

Big Idea/ Topic (Science)

Cells and Organelles

Reading/ Writing Skills

Reading Skill: Determine the meaning of new words

Writing Skill: Write arguments with a rebuttal

Standard Alignment

Science Standard:

S7L2 -Obtain, evaluate, and communicate information to describe how cell structures, cells, tissues, organs, and organ systems interact to maintain the basic needs of organism

a. Develop a model and construct an explanation of how cell structures (specifically the nucleus, cytoplasm, cell membrane, cell wall, chloroplasts, lysosome, and mitochondria) contribute to the function of the cell as a system in obtaining nutrients in order to grow, reproduce, make needed materials, and process waste. (Clarification statement: The intent is for students to demonstrate how the component structures of the cell interact and work together to allow the cell as a whole to carry out various processes. Additional structures, beyond those listed, will be addressed in high school Biology.)

Reading Standard:

ELAGSE7RI4: Determine the meaning of words and phrases as they are used in a text, including figurative, connotative, and technical meanings; analyze the impact of a specific word choice on meaning and tone.

Writing Standard:

ELAGSE7W2: Write informative/explanatory texts to examine a topic and convey ideas, concepts, and information through the selection, organization, and analysis of relevant content.

d. Use precise language and domain-specific vocabulary to inform about or explain the topic.

Table of Contents

1. [Pre-Reading](#)
2. [Reading](#)
3. [Post Reading](#)
4. [Print ready student sheets](#)
5. [Print ready article to read](#)

Pre-Reading: living and non-living

Activity 1: Me vs. Tree

Give students the graphic organizer "[Me vs. Tree.](#)"

Begin by having them complete the "me" side of the graphic organizer, in which they will think about their body parts and what those parts are made of. At this point, encourage them to give their best guesses and don't worry about getting the answers "correct."

Then, take students outside and have them gather around a tall tree. They should attempt to fill in the "tree" side of the graphic organizer. Once again, it does not matter if their answers are correct.

Finally, have students attempt the question about whether they have any parts in common with trees. Bring students back to class to discuss their responses.

During the class discussion, a student may suggest the word "cell" as the building block of both human parts and tree parts, but if not, explain to students that all living things --including plants and animals, trees and people-- are made of tiny parts called cells. These parts are so small that they can only be seen through a microscope. Tell students your next activity will be to take a look at some plant and human cells through a microscope.

Activity 2: Cells through a Microscope

For this activity, you will provide students with at least two types of animal cells and two types of plant cells to observe. If at all possible, allow students to view at least one of these through a microscope, as that will allow them to view the slide before and after magnification and understand how small the cells are. (If microscopes are not available these [images](#) may be used)

Give students the page "[Cell Observations](#)" and have them view and draw the cell samples. they should indicate colors on their drawings (with labels or colored pencils). If using prepared slides, be sure to tell them what colors are natural and what samples have been dyed.

Georgia Department of Education

THIS WORK IS LICENSED UNDER A CREATIVE COMMONS ATTRIBUTION - NONCOMMERCIAL - SHAREALIKE 4.0 INTERNATIONAL LICENSE



As students are drawing, help them understand what portion of what they are viewing is a single cell. They may label any parts they happen to know, but no vocabulary is necessary at this time.

For animal cells, epidermal cells do a good job of representing a “typical” cell. For plants, fresh samples are especially powerful because students can see the chloroplast in their natural color and observe them moving in the cytoplasm. Elodea (also called Anacharis) is an example of a freshwater plant with very thin leaves. Students can place one leaf on a wet mount slide and see cells clearly around the edges.

Reading: The Cell: A Tiny Piece of a Great Giant

Tell students that they are going to read an article that will tell them more about cells, and in particular, more about the various shapes they may have seen inside the cells that they viewed.

Reading Skill: Determine the meaning of new words

Students should read the [article](#) below about Hyperion, which is the world’s tallest tree. As they read, tell them to be watching for new words and their meanings.

After students complete the first read, explain that they are going to read it again to identify the specific parts of cells that are discussed and find what those parts do.

Tell students that in science texts, the definition or description of a new word is usually given just before or after the **first** time the word is used. If they encounter a science word that is unfamiliar, they may need to look back in the text to find the first time it was used.

Display this text for students to look at:

Cells have a flexible coating called ...

Ask students to predict what kind of information might come next (the name of the coating). They may know the word but point out that they at least can see that the text is about to give them a vocabulary word. Ask what part of the sentence gave them a clue that the word was coming (“called”).

Now add this information to your display:

Cells have a flexible coating called a cell membrane. The cell membrane...

Have them predict what kind of information will come next. They can predict that the next sentence or two will give them more information about the cell membrane. When they are looking back to the text to pick out important information about the cell parts, they will want to consider the information given before and after the word. Tell students that there are several clues that can signal a definition, including the words *called*, *known as*, or *which means*. The meaning may also be given by the word “or” if it comes after a comma.

Georgia Department of Education

THIS WORK IS LICENSED UNDER A CREATIVE COMMONS ATTRIBUTION - NONCOMMERCIAL - SHAREALIKE 4.0 INTERNATIONAL LICENSE



As students read, they should be looking for the meaning of the new words in the text and how those words are signaled. After the first read, have them reread the text using the [graphic organizer](#) and have them locate each cell part, summarize the roles of each cell part, and identify if the information used to define the word came before or after the word in the text.

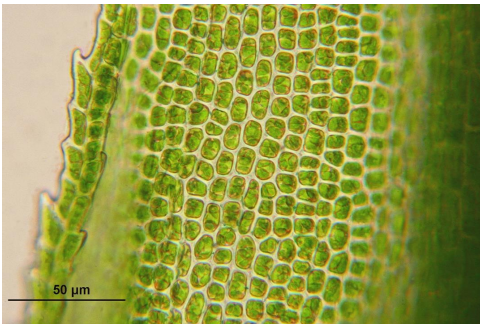
Post-Reading: How do trees get so tall?

Writing Skill: Writing an argument with a rebuttal

Activity 1: Plant or Animal?

Tell students that a local lab is analyzing a cell sample and wants to know if they have cells from a plant cell or an animal. Your students have been asked to look at the sample and send their findings. Students may use this [sheet](#) to make their claim.

Display this picture for the class:



Explain that they need to make a claim and support it with evidence and reasoning. Their claim should also include a rebuttal for whichever cell type they are rejecting. If students need help getting started, you can direct them to re-read the last paragraph of the article.

You may wish to provide this scaffolding:

Claim: The cells come from a Plant/ Animal. (*Circle one*)

Evidence: (What cell parts do you see that help you know which it is?)

Reasoning: (What do you know about the cell parts in plant vs. animal cells?)

Rebuttal: These cannot be Plant/Animal cells (*circle one*) because ...

[Return to the table of contents](#)

Print Ready Student Sheets

Georgia Department of Education

THIS WORK IS LICENSED UNDER A CREATIVE COMMONS ATTRIBUTION - NONCOMMERCIAL - SHAREALIKE 4.0 INTERNATIONAL LICENSE

10.21.2022 Page 5 of 14



Reading Skill–Finding the Meaning of New Words

Cell Organelles

Organelle	Function	I took information from (circle)
Cell Wall		before the word after the word both
Cell Membrane		before the word after the word both
Chloroplast		before the word after the word both
Mitochondria		before the word after the word both
Nucleus		before the word after the word both

Georgia Department of Education

THIS WORK IS LICENSED UNDER A CREATIVE COMMONS ATTRIBUTION - NONCOMMERCIAL - SHAREALIKE 4.0 INTERNATIONAL LICENSE



Lysosome		before the word after the word both
Cytoplasm		before the word after the word both



Pre-Reading Observations: Me vs Tree

Before you go outside, think about your own body and what you are made of. Then you will observe a tree and look for similarities and differences. Fill in the chart below with your observations.

Me		Tree	
About how tall are you?		How tall do you think the tree is (take a guess)?	
How did you get that tall?		How do you think it gets so tall?	
What kinds of things are inside you? Name a few body parts.		What parts do you see?	
What body part(s) hold you up? That is, why aren't you a pile of mush on the ground?		What part(s) hold the tree up?	
What do you think your skeleton is made of?		What do you think is inside the trunk of the tree? That is, what are tree trunks made of?	

1. Do you think there are any parts that you and a tree have in common? Why or why not?

Georgia Department of Education

THIS WORK IS LICENSED UNDER A CREATIVE COMMONS ATTRIBUTION - NONCOMMERCIAL - SHAREALIKE 4.0 INTERNATIONAL LICENSE



Pre-Reading Observations: Cells

Sample 1 Cell Type _____	Sample 2 Cell Type _____
Magnification: _____	Magnification: _____
Sample 3 Cell Type _____	Sample 4 Cell Type _____
Magnification: _____	Magnification: _____

Georgia Department of Education

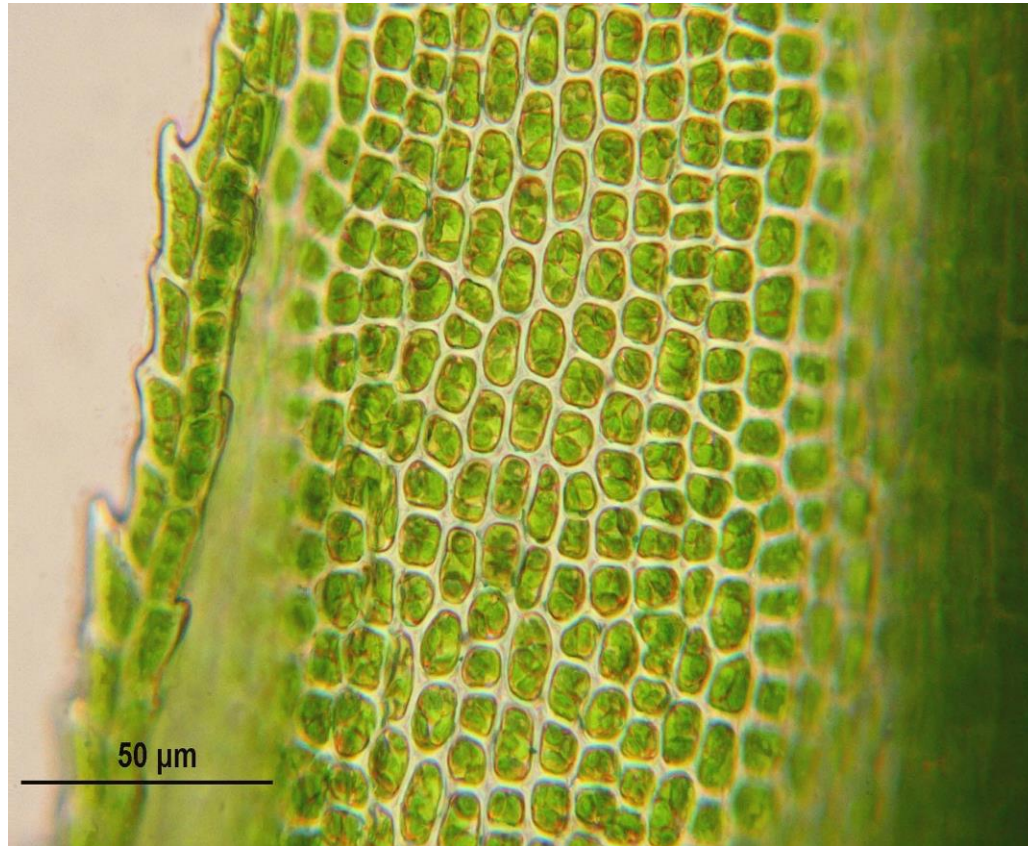
THIS WORK IS LICENSED UNDER A CREATIVE COMMONS ATTRIBUTION - NONCOMMERCIAL - SHAREALIKE 4.0 INTERNATIONAL LICENSE



Writing Skill: Writing an argument with a rebuttal

A local lab is analyzing a cell sample and wants to know if they have cells from a plant cell or an animal. You have been asked to look at the sample decide if it is an animal or plant cell and report your findings to the lab.

Sample:



Georgia Department of Education

THIS WORK IS LICENSED UNDER A CREATIVE COMMONS ATTRIBUTION - NONCOMMERCIAL - SHAREALIKE 4.0 INTERNATIONAL LICENSE

10.21.2022 Page 10 of 14

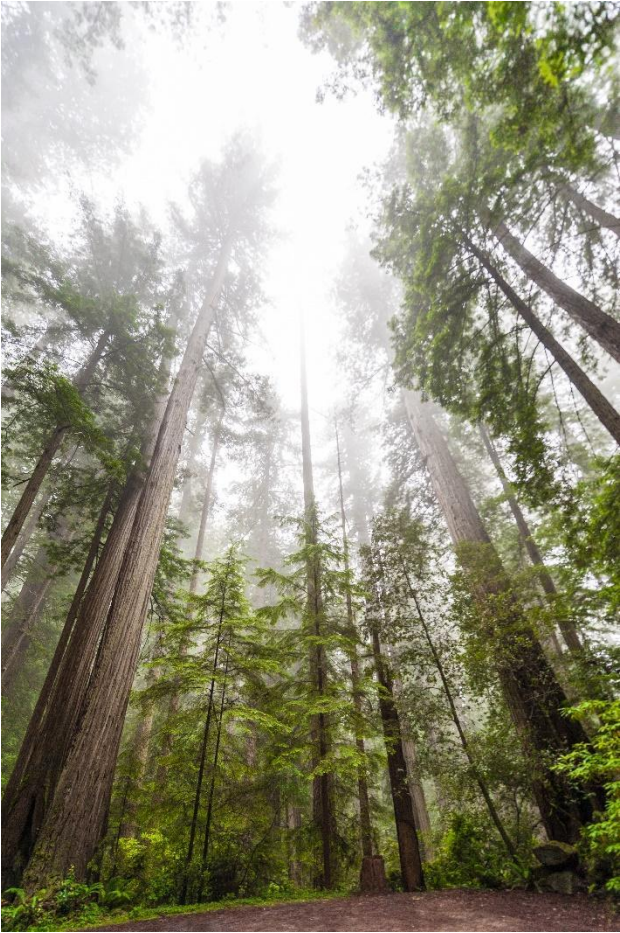


This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

10.21.2022 Page 11 of 14



The Cell: A Tiny Piece of a Great Giant



Deep in a remote area of California's Redwood National Forest stands a tree that is a giant, even among giant trees. It is named Hyperion, after a Greek Titan.

Hyperion is 380 feet tall (115.8 m), so tall that it disappears into low clouds, as seen in the image on the left. That's taller than a 35-story building. It's taller than the Statue of Liberty. You and 75 of your best friends could stand on top of each other and still not reach the top!

Scientists believe that Hyperion is somewhere between 600 and 800 years old. It has been growing that entire time. How does a tree get that tall and stay upright?

The answer begins in the tiniest parts of the tree: its cells. All living things are made of microscopic units that build on each other, one by one, to make up the entire organism. You can imagine it like a brick wall. The wall is built from stacks of individual bricks. In the same way, organisms are made from groups of individual cells.

Unlike a brick, however, the inside of a cell is full of action. Each cell is at work making needed materials, getting rid of waste, and even creating new cells to keep the organism growing. Hyperion is no exception.

Inside a Cell

All plant cells work in similar ways, whether part of a gigantic tree like Hyperion or a short blade of grass. Around the outside, plant cells are covered with a tough material called cellulose. This covering is called the cell wall, and it is an important part of Hyperion's height. The cell wall is firm and rigid and gives the cell a consistent shape. Trees can pile trillions of cells on top of each other because the cell wall keeps them from being crushed.

Inside the cell wall is a more flexible coating called the cell membrane. The cell membrane controls what molecules can get inside of the cell. The cell membrane lets water in and forces waste out. It lets nutrients in when they are needed and keeps them out when they are not.

Inside the cell membrane, there are other structures. Like all living things, plants need food, but unlike animals, they make it themselves. A cell part called a chloroplast captures the energy from the sun. It uses the energy to make sugars in a process called photosynthesis. Those sugars are used to power all of the other activities in the cell. Chloroplasts are green. You can see them in the leaves of trees and leaves and stems of other plants.

The sugars made by the chloroplasts are sent to another cell part, called mitochondria. Mitochondria take the energy from the sugar and divide it into smaller molecules. You can think of it like breaking a one-hundred-dollar bill into twenties that are easier to spend. Those smaller units of energy are sent around the cell to power everything from making proteins, moving materials, and getting rid of waste.

Some of that power is sent to the nucleus. The nucleus controls everything that happens in a cell. The nucleus is full of DNA. DNA is similar to an instruction book. It tells the cell how to make proteins. It gives directions for when and how to grow and make more cells. Each cell in an organism has all of the DNA needed to give instructions for the whole organism. However, the nucleus only activates the information that is needed within its specific cell.

As the cell grows and does its work, it also creates waste. Lysosomes are the cell part responsible for getting rid of waste. Sometimes, lysosomes work like a recycling center, chopping up molecules into pieces that can be reused. Other times, a lysosome is more like a garbage truck, taking waste to the cell membrane so it can be removed from the cell.

As seen in image 1, all these cell parts, plus many others, are held in a gel-like substance called cytoplasm. If you watch a live plant cell under a microscope for a few minutes, you can see the green chloroplasts moving around the cell. They are moving with currents in the cytoplasm.

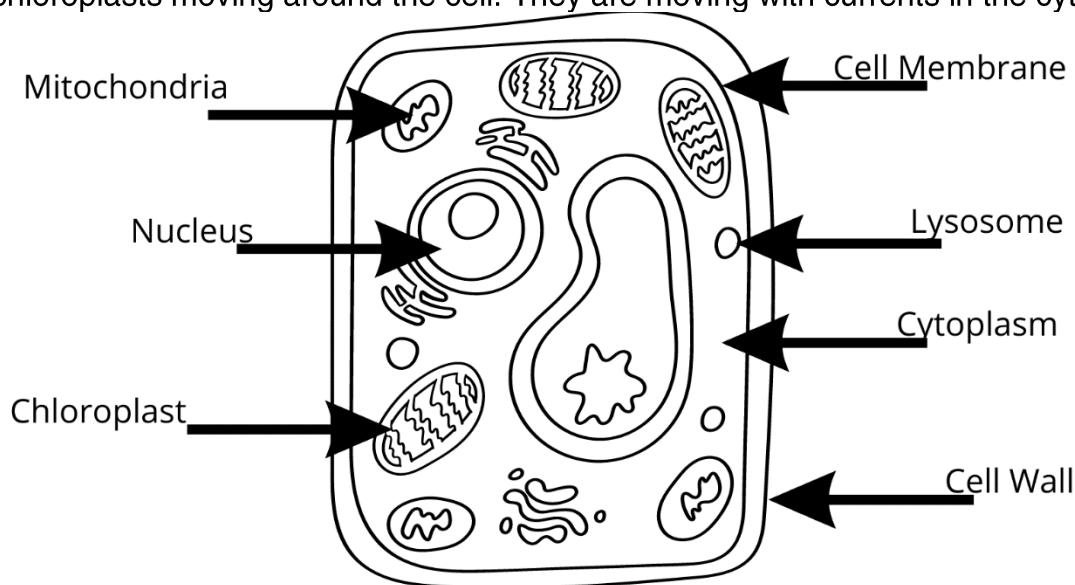


Image 1

Cells at Work

Within each cell, the cell wall, cell membrane, chloroplasts, mitochondria, nucleus, lysosomes and cytoplasm work together to keep the cell healthy and functioning. Trillions of individual cells working together make up an organism, such as the mighty Hyperion.

You may someday have a chance to look up at a giant tree like Hyperion, and it may seem like you have very little in common. But in fact, your body is also made of cells. Animal cells have some differences from plant cells, but many of your cell parts are the same. Your cells have a cell membrane, mitochondria, a nucleus, lysosomes and cytoplasm, just like plant cells. However, your cells do not have a cell wall. Animal bodies get their strength and shape from other parts. And you have probably noticed that you can't make your own food from sunlight, because your cells don't have chloroplasts. But, like Hyperion, you are made of trillions of cells working together, with each cell part contributing.

