

Unit Organizer
5th Grade Science

Cells: Structures and Processes

Colorado State Standards:

Science Standard 1: Students understand the process of scientific investigation and design as well as conduct, communicate about and evaluate such investigations.

Science Standard 3.1: Students know and understand the characteristics of living things, the diversity of life, and how living things interact with each other and with their environment.

Science Standard 3.3: Students know and understand how the human body functions, factors that influence its structures and functions, and how these structures and functions compare with those of other organisms.

Science Standard 3.4: Students know and understand how organisms change over time in terms of biological evolution and genetics.

Science Standard 6: Students understand that science involves a particular way of knowing and understand common connections among scientific disciplines.

Core Knowledge Unit:

II. Cells: Structures and Processes

- All living things are made up of cells.
- Structure of cells (both plant and animal)
 - Cell membrane: selectively allows substances in and out
 - Nucleus: surrounded by nuclear membrane, contains genetic material, divides for reproduction
 - Cytoplasm contains organelles, small structures that carry out the chemical activities of the cell, including mitochondria (which produce the cell's energy) and vacuoles (which store food, water, or wastes).
- Plant cells, unlike animal cells, have cell walls and chloroplasts.
- Cells without nuclei: monerans (bacteria)
- Some organisms consist of only a single cell: for example, amoeba, protozoans, some algae.
- Cells are shaped differently in order to perform different functions.
- Organization of cells into tissues, organs, and systems:
 - In complex organisms, groups of cells or tissues (for example, in animals, skin tissue or muscle tissue; in plants, the skin of an onion or the bark of a tree).
 - Tissues with similar functions form organs (for example, in some animals, the heart, stomach, or brain; in some plants, the root or flower).
 - In complex organisms, organs work together in a system (recall, for example, from earlier studies of the human body, the digestive, circulatory, and respiratory systems).

Previous Unit: Chemistry: Matter and Change

Next Unit: Classifying Living Things

Standards for Achievement and Performance:

Can you...

- Identify the parts of a compound microscope?
- Recognize that all living things are made up of cells?
- Draw and label the parts of a cell?
- Describe the functions of the parts of an animal cell: cell membrane, nucleus, nuclear membrane, cytoplasm, mitochondria, vacuoles?
- Identify two structures found in plant cells that are not found in animal cells and describe their functions?
- Relate a cell's shape to the cell's function?
- Identify a type of cell that has no nuclei?
- List three single-celled organisms?
- Use the Scientific Method and identify the steps in the Scientific Method?
- Explain the steps in cell division?
- Explain the organization of cells into tissues, which then form organs, which in turn form systems?
- Discuss the contributions of the scientist Ernest Just to the study of cells?
- Demonstrate proper lab safety and procedure?

Character Education:

Responsibility by taking care of microscopes and other lab equipment and following safety procedures

Self-Control by displaying appropriate and on-task behavior during experiments

Cooperation through working together during the cell lab and other group activities

Perseverance as demonstrated by Ernest Just throughout his education and study of cells

Vocabulary

cell
organelle
mitochondria
membrane
nucleus
vacuole
cytoplasm
tissue
organ
system

Thinking Framework

Knowledge:

- Memorize and explain the functions of the parts of animal and plant cells
- List the characteristics of the other three kingdoms: fungi, protists, and monerans
- New vocabulary

Patterns:

- Compare different types of cells (their shape and function) to various jobs/items by making similes
- Explain how cells make tissues, which make organs, which make systems, and draw a pyramid showing the relationship

Mental Modeling:

- Using a description of a cell, make a hypothesis of the shape of the cell by drawing an example and then justify the hypothesis
- Develop a short skit demonstrating the steps of cell division