WHAT YOU NEED TO KNOW ABOUT CELLS, CELL MEMBRANES AND CELL SIGNALING

* **Explain why surface area-to-volume ratios are important in affecting a biological system’s ability to obtain necessary resources or eliminate waste products.**
* **Explain why smaller cells have a more favorable surface area-to-volume ratio for exchange of materials with the environment**
* **Diagram the endomembrane system of eukaryotic cells.**
* **Describe ribosome structure and function.**
* **Describe the two types endoplasmic reticulum (ER) in both structure and function.**
* **Describe the Golgi complex structure and their function**
* **Describe mitochondria structure and function.**
* **Describe lysosome structure and function**
* **Describe a vacuole structure and function**
* **Compare the cellular organization of prokaryotic and eukaryotic cells.**
* **Compare the structural similarities and differences of prokaryotic and eukaryotic cell walls, chromosomes and ribosomes.**
* **Explain the structure and function relationship in the chloroplast.**
* **Explain what chlorophyll is and why they are important.**
* **Explain the structure and function relationships between chloroplasts and mitochondria**
* **Relate structural and functional evidence in chloroplasts and mitochondria to the endosymbiotic theory of their origins. Explain how internal membranes facilitate simultaneous occurrence of diverse cellular processes.**
* **Using the examples from below to explain how membranes and membrane-bound organelles in eukaryotic cells localize (compartmentalize) intracellular metabolic processes and specific enzymatic reactions.** 
  + **Endoplasmic reticulum**
  + **Mitochondria**
  + **Chloroplasts**
  + **Golgi**
  + **Nuclear envelope**
* **Describe passive transport and explain its role in cellular systems**
* **Explain how membrane proteins play a role in facilitated diffusion of charged and polar molecules in general and in relation to the specific molecules below.**
  + **Glucose transport**
  + **Na+/K+ transport**
* **Explain the terms: hypotonic, hypertonic or isotonic in relationship to the internal environments of cells.**
* **Describe active transport.**
* **Explain the relationship between active transport, free energy and proteins embedded in the membrane.**
* **Describe the processes of endocytosis and exocytosis.**
* **Explain the role of the cell membrane?**
* **How is selective permeability related to the fluid mosaic model.**
* **Describe the components of the Cell membranes**
* **What properties do Phospholipids give the membrane?**
* **Describe the orientation of phospholipids in a cell membrane.**
* **Describe the chemical characteristics of membrane proteins, and how this effects their position in the membrane.**
* **Describe the movement of the following through the membrane: Small, uncharged polar molecules, small nonpolar molecules (e.g. N2), Hydrophilic substances (e.g. large polar molecules and ions), and water.**
* **Describe the function of the cell walls.**
* **Describe the composition and location of plant cell walls.**
* **Describe the composition and location of cells walls of prokaryotes and fungi**
* **Describe how signals are received by cells.**
* **List the types of different chemical messengers and explain the specific one-to-one relationship with their receptors.**
* **Using an example to explain how a receptor protein recognizes signal molecules, causing the receptor protein’s shape to change, which initiates transduction of the signal.**
* **Describe the process of signal transduction.**
* **Explain the concept of signaling cascades.**
* **Use an example to explain how second messengers are often essential to the function of a signaling cascade.**
* **Explain the effects of protein modifications on the signaling cascade**
* **Explain the effects of phosphorylation on the signaling cascade.**
* **Use an example to explain how cells communicate by cell-to-cell contact.**
* **Use an example to explain how cells communicate over short distances by using local regulators that target cells in the vicinity of the emitting cell.**
* **Explain how signals released by one cell type can travel long distances to target cells of another cell type.**
* **List the types of signals involved in communication and where they come from.**
* **Describe why signal transduction pathways that are under strong selective pressure.**
* **Use an example to explain how signal transduction pathways influence how the cell responds to its environment in unicellular organisms.**
* **Using an example to explain how signal transduction pathways coordinate the activities within individual cells that support the function of the organism as a whole in multi-cellular org**