**Purpose/Objectives:**

You will be given several different food items representing the different organelles or cell structures found in plant and animal cells. Using these items you will work with your lab partners to construct edible models of both a plant and an animal cell complete with a key of organelle functions. By the end of this exercise, you should be able to:

- Identify the role of the cell wall, cell membrane and nucleus in the cell.
- Name the organelles found in cytoplasm and describe their functions.
- Describe how plant and animal cells differ.

**Background:**

You are composed of cells. **Cells** are the basic units of both structure and function in all living things. Just like larger organisms, cells carry out all the necessary life processes such as obtaining oxygen, acquiring food, and removing wastes. Cells contain **organelles** that have very specific functions, similar to the organs in your body.

All cells have a **cell membrane**, which forms a barrier to separate the cell from its environment. This membrane controls which substances can move into and out of the cell. The cell membrane surrounds a gel-like fluid called **cytoplasm**, which is the medium that holds all the organelles of the cell. The large **nucleus** of a cell is similar to your brain because it functions as the cell’s control center. The nucleus contains genetic material that is used as instructions for directing cell functions. **Endoplasmic reticulum (ER)** surrounds the nucleus and helps to form and move proteins throughout the cell. Sometimes there are ribosomes attached to the ER. **Ribosomes** produce proteins and can also be found floating elsewhere in the cytoplasm. The **golgi body** receives materials from the ER and packages them for transport to other parts of the cell. The “powerhouses” of the cell are the **mitochondria**, which convert food energy to usable energy. Water, food, and other materials are stored in **vacuoles**. **Lysosomes** are the clean-up crew of the cell. They contain chemicals that break down old cell parts so they can be used again.

Plant cells differ from animal cells in a few ways. For structural support, plant cells have a rigid **cell wall** surrounding the membrane. Because animal cells lack this cell wall, they have a **cytoskeleton**, a framework of proteins that supports the cell and gives it shape. Additionally, plant cells contain **chloroplasts**, which capture light energy from the sun and manufacture food. Chloroplasts are also what make plants green.
**Vocabulary:**

<table>
<thead>
<tr>
<th>Cell</th>
<th>Nucleus</th>
<th>Golgi body</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organelle</td>
<td>Cytoplasm</td>
<td>Chloroplast</td>
</tr>
<tr>
<td>Cell wall</td>
<td>Mitochondria</td>
<td>Vacuole</td>
</tr>
<tr>
<td>Cytoskeleton</td>
<td>Endoplasmic reticulum</td>
<td></td>
</tr>
<tr>
<td>Cell membrane</td>
<td>Ribosome</td>
<td>Lysosome</td>
</tr>
</tbody>
</table>

**Materials:**

Per Group:
- 1 rice cake and 1 graham cracker (base for the models) on paper plates
- Frosting (cytoplasm) and a plastic knife
- Various food items (graham crackers, jelly beans, sprinkles, gummies, gumballs, etc.)
- Paper plates and bowls
- Plastic gloves

**Methods/Procedure:**

You will be assigned to a group of 4 students. Within your group, determine which pair will construct the model of a plant cell and which pair will construct the model of an animal cell.

**Do NOT eat any of the materials until given permission by your instructor!**

1. Collect food items to represent the following organelles or structures in your models:
   - Cell wall
   - Cell membrane
   - Nucleus (1 for each model)
   - Mitochondria
   - Endoplasmic reticulum
   - Ribosomes
   - Golgi bodies
   - Chloroplasts
   - Vacuoles
   - Lysosomes

2. Use the graham cracker base for the plant cell model, and the rice cake base for the animal cell model.

3. Label your paper plate with the correct cell type (plant or animal) and your names.

4. Spread frosting evenly over the base to represent the cytoplasm.

5. Assemble your model by sticking the appropriate “organelles” into the “cytoplasm,” showing correct spatial relationships between different types of organelles.

6. Complete the Organelle Function Key with a summary of the main function for each organelle or structure. You may use your book as a resource but do **NOT** copy.

7. After both models are completed, ask your instructor to take a picture of the models.

8. Discuss and answer the following questions with your group.
### The Incredible Edible Cell

Name: _____________________ Period: ____

**Organelle Function Key**

<table>
<thead>
<tr>
<th>Organelle/Structure</th>
<th>Food Item</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cell Wall</td>
<td>Graham crackers</td>
<td>Helps to protect and support the cell</td>
</tr>
<tr>
<td>Cell Membrane</td>
<td>Fruit by the Foot</td>
<td>Controls what substances come into and out of the cell</td>
</tr>
<tr>
<td>Nucleus</td>
<td>Mallow-pumpkins</td>
<td>Is the cell’s control center, directs all the cell’s activities</td>
</tr>
<tr>
<td>Cytoplasm</td>
<td>Frosting</td>
<td>Gel-like fluid that holds many different organelles</td>
</tr>
<tr>
<td>Mitochondria</td>
<td>Hot Tamales</td>
<td>Produces most of the cell’s energy</td>
</tr>
<tr>
<td>Chloroplasts</td>
<td>Green jelly beans</td>
<td>Produces food for the cell using energy from sunlight</td>
</tr>
<tr>
<td>Endoplasmic Reticulum</td>
<td>Licorice strings</td>
<td>Carries materials form one part of the cell to another</td>
</tr>
<tr>
<td>Ribosomes</td>
<td>Sprinkles</td>
<td>Produces proteins</td>
</tr>
<tr>
<td>Golgi bodies</td>
<td>Raisins</td>
<td>Receives materials from the ER and sends them to other parts of the cell</td>
</tr>
<tr>
<td>Vacuoles</td>
<td>Marshmallows</td>
<td>Stores water, food, waste products, and other materials</td>
</tr>
<tr>
<td>Lysosomes</td>
<td>M&amp;M's</td>
<td>Contains chemicals that break down food particles and worn-out cell parts</td>
</tr>
</tbody>
</table>
**Questions:**

1. Given the function of mitochondria, what tissue might contain cells with a high concentration of mitochondria? Why? (3 points)

   **There might be a high concentration of mitochondria in tissues that require a lot of energy (i.e. heart or muscle) because mitochondria are the “powerhouses” of the cell, they produce most of the energy a cell needs.**

2. Explain what is meant by the statement “The cell is the functional unit of life.” (2 points)

   **A cell may be considered the functional unit of life because it carries out all the processes a larger organism does, such as obtaining food, harvesting energy, and excreting wastes.**

3. Why is it important to have a cell membrane when there is a cell wall? (2 points)

   **A cell wall provides structural support, but the cell still needs to regulate what moves in and out using a cell membrane.**

4. How is the nucleus the “command center” of the cell? (2 points)

   **The nucleus directs and controls all of the cell’s activities.**

5. In the space below, draw a diagram of a nucleus. Label the nuclear envelope, chromatin, and nucleolus. (4 points)