the body is known as _____.
82. The _____ filter waste products from the blood and maintain fluid balance.
83. The _____ system breaks down food into nutrients, absorbs those nutrients, and eliminates solid waste.
84. Arteries carry oxygenated blood _____ from the heart.
85. The _____ system provides structure, support, and protection for the body's internal organs.
86. Veins carry deoxygenated blood back to the heart. (True/False) _____

87. The muscular system enables movement by contracting and relaxing muscles, which pull on bones. (True/False) _____

88. The integumentary system is primarily composed of the brain and spinal cord. (True/False) _____

89. Hormones act as chemical messengers that travel through the bloodstream. (True/False) _____

90. The immune system plays a key role in defending the body against injury or illness. (True/False) _____

Section 7: Biological Evolution & Classification (Questions 91–105)

91. The process by which organisms better adapted to their environment survive and reproduce is called:

- A) Genetic drift B) Natural selection C) Artificial selection D) Gene flow

92. Anatomical structures that show common ancestry among different species are known as:

- A) Analogous structures B) Vestigial structures C) Homologous structures D) Divergent structures

93. The random change in the frequency of an existing gene in a population due to chance events is called:

- A) Natural selection B) Genetic drift C) Gene flow D) Mutation

94. Chordata is a phylum characterized by having a _____ at some stage of development.

- A) Exoskeleton B) Notochord C) Radial symmetry D) Nematocyst

95. Which of the following provides evidence for evolution?

- A) Fossil records B) Comparative anatomy C) Molecular biology (DNA) D) All of the above

96. Evolutionary mechanisms include natural selection, genetic drift, gene flow, and _____.

97. Natural selection acts on populations, not _____.
98. The formation of new and distinct species in the course of evolution is known as _____.
99. The scientific system of categorizing organisms based on shared similarities is called _____.
100. Structures that have lost their original function through evolution (like the human appendix) are called _____ structures.
101. Mutations introduce new genetic variations, which provide the raw material for evolution. (True/False) _____
102. Natural selection leads to differential reproductive success based on inherited variations. (True/False) _____
103. The fossil record provides a complete and unbroken timeline of every species that ever lived. (True/False) _____
104. Biogeography is the study of the distribution of species and ecosystems in geographic space. (True/False) _____
105. Fungi are classified as autotrophs because they photosynthesize. (True/False) _____

Section 8: Interdependence within Ecosystems (Questions 106–120)

106. A network of interconnected food chains in an ecosystem is called a:
- A) Food web B) Trophic pyramid C) Biomass hierarchy D) Energy cycle
107. Species that have a disproportionately large impact on the stability of their ecosystem are known as:
- A) Invasive species B) Pioneer species C) Keystone species D) Climax species
108. Which of the following represents a symbiotic relationship where one organism benefits and the other is harmed?
- A) Mutualism B) Commensalism C) Parasitism D) Competition

109. What happens to the amount of available energy as you move up successive trophic levels in an energy pyramid?

- A) It increases B) It decreases C) It remains constant D) It fluctuates randomly

110. The process by which ecosystems change and develop over time is called:

- A) Speciation B) Ecological succession C) Natural selection D) Biomagnification

111. Organisms that create their own food through photosynthesis are called

_____.

112. The variety of life in a particular habitat or ecosystem is referred to as

_____.

113. The _____ cycle involves the continuous movement of carbon through the biosphere, atmosphere, hydrosphere, and geosphere.

114. An ecosystem includes both living (biotic) factors and non-living (_____) factors.

115. _____ species can disrupt local ecosystems by outcompeting native species for resources.

116. Primary succession occurs in an area where no soil previously existed, such as on a newly formed volcanic island. (True/False) _____

117. Climate change can impact ecosystems by altering temperature and precipitation patterns. (True/False) _____

118. In mutualism, both species involved in the relationship benefit. (True/False) _____

119. Matter is created and destroyed continuously within a healthy ecosystem. (True/False) _____

120. Deforestation and urbanization are human activities that can influence the climate and affect ecosystem stability. (True/False) _____