

Cells	Grade 8 Biology	
<h2 style="margin: 0;">Lesson Plan</h2>	<b>Safety Notes</b>	Ask for permission before gathering the materials to make a cell.
<p><b>Description</b></p> <p>In this lesson, students will learn about the cells and investigate functions and processes of plant and animal cells. Students will be able to demonstrate an understanding of the basic structures and functions or organelles within plant and animal cells and their processes.</p>		
<p><b>Materials</b></p> <ul style="list-style-type: none"> <li>● Towel or blanket or bed sheet</li> <li>● 4 pairs of coloured socks</li> <li>● 1 pair of black socks</li> <li>● String, charger, cord</li> <li>● Pencil or pen</li> <li>● Hat</li> <li>● Coins</li> <li>● Pipecleaner</li> <li>● Toilet paper roll</li> <li>● Ping pong balls or tennis balls</li> </ul>		
<p><b>Science Background</b></p> <p>Every <b>living thing</b> is composed of cells. Some forms of life, like bacteria and protozoa, are made of only a single cell. To be considered a living thing, the organism has to possess all of these characteristics and needs:</p> <ul style="list-style-type: none"> <li>● <b>Nutrition:</b> Living things need some form of material to obtain energy from, such as; eating animals and plants or taking energy from the sun.</li> <li>● <b>Respiration:</b> Living things release some of the energy from food through a chemical reaction that happens with respiration.</li> <li>● <b>Excretion:</b> Living things must expel waste.</li> <li>● <b>Sensitivity:</b> Living things detect changes in their environment (light, temperature, gravity or chemical substances are some triggers).</li> <li>● <b>Growth:</b> Living things grow,</li> <li>● <b>Reproduction:</b> Living things are able to reproduce and pass on their traits to offspring.</li> <li>● <b>Movement:</b> Living things move (even plants since some parts move to follow the sun).</li> </ul> <p><b>Cells:</b> are the smallest unit of life that can only be seen with a microscope, they are the basic building blocks that make up all living things that vary in functions and shape (the human</p>		

body is made up of trillions of different kinds of cells). They also contain hereditary material and can make copies of themselves.

**Organelles:** are tiny cellular structures that perform specific functions within a cell. Below are different organelles within cells and their purpose:

- **Cell wall:** is the rigid outer covering of the cell protects the plant cell and gives it shape. Found only in plant cells.
- **Cell membrane:** controls the movement of substances in and out of the cell. Water, energy, and nutrients enter the cell, and waste material leaves the cell through the cell membrane. Found in both plant and animal cells.
- **Cytoplasm:** is not considered an organelle, but is the fluid that the organelles are surrounded in. It contains proteins, sugars and other substances that help the cell function properly. Found in plant and animal cells.
- **Nucleus:** controls cell activity. It also contains DNA. Found in plant and animal cells.
- **Vacuoles:** are storage areas. They are surrounded by membranes and filled with liquid or solid material. The vacuole takes up approximately 90% of the plant cell while in the animal cell, there are multiple smaller vacuoles. Found in both plant and animal cells.
- **Ribosomes:** make protein. There are thousands of ribosomes inside a cell. They are found in the cytoplasm, mitochondria and endoplasmic reticulum. Found in plant and animal cells.
- **Mitochondria:** generate energy for the cell to use for its processes. They're often called the 'powerhouses' of the cell. Found in plant and animal cells.
- **Smooth Endoplasmic Reticulum:** is a network of membranes folded into a series of sheets or tubes. It is responsible for metabolization and for making fats like lipids and carbohydrates that are used to build the cell membrane. Found in plant and animal cells.
- **Rough Endoplasmic Reticulum:** is where proteins are made and packaged up for transport around, or out of, the cell. Ribosomes are present in this organelle which makes it look rough. Found in plant and animal cells.
- **Golgi Apparatus:** makes some of the chemicals produced within the cell. It also collects and packages chemicals for transport to different parts of the cell. Found in plant and animal cells.
- **Centrosome:** is a hollow tube made of proteins. Its purpose is to change the shape of the membrane and make sure that when a cell duplicates, some DNA of the original cell is given to the new cell. Found only in animal cells.
- **Chloroplast:** creates glucose and oxygen from the plant cell through photosynthesis. They contain chlorophyll, a green pigment that absorbs energy from sunlight. Found only in plant cells.
- **Lysosomes:** help with intracellular digestion, storing nutrients and releasing cellular waste. Found only in animal cells.

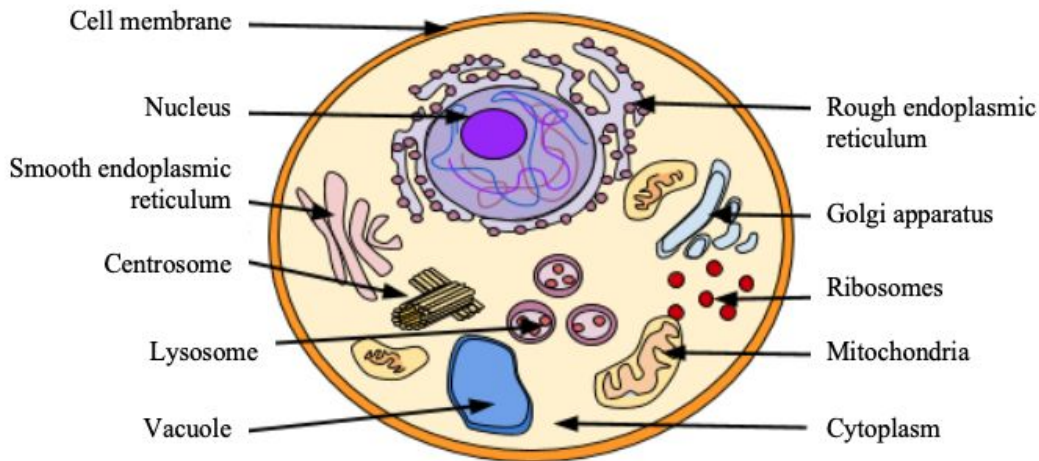
All cells are divided into two categories: **prokaryote** and **eukaryote**. The cells are split into these two categories based on how the genetic material or DNA is placed in the cell.

**Prokaryotic cells:** are single-cell organisms that do not have a nucleus or organelles. The DNA within the cell is found floating in the center of the prokaryotic cells. Examples of prokaryotic cells are bacteria and archaea.

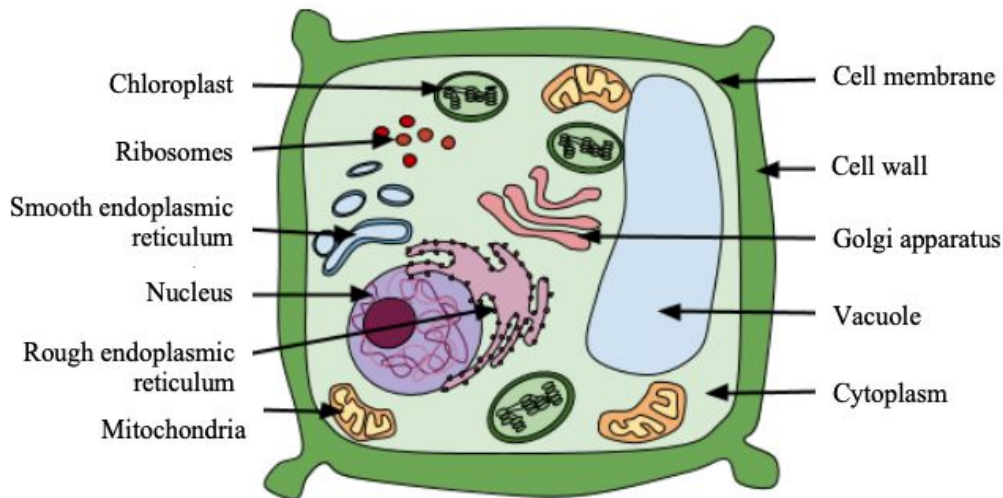
**Eukaryotic cells:** are multicellular organisms and possess a nucleus that contains the DNA accompanied by a wide variety of organelles. Eukaryotic cells are much more complex and comprise most living things like; protists, fungi, animals and plants.

Plant and animal cells are both eukaryotic cells. These two types of cells have more things in common with one another, below are labeled diagrams with a list of their major differences.

**Animal Cells:** are round, smaller sized cells with smaller vacuoles and do not have cell walls.



**Plant Cells:** are square, larger cells with large vacuoles, a rigid cell wall and have chloroplasts for photosynthesis.



**Activity Procedure** We will be building a homemade animal cell which will be composed of household materials. Here is what you will need for each component:

1. **Cell membrane:** Make a big circle either on the floor or on our table using our **sheet/towel**.
2. **Cytoplasm:** Use the background of the table/ floor to represent the cytoplasm.
3. **Nucleus:** Use a larger object like a hat. Place anywhere in your cell.
4. **Ribosome:** Use coins or anything small and round that you can find and place them around your cell.
5. **Smooth endoplasmic reticulum:** Use a cord/charger/string. Place sporadically in the cytoplasm.
6. **Rough endoplasmic reticulum:** Use a cord/charger/string with coins because it contains ribosomes. Place next to the nucleus.
7. **Golgi Apparatus:** Use a pen or a pencil to represent the rounded and folded sacs.
8. **Lysosome:** Use a ping pong or tennis ball and place it in the cell.
9. **Mitochondria:** Bunch a pair of dark socks and make a zig-zag shape out of pipe cleaners to put on the socks then place in the cell.
10. **Vacuole:** Roll up a coloured sock and place in the cell.
11. **Centrosome:** Use a toilet paper roll to represent the tubular shape, then place in the cell.



12. We now have our animal cell. Using some of the same materials and some new materials, you can apply what you learned in the lesson and make a plant cell. All you need extra is something to represent the cell wall and the chloroplast!
13. Complete questions 1 - 2 on the handout.

### Debrief

Cells have evolved through time to create different forms of life from one-celled prokaryotic cells (bacteria) to multicellular eukaryotic cells (plants and animals). Each type of cell and its organelles have evolved to process specific functions. Cells are not only tiny and complex, but are the structural, functional and biological unit of all living things.

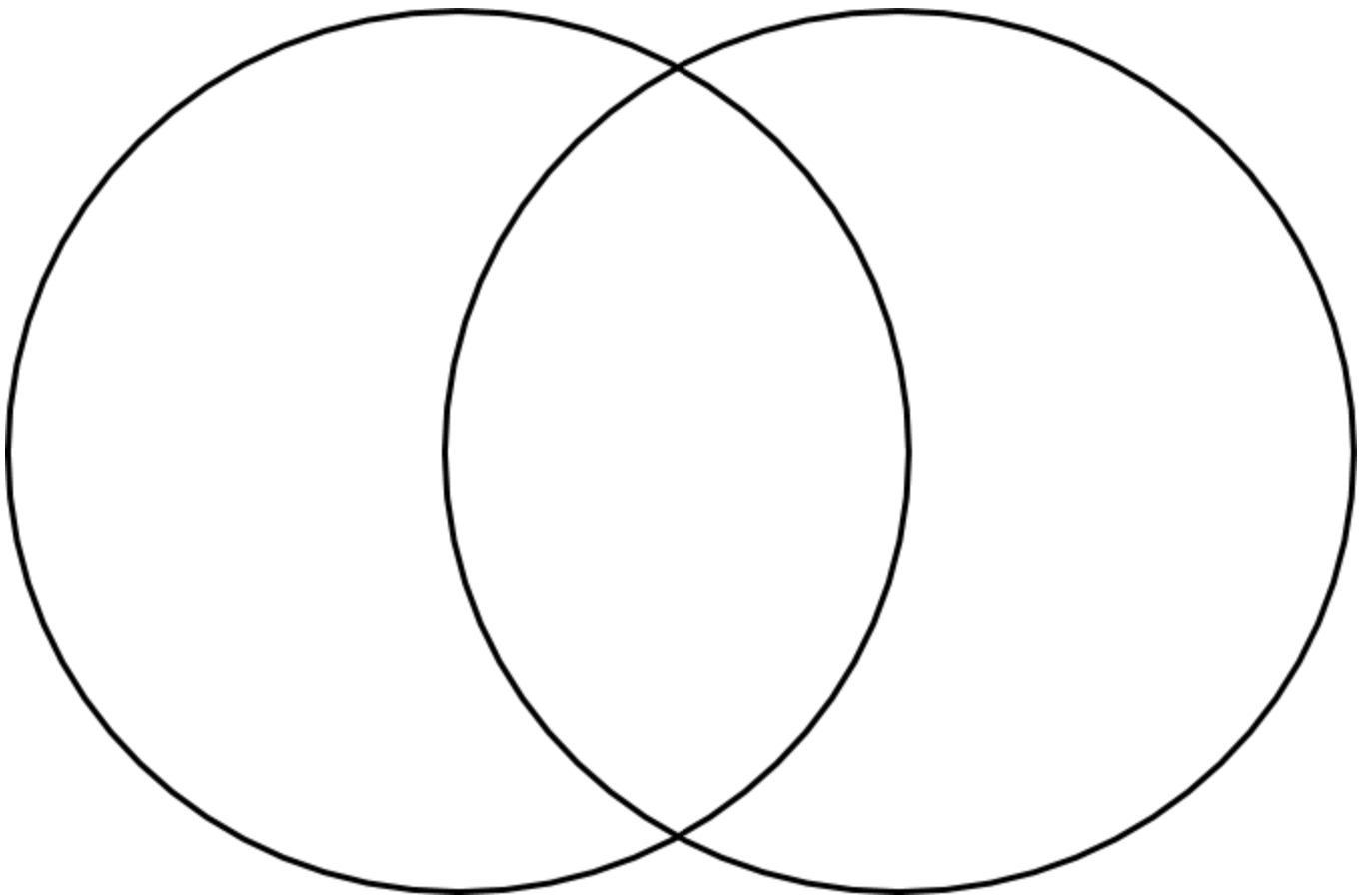
Handout

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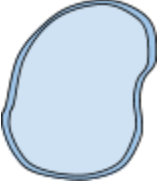

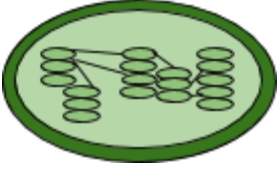



1. What are similarities and differences between plant and animal cells?

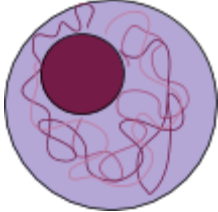

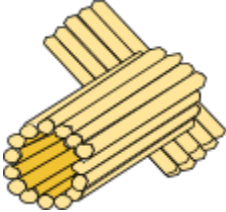
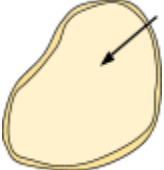
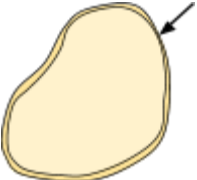

Animal Cell

Plant Cell



2. Fill in the missing information in the table below:

Picture	Name	Function	Plant, animal or both
	Cell Wall		
		Filled with liquid or solid material acting as a storage area	
	Golgi Apparatus		
		Creates glucose and oxygen through photosynthesis	
	Mitochondria		
	Ribosomes		
		Helps with intracellular digestion, storing nutrients and releasing cellular waste	

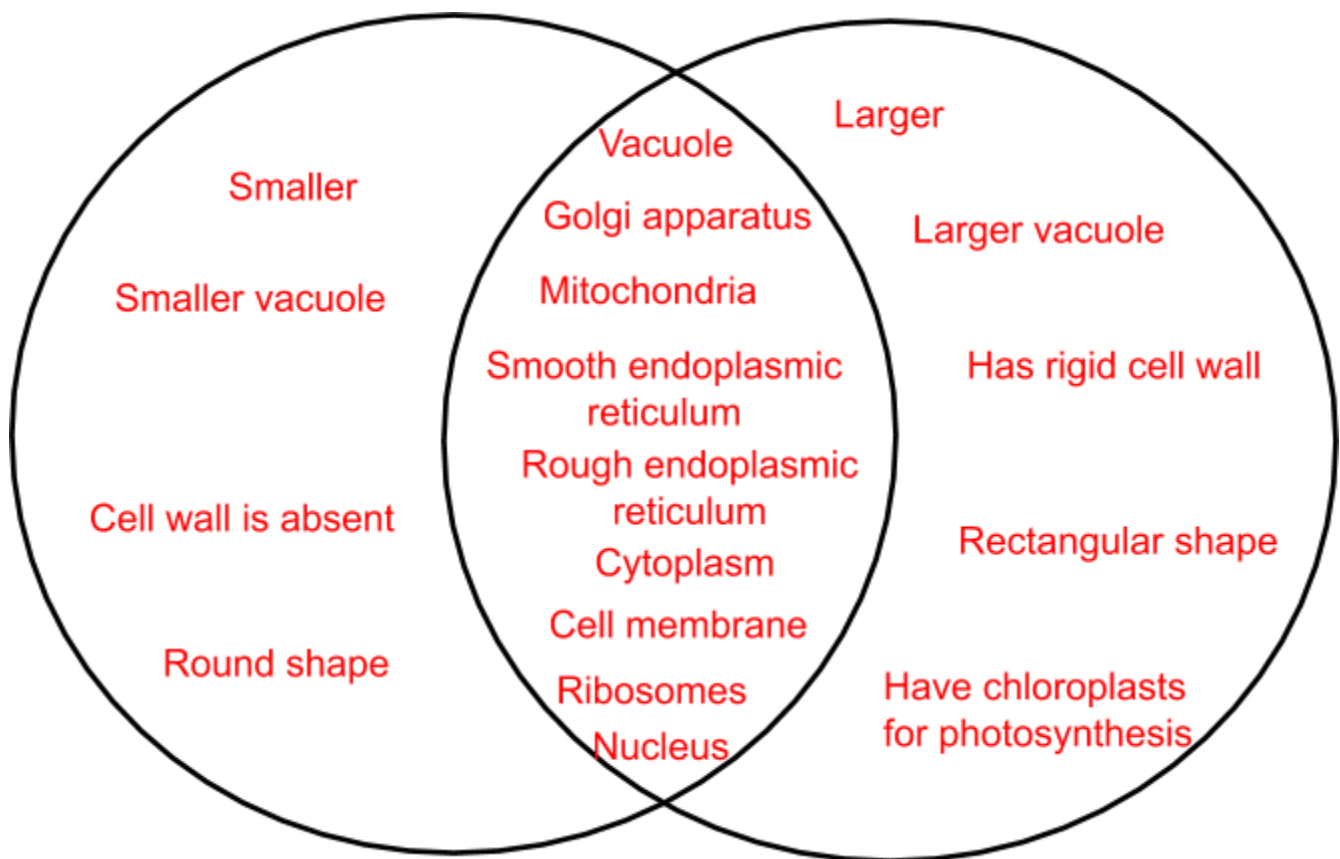
	<p>Nucleus</p>		
		<p>Responsible for metabolization and for making fats and carbohydrates used to build the cell membrane</p>	
		<p>Organize microtubules and provide structure for the cell, as well as work to pull chromatids apart during cell division</p>	
	<p>Cytoplasm</p>		
		<p>The main support of the cell</p>	
	<p>Rough endoplasmic reticulum</p>		

Handout (Answer Key)

1. What are similarities and differences between plant and animal cells?


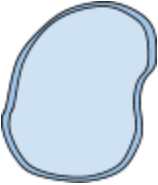

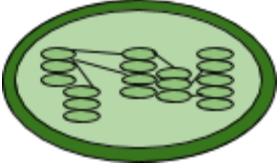



Animal Cell

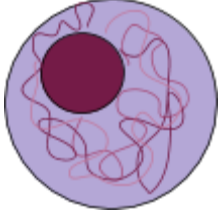

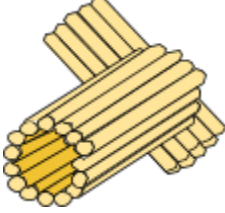
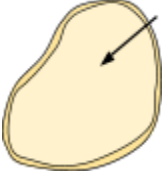
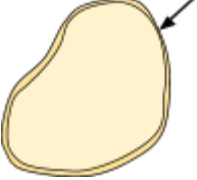

Plant Cell





2. Fill in the missing information of cell structures in the table below:

Picture	Name	Function	Plant, animal or both
	Cell Wall	Protects the plant cell and gives it shape	Plant
	Vacuole	Filled with liquid or solid material acting as a storage area	Both
	Golgi Apparatus	Makes some of the chemicals produced within the cell. Collects and packages chemicals for transport to different parts of the cell	Both
	Chloroplast	Creates glucose and oxygen through photosynthesis	Plant
	Mitochondria	Generate energy for the cell to use to do all the other processes	Both
	Ribosomes	Make proteins	Both
	Lysosome	Helps with intracellular digestion, storing nutrients and releasing cellular waste	Animal

	<p>Nucleus</p>	<p>Controls cell activity and contains the cell's chromosomes</p>	<p>Both</p>
	<p>Smooth endoplasmic reticulum</p>	<p>Responsible for metabolization and for making fats and carbohydrates used to build the cell membrane</p>	<p>Both</p>
	<p>Centrosome</p>	<p>Organize microtubules and provide structure for the cell, as well as work to pull chromatids apart during cell division</p>	<p>Animal</p>
	<p>Cytoplasm</p>	<p>It is the fluid the organelles are bathed in. It contains proteins, sugars and other substances that help the cell function properly</p>	<p>Both</p>
	<p>Cell membrane</p>	<p>The main support of the cell</p>	<p>Both</p>
	<p>Rough endoplasmic reticulum</p>	<p>Produces and packages proteins for transport in or out of the cell</p>	<p>Both</p>