Biology 150: 2nd in-class examination October 8, 2012

Indicate the lab you are <u>registered</u> in:

<u>Tuesday, 8-9:50</u>	<u>Tuesday, 10-11:50</u>	<u>Tuesday, 12-1:50</u>
<u>Tuesday, 3-4:50</u>	<u>Tuesday, 5-6:50</u>	<u>Thursday, 3-4:50</u>

Answer the questions in the space provided and you may also use the back of the page to complete your response. There are 20 questions worth a total of 50 points (plus three points in bonus questions). The point value of individual questions appears in parentheses.

- 1) What is the defining difference between prokaryote and eukaryote cells? (1)
- 2) In general, which cell are largest plant, animal, or bacterial? (1)
- 3) As an object increases in size what happens to its surface to volume ratio? (1)
- 4) Describe the nuclear envelope. Through what structures does molecular traffic cross the nuclear envelope. (3)

- 5) Inside the nucleus, there are one or more ______ (especially darkly staining regions) where ______ are assembled from proteins and ______. The rest of the nuclear interior is filled with ______ which consists of a ~50/50 mixture of protein and ______. (5)
- 6) What organelle is physically attached to the nuclear envelope? This organelle is often composed of two types. What are they and what occurs in each? (3)

Name____

7) The cisternal maturation model describes events in what organelle? Describe the model with reference to the cis and trans faces. (3)

8) What is meant by the endomembrane system of the cell (3) What structures are conspicuously not part of the endomembrane system? (3)

9) What are lysosomes? How do primary lysosomes differ from secondary lysosomes? (3)

10) The endosymbiosis theory explains the existence of what two organelles? What evidence supports this idea? (4)

11) What distinguishes microbodies from other types of organelles? (1)

- 12) Intermediate filaments are composed of what type of protein and serve what general function in cells? (2)
- 13) In muscle cell contraction microfilaments, composed of the protein ______, are pulled together by motor proteins called ______. The energy for this movement is provided by hydrolysis of the molecule ______. The action of the motor protein requires the presence of the ion ______ which is released into the cytoplasm following electrical messages to the muscle cell from the nervous system. (4)
- 14) Movement of atoms, molecules, or particles from regions of high concentration to regions of low concentration is called ______. (1)
- 15) Name the currently accepted model for the structure of the cell membrane. (1)
- 16) Plant cells placed in an isotonic solution will retain a constant amount of water. In a _______ solution, however, they lose water and, pulling away from their cell walls become ______. (2)
- 17) Facilitated transport permeases are divided into what two types? Describe each mentioning, where appropriate, selectivity filters, gating (and types) and conformation changes. (5)

18) Describe how the Na^+/K^+ pump is electrogenic. (2)

19) What does the 1st law of thermodynamics state? (1)

20) What does the 2^{nd} law of thermodynamics state? (1)

Bonus questions:

(1) Some commercially available "ice packs" are activated by striking them with the palm of the hand. This force ruptures a thin membrane separating water from ammonium nitrate (NH₄NO₃) or ammonium chloride (NH₄Cl). The resulting reaction (NH₄NO₃ + H₂O \rightarrow NH₄⁺ + NO₃⁻) turns the ice pack cold. For the reaction (NH₄NO₃ + H₂O \rightarrow NH₄⁺ + NO₃⁻), which of the following are negative and which positive? ΔG ______, ΔH ______, and ΔS ______(1)

(2) Are cotransporters engaged in active or passive transport? Justify you answer. (2)