1. Which of the following is not a feature of scientific hypotheses?
   A) They are true.
   B) They make predictions.
   C) They are based on observations.
   D) They can be tested by experimentation.
   E) They can be tested by observational analysis.

2. Members of the kingdom Animalia obtain their energy from
   A) decomposing organic matter.
   B) photosynthesis.
   C) other organisms.
   D) sunlight.
   E) inorganic molecules.

3. After observing that fish live in clean water but not in polluted water, you make the statement, “polluted water kills fish.” Your statement is an example of
   A) scientific inquiry.
   B) biological evolution.
   C) a prediction.
   D) a hypothesis.
   E) a theory.

4. Count de Buffon thought that pigs have small functionless toes because
   A) they are evolving toward having functioning toes but have not yet reached the goal.
   B) they have defective toe-producing information in their DNA.
   C) they evolved from ancestors that had functioning toes.
   D) constant parasitization over generations caused the loss of their toes.
   E) All of the above

5. Eukarya include
   A) Protista.
   B) Plantae.
   C) Fungi.
   D) Animalia.
   E) All of the above
6. Ozone is important to life on Earth because it
   A) is toxic to all forms of life.
   B) can be used in place of oxygen.
   C) blocks much ultraviolet radiation.
   D) provides energy to some basic forms of life.
   E) disinfects.

7. Ionic bonds are
   A) attractions between oppositely charged ions.
   B) the result of electron sharing.
   C) the strongest of the chemical bonds.
   D) caused by partial electrical charges.
   E) dependent upon hydrophobic interactions.

8. Two characteristics of water make it different from most other compounds. Its solid
   state is _______ its liquid state, and it takes up _______ heat to change to its gaseous
   state.
   A) less dense than; large amounts of
   B) more dense than; small amounts of
   C) less dense than; small amounts of
   D) more dense than; large amounts of
   E) just as dense as; no

9. The functional group diagramed =O is a(n)
   A) carbonyl.
   B) carboxyl.
   C) aldehyde.
   D) amino.
   E) hydroxyl.

10. The part of the atom that determines how the atom behaves chemically is the
    A) proton.
    B) electron.
    C) neutron.
    D) innermost shell.
    E) nucleus.
11. Which pair has similar chemical properties?
   A) $^1$H and $^{22}$Na
   B) $^{12}$C and $^{28}$Si
   C) $^{16}$O and $^8$S
   D) $^{12}$C and $^{14}$C
   E) $^8$H and $^2$He

12. The number of different elements found in the universe is closest to
   A) 12.
   B) 24.
   C) 48.
   D) 100.
   E) 192.

13. The amino acids of the protein keratin are arranged in a helix. This secondary structure is stabilized by
   A) covalent bonds.
   B) peptide bonds.
   C) glycosidic linkages.
   D) polar bonds.
   E) hydrogen bonds.

14. Lipids are
   A) insoluble in water.
   B) readily soluble in organic solvents.
   C) characterized by their solubility.
   D) important constituents of biological membranes.
   E) All of the above

15. In a biological membrane, the phospholipids are arranged with the fatty acid chains facing the interior of the membrane. As a result, the interior of the membrane is
   A) hydrophobic.
   B) hydrophilic.
   C) charged.
   D) polar.
   E) filled with water.
16. A type of molecule very often drawn with a single six-sided ring structure is
   A) sucrose.
   B) an amino acid.
   C) glucose.
   D) a fatty acid.
   E) a steroid.

17. Spontaneous generation was disproved by
   A) Miller.
   B) Urey.
   C) Redi and Pasteur.
   D) Allan Hills.
   E) van der Waal.

18. The difference between $\alpha$- and $\beta$- glucose is
   A) in the number of covalent bonds present.
   B) in the placement of OH and H atoms.
   C) in the type of R group attached to the terminal carbon.
   D) that $\alpha$-glucose is polar, whereas $\beta$-glucose is nonpolar.
   E) that $\alpha$-glucose is a pentose, whereas $\beta$-glucose is a hexose.

19. Light energy for conversion to chemical energy is trapped in the
   A) mitochondrion.
   B) chromoplast.
   C) thylakoid.
   D) endoplasmic reticulum.
   E) Golgi apparatus.

20. Chloroplasts are the structures in which
   A) chemical energy is stored by making ATP.
   B) cell division is controlled.
   C) genetic information is used to make proteins.
   D) sunlight energy is converted into chemical energy.
   E) new organelles are made.
21. Lysosomes are important to eukaryotic cells because they contain
   A) photosynthetic pigments.
   B) starch molecules for energy storage.
   C) their own DNA molecules.
   D) the cells’ waste materials.
   E) digestive enzymes.

22. Starch molecules are stored inside
   A) chromoplasts.
   B) granularplasts.
   C) chloroplasts.
   D) potatoplasts.
   E) leucoplasts.

23. Ribosomes are not found in
   A) the mitochondrion.
   B) a chloroplast.
   C) the rough endoplasmic reticulum.
   D) a prokaryotic cell.
   E) the Golgi apparatus.

24. Which statement about the nuclear envelope is true?
   A) It contains pores for the passage of large molecules.
   B) It is composed of two membranes.
   C) It contains ribosomes on the inner surface.
   D) Both a and b
   E) All of the above

25. Clathrin-coated pits are structures associated with
   A) active transport.
   B) phagocytosis.
   C) flagellar movement.
   D) receptor-mediated endocytosis.
   E) secretory vesicles.
26. When a membrane is prepared by freeze-fracture and examined under the electron microscope, the exposed interior of the membrane bilayer appears to be covered with bumps. These bumps are
A) integral membrane proteins.
B) ice crystals.
C) platinum.
D) organelles.
E) vesicles.

27. Insulin is a protein secreted by cells of the pancreas. What is the pathway for the synthesis and secretion of insulin?
A) Rough ER, Golgi apparatus, vesicle, plasma membrane
B) Golgi apparatus, rough ER, lysosome
C) Lysosome, vesicle, plasma membrane
D) Plasma membrane, coated vesicle, lysosome
E) Rough ER, cytoplasm, plasma membrane

28. Structures that contain networks of keratin fibers and hold adjacent cells together are called
A) extracellular matrices.
B) glycoproteins.
C) gap junctions.
D) desmosomes.
E) phospholipid bilayers.

29. Substances move through biological membranes against concentration gradients via
A) simple osmosis.
B) active transport.
C) reverse osmosis.
D) simple diffusion.
E) None of the above

30. Stephen Hawking's muscle cells do not respond to stimulation by nerve cells. This condition is due to
A) a failure of the plasma membrane's protein channels to open.
B) a deficiency of lipids in the plasma membrane.
C) a high level of cholesterol in the plasma membrane.
D) the rapid passage of hydrophilic materials through the plasma membrane.
E) poor diet and lack of exercise.
31. The ability of an enzyme's active site to sometimes bind inhibitors that are larger than
the substrate is called
A) induced fit.
B) enzyme flex.
C) the lock and key paradox.
D) substrate-induced active site shaping.
E) enzyme retrofit.

32. Which of the following is true regarding allosteric regulators?
A) Positive regulators stabilize the active form of the enzyme.
B) All enzymes are allosterically regulated.
C) Enzymes that are allosterically regulated are made of multiple polypeptide subunits.
D) Both the active site and the regulatory site are present on the same subunit.
E) Allosteric regulators bind to the active site, blocking enzyme function.

33. The molecules that are acted on by an enzyme are called
A) products.
B) substrates.
C) carriers.
D) prosthetics.
E) effectors.

34. The sum total of all the chemical reactions in a living structure is called its
A) energetics.
B) activity.
C) digestive power.
D) entropy.
E) metabolism.

35. Aspirin reduces swelling and pain by
A) adding hydroxyl groups to amino acids.
B) hindering the conversion of linear fatty acids to a ring structure.
C) blocking a substrate's access to enzymes.
D) accelerating the formation of a fatty acid ring structure.
E) repairing damage to the stomach wall and aiding in blood clotting.
36. The statement “Enzymes are highly specific” means that certain
   A) enzymes are found in certain cells.
   B) reactions involving certain substrates are catalyzed by certain enzymes.
   C) enzymes require certain concentrations of substrates.
   D) reactions with certain activation energies are catalyzed by certain enzymes.
   E) concentrations of substrates work with certain enzymes.

37. For bacteria to continue growing rapidly when they are shifted from an environment
    containing oxygen
    to an anaerobic environment, they must
   A) increase the rate of the citric acid cycle.
   B) produce more ATP per mole of glucose during glycolysis.
   C) produce ATP during the oxidation of NADH.
   D) increase the rate of transport of electrons down the respiratory chain.
   E) increase the rate of the glycolytic reactions.

38. How does the reduction of pyruvate to lactic acid during fermentation allow glycolysis
    to continue in the absence of oxygen?
   A) Water is formed during this reaction.
   B) This reaction is a kinase reaction.
   C) This reaction is coupled to the oxidation of NADH to NAD$^+$. 
   D) This reaction is coupled to the formation of ATP.
   E) This reaction is coupled to the reduction of NAD$^+$ to NADH.

39. Yeast cells tend to create anaerobic conditions because they use oxygen more quickly
    than it can be replaced by diffusion through the cell membrane. For this reason, yeast
    cells
   A) exhibit a red pigment.
   B) exhibit a green pigment.
   C) die.
   D) produce ethanol.
   E) None of the above
40. In steps 6 through 10 of glycolysis, the conversion of one mole of glyceraldehyde 3-phosphate to pyruvate yields 2 moles of ATP. But the oxidation of glucose to pyruvate produces a total of 4 moles of ATP. Where do the remaining 2 moles of ATP come from?
   A) One mole of glucose yields 2 moles of glyceraldehyde 3-phosphate.
   B) Two moles of ATP are used during the conversion of glucose to glyceraldehyde 3-phosphate.
   C) Glycolysis produces 2 moles of NADH.
   D) Fermentation of pyruvate to lactic acid yields 2 moles of ATP.
   E) Fermentation of pyruvate to lactic acid yields 2 moles of NAD$^+$.  

41. When the supply of acetyl CoA being produced exceeds the demands of the citric acid cycle, some of the acetyl CoA is diverted to the synthesis of
   A) pyruvate.
   B) NAD.
   C) proteins.
   D) fatty acids.
   E) lactic acid.  

42. Which of the following is true of metabolic pathways?
   A) Complex chemical transformations in the cell occur in a single reaction.
   B) Each reaction in a pathway requires oxygen.
   C) Metabolic pathways in eukaryotes occur in the cytoplasm.
   D) Metabolic pathways vary from organism to organism.
   E) Each metabolic pathway is regulated by specific enzymes.  

43. When a cell needs energy, cellular respiration is regulated by isocitrate dehydrogenase, an enzyme of the citric acid cycle. This enzyme is stimulated by
   A) H$^+$.  
   B) heat.  
   C) oxygen.  
   D) ADP.  
   E) None of the above
44. NAD
   A) is a key electron carrier in redox reactions.
   B) requires oxygen to function.
   C) is found only in prokaryotes.
   D) binds with an acetyl group to form acetyl CoA.
   E) detoxifies hydrogen peroxide.

45. Which of the following are guidelines or rules dealing with on-line quizzes in BIO 121?
   A) Quizzes are "closed-book quizzes." This means you are not allowed to use your textbook, notebook, or any other resources while you take the quiz.
   B) Quizzes and answers may not be printed nor shared with other students.
   C) You may take each quiz only once; once you begin to take a quiz be sure to complete it before pressing "Submit."
   D) If you violate any of the guidelines and policies stated on the syllabus, you will receive a grade of zero on all quizzes, and therefore receive a reduction of nearly 27% in your BIO 121 grade.
   E) All of the above

46. Essay/Problem [10 pts.]
   Explain the importance of the theory of evolution in the field of biology.
   Be sure to place your answer on the answer sheet.
Answer Key

1. A
2. C
3. D
4. C
5. E
6. C
7. A
8. A
9. A
10. B
11. D
12. D
13. E
14. E
15. A
16. C
17. C
18. B
19. C
20. D
21. E
22. E
23. E
24. D
25. D
26. A
27. A
28. D
29. B
30. A
31. A
32. A
33. B
34. E
35. B
36. B
37. E
38. C
39. D
40. A
41. D
42. E
43. D
44. A
45. E

Give some thought to the answer to the essay question.