

**Science**  
**Life Science**  
**Grade 7**



**Lesson Plans**

## "Cell Biology: Cell Structures and Their Functions"

**Subject:**

**Science:** Life Science

**Level:**

Grade 7

**Abstract:**

In studying how living things are able to perform the tasks required for an organism to stay alive, students need to have a working knowledge of cells. In this lesson, students will discover the basic organelles of both plant and animal cells and how they function and interact with one another. Students will learn about each organelle by first researching the organelle with a teammate and then presenting their findings to the entire class using Microsoft PowerPoint. Students will be able to explain how each cell acquires energy and how the cell converts the energy so it can do the work of the cell. In an optional activity, students simulate the interaction of the cell organelles in keeping the cell alive.

**Invitation:**

In this lesson, you will learn that the cell is the basic unit of all living things. As far as we know, only things that are or were ever alive are made up of cells. When you complete this lesson you will be able to describe the basic organelles found in cells, how prokaryotic and eukaryotic cells are different, how plant and animal cells are different, and how all types of cells perform the functions necessary to maintain life.

In teams of two, you will be assigned a specific organelle to study. Each team will discover how the organelle works, what function it performs, and how it interacts with other parts of the cell. You will also use Microsoft PowerPoint to prepare and present your findings to the entire class.

**Situations:**

**Where:** The lesson will be taught in a 7<sup>th</sup> grade science class using compound microscopes and computers. Students may also work after school in the computer lab, at the local library, or on home computers if they have access to these resources outside of the classroom.

**When:** This lesson will take place during Science class (and a Computer class or Social Studies class if there is the possibility of integrating the curriculum). In science class, this lesson could be given early in the year or when the students are learning about how energy moves through the environment. In social studies, this lesson could be integrated with European history when cells are first discovered, when the microscope was invented, or when Europe was faced with the plague. This lesson might also be integrated with a current events class that takes up the issues of stem cell research, cloning, or GMO's (genetically modified organisms). The student work using Microsoft PowerPoint could be integrated with a computer skills class.

**How Long:** This lesson will require up to two weeks to complete including lecture, research, presentation preparation, class presentations, and individual assessment.

### **Tasks:**

#### **Task 1:**

The teacher will begin the lesson by asking students what it means for something to be alive. Students will respond and their answers will be listed on the board. When students have exhausted their ideas, the teacher will list non-living things that also display the characteristics that students have identified. Examples could include engines that breathe and use energy, photocopy machines that reproduce, rock minerals and ice crystals that grow, clouds that move, and so on.

Ideas unique to ALL LIVING THINGS that students have identified should include the following:

1. Composed of similar units
2. Can change over time as the environment changes
3. Can pass on information from previous generations to future generations

The teacher will then ask the class what these similar units are and how can they change in response to the environment? How can they pass on information? Students will be assigned to teams and do research on specific cell parts. Students will prepare and present their findings to the class using Microsoft Word and Microsoft PowerPoint.

#### **Task 2:**

The teacher will begin the introduction to the types of cells using a lecture format. Subject matter content and graphics may be shown using PowerPoint slides. (The teacher can model and describe how the slides can be made as the information is presented.) The teacher will differentiate

between prokaryotic cells and eukaryotic cells. The teacher will introduce the different organelles in plant and animal cells by discussing these organelles in prokaryotic cells.

Students will prepare a written table that lists the organelles discussed in class. The list should identify where the organelles are found (plant cells, animal cells, or both) and what function they serve in the cell. Students will need this list to begin the next class. (See the "Step Sheet: Organelle List" attachment.)

**Task 3:**

The teacher will ask students to take out the lists they made from the previous lecture. Students will put these lists into a table made in Word. (See the "Step Sheet: Creating a New Document" attachment.) Students will refer to the step sheet and follow along on the monitor as the teacher models how to set up a table in Word.

Students will then move to their computers and make a table of their homework in Word. When the students are finished the teacher will show them how to save their work for future use (to disc or a student file on the server).

**Task 4:**

The teacher will show students how to search the web for information about the organelles. Students will be introduced to the different major search engines and the teacher will point out how the same search query from different search engines provides different results.

Next, the teacher will illustrate how to browse the site to determine if it has the information that is needed. The teacher will emphasize that students need to avoid getting "caught up" in a site or information that is not what they are looking for.

Students will be shown how to capture text or a graphic image and import it into their research folder/file. The student can decide later if they are going to use this information in their final presentation.

**Task 5:**

Students will create a Power Point presentation. (See the "Step Sheet: Creating a Presentation" and "Step Sheet: Creating a Slide Show" attachments.) The students will first learn about the types of slide formats they can choose and determine which is the best format for their presentations.

The teacher will show students how to retrieve graphics and tables from their research files/folders and import them into their PowerPoint presentation. When students are familiar with building slides, they will be shown how to put slide transition effects on their slides. Students will learn how to estimate how long a slide needs to be on the screen before the next slide appears. Then the teacher will show the students how to put that timing on the slide for an automatic slide transition. More advanced students may be encouraged to add sound files to their PowerPoint presentation. The students should be given two class periods to research and construct their slide presentations.

**Task 6:**

In the next class meeting, students will present their PowerPoint slide shows to the class. The teacher will use a rubric to evaluate each team's presentations. Students will vote anonymously on their favorite presentation. After all the presentations have been made, the teacher will ask questions about the functions of the organelles and where they are found (plants, animals, or both).

**Task 7: (Optional)**

After the teacher has questioned the students, the class will be divided as follows into 12 categories for plant cells or 9 categories for animal cells:

- Nuclear membrane                      4 students
- DNA    3 students
- Messenger RNA                              3 students
- Chloroplasts                                  2 students                      (plant only)
- Mitochondria                                  2 students
- Photons    3 students                      (plant only)
- ATP    3 students
- Glucose    3 students
- Ribosomes                                      2 students
- Proteins    2 students
- Cell membrane                                4 students
- Cell wall    4 students                      (plant only)

Students will arrange themselves as they would be found in a plant cell or an animal cell. (The teacher can reemphasize the differences in each cell). The nuclear membrane, cell membrane and cell wall students should be given a string as a prop to show how they enclose the nucleus and the cell.

The teacher will give the nucleus a task to perform and the nucleus must send the correct organelle the message to complete the task. The whole class will walk through a demonstration so all students understand how this

activity works. For example, the teacher gives the nucleus a written order to make a protein. The nucleus sends out messages into the cell to make this protein. ATP is sent from the mitochondria to the ribosome to power this work. The protein is made and stays in the cell. ATP returns to the mitochondria. Photons of light enter the cell and the photons are captured by the chloroplast. The chloroplast makes a sugar molecule, which is then transferred to the mitochondria, where it is ready to be broken down to make ATP. When the sugar molecule is broken down it returns to the chloroplast to be made again into a sugar molecule.

The teacher will talk students through the process a few times and then let them try it on their own. The game can be repeated for the other type of cell (plant and animal) and for students playing out different roles of cell organelles.

### **Task 8:**

If the teacher thinks it is necessary, a quiz may be given to the class to identify the organelles in plants and animals, explaining the function for each organelle and how they interact with each other.

### **Interactions:**

**Full Class:** The class will take notes from the teacher's lecture on the types of cells and their organelles. The class will listen to and take notes on each team's PowerPoint presentation. The class will also perform the activities of the cell as an entire group.

**Partners:** Student partners will work on PowerPoint presentations on the major organelles of plant and animal cells. Each student team will present their work to the class.

**Individual:** Each individual student will create a table listing the cell organelles, their location and their functions. The students may also be given an individual quiz on the material.

### **Standards:**

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1a. Students know cells function similarly in all living organisms.

1b. Students know the characteristics that distinguish plant cells from animal cells, including chloroplasts and cell walls.

1c. Students know the nucleus is the repository for genetic information in plant and animal cells.

1d. Students know that mitochondria liberate energy for the work that cells do and that chloroplasts capture sunlight energy for photosynthesis.

**Assessment:**

- "Organelle Table"
- "PowerPoint Evaluation Rubric"
- "Performance Test"
- "Unit Quiz" (optional)

**Tools:**

- Microsoft Word
- Microsoft PowerPoint
- computers
- Internet browser

**Project Tips and Alternatives:****Tip #1:**

If students do not have access to computers, presentations may be tailored to a poster.

**Tip #2:**

Students may make comparisons of organelle functions to the functions of a school, business, city, or government.

**Tip #3:**

There may be opportunities to integrate this lesson with other disciplines. For example, a city acts much like a cell. It has a central government (city hall – nucleus), a set of laws by which the city is run (regulatory codes – DNA), it sends out workers to keep the city running efficiently by building and repairing infrastructure (repairs – protein synthesis at the ribosome), it packages and sends out goods (business products – golgi apparatus), and so on.

**Attachments:**

- "Handout: Organelle List"
- "Step Sheet: Creating a New Document"
- "Step Sheet: Searching the Internet"
- "Step Sheet: Creating a PowerPoint Presentation"
- "Step Sheet: Putting the Slide Show Together"
- "Cell Organelles: a PowerPoint Presentation"
- "PowerPoint **Presentation** Rubric"

**Web Resources – Content:**

A list of [linked web resources](#) related to the content of this lesson can be found on the Lesson Page.

**Web Resources – PowerPoint:**

A list of linked web [resources for PowerPoint](#) can be found on the PowerPoint Resources page.

**Assistive Technology:**

Please refer to the [Assistive Technology section](#) for information on methods and devices to help ensure that all students have access to the curricula in the least restrictive environment.