BIOLOGY 205 **Name _____**
Midterm I - 14 October 2005

Multiple choice questions – 3 points each.

1. When comparing the different levels of protein structure, which is/are best described by the occurrence of **β-pleated sheets**?

A. primary
B. secondary
C. tertiary
D. quaternary
E. all of the above

2. Which of the following is NOT a specific special property of **water**?

A. cohesive strength
B. adhesive strength
C. high heat capacity
D. more viscous to a whale than a bacterium
E. solid phase less dense that liquid

3. Of all the types of chemical bonds, which of the following is capable of the **strongest attractive force** linking atoms together?

A. van der Waals attractions
B. hydrogen bonds
C. ionic bonds
D. covalent bonds
E. organic bonds

4. Which of the following statements about **mitosis** is correct?

A. Only diploid cells can divide mitotically.
B. Crossing over can occur during prophase of mitosis.
C. Cells produced by mitosis are almost always genetically identical.
D. Each mitotically produced cell has retains less DNA than the cell that produced it.
E. At metaphase of mitosis, each chromosome has a single kinetochore microtubule attached to it.

5. In plant cells, which of the following constitutes an **analogous structure** to the extracellular matrix in the epithelial cells of animal cells?

A. cell wall
B. plasmodesmata
C. tonoplast
D. plastids
E. contractile vacuole

6. Which of the following is NOT a **fundamental concept** used throughout the study of biology:

A. emergent properties
B. spontaneous generation
C. hypothesis testing & deductive reasoning
D. natural selection
E. hierarchical organization

7. What type of polysaccharide is it that has the most **covalent cross-linking** associated with its polymerized chains?

A. cellulose
B. starch
C. glycogen
D. amylopectin
E. sucrose

8. The **nucleoli** (nucleolus if only one), aside from being a sub-component of the cell's nucleus, are best characterized by which of the following properties?

A. histone generation
B. chromosome condensation
C. membrane production
D. ribosome assembly
E. necessary for S phase

9. The second law of thermodynamics can be summed up by the idea of **entropic doom**, which of the following best fits this concept?

A. the whole is greater than the sum of the parts
B. biology occurs in a closed system
C. energy cannot be created nor destroyed
D. disorder is ever increasing
E. survival of the fittest

10. A paramecium has **special needs** when it comes to living in an aquatic environment, which of the following best describes how it deals with this problem?

A. Uses a contractile vacuole to pump water into the cell as water tends to cause lysis.
B. Uses a contractile vacuole to pump water out of the cell as water tends to cause lysis.
C. Uses a contractile vacuole to pump water into the cell as water tends to cause shriveling.
D. Uses a contractile vacuole to pump water out of the cell as water tends to cause shriveling.
E. Has decided that osmosis sucks and evolved to use a cell wall instead.

11. Consider the bonds formed by condensation reactions for the major biological polymers and/or macromolecules. Match the single best answer (using the representative number) with the statements below. The choices may be used once, more than once, or not at all **(2 points each)**.

Your choices are:

1. Nucleic acids	**3. Lipids**	**5. Produced**
2. Polysaccharides	**4. Proteins**	**6. Consumed**

_____ Phosphodiester linkage

_____ Glycosidic linkage

_____ Ester linkage

_____ Polypeptide linkage

_____ Water gets ????? during the formation of each of these bonds?

True or False – (2 points each)

_____ **12.** When plant cells undergo cytokinesis, a cell plate is produced by vesicles originating from the golgi apparatus.

_____ **13.** Microfilaments are required for the development of the cleavage furrow in animal cells.

_____ **14.** The nuclear lamina is a network of microfilaments just inside the nuclear envelope.

_____ **15.** Enzymes that show cooperativity have multiple subunits.

_____ **16.** ATP is the universal energy carrier inside the cell, getting turned over rapidly and often.

_____ **17.** The most abundance polymer on Earth is cellulose.

_____ **18.** Glycogen includes both α-1,4 and β-1,4 types of linkages.

_____ **19.** RNA is a specialized version of DNA, better at information storage.

_____ **20.** Structural isomers are described by various cis or trans arrangements about a double bond.

Short answer – Number of points in parentheses.

21. **(5 points)** Amino acids and monosaccharides each have different isomers, what type of isomer is the biologically predominant form for each **AND** name the category of isomers each of these constitute?

22. **(6 points)** Compare and contrast (i.e., one common AND one differentiating characteristic or feature) the structure and/or function of the centrosome with that of the centromere during mitosis.

23. **(6 points)** Consider the major types macromolecules that are required to build a cell. Of these, which one is NOT technically a polymer? What type of interactions are necessary to cause these macromolecules to stick together?

24. **(6 points)** What is the function of the **lysosome** inside the cell AND why is it a good idea to have both primary and secondary lysosomes, i.e., what is the difference?

25. **(6 points)** Consider the "idealized" cell. Starting on the outside of an animal cell and moving to the matrix of a mitochondrion, how many membranes would you have to cross AND what are each of their names?

26. **(5 points)** Consider the five phases of Mitosis, which phase is it that is exemplified by the separation of daughter chromosomes and can be visualized by the characteristic chevron shape of chromosomes on the move towards spindle poles?

27. **(8 points)** Briefly describe how an integral protein that is destined to be an antiporter (transmembrane function) gets constructed and transported inside the cell when it would be automatically denatured and thereby useless when exposed to the hydrogen bond interactions found in water?

28. **Extra Credit (progressive point bonus, i.e., first one wrong and game over):** Name the cytoskeleton component most responsible for the following characteristics **AND** state a good reason as to how or why it is involved with this scenario:

A. **(2 points)** causes movement of organelles from various locations inside the cell –

B. **(2 points)** responsible for cytoplasmic streaming inside a plant cell –

C. **(3 points)** chromoplast contraction causing color change in fish scale cell –