

- 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 2nd 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 (NH_4NO_3) or ammonium chloride (NH_4Cl). The resulting reaction ($\text{NH}_4\text{NO}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{NO}_3^-$) turns the ice pack cold. For the reaction ($\text{NH}_4\text{NO}_3 + \text{H}_2\text{O} \rightarrow \text{NH}_4^+ + \text{NO}_3^-$), which of the following are negative and which positive?

ΔG _____, ΔH _____, and ΔS _____ (1)

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