



9. Which of the following is NOT true about proteins?
- Are composed of amino acids linked by peptide bonds.
  - May function in assemblies of several polypeptide chains (multiple subunits).
  - May function as biological catalysts.
  - May function in structural support of cells.
  - Primary structure is maintained by strong hydrogen-bonding.**
10. Where would you likely find phenylalanine (hydrocarbon ring sidechain) in a mature, fully folded protein?
- In the hydrophilic central core of a globular protein.
  - On the hydrophilic surface of a globular protein.
  - In the hydrophobic central core of a globular protein.
  - In the hydrophobic transmembrane region of an integral membrane protein.
  - Both (c.) and (d.)**
11. 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
- Hydrophobic**
  - Hydrophilic
  - Charged
  - Polar
  - Filled with water
12. A *nucleotide* contains a pentose (5C) sugar, a phosphate, and a(n)
- Nothing else
  - Glycerol
  - Nitrogen-containing base**
  - Amino acid
  - Really awesome wave, Dude! ☺
13. What is the nucleotide sequence of the complementary strand of this DNA molecule: 5'-AATGCGA-3'
- 5'-TTACGCT-3'
  - 5'-AATGCGA-3'
  - 5'-GGCATAG-3'
  - 5'-TCGCATT-3'**
  - 5'-AGCGTAA-3'
14. The \_\_\_\_\_ structure of a protein relates to how separate polypeptides assemble together.
- Primary
  - Secondary
  - Tertiary
  - Quaternary**
  - Helical
15. A type of protein that functions by helping the correct folding of other proteins is called
- Foldzyme
  - Renaturing protein
  - Chaperonin**
  - Hemoglobin
  - Denaturing protein
16. Which of the following is NOT a characteristic of a prokaryotic cell?
- A plasma membrane
  - A nuclear envelope**
  - A nucleoid
  - Ribosomes
  - A cell wall
17. The amino acids of the protein keratin (in skin and hair) are arranged in an alpha-helix. This secondary structure is stabilized by
- Covalent bonds
  - Peptide bonds
  - Hydrogen bonds**
  - Polar bonds
  - Barry Bonds ☺
18. (Hypothetical situation:) In studying secretory cell function, you discover a membrane channel that couples the transport of urea against its concentration gradient out of the cells, with the spontaneous transport of potassium ions out of the cells. The potassium ions were initially concentrated in the cell by transport against their concentration gradient using a transporter protein using the energy of ATP hydrolysis. The coupled export of urea from cells along with the export of potassium ions is called.....
- Primary active symport
  - Primary active antiport
  - Primary active uniport
  - Secondary active symport**
  - Secondary active antiport
19. Ribosomes are important because they are the structures where
- Chemical energy is stored in making ATP
  - Cell division is controlled
  - Genetic information is used to make proteins**
  - Sunlight energy is captured into chemical energy
  - New organelles are made
20. Which of the following features of eukaryotic cells is NOT also found in prokaryotic cells?
- Cytoplasm
  - Ribosomes
  - Plasma membrane
  - Flagella composed of microtubules**
  - Metabolic enzymes

21. What cellular compartment is responsible for the storage, modification, and packaging of proteins for delivery?
- Rough ER
  - Smooth ER
  - Golgi Apparatus**
  - Nucleolus
  - Mitochondrion
22. Which of the following statements is NOT true about the Fluid Mosaic Model of the cell membrane?
- Membrane proteins "float" in a lipid "lake".
  - Proteins and lipids freely diffuse transversely ("flip-flop") in the membrane.**
  - Phospholipids spontaneously form a bilayer membrane in aqueous solution.
  - Proteins and lipids freely diffuse laterally in the membrane.
  - The molecular content of the phospholipid bilayers may differ between different cells in the same organism or between different organisms.
23. True or false? Placing an animal cell in a HYPOTonic solution can cause it to swell and burst.
- True**
  - False
24. Which of the following is the common transport sequence for newly-synthesized proteins or lipids destined for the plasma membrane?
- Endoplasmic reticulum (ER) → *trans* Golgi → vesicles → *cis* Golgi → vesicles → plasma membrane.
  - ER → *trans* Golgi → *cis* Golgi → vesicles → plasma membrane.
  - Trans* Golgi → *Cis* Golgi → vesicles → ER → vesicles → plasma membrane.
  - ER → vesicles → *cis* Golgi → *trans* Golgi → vesicles → plasma membrane.**
  - ER → vesicles → *trans* Golgi → *cis* Golgi → vesicles → plasma membrane.
25. Cholesterol and steroids, like other lipids, are synthesized in the
- Rough ER
  - Smooth ER**
  - Golgi apparatus
  - Nucleolus
  - Home of the Double Western Bacon Cheeseburger ☺

Fill-in the blanks with the appropriate terms (3 points each):

26. Nitrogen, with 5 electrons in its outer shell, will be most stable when it has acquired **3 electrons**.
27. The chemical group -COOH (or -COO<sup>-</sup>), which can be incorporated into large molecules, is called a **carboxy group**.
28. Glycerol may combine with three fatty acids to form a **triglyceride**.
29. Most of a plant cell's cytoplasm is taken up by its **vacuole** which supplies the osmotic pressure that supports the cell's structure.
30. The idea that eukaryotic organelles such as mitochondria and chloroplasts may have originated as free-living prokaryotes is called the **endosymbiotic theory**.

Short Essays (12 pts total): Answer **ONLY TWO** of the following questions BRIEFLY but COMPLETELY. Use diagrams when helpful.

31. (6 pts) Briefly explain how Louis Pasteur's experiments disproved the prevailing theories of the origin of life during his time, when the scientific community did not accept previous results from experiments by other scientists. Also mention how Pasteur's conclusions are consistent with the current Cell Theory.

*Work these out yourselves!!*

32. (6 pts) Describe three differences between simple diffusion and primary active transport across a biological membrane. Also, what are two properties of a transported substance that strongly affect its rate of simple diffusion across a cellular membrane?

*Work these out yourselves!!*

33. (6 pts) Explain how two different biochemical polymers, composed of the exact same monomer (such as glucose), might have very different chemical properties and biological functions (such as: easily broken down for energy, vs. strong and stable for cell structural support). Give an example, if possible.

*Work these out yourselves!!*