**UNIT 2: Cells Guide**

**Unit 2 Vocabulary:**

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| **Word** | **Parts/meaning of word, if any** | **Definition** | **Picture example if any** |
| Eukaryotic cell | Eukaryotic  Eu=  Kary= |  |  |
| Prokaryotic cell | Prokaryotic  Pro=  Kary= |  |  |
| Organelles |  |  |  |
| Diffusion |  |  |  |
| Osmosis |  |  |  |
| Cell Cycle |  |  |  |
| Chromosomes |  |  |  |
| DNA/RNA |  |  |  |

**OLS Lesson 1: The Cell**

* Students will discover how the cell exhibits the characteristics of living organisms: growing, reproducing, obtaining and using energy, adapting to the environment. Further instruction will lead students to compare and contrast cell types.

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| **Essential Questions** | **Main Concepts** | |
| **Words to know:**  Cytoplasm  Nucleus  *How is the cell the basic unit of structure and function in all living things?*  *What events helped the ‘cell theory’ develop over time?*  *How do cells arise from pre-existing cells?*  *How do the parts of a cell function for the cell to live, grow, and reproduce?* | The cell is the most basic structure that exhibits the characteristics of life and meets the challenges of life.  A cell grows, divides (reproduction), has homeostasis, metabolism, passes on genetic info, and responds to stimuli.  **Scientific Theory:**  A theory is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Microscope invented in 1600’s allowed scientists to begin to examine and describe cells  **Cell Theory: (See timeline in OLS)**      **Parts of a Cell:**    **Nucleus**- contains the genetic information  **Cytoplasm**- surrounds the nucleus and contains [organelles](javascript:%20K12.Activity.showPopup('268D8EB1-511A-E0F8-03AF-2F5C842DD43A.html',%20420,%20280,%20'organelles');)  **Organelles**- perform the different functions the cell needs to meet the challenges of life  **Plasma membrane**- surrounds the cell and separates its contents from the outside world. | |
| **Essential Questions**  **OLS Lesson 2: Differing Cells** Students will define and describe prokaryotic and eukaryotic cells. | **Main Concepts** |
| **Words to know:**  Cilia  Flagella  Pili  Plasma membrane  Plasmid  Ribosome  *How do prokaryotic and eukaryotic cells differ?*  *Give examples of prokaryotic cells and eukaryotic cells*  *How do cells move around their environment?* | * Prokaryotic cells are ­­­­­­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or other membrane-enclosed structures. * Prokaryotic cells are surrounded by a\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ and some have \_\_\_\_\_ \_\_\_\_\_\_\_ \_ \_\_\_\_\_\_\_\_\_\_\_\_\_. * *Pili (hairs:)* for \_\_\_\_\_\_\_\_\_\_ and * *Flagella* (*whiplike structures*)for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * \_\_\_\_\_\_\_\_\_\_\_\_ is an example of a prokaryotic cell * Has genetic material in the region of the cytoplasm called the \_\_\_\_\_\_\_\_\_\_ and also structures called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.      * **Eukaryotes** are larger, more complex cells * Can be single-celled or multicellular organisms   \_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_ cells are examples of eukaryotic cells   * Contains a \_\_\_\_\_\_\_\_\_\_, where the genetic material is found * May have *cilia* or *flagella* to help move around * Eukaryotes contain membrane bound organelles |

**OLS Lesson 3: Cell Organelles**

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| **Essential Questions** | **Main Concepts** |
| **Words to know**:  Cytoskeleton  Endomembrane system  *How do the structures within the cell help the cell to function and meet the challenges of life?*  **Nucleus:** The brain of the cell (contains genetic info for cell)  **Nuclear membrane**: double layered membrane surrounding nucleus  **Cytoplasm:** Jelly like substance that cushions organelles and keeps them in place.  **Endomembrane system:** Includes nuclear membrane and network of membranes in cell, transports materials around the cell. Produces, Sorts and Packages.  **Mitochondria:** Power plants of cells, cellular respiration (energy conversion) takes place here  **Ribosomes:** protein factories of cells  **Flagella:** Helps cells move through fluid  **Cytoskeleton:** “Cell skeleton” – system of fibers and tubes that gives the cell structure and support  **Plasma membrane:** Gate keeper of cell  **Cell wall:** Found in plant cells – provides extra support and structure  **Chloroplast:** Found in plant cells. Convert sunlight into energy-this process is photosynthesis.  Good review!  Cells, cells, they’re made of Organelles!  <http://www.youtube.com/watch?v=-zafJKbMPA8> | The structures within a cell that perform specific functions are known as *\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*  What is the purpose of these organelles in the cell? *\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*  The genetic material of a prokaryotic cell is found in the \_\_\_\_\_\_\_\_\_\_\_\_ and the genetic material of a eukaryotic cell is found in the \_\_\_\_\_\_\_\_\_\_\_\_\_.  The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_are the power plants of the cell, converting sugar and other fuels into a form of energy the cell can use.  Eukaryotic cells have membrane-bound \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the protein-assembly factories of the cell, are present in prokaryotic cells, animal cells, and plant cells.  In plant cells, conversion of light energy into chemical energy occurs in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Cells can move around using one or more long \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ or many shorter \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Materials are transported around the cell by the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Both prokaryotic and eukaryotic cells have a \_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ that surrounds their \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  The \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ gives shape, structure and support to a cell. |

**OLS Lesson 6: DNA to RNA to Proteins**

Students will model how information in DNA is transferred to the site of protein synthesis **(flow of genetic information)**, and the essential role of DNA in almost all cell functions and structure.

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| **Essential Questions** | **Main Concepts** |
| **Words to know:**  DNA RNA  Proteins  *What is DNA?*  *Why are proteins important to the body?*  *How do the DNA instructions get from the nucleus to the ribosome?*  *What is the relationship between DNA, RNA, and proteins?*  *What is the role of DNA in almost all cell functions and structure?*    They Might Be Giants Cells: What is that “twisted ladder”?  <http://www.youtube.com/watch_popup?v=ZK6YP1Smbxk&vq=medium>  [DNA Transcription 1:53](http://www.youtube.com/watch?v=5MfSYnItYvg)  <http://www.youtube.com/watch?v=5MfSYnItYvg> | \_\_\_\_\_\_\_\_ is the genetic material for all living things on earth.  Proteins are the workers of your body and are made up of a sequence of amino acids.  The instructions in the DNA are transported from the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to the ribosomes in the cytoplasm by \_\_\_\_\_\_\_\_\_\_\_\_\_\_.  The instructions are used to assemble the cell’s \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_at the ribosomes.    The sequence of DNA determines the sequence of building blocks in the proteins.  The genetic information in the cell flows from  \_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_ to \_\_\_\_\_\_\_\_\_\_\_\_\_. |
| Essential Questions  **OLS Lesson 7: Plant and Animal Cells** In this lesson, students will identify structures that differentiate plant and animal cells | **Main Concepts** |
| *What structures and functions differentiate plant and animal cells?* | * One of the most important differences between plant cells and animal cells is the way they obtain energy. * Plant cells make their own food through \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.   **Looking at the cell models below, draw an arrow to the organelles found in both cell types.**    **List the structures found in *animal cells* but not in plant cells**  **List the structures found**  **in *plant cells* but not in animal cells:**    **Plant cells have:**  **Animal cells have:**   1. **\_\_\_\_\_\_\_\_\_\_** 2. **\_\_\_\_\_\_\_\_\_\_** 3. **\_\_\_\_\_\_\_\_\_\_** 4. **\_\_\_\_\_\_\_\_\_\_** 5. **\_\_\_\_\_\_\_\_\_\_** |

**OLS Lesson 8 and 9: Cells and Energy/Diffusion and Osmosis** Students will learn how energy is converted and released in plant and animal cells through the process of cellular respiration (in both) and photosynthesis (in plants)

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| **Essential Questions** | **Main Concepts** |
| **Words to know:**  Mitochondria  Cellular Respiration  Photosynthesis  Osmosis  Diffusion  Concentration  *How do cells meet the challenge of obtaining and using energy?*  *What role does the mitochondria and chloroplasts have in converting and releasing stored energy in cells?*  *What role does the cell membrane play in the movement of molecules entering and leaving the cell?*  *Through which processes does the cell membrane regulate what goes into and out of the cell?*  Inner Life of a Cell: <http://www.youtube.com/watch_popup?v=wJyUtbn0O5Y&vq=medium>  Brainpop: Photosynthesis and respiration: <http://glencoe.mcgraw-hill.com/sites/dl/free/0078600472/164155/00053412.html>  Diffusion and osmosis interactive: <http://www.bbc.co.uk/schools/gcsebitesize/science/add_ocr_gateway/green_world/diffusionact.shtml>  **Diffusion:** The overall movement of molecules from a region of higher concentration  to a region of lower concentration between the two regions | Cells in Living things need energy to  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Cellular Respiration:   * Takes place in the \_\_\_\_\_\_\_\_\_\_\_\_\_of both animal and plant cells * The products of cellular respiration are \_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ * Some energy released is as ATP which is used to carry on other activities, such as the building and repairing of cells   **Glucose + Oxygen = Carbon Dioxide + Water + ATP**  Photosynthesis:   * Takes place in the \_\_\_\_\_\_\_\_\_\_ of plant cells, converting *light energy* into *chemical energy* * Product of photosynthesis are \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_   **Sunlight + CO2 + Water = Glucose and Oxygen**  The \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ controls what substances pass in and out of the cell.  Plant and animal cells use the process of  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in regulating and transporting substances in and out of the cell  The process of diffusion is the movement of atoms and molecules from an area of \_\_\_\_\_\_\_\_ concentration to an area of \_\_\_\_\_\_\_\_\_\_ concentration and is important in maintaining HOMEOSTASIS.  The movement of **water** across the cell membrane is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |

**OLS Lesson 10 and 11: Cell Division and Mitosis**

Students will explore the process of mitosis and how cells divide and grow. The importance of Cell Division: makes it possible for organisms to grow larger, allows organisms to repair injured tissue, and organisms also reproduce through cell division processes.

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| **Essential Questions** | **Main Concepts** |
| **Words to know:**  Cell cycle  Chromosomes  Cytokinesis  Meiosis  Mitosis  Anaphase  Centromere  Chromatids  Metaphase  Prophase  Spindle  telophase  *What is the purpose and process of* ***cell division****?*  **Stages of the cell cycle:**      **Fill in-------🡪**  **Cell Division Music videos:**  [**https://www.youtube.com/watch?v=BTicXXxzQA4&playnext=1&list=PL6EBC94D555A66673&feature=results\_video**](https://www.youtube.com/watch?v=BTicXXxzQA4&playnext=1&list=PL6EBC94D555A66673&feature=results_video)  **Cell Division Video from K12**  [**http://k12.http.internapcdn.net/k12\_vitalstream\_com/CURRICULUM/375392/CURRENT\_RELEASE/MS2\_LIF\_02\_11\_VID\_Cell\_Mitosis.html**](http://k12.http.internapcdn.net/k12_vitalstream_com/CURRICULUM/375392/CURRENT_RELEASE/MS2_LIF_02_11_VID_Cell_Mitosis.html) | The cell theory states that all new cells come from other cells.  Multicellular organisms increase the number of their cells through \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Why is cell division important?  The genetic material of a cell is found in structures located in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.  Why must a cell copy its chromosomes before it can go through mitosis? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   * Cell that divides is called a *\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_*. * The two new cells are called *\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_.* * In \_\_\_\_\_\_\_\_, each daughter cell receives a complete copy of the parent cell’s genetic material. * The \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_ is the sequence of growth and division of a cell. * Before mitosis, the parent cell grows and makes a copy of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_in the nucleus. * During *mitosis*, the genetic material is divided between the daughter cells. * Cytokinesis is the part of the cell cycle when the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of the parent cell is divided between the daughter cells.   **Chromatids-**the two copies of a duplicated chromosome that will eventually end up in separate cells  **Centromere-** the place where two sister chromatids join in a chromosome before it divides  ***Prophase***:  ***Metaphase:***  ***Anaphase:***  ***Telophase:*** |

