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# IMH TEP'S

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## LEGACY ACADEMY

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### **8.8a The Cell Project**

Grade 8 Activity Plan

# Reviews and Updates

## 8.8a Plant Cell Project

**Objectives:**

1. To identify cell organelles and their functions.
2. To demonstrate the difference between plant and animal cells.

**Keywords/concepts:** cells, plant and animal types, tissues, organs, organism, organelle

**Curriculum outcomes:** 209-3, 304-4, 304-5, 304-8.

**Take-home item:** Picture of a labelled plant and animal cell, edible animal cell

Segment	Detail
African Proverb and Cultural relevance (5 min.)	“One person alone cannot rule the country” <b>Ethiopia</b>
Pre-test (5 min.)	Display giant cell on Bristol board that has removable plant cell and animal cell organelles. Ask students to name cell organelles.
Background (10 min.)	Display giant cell on Bristol board that has removable plant cell and animal cell organelles. Ask students to indicate which components do not belong to a plant cell and remove pieces until only plant cell organelles remain.
Activity 1 (10 min.)	Discuss the role if each organelle in the plant and animal cell. Have students labelled the cells on their handout.
Activity 2 (15 min.)	Make a 3D animal cell. Further discuss the position and function of each organelle in the animal cells.
Activity 3 (20 min)	Look at plant cells under the microscope.
Follow-up (5 min.)	Have students report their observations and determine whether they are consistent with what was taught.
Post-test (15 min.)	Pin the organelles on the plant cell! ( <i>pin the tail on the donkey - plant cell style</i> ): have students recall a plant cell component and permit them to play the game (attach it to the cell blindfolded) if they recall correctly. When the game is over, have students rearrange the cell properly.

**Suggested interpretation of proverb:** It takes many people working together in order to run anything in society – a country, a town, even a school. The same concept applies even at the cellular level. It takes many cells to make up an organism, and many cell parts (organelles) to make up a cell. Today we are going to learn about all the parts of a cell that work together to coordinate the activities of an organism.

**BACKGROUND INFORMATION**

## Components of a cell

**cell (plasma)membrane** - the thin layer of protein and fat that surrounds the cell. The cell membrane is semipermeable, allowing some substances to pass into the cell and blocking others.

**Cytoplasm** - the jellylike material outside the cell nucleus in which the organelles are located.

**Golgi body** - (also called the Golgi apparatus or Golgi complex) a flattened, layered, sac-like organelle that looks like a stack of pancakes and is located near the nucleus. The Golgi body packages proteins and carbohydrates into membrane-bound vesicles for "export" from the cell.

**Lysosome** - (also called cell vesicles) spherical organelles surrounded by a membrane; they contain digestive enzymes. This is where the digestion of cell nutrients takes place.

**Mitochondrion** - spherical to rod-shaped organelles with a double membrane. The mitochondrion converts the energy stored in glucose for use by the cell.

**Nucleolus** - an organelle within the nucleus - it is where ribosomal RNA is produced. Some cells have more than one nucleolus.

**Nucleus** - spherical body containing the nucleolus. The nucleus controls many of the functions of the cell (by controlling protein synthesis) and contains DNA. The nucleus is surrounded by the nuclear membrane

**Ribosome** - small organelles composed of RNA-rich cytoplasmic granules that are sites of protein synthesis.

**Rough endoplasmic reticulum** - (rough ER) a vast system of interconnected, membranous, infolded and convoluted sacks that are located in the cell's cytoplasm. Rough ER is covered with ribosomes that give it a rough appearance. Rough ER transports materials through the cell and produces proteins.

**Smooth endoplasmic reticulum** - (smooth ER) a vast system of interconnected, membranous, infolded and convoluted tubes that are located in the cell's cytoplasm. The space within the ER is called the ER lumen. Smooth ER transports materials through the cell. It contains enzymes and produces and digests lipids (fats) and membrane proteins; smooth ER buds off from rough ER, moving the newly-made proteins and lipids to the Golgi body, lysosomes, and membranes.

**Vacuole** - fluid-filled, membrane-surrounded cavities inside a cell. The vacuole fills with food being digested and waste material that is on its way out of the cell.

## Plant cell specific organelles

When it comes to plant cell organelles, they are more or less similar to animal cells, except that the latter lacks chloroplast organelles that are responsible for photosynthesis.

**Peroxisomes** - cytoplasmic organelles of the plant cell, which contains certain oxidative enzymes. These enzymes are used for the metabolic breakdown of fatty acids into simple sugar forms. Another important function of peroxisomes is to help chloroplasts in undergoing photorespiration process.

**cell wall** - A rigid layer that surrounds the cell membrane of a plant cell.

**chloroplast** - an elongated or disc-shaped organelle containing chlorophyll. Photosynthesis takes place in the chloroplasts. Chlorophyll is a molecule that can use light energy from sunlight to turn water and carbon dioxide gas into sugar and oxygen (this process is called photosynthesis).

Chlorophyll is usually green.

**vacuole** - a large, membrane-bound space within a plant cell that is filled with fluid. It helps maintain the shape of the cell. In a plant cell, there can be more than one vacuole. However, the centrally located vacuole is larger than others, which stores all sorts of chemical compounds. Vacuoles also assist in intracellular digestion of complex molecules and excretion of waste products.

## Activity 1: Label Me!

*Purpose: To demonstrate what a cell looks like and to show the difference between animal and plant cells.*

<b>Items</b>	<b>Quantity (10 students)</b>
Pencils	10
Printed Animal cell	10
Printed Plant cell	10

### **Procedure:**

1. Give each student a picture of an animal and plant cell for labelling. (on pg. 10 & 11)
2. As you discuss each structure have the students label the structure on their picture.
3. Discuss the differences between animal and plant cells and the reason for the difference.

## Activity 2: Edible animal cell

*Learning objectives: To make a 3D representation of the animal cell.*

*Suggested format: students work as individuals, each is given Jello mold.*

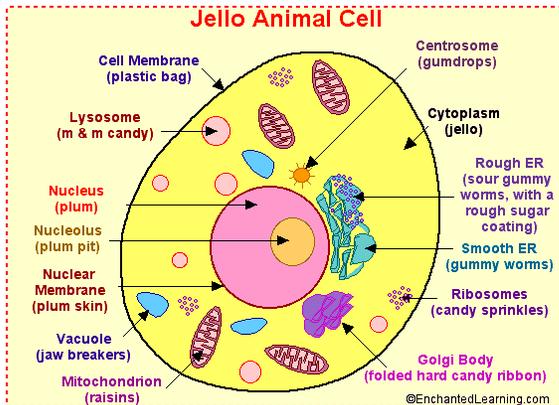
Item	Quantity (10 students)
Light colored Jello (yellow works well)	3 boxes
Water	As needed
Gelatin	3 boxes
Green and yellow fruit roll-ups	1 box (minimum ten)
Round sprinkles	1 box
9 oz. plastic cups	10
Chocolate covered raisins	1 box
Gum balls	10
Plastic spoons	10
Plastic knife	1
Plastic plates	10

**Note:** this activity can be made non-edible by using small objects (e.g. beads of different sizes and colours) instead of the candy. You will of course need to use the jello.

**Note:** You will need to prepare the jello before you arrive for the session and decide what candy or object represents each organelle in the cell.

### **Procedure:**

1. Prepare the Jello mixture ahead of time, following the directions on the box. Note that every 6 oz. of Jello will make four cells. Pour the Jello mixture into the plastic cups until each cup is two-thirds full. Place the cups in the refrigerator to set.
2. Remove the Jello from the plastic cups. Use a plastic knife to loosen the edges of the Jello from the cup if resistant. Cut each Jello mold in half and place the two halves side by side, with the top side placed upside down on a plastic plate.
3. Dig out a hole in the bottom half of the Jello mold (the mold represents the cytoplasm). Place a gum ball in the hole. The gum ball represents the nucleus of the cell.
4. Place the other pieces of candy (pieces of green and yellow fruit roll-ups, round sprinkles and chocolate covered raisins) in the Jello to represent the other parts of the cell. They can be placed into both the top and bottom half of the mold. There should be one piece of each type of candy in each cell, with several sprinkles per cell.
5. Place the top and bottom halves together to complete the cell.



Other fruits and candies can be used to represent the parts of the cell: raisins, gummy worms (plain and sour), gumdrops, gum ball, jelly beans, grapes, mandarin orange sections, M&M's, jaw breakers, dried fruit, etc. See picture below. Read more: How to Make an Edible Cell for a School Project | eHow.com [http://www.ehow.com/how\\_5656190\\_make-edible-cell-school-project.html#ixzz1VVeLxEFg](http://www.ehow.com/how_5656190_make-edible-cell-school-project.html#ixzz1VVeLxEFg)

## Activity 3: Plant cells under a Microscope

*Learning objectives: To observe plant cells under a microscope.*

*Suggested format: during this activity, goggles must be worn. Mentor should conduct the experiment encouraging students to make observations*

Item	Quantity (for mentor and 10 students)
Safety goggles	11
Red onion (or other sample)	1
Microscope slides & cover slips	10
Tweezers	2
Compound Microscope	2
Iodine	100ml
Small knife	1

### Procedure:

1. With goggles on, carefully cut the onion into wedge shaped pieces using a knife.
2. Use an eye dropper to place a drop of water in the centre of a microscope slide.
3. Use the tweezers to peel a thin layer of skin tissue from the thick part of the onion wedge and place it in the centre of the microscope slide.
4. Add a drop of water and a drop of stain (iodine) over the onion tissue on the slide.
5. Carefully lower a cover glass slip at an angle on the stained tissue to allow air bubbles to escape.
6. Examine the prepared slide under the compound microscope at 100X magnification. This is your control experiment.
7. Record what the cells look like.

## Post-test

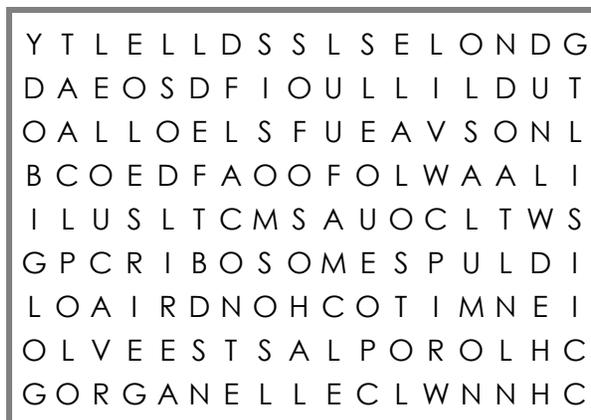
### Pin The Organelle on The Plant Cell!

Either read the function of the organelle and students must recall which organelle does the job or read the organelle and have the student state the function. If they answer correctly, permit them to play the game and attempt to pin the organelle on the plant cell while blindfolded. If they are incorrect or do not know, another student may save them and get a prize. The incorrect student does not receive the prize, but they are still permitted to pin the organelle on the plant cell. When the game is over, have students rearrange the cell properly.

Prize Ideas: Candy, chocolate bars, bags of chips, Popsicle, bouncy balls...etc

### Inside a cell puzzle

Instructions: Use the short description clues to find the different parts of a plant cell in the puzzle below.



1. "Flattened pancakes" involved in packaging and the vesicle formation (2 words, 9 letters)
2. Photosynthesis occurs here (11 letters)

3. Protective layer found in only plant cells (2 words, 8 letters)
4. Protein synthesis occurs here (9 letters)
5. An organism which typically produces its own food by the process of photosynthesis (5 letters)
6. "powerhouse" of the cell (12 letters)
7. Smallest unit of life (4 letters)
8. Stores DNA (7 letters)

### **Additional Resources**

<https://www.thoughtco.com/animal-cells-vs-plant-cells-373375>

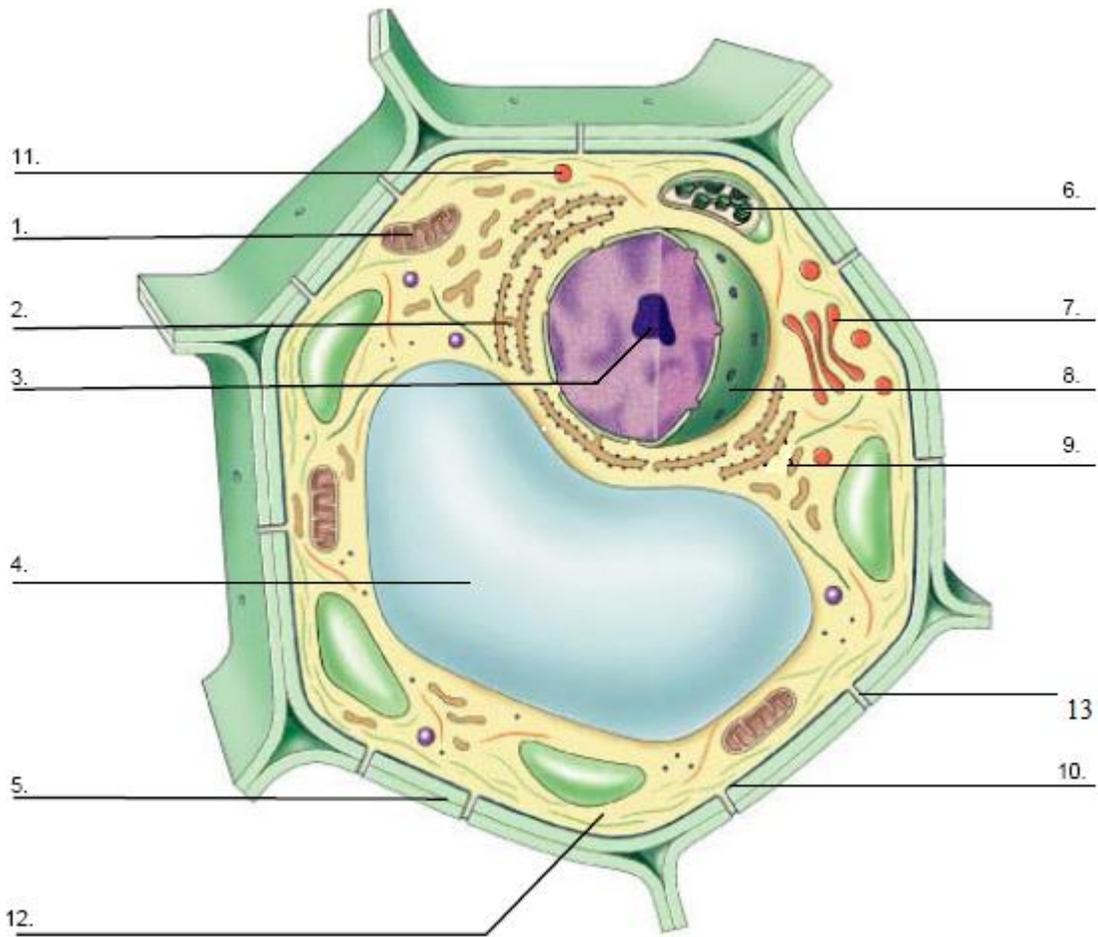
Explains some of the differences between animal and plant cells

<http://www.quizbiology.com/2013/09/plant-cell-diagram-online-quiz.html#.WTWyPevyvIU>

Link to the plant cell diagram and a quick quiz

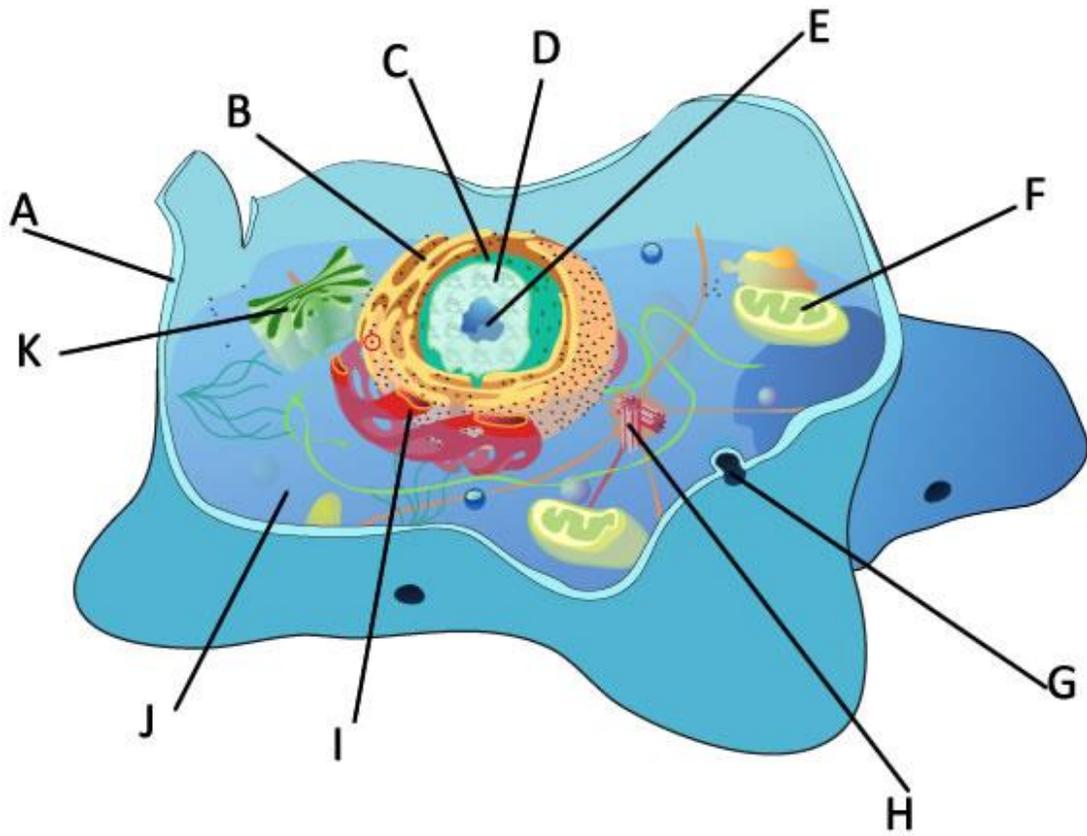
<http://www.sciencegeek.net/Biology/review/U1animalcells2.htm>

Link to the animal cell diagram and the correct answers



**Plant Cell**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
13. \_\_\_\_\_



**Animal Cell**

- A. \_\_\_\_\_
- B. \_\_\_\_\_
- C. \_\_\_\_\_
- D. \_\_\_\_\_
- E. \_\_\_\_\_
- F. \_\_\_\_\_
- G. \_\_\_\_\_
- H. \_\_\_\_\_
- I. \_\_\_\_\_
- J. \_\_\_\_\_
- K. \_\_\_\_\_