

The exam consists of 40 multiple guess questions and five pages. Each question is worth 2.5 points. Please bubble in your name, last name first. Please be sure you use the name with which you are registered here at UIC and not a nickname. If you only learn one thing from college, please learn that whenever you fill out one of these forms, you should use a #2 pencil. Pen just won't work. Really, it won't. Good luck!

1. Arrange the bond types below from weakest to strongest:  
A. **Hydrogen, Ionic, Covalent**      B. Hydrogen, Covalent, Ionic  
C. Covalent, Ionic, Hydrogen      D. Ionic, Hydrogen, Covalent  
E. None of the above
  2. Which of the following elements is NOT a major component of most biologically important macromolecules?  
A. Carbon      B. Nitrogen      **C. Silicon**  
D. Hydrogen      E. Oxygen
  3. Nitrogen typically can form \_\_\_\_\_ covalent bonds.  
A. Zero      B. One      C. Two      **D. Three**      E. Four
  4. When table salt (NaCl) dissolves, the bonds between the Na<sup>+</sup> ion and the surrounding water molecules is an example of a/an \_\_\_\_\_ bond  
A. **Hydrogen**      B. Ionic      C. Covalent      D. None of the above
  5. Which of the following is NOT a property of water?  
A. Water is a very polar molecule  
B. Water has a very high heat of vaporization  
**C. Water has a low heat capacity**  
D. Water has strong adhesive and cohesive properties  
E. All of the above are properties of water
  6. A lake will freeze from the top down to the bottom  
A. **True**      B. False
- This question caused more confusion than any other question, so I threw it out - everyone got credit for it*
7. In science, it is impossible to prove something to be true.  
A. **True**      B. False
  8. The picture to the right is an example of a monomer of what type of molecule?  
A. **Protein (it's the amino acid glycine)**  
B. Carbohydrate  
C. Nucleic Acid  
D. Lipid  
E. None of the above

Use the key below to answer question 9 - 12

I. Polysaccharides  
III. Proteins

II. Lipids  
IV. Nucleic Acids

9. This/these molecule(s) is/are used to store genetic information in the nucleus  
A. II only      B. III only      **C. IV only**      D. III & IV      E. None of the above
10. This/these molecule(s) is/are used in energy storage  
A. I only      B. II only      C. III only      **D. I & II**      E. II & III
11. This type of molecule comprises about 70% of your cell's dry weight  
A. I      B. II      **C. III**      D. IV
12. A cell membrane is *primarily* composed of this type of molecule  
A. I      **B. II**      C. III      D. IV
13. The arrangement of tubulin in a microtubule is an example of protein \_\_\_\_\_ structure.  
A. Primary      B. Secondary      C. Tertiary      **D. Quaternary**
14. The formation of a peptide bond is an example of:  
**A. a condensation reaction**      B. a hydrolysis reaction  
C. a proteolysis reaction      D. a peptidase reaction  
E. None of the above
15. An integral protein will typically have \_\_\_\_\_ in the portions that cross the plasma membrane  
**A. alpha helices with hydrophobic R-groups**  
B. alpha helices with hydrophilic R-groups  
C. beta-pleated sheets with hydrophobic R-groups  
D. beta-pleated sheets with hydrophilic R-groups  
E. None of the above
16. You eat food so that you can break down the food molecules to release energy. These metabolic reactions are examples of \_\_\_\_\_ reactions  
**A. exergonic**      B. endergonic      C. Not enough information to determine
17. Which of the following statements (A-D) about enzymes is FALSE? If statements A-D are true, then choose E  
A. Enzymes are very sensitive to their environmental conditions  
B. An enzyme will catalyze the forward and reverse reactions  
**C. Non-competitive inhibitors cannot bind to the enzyme**  
D. If one increases the temperature beyond the temperature optimum, the enzyme may start to denature  
E. All of the above statements about enzymes are TRUE
18. To which of the following molecules is ATP most similar in structure?  
A. A phospholipid      **B. A nucleotide**      C. An amino acid      D. A sugar
19. You would expect carbonic anhydrase, an enzyme which converts CO<sub>2</sub> to carbonic acid in the blood, to have a pH optimum of:  
A. 2      B. 5.5      **C. 7.4**      D. 9.5      E. Not enough info to determine

20. In the conversion of threonine to isoleucine (the example given for feedback inhibition), isoleucine acts as a/an \_\_\_\_\_ to Threonine Deaminase, the first enzyme in this five enzyme pathway.
- A. Substrate                      B. competitive inhibitor                      **C. non-competitive inhibitor**  
D. cofactor                      E. None of the above
21. Which of the following statements (A-D) about enzymes is FALSE. If statements A-D are true, then choose E.
- A. Enzymes are very selective  
B. The induced fit model of enzyme binding states that the substrates do not perfectly fit in the active site - binding of the substrate to the enzyme alters the conformation of the substrate  
C. Enzymes and substrates often bind to form enzyme-substrate complexes, stabilized by hydrogen and/or ionic bonds  
D. Both substrates and competitive inhibitors can bind to the active site of an enzyme  
**E. All of the above statements about enzymes are TRUE.**
22. Which of the following cell types lacks mitochondria?
- A. Onion cells                      B. Human liver cells                      **C. *E. coli* bacteria cells**  
D. Mushroom cells                      E. All of the above cell contain mitochondria
23. Which of the following is NOT a function of the cytoskeleton?
- A. Protein synthesis**                      B. Maintain cell shape and provide support  
C. Cellular movement                      D. Intracellular transport  
E. All of the above are functions of the cytoskeleton
24. All of the following features below are found in all cells except:
- A. Ribosomes                      B. DNA  
**C. Nucleus**                      D. Plasma membrane  
E. Cytoplasm
25. In which of the following structures would you expect to find the distinctive 9+2 pattern of microtubules?
- A. In a nucleoli                      **B. In a flagella**                      C. In a ribosome  
D. In a cytoskeleton                      E. None of the above
26. Which of the following is NOT part of the endomembrane system?
- A. Mitochondria**                      B. Central vacuole                      C. Golgi apparatus  
D. Peroxisome                      E. All of the above are part of the endomembrane system
27. Which of the following is NOT evidence used to support the endosymbiosis theory of mitochondrial and chloroplast origin?
- A. Mitochondria and chloroplasts contain DNA similar in structure to prokaryotes  
B. Mitochondria and chloroplasts synthesize proteins  
**C. The ribosomes in mitochondria and chloroplasts are more similar eukaryotic forms**  
D. Mitochondria and chloroplasts divide in process similar to binary fission  
E. All of the above support the endosymbiosis theory of mitochondrial and chloroplast origin
28. In which of the following cellular structures would you expect to find ribosome activity to be greatest?
- A. Lysosome                      **B. Rough ER**                      C. Smooth ER  
D. Golgi apparatus                      E. Nucleolus



