

**Cell City**

Fill in the following table as you read “Cell City”.

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| **Organelle** | **City Component** | **Reasoning** |
| Nucleus  |  |  |
| Ribosome |  |  |
| Endoplasmic Reticulum |  |  |
| Cell Membrane/Wall |  |  |
| Cytoplasm |  |  |
| Golgi Apparatus  |  |  |
| Chloroplasts |  |  |
| Mitochondria |  |  |
| Lysosomes |  |  |
| Vacuoles |  |  |

**Cell City**

***Think of the cell as a microscopic city. Like a real city it requires many services to keep it clean and running smoothly. Think of some of the services a real city needs: traffic control, waste disposal, and authority figure just to name a few. Like our imagined city a cell needs the same services. Organelles are the “workers” that provide these services. The following is a list describing the various functions of some common organelles.***

 **The NUCLEUS (“mayor of city hall”)**

The nucleus houses the majority of genetic material of a cell. The nucleus is the “brain” of the cell and controls all activity within the cell. Using DNA as a blueprint (like the blueprints of a city) the nucleus directs the production of proteins.

**RIBOSOMES (“lumber or brick yard”)**

The ribosomes carry out manual labor in the form of protein synthesis for the nucleus. They bring together all the raw ingredients such as RNA (copies of the original DNA blueprints) and amino acids to assemble proteins. The proteins created are essential to cell and organismal function. Think of proteins as machinery for cell functions much like electricity and plumbing are essential in a real city.

**The ENDOPLASMIC RETICULUM (“highways and road systems”)**

 There are two types of endoplasmic reticulum (ER) – Smooth ER and Rough ER. This extensive network makes up approximately one half of all membranous tissue of the cell and is the site of membrane and protein synthesis. The ER system is much like a road system along which industry can be found. Goods are manufactured and shipped to needed areas via the road system. Rough ER is named for the presence of ribosomes along its membrane and is the source of proteins. Smooth ER lacks ribosomes and is responsible for lipid synthesis and processes a variety of metabolic processes such as drug detoxification.

**CELL MEMBRANE (“City Border”) and CELL WALL (“City Wall”)**

Cell membranes are found in animal cells whereas cell walls are found in plant cells. Cell walls and membranes have similar functions. Like a city perimeter, cell membranes surround the cell and have the ability to regulate entrance and exit of substances, thereby maintaining internal balance. These membranes also protect the inner cell from outside forces.

**CYTOPLASM (“lawns and parks”)**

Cytoplasm is a semi-fluid substance (think gelatin) found inside the cell. The cytoplasm encases, cushions and protects the internal organelles. It is the cell landscape found in any space where organelles are not and therefore is much like the lawns and parks of our city.

**GOLGI APPARATUS (“post office”)**

 Like a post office, the golgi apparatus is used for shipping those goods created by the ER and ribosomes to the rest of cell.

**CHLOROPLASTS (“solar energy plant”)**

Chloroplasts are organelles found only in plant cells. Like a solar energy plant they use sunlight to create energy for the city. Chloroplasts are the site of photosynthesis a process in which the plant uses carbon dioxide, water and sunlight to create energy in the form of glucose for the plant cell as well as heterotrophs that consume the plant.

**MITOCHONDRIA (“energy plant”)**

Mitochondria are found in both plant and animal cells and is the site of cellular respiration. Through this process that ATP is created which is used for energy by the cell.

**LYSOSOMES (“waste disposal and recycling”)**

The lysosomes are digestive sacs that can break down molecules in the cell using the process of hydrolysis. The digestion is carried out with lysosomal enzymes found in the lysosome. Like waste disposal in a city, lysosomes help keep excessive or bulky molecules from building up in the cell.

**VACUOLES and VESICLES (“warehouses, water towers or garbage dumps”)**

Think of these membrane sacs that have a variety of functions as containment units for anything in excess in a city. They can hold many substances from organic molecules to simple excess water. Plant cells have a central vacuole that is important in maintaining plant turgidity.