**Cells and Transport KUDs:**

The student will KNOW:

* The functions of important cell organelles
* The difference between prokaryotes and eukaryotes
* The difference between plant and animal cells
* How the cell membrane works to maintain homeostasis
* The structure of the fluid mosaic model of the plasma membrane How magnification works in a microscope
* The difference between the DNA structure of a prokaryote vs. eukaryote
* The purpose of the Miller-Urey Experiment and how it was set up
* How endosymbiosis occurs to lead to the formation of cellular organelles

The student will UNDERSTAND:

* That cells are building blocks of organisms
* That organelles’ structure fits their function
* That the functions of organelles articulate with that of other organelles to carry out the life processes of cells
* That cellular processes are responsible for maintaining the life of the organism
* That without electron microscopes, the cell would still be a “black box”
* That cells evolved in stages through multiple processes

The student will be able to:

* Predict water and other particle movement to attain equilibrium using concentration gradients
* Predict what will happen to cells if equilibrium can’t be reached
* Describe the role of bound and integral proteins in cell marking, transport, and communication
* Recognize organelles on a diagram
* Calculate the total magnification of each objective on a microscope
* Use a microscope safely and correctly
* Distinguish between prokaryotes and eukaryotes on a diagram
* Distinguish between plan and animal cells on a diagram
* Compare and contrast active and passive transport mechanisms and predict when each will be used
* Equate ATP with cellular energy for active transport

**From the NC Essential Standards:**

**Bio.1.1.1**

• Identify these cell organelles (including the nucleus, plasma membrane, cell wall, mitochondria, vacuoles, chloroplasts, and ribosomes) in diagrams of plant and animal cells. (middle school review)

• Explain how the structure of the organelle determines it function. (Example: folded inner membrane in mitochondria increases surface area for energy production during aerobic cellular respiration).

• Summarize how these organelles interact to carry out functions such as energy production and use, transport of molecules, disposal of waste, and synthesis of new molecules. (Example: DNA codes for proteins which are assembled by the ribosomes and used as enzymes for energy production at the mitochondria).

**Bio.1.1.2**

• Proficiently use proper light microscopic techniques as well as determine total power magnification. The purpose is to use microscopes to observe a variety of cells with particular emphasis on the differences between prokaryotic and eukaryotic as well as plant and animal cells. While students are not expected to understand how scanning and electron transmission microscopes work, they should recognize that they reveal greater detail about eukaryotic and prokaryotic cell differences.

• Infer that prokaryotic cells are less complex than eukaryotic cells.

• Compare the structure of prokaryotic and eukaryotic cells to conclude the following:

▪ Presence of membrane bound organelles – mitochondria, nucleus, vacuole, and chloroplasts are not present in prokaryotes

▪ Ribosomes are found in both.

▪ DNA and RNA are present in both, but are not enclosed by a membrane in prokaryotes. ▪ Contrasts in chromosome structure – circular DNA strands called plasmids are characteristic of prokaryotes.

▪ Contrasts in size – prokaryotic cells are smaller.

**Bio.1.2.1**

• Explain how cells use buffers to regulate cell pH and how cells can respond to maintain temperature, glucose levels, and water balance in organisms.

• Compare the mechanisms of active vs. passive transport (diffusion and osmosis).

• Conclude how the plasma membrane structure functions.

• Explain changes in osmotic pressure that occurs when cells are placed in solutions of differing concentrations

**Bio.3.4.1**

• Summarize the hypothesized early atmosphere and experiments that suggest how the first “cells” may have evolved and how early conditions affected the type of organism that developed (first anaerobic and prokaryotic, then photosynthetic, then eukaryotic, then multicellular).