**Unit 2: Cells, Membranes and Cell Transport Chapters: 6, 7, 12, & 36**

**Key Concepts**

* Cells are the fundamental units of life
* Understand how organelles localize reactions and promote efficiency
* Understand the cell cycle and the key differences between interphase and mitosis
* Understand how cell membranes are important to the functioning of eukaryotic cells
* Plant cells are special and have unique characteristics
* Understand the important connections between organisms in ecosystems in regards to nutrient cycles.



**Key Terms:**

Active Tranport

Adhesion

Amphipathic

Aquaporins

Binary Fission

Cell Cycle

Cell Wall

Centrioles

Centromere

Centrosome

Cholesterol

Chloroplast

Chromosomes

Chromatin

Cilia

Cleavage Furrow

Concentration Gradient

Cohesion

Cytokinesis

Cytoplasm

Cytoskeleton

Cytosol

Diffusion

Endocytosis

Endoplasmic Reticulum (ER)

Endosymbiotic Theory

Eukaryotic

Exocytosis

Facilitated Diffusion

Flagella

Fluid Mosaic Model

Genome

Glycolipids

Glycoproteins

Golgi Apparatus

Guard Cells

Hypertonic

Hypotonic

Interphase

Isotonic

Ligand

Lysosome

Metaphase Plate

Microfilaments

Mirotubules

**Essential Knowledge:**

**Compartments in Cells (2.B.3)**

* Using examples e.g. **endoplasmic reticulum**, **chloroplast,** **mitochondria**, **golgi apparatus** or **nuclear envelope** describe the roll of cell membranes in localizing metabolic processes within the cell.
* Describe the structure of a **prokaryotic cell** recognizing the **nucleoid** region and cell wall**.**

**Subcellular Components (4.A.2)**

* Describe the importance of the **ribosomes** and the difference between free and attached ribosomes.
* Describe the structure of the **endoplasmic reticulum** (ER), distinguish between rough and smooth and relate the structure to the function of each one.
* Describe the structure of the **golgi apparatus** (complex) and relate this to its function. Where do the exports from this complex go?
* Describe the structure of the **lysosome** including their role in apoptosis
* Describe the structure of and function of the **vacuoles**, compare the difference in plant and animal cells and describe how it can account for differences in these two cells
* Describe the structure and function of the **chloroplasts** and other **plastids**.
* Distinguish between **microfilaments** and **microtubules**. Explain their role in eukaryotic organelles such as the **flagella**, **centrioles**, and **cytoskeleton**.
* Describe the **endosymbiotic theory** in relation to **chloroplasts** and **mitochondria**

**Structure of the Cell Membrane (2.B.1, 4.A.1)**

* Describe the general role of the **plasma membrane** in the cell
* Describe the **fluid mosaic model** including the significance of the **amphipathic** character of the phospholipids that make up the framework of the membrane.
* Describe the function of **transmembrane proteins**, **glycoprotein**s, and **glycolipids**.
* Describe the significance of **cholesterol** in the cell membrane and how it can lead to evolutionary adaptations in certain organisms.
* Explain how properties of embedded proteins contribute to the selectively permeable nature of the membrane. Include **channel proteins**, **carrier proteins** and **aquaporins.**
* Describe and evaluate the experimental evidence that led to the current model of membrane structure
* Distinguish between the **plasma membrane** and the **cell wall** of plants, bacteria, algae and fungus. Make sure you understand the location of the cell wall in relation to the cell membrane.

**Key Terms:**

Mitochondria

Mitosis

Nitrogen Fixation

Nucleolus

Nucleoid

Nucleus

Nuclear Envelope

Osmosis

Passive Transport

Phagocytosis

Phloem

Plasma Membrane

Plasmolysis

Prokaryotic

Ribosomes

Rough ER

Sister Chromatids

Smooth ER

Somatic Cells

Stomata

Surface Area

Transpiration

Turgor Pressure

Organelles

Vacuoles

Vesicles

Water Potential

Xylem

**Transport Across Membranes (2.B.2)**

* Describe and explain the difference between **diffusion**, **facilitated diffusion**, and **osmosis**. Explain why these processes are considered **passive transport**. Explain factors that can affect diffusion rate across membranes such as membrane thickness, **surface area** and **concentration gradients**.
* Explain the role of **passive transport** in getting necessary materials into cells. Using an example such as glucose (a polar molecule) entering a cell, explain how the membrane proteins are involved.
* Explain why cell size is limited. Use specific examples from your lab.
* Explain **turgor** and **plasmolysis** in plant cells. With respect to the solutions explain **hypotonic**, **isotonic**, and **hypertonic**. Describe what happens to a cell in each solution and explain why.
* Distinguish between passive and **active transport**. Identify membrane proteins that may be involved in each process.
* Using examples describe and explain **active transport** processes including **ion pumps**, **endocytosis**, **exocytosis**, **phagocytosis** and **pinocytosis**.

**Plant structure in Relation to Function (4.A.4, 2.B.2)**

* Explain how water moves through a plant from the roots to the leaves. Identify factors that affect **transpiration.** Describe the function of the **xylem** and **phloem** tissue in terms of movement of substances in plants. Include the role of **adhesion** and **cohesion** of water molecules.
* Describe the roll of the **stomata** and explain the movement of gasses into and out of the leaf. Explain how **guard cells** regulate water loss by opening and closing the stomata.

**Movement of Matter in Ecosystems (4.A.6)**

* Describe the roll of nutrient cycles in ecosystems.
* For the Nitrogen cycle explain **nitrogen fixation**, **denitrification,** and **assimilation of nitrogen**. Explain the role of decomposers in this process as well as how humans can impact this important cycle.

**The cell Cycle and Mitosis (4.A.4, 2.B.2)**

* Describe the **cell cycle** in Eukaryotes recognizing the stages of **interphase** and **mitosis**. Describe the events that take place during the 3 stages of interphase
* Explain how the cell cycle is regulated by internal controls and external controls. Describe the role of **cyclin-dependent kinases** (cdk’s). Explain what happens when cells grow out of control
* Recognize that **differentiation** of cells into specialized cell types involves controlled modifications in gene expression.
* Describe the role of **mitosis** in growth and repair and asexual reproduction
* Recognize and summarize the events occurring in each stage of mitiosis; **prophase**, **prometaphase**, **metaphase**, **anaphase**, and **telophase**
* Explain **cytokinesis** and how it is different in plants and animal cells
* Explain the difference between **chromatin**, **chromosome**, and **sister chromatids**
* During mitosis understand the role of the **centrioles**, **centromere**, and **centrosome**. Explain the different types of **spindle fibers** and their function during the process of mitosis.