# BIO 103 Principles of Biology
# EXAM FOR CREDIT Practice Questions

1. The starting point for the scientific method is:
   a. Formation of Hypothesis
   b. Predictions
   c. Experimental Design
   d. Observations

2. Once supported by enough experiments, a theory can be considered to be a fact.
   a. True
   b. False

3. The Scientific Method can be used to determine moral and ethical standards for society.
   a. True
   b. False

4. Which of the following is a characteristic shared by all life on earth?
   a. Cells with a nucleus
   b. Multicellular anatomy
   c. Being an autotroph
   d. Descent from a universal common ancestor

5. In the typical environment on earth, energy flows from producers to consumers to _____.
   a. the original producers
   b. different producers
   c. decomposers
   d. National Grid

6. Consumers are also referred to as Heterotrophs.
   a. True
   b. False

7. In the Biological Hierarchy, life begins at which level?
   a. Chemical
   b. Cellular
   c. Tissue
   d. Ecosystem

8. In the Biological Hierarchy, an organ is defined as composed of two or more:
    a. Cells
    b. Tissues
    c. Communities
    d. Biomes

9. In the scientific name *Homo sapiens, Homo* refers to which category in the Linnaean system of taxonomy?
    a. Kingdom
    b. Class
    c. Genus
    d. Species

10. Evolutionary change in natural, wild populations of organisms is considered to lead to adaptive change through the scientific process of:
    a. Natural Selection
    b. Artificial Selection
    c. Inheritance of Acquired Characteristics
    d. Supernatural agency

11. Which of the following Kingdoms of life consist only of single cell organisms?
    a. Bacteria
    b. Bacteria and Archaea
    c. Protists
    d. Bacteria, Archaea and Protists

12. Which of the following traits are shared by bacteria from archaea?
    a. Single cell organisms
    b. Microorganisms (in the micrometer size range)
    c. Prokaryotes
    d. They share all of these traits

13. Bacteria cells have what shape?
    a. Bacilli
    b. Cocci
    c. Spiral
    d. All of the above

14. Which Domain especially contains organisms that occupy extreme environments on earth today, in terms of temperature and acidity?
    a. Bacteria
    b. Archaea
    c. Eukaryotes
    d. None of the Above

15. In terms of acquiring energy from the environment, bacteria can be:
    a. Photoautotrophs
    b. Chemoautotrophs
    c. Chemoheterotrophs
    d. Bacteria may be all of these.

16. Which of the following Kingdoms of life consist of only eukaryotic organisms?
    a. Bacteria
    b. Bacteria and Archaea
    c. Protists
    d. Bacteria, Archaea and Protists

17. Which of the following traits can be used to distinguish bacteria from protozoa?
    a. Protozoa are multicellular organisms and Bacteria are single cell organisms
    b. Protozoa contain a nucleus and Bacteria do not contain a nucleus
    c. Protozoa have DNA but Bacteria do not have DNA
    d. Protozoa have a cell membrane and Bacteria do not have a cell membrane

18. Which Protists from your lab are multicellular organisms?
    a. Volvox
    b. Spirogyra
    c. Red, Green and Brown Algae
    d. All of these are multicellular
    e. None of these are multicellular

19. Which Plant phyla share the traits of vascular tissue and two alternate generations in their life cycle?
    a. All plant phyla
    b. Both mosses and ferns
    c. Only mosses
    d. Only ferns
    e. None of the above

20. Which Plant phyla reproduce by the production of seeds?
    a. Mosses and Ferns
    b. Gymnosperms and Angiosperms
    c. All plants produce seeds
    d. No plants produce seeds

21. Fruit production is adaptive for plants because:
    a. It attracts pollinators
    b. Its stores energy for the later use of the plant
    c. Consumers of plants can disperse the seeds
    d. Fruit is only adaptive in domesticated plants for human food consumption

22. Fungi may acquire their energy from the environment by acting as:
    a. Chemoautotrophs
    b. Chemoheterotrophs
    c. Decomposers
    d. Both a. and b.
    e. Both b. and c.

23. The main body of a fungi is composed of its:
    a. Mushrooms
    b. Mycelium
    c. Roots
    d. Leaves

24. Lichens are a symbiotic association between:
    a. Algae and plants.
    b. Algae and fungi.
    c. Protists and animals.
    d. All of the above
    e. None of the above.

25. Fungal cells differ from Animals cells is that they:
    a. Are eukaryotic.
    b. Heterotrophic.
    c. Have a cell membrane and a cell wall.
    d. Have a cell membrane but lack a cell wall.

26. Protostome and Deuterostome animals:
    a. Lack a digestive track.
    b. Have only one opening to their digestive tract.
    c. Have two openings to the digestive tracts.
    d. Contain no body cavity.

27. Vertebrate animals:
    a. Include animals like a birds and mammals only.
    b. Form a lineage from a common ancestor that possessed a vertebral column.
    c. Are the most numerous lineages of animals in the biosphere.
    d. Evolved their vertebral column independently in their evolutionary history.

28. The most ancient animal phyla are the:
    a. Sponges
    b. Flatworms
    c. Mollusks
    d. Echinoderms

29. In atoms, the closest electrons to the atom nucleus would which orbital/shell?
    a. $1^{st}$
    b. $2^{nd}$
    c. $3^{rd}$
    d. all electrons are equally close to the nucleus

30. Which of the following chemicals is a molecular compound?
    a. $H_2O$
    b. $O_2$
    c. C
    d. $N_3$

31. When an atom of K loses an electron which is gained by atom Cl, the two atoms form what type of chemical bond?
    a. Covalent
    b. Ionic
    c. Hydrogen
    d. None of these

32. Ammonia tested with a pH meter and has a pH of ~10 … so ammonia is chemically considered:
    a. An acid
    b. a Base
    c. Neutral
    d. Good to drink

33. Which of the following is a physical property of water that is important for life on earth?
    a. It is not a good solvent for chemical reactions
    b. It's low heat capacity leads to drastic temperature changes in the environment
    c. Water is unable to evaporate when heated
    d. The hydrogen bonds between water molecules is important for its transport through the vascular tissue of some types of plants

34. An atom of carbon can form up to 4 valence electrons, so that:
    a. It can form 4 covalent bonds
    b. It can bond directly with up to 4 other atoms
    c. It can bond to other carbon atoms and form large biochemical
    d. All of the above

35. Which of the following compounds is also organic?
    a. $H_20$
    b. $CO_2$
    c. NaCl
    d. $CH_4$
    e. they are all organic

36. Which of the following biochemical groups contains N atoms?
    a. Carbohydrates
    b. Fatty Acids
    c. Amino Acids
    d. Metals

37. Complex carbohydrates like cellulose are made from what monomer?
    a. $H_2O$
    b. $C_6H_{12}O_6$
    c. $CH_4$
    d. $NH_3$
38. Which of the following organic chemicals is considered a polymer?
    a. Proteins
    b. Lipids
    c. Nucleic Acids
    d. These are all polymers

39. Which of the following types of organic molecules has the greatest amount of stored energy (i.e. kcal/gram)?
    a. Carbohydrates
    b. Proteins
    c. Lipids
    d. Nucleic Acids

40. Which of the following chemicals may be found in a Triglyceride?
    a. Glycerol
    b. Fatty Acid
    c. Both of these
    d. Neither of these

41. Which of the following chemicals is a Nucleic Acid?
    a. DNA
    b. RNA
    c. ATP
    d. only a. and b.
    e. a., b., and c.

42. In the reaction A+B --------→ C, the product is:
    a. A
    b. B
    c. C
    d. There is no product

43. Which of the following structures is found in all types of cells?
    a. Cytoplasm
    b. Plasma membrane
    c. Ribosomes
    d. All of these

44. Which of the following structures would not be found in a prokaryotic cell?
    a. Cytoplasm
    b. Nucleus
    c. Ribosome
    d. Plasma membrane

45. What is the function of the Smooth Endoplasmic Reticulum (smooth ER)?
    a. Manufactures and Transports Lipids
    b. Stores water and nutrients
    c. Converts sunlight into chemical energy
    d. Produces ATP energy for the cell

46. Which of the following describes what a chloroplast does?
    a. Contain an entire copy of a cell's DNA
    b. Synthesize proteins using ATP energy
    c. Synthesis carbohydrates using sunlight energy
    d. Transports lipids within the cell

47. In eukaryotic cells, both the nucleus and the mitochondrion have:
    a. Double membranes
    b. Nucleoli
    c. RNA
    d. None of the above

48. Which of the following would supply energy directly to an active carrier protein?
    a. ATP
    b. DNA
    c. RNA
    d. STP

49. A cheek cell in a solution swells until it bursts. The solution must be _____ compared to the cell.
    a. Isotonic
    b. Hypotonic
    c. Hypertonic
    d. None of these

50. Osmosis:
    a. Involves exocytosis
    b. Requires energy from the cell
    c. Is the passive diffusion of water
    d. Actively moves large solutes through a membrane

51. Substances ca move into a cell by:
    a. Phagocytosis
    b. Pinocytosis
    c. Endocytosis
    d. All of the above

52. The theory that mitochondria and chloroplasts were once free-living prokaryotes that becomes mutualists with eukaryotes is:
    a. Now a discredited theory
    b. The endosymbiotic theory
    c. Explains why they do not have DNA
    d. Evidence that life began on Mars

53. The marine/ocean environment is _____ compared to human cells.
    a. Isotonic
    b. Hypotonic
    c. Hypertonic
    d. Supertonic

54. Cellular Respiration uses oxygen to break apart glucose in what organelle?
    a. Chloroplast
    b. Rough Endoplasmic Reticulum
    c. Mitochondrion
    d. Lysosome

55. Which of the following together are components of the cytoskeleton of a cell?
    a. Cell wall and Plasma Membrane
    b. Nucleus and Nucleolus
    c. Mitochondria and Chloroplasts
    d. Microtubules and Microfilaments

56. Enzymes _____ the rate of a chemical reaction.
    a. Decrease
    b. Increase
    c. Do not change
    d. Inhibit

57. Enzymes work thermodynamically how?
    a. Increasing the activation energy needed to start a reaction
    b. Decreasing the activation energy needed to start a reaction
    c. Reversing the natural direction of the chemical reaction
    d. None of the above

58. Reactions in which bonds are broken to break larger chemicals into smaller chemicals are:
    a. Anabolic
    b. Catabolic
    c. Catatonic
    d. Anatonic

59. In many biological chemical reactions, chemicals undergo _____ when they lose electrons.
    a. Reduction
    b. Oxidation
    c. Hydrogenation
    d. None of these

60. The part of an enzyme that a substrate and a competitive inhibitor both can fit into is the:
    a. Active Site
    b. Allosteric Site
    c. Competitive Site
    d. Inactive Site

61. Chemically, enzymes are:
    a. Proteins
    b. Lipids
    c. Carbohydrates
    d. Nucleic Acid

62. Allosteric inhibitors provide feedback to stop a chemical reaction when?
    a. The cell lacks the reaction's product
    b. The cell has enough of the reaction's product
    c. The enzyme is denatured
    d. The enzyme's active site is occupied by the allosteric inhibitor

63. Which of the following environmental changes can affect the rate of a enzymatically catalyzed reaction?
    a. Extreme changes in pH
    b. Extreme changes in Temperature
    c. Enzyme Concentration Changes
    d. All of these

64. Anabolic reactions in biology usually:
    a. Use energy to build complex molecules
    b. Release energy from complex molecules
    c. Occur only in animals
    d. Occur only in plants

65. Photosynthetic organisms are:
    a. Anaerobic
    b. Heterotrophic
    c. Homeothermic
    d. Autotrophic

66. The wavelengths of light most active in photosynthesis are associated with which colors?
    a. Green and Yellow
    b. Green and Blue
    c. Green and Red
    d. Blue and Red

67. During the photosynthetic light reaction, energized electrons flow through Photosystems I and II helps produce what in the Light Reaction?
    a. ATP
    b. NADPH
    c. Both
    d. Neither

68. In a leaf, chloroplasts are most likely to found in which cells?
    a. Epidermal Cells
    b. Mesophyll Cells
    c. Xylem Cells
    d. Phloem Cells

69. The group of plant pigments that are responsible for bright coloration and act as anti-oxidants are called:
    a. Chlorophylls
    b. Thylakoids
    c. Flavonoids
    d. Synthases

70. Vascular tissue in plants involves _____ that transports water and _____ that transports sugary sap.
    a. Xylem/Phloem
    b. Phloem/Xylem
    c. Guard Cells/Stoma
    d. Stoma/Guard Cells

71. Both photosynthesis and cellular respiration use _____ systems in their biochemical processes.
    a. Pigments
    b. Electron Transport Chains
    c. Oxygen as a reactant
    d. Carbon Dioxide as a reactant

72. The first stage of the breakdown of glucose for energy in Respiration is:
    a. Glycolysis
    b. Krebs Cycle
    c. Oxidative Phosphorylation
    d. Calvin Cycle

73. The Krebs Cycle of Respiration occurs in the _____ of the mitochondrion.
    a. Thylakoid
    b. Stroma
    c. Matrix
    d. Central Vacuole

74. The enzyme Rubisco is used in which part of Respiration?
    a. Glycolysis
    b. Krebs Cycle
    c. Calvin Cycle
    d. None of these

75. Acetyl CoA is a two-carbon molecule used in:
    a. The electron transport chain
    b. The Calvin Cycle
    c. The Krebs Cycle
    d. None of these

76. In Cellular Respiration, the greatest amount of ATP made per glucose occurs in:
    a. Glycolysis
    b. Krebs Cycle
    c. Oxidative Phosphorylation/ETS
    d. Light Reaction

77. Glucose and oxygen are the reactants of _____ and the products of _____.
    a. Respiration and Photosynthesis
    b. Photosynthesis and Respiration
    c. Fermentation and Respiration
    d. Photosynthesis and Respiration

78. During exercise, increased respiration rate and heartbeat rate are driven by the need for what?
    a. Carbon Dioxide for glycolysis in lung cells
    b. Oxygen for mitochondria in muscle cells
    c. Water needed for the Krebs cycle in nerve cells
    d. The psychological excitement of exercise

79. The burning pain in your muscles during strenuous exercise is the result of what?
    a. The build-up of carbon dioxide during cellular respiration
    b. The lack of ATP in your nerve cells
    c. Sugar starved muscle cells
    d. The buildup of lactic acid due to fermentation

80. Fermentation by yeast cells produces:
    a. Alcohol
    b. Carbon Dioxide
    c. Both
    d. Neither

81. Which of the following is a product of cellular respiration?
    a. Glucose
    b. Oxygen Gas
    c. Carbon Gas
    d. Water

82. The rise of what life forms in the evolution of life provided the high levels of oxygen available now in the environment.
    a. Cyanobacteria
    b. Algae
    c. Plants
    d. All of these

83. If a mutation does arise in a gene, it can change:
    a. The nucleotide sequence in the DNA of the gene
    b. The nucleotide sequence in the mRNA transcript of the gene
    c. The order of amino acids in the protein coded by the gene
    d. All of the above can happen from a mutation in a gene

84. For example, in sickle cell disease, a point mutation in the hemoglobin gene changes a GAG codon into a GUG codon. This causes the amino acid _____ to be replaced by the amino acid _____ in the protein produced.
    a. Glutamic acid replaced by Glutamine
    b. Valine replaced by Glutamine
    c. Threonine replaced by Glutamic Acid
    d. Glutamic Acid replaced by Valine

85. The sickle shape of a red blood cell in a person with sickle cell disease is caused by the mutation disrupting:
    a. Cell Membrane proteins
    b. Nuclear Membrane proteins
    c. Mitochondria function
    d. Hemoglobin Protein folding

86. In a eukaryotic cell, which of the following are removed from a mRNA molecule after transcription and before it is translated?
    a. Introns
    b. Spacer DNA
    c. Exons
    d. All Methionine

87. A promoter sequence and a terminator sequence would be found in:
    a. The DNA of a gene
    b. The mRNA of a gene
    c. The protein produced by a gene
    d. The enzyme controlling protein synthesis

88. The expression of most genes is controlled when, in the production of a protein?
    a. Transcription
    b. Translation
    c. Replication
    d. None of the above

89. An organism may turn a gene “on” or “off” in response to:
    a. Nutrient availability
    b. Stressors like high environmental temperature
    c. Hormonal signals
    d. All of the above

90. The insertion or deletion of a nucleotide can be one type of:
    a. Translation
    b. Mutation
    c. Indentation
    d. Transformation

91. In an eukaryotic cell in interphase, the DNA in the nucleus is referred to as:
    a. Centrioles
    b. Chromosomes
    c. Chromatin
    d. None of the above

92. Paramecia can carry out binary fission as a form of:
    a. Sexual Reproduction
    b. Asexual Reproduction
    c. Both of the above
    d. Neither of the above

93. Crossing over by the tetrads formed by homologous chromosomes occurs during what phase of Meiosis I?
    a. Prophase I
    b. Metaphase I
    c. Anaphase I
    d. Telophase I

94. In humans, sexual reproduction and development of a fertilized egg requires:
    a. Mitosis only
    b. Meiosis only
    c. Both Mitosis and Meiosis
    d. Neither Mitosis nor Meiosis

95. Whereas human body cells are diploid, human gametes are:
    a. Haploid
    b. Diploid
    c. Triploid
    d. Polyploid

96. In a human female, oogenesis produces how many usable ova?
    a. 1
    b. 2
    c. 3
    d. 4

97. An individual that carries two identical copies of an allele for a particular gene has what type of genotype?
    a. Homozygous
    b. Heterozygous
    c. Transzygous
    d. Duozygous

98. In corn, kernel color is determined by a single gene, with blue as the dominant trait (B) and yellow as the recessive trait (b). What is the ratio of dominant to recessive phenotypes in the cross between these two genotypes; Bb x Bb?
    a. 1:1
    b. 3:1
    c. 1:2:1
    d. 9:3:3:1

99. What allelic interaction explains why four different blood types in the ABO system results from the expression of a single gene with three different alleles?
    a. Pleitropy
    b. Heterotrophy
    c. Codominance
    d. Epistasis

100. From a public health perspective, among humans many chronic diseases with a genetic basis are:
    a. polygenic
    b. environmentally influenced
    c. are more prevalent than diseases caused by single gene defects
    d. all of the above