

Introduction to Cells

Lesson Overview

This is an introductory lesson on how cells are the basic structure of all living things. Students are introduced to cells in a previous grade therefore prior knowledge is limited. Students will learn the basic cell organelles and the difference between plant and animal cells. Students will be engaged in close reading of an article, annotated note taking, and collaborative discussions.

Standards Addressed

- SC 2005 7-2.1 Summarize the structures and functions of the major components of plant and animal cells (including the cell wall, the cell membrane, the nucleus, chloroplasts, mitochondria, and vacuoles).
- 7-2.2 Compare the major components of plant and animal cells.
- SC 2014 7.L.3A.2 Analyze and interpret data from observations to describe different types of cells and classify cells as plant, animal, protists, or bacteria.
- 7.L.3A.3 Develop and use models to explain how the relevant structures within cells (including cytoplasm, cell membrane, cell wall, nucleus, mitochondria, chloroplasts, lysosomes, and vacuoles) function to support the life of plant, animal, and bacterial cells.
- NGSS MS-LS1-2. Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function.

Disciplinary Literacy Best Practices

Concept Cartoon

Think-Ink-Pair-Share (TIPS) (Pair with Elbow Partner)

Close reading with highlighting and annotation

5-3-1

Lesson Plan

Time Required – One 60 minute class period

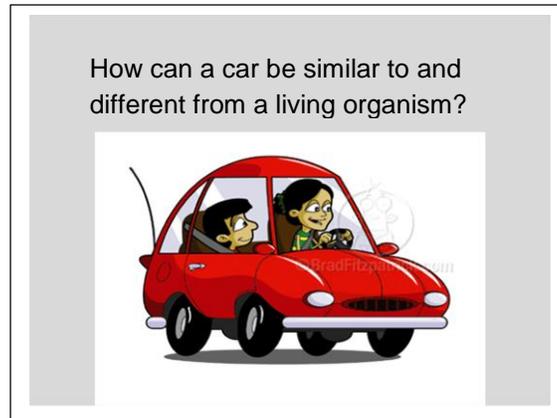
Disciplinary Vocabulary – cell wall, cell membrane, nucleus, chloroplasts, mitochondria, organelles, vacuoles, function, structure

Materials Needed:

- (1) Copy of article “Cells – The Structure of Life” per student (at end of lesson)
- (1) Highlighter per student
- (1) pencil per student
- Paper for each student
- Smartboard (or some method of projecting teacher notes via Power Point)

Assessment: 5-3-1

Engage



- As students enter the room, they will consider the Concept Cartoon and individually **Think and Ink** responses to the question: *How can a car be similar to and different from a living organism?*
 - ★ You may be tempted to skip the “Ink” part of this strategy. Don’t. It is important for students to write what they are thinking independently because it makes them engage with the question and commit their thoughts to paper before sharing with someone else.
- After having time to work individually, students will turn to their elbow partners and **Pair and Share** their thinking about the Concept Cartoon. They may choose to refine their original Think and Ink.

Explore

- Students will continue their research on cells by **close reading** a Discovery Education Article titled: “Cells - The Structure of Life.”
- Students will follow the same procedure used on the previous day- **Close read** independently, highlighting and annotating as they go (by writing down questions, thoughts, feelings, etc.).
- **Close reread** with partner **a chunk at a time**. Students should re- read just a short section, or page at a time. Partners agree before beginning where the “breaks” for chunks will be. When partners finish reading a chunk, they are to discuss the chunk with each other and take notes. Partners continue until all chunks are read and discussed.
- After close re-reading and note taking with partners is complete, students will check their notes on cells by comparing them to the teacher notes (Power Point) and refining their individual notes as needed.

- The teacher will stress the main ideas they should have gotten in their notes on the different cell parts.
- NOTE: I usually start out the year with this method (using the Power Point with the teacher notes) but will quickly change over to students checking their notes by viewing guiding questions. If they are unable to answer those questions using their notes, they know their notes are incomplete, and they need to revisit the source article(s).

Explain

- **Closure: 5-3-1**
- Students will each write 5 words or phrases that are essential to the topic.
- With elbow partners, students will identify, discuss, and come to a consensus regarding 3 words or phrases that are essential to the topic.
- In groups of four, students will come to a consensus on 1 appropriate word or phrase that they believe is most essential to the topic.
- Each group will share their word or phrase and explain why it was chosen.

Lesson Assessment: Students will summarize the information shared from dialogue generated by the 5-3-1 strategy and enter it in their science notebooks.

Teacher Biographical Information

Karen Rushton is a 7th grade science teacher at Saluda Middle School with a Masters plus 30. This lesson was filmed during my 34th year of teaching middle school (which has also included teaching 6th and 8th grade) and the 2nd year of being a part of IQ-MS.



Getting to Know: The Structure of Life

When you were younger, you might have played with toy blocks, transforming simple blocks into elaborate structures. Just as the structures you made were composed of blocks, all living things are made of cells. Cells are the building blocks of life.

What exactly are cells, and why are they important?

Cells are the simplest structure that can carry out the characteristic activities of life. Some cells can live independently; these are called *unicellular organisms*. Other types of cells must work together with many cells in order to survive. These types of cells live in *multicellular organisms*, or organisms made from multiple cells. Scientists consider cells the building blocks of life because all living things are made of cells.



Misconception 1: *Is it true that cells come from non-living things?*

Cells do not come from nonliving things. All cells come from pre-existing cells in the process of cell division.



Cells can be compared to building blocks. Scientists consider cells the building blocks of life.

Do all cells have the same structures?

Cells can have some different structures. In particular, the cells of multicellular organisms can vary greatly. In spite of these differences, most cells share some common characteristics. Most cells have cytoplasm, a cell membrane, a nucleus, mitochondria, ribosomes, and vacuoles. *Cytoplasm* is the thick liquid inside of cells in which other cell structures float. The *cell membrane* is the outer lining of the cell. It helps control which substances can enter or leave the cell. The *nucleus* of a cell is where the cell's DNA is stored; this material helps control cell activities. *Mitochondria* and *vacuoles* are organelles, or tiny structures within cells. They help the cell perform biochemical processes. *Ribosomes* are other tiny particles found within the cytoplasm of cells. They help carry out other biochemical cell processes.



Misconception 2: *Cells and atoms both have nuclei. Does that mean that cells and atoms are similar?*

Cells and atoms are very different from each other. Atoms are much smaller than cells, and are nonliving. The nucleus of an atom contains sub-atomic particles, such as neutrons and protons, while the nucleus of a cell contains DNA. DNA is a genetic material that contains many, many individual atoms.

Plant and animal cells can have different structures. Plant cells usually have additional structures that aid the plant in creating food. Specifically, plant cells contain a cell wall, chloroplasts, and large, water-filled vacuoles. A plant's *cell wall* gives the plant a more rigid shape and is a firm structure that surrounds the entire cell. Animal cells lack this structure, so they are generally not as tough as plant cells. *Chloroplasts* are organelles in plant cells that contain chlorophyll, a pigment that helps convert sunlight into chemical energy.

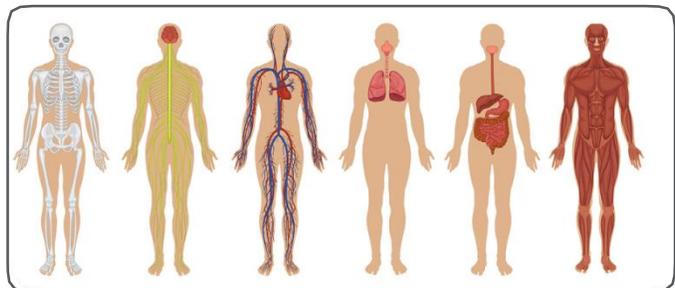


Misconception 3: Is it true that plant cells are always square and animal cells are always round?

People often think that plant cells are square. In fact, cells are three-dimensional. While a plant cell might look like a square, it is shaped more like a cube. Likewise, an animal cell might look round, but it is shaped more like a sphere. In truth, both types of cells can exist in a variety of different shapes and sizes.

Do multicellular organisms have different characteristics than unicellular organisms?

Multicellular organisms are different from unicellular organisms in some important ways. Unicellular organisms are made of a single cell that is capable of living independently. Multicellular organisms are made of many cells. The cells that make up a multicellular organism cannot live independently. Unicellular organisms often have specialized structures that cells in multicellular organisms do not. Structures like cilia and flagella are present only in unicellular organisms, and help the cell move.



Cells in multicellular organisms, like humans, are highly specialized. They allow for the development of organ systems.

Cells in multicellular organisms tend to be more highly specialized than unicellular organisms. This specialization helps them perform specific functions. The cells in multicellular organisms are organized according to their function. Many specific cells grouped together form tissue.

Tissues are then grouped together to form organs, and organs in turn form organ systems.

Although all types of cells share several similarities, the differences between cells enable the great diversity of living things on Earth.