



Educator's Guide to Cell Structure and Function

Overview: This lesson is designed to familiarize students with cell structures (organelles) and their functions. Students will “sketch up” cell structures and the structures of familiar, everyday objects found in their homes that have comparable functions.

Grades and Subject Areas:

Recommended for High School Biology A.

Objectives:

- Students will identify the structure of ten cell organelles.
- Students will identify the function of ten cell organelles.
- Students will describe and visualize an analogous structure and function for each cell organelle.

I Can Statements:

- I can “sketch up” realistic representations of a cell’s organelles.
- I can develop an analogy that compares an organelle’s function to the function of an everyday object in my home.
- I can digitally share these representations and analogies with others.

Curriculum Connections:

FNSBSD Core Standards:

Describe cell organelles and their functions [10] SC2.2, [11] SC2.1

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Alaska Content Standards:

Science

C. Concepts of Life Science

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by explaining that cells have specialized structures in which chemical reactions occur.
[10] SC2.2

SC2 Students develop an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms.

The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by describing the structure-function relationship.
[11] SC2.1

Technology

A. A student should be able to operate technology-based tools.

2) Use technological tools for learning, communications, and productivity.

C. A student should be able to use technology to explore ideas, solve problems, and derive meaning.

1) Use technologies to observe, analyze, interpret, and draw conclusions.

3) Create new knowledge by evaluating, combining, or extending information using multiple technologies.

D. A student should be able to use technology to express ideas and exchange information.

1) Convey ideas to a variety of audiences using publishing, multi-media, and communications tools.

ISTE Student Standards:

1. Creativity and Innovation

Students demonstrate creative thinking, construct knowledge, and develop innovative products and processes using technology.

Students:

b. create original works as a means of personal or group expression

c. use models and simulations to explore complex systems and issues

2. Communication and Collaboration

Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others. Students:

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- b. communicate information and ideas effectively to multiple audiences using a variety of media and formats
- d. contribute to project teams to produce original works or solve problems

ISTE Teacher Standards:

1. Facilitate and Inspire Student Learning and Creativity

Teachers use their knowledge of subject matter, teaching and learning, and technology to facilitate experiences that advance student learning, creativity, and innovation in both face-to-face and virtual environments. Teachers:

- a. Promote, support, and model creative and innovative thinking and inventiveness
- b. Engage students in exploring real-world issues and solving authentic problems using digital tools and resources

3. Model Digital-Age Work and Learning

Teachers exhibit knowledge, skills, and work processes representative of an innovative professional in a global and digital society. Teachers:

- a. Demonstrate fluency in technology systems and the transfer of current knowledge to new technologies and situations
- b. Collaborate with students, peers, parents, and community members using digital tools and resources to support student success and innovation

Technology Integration:

Hardware and Software Needs

1. Apple laptop
2. Whiteboard
3. Projector for computer
4. Application Google Sketch Up
5. Laser Pointer

Resources:

Handouts or Downloads

- ∞ Cell Structure & Function with Google Sketch Up

Links to teaching resources

- http://sketchup.google.com/intl/en/training/videos/new_to_gsu.html

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Web resources

- <https://sites.google.com/a/alaska.edu/all-things-google---google-earth/home/4---john-s-sketchup-page>
- http://sketchup.google.com/intl/en/training/videos/new_to_gsu.html
- <http://sketchup.google.com/3dwarehouse/>

Lesson Directions

Prep Time:

- ∞ Xerox Handouts - Cell Structure & Function with Google Sketch Up
- Familiarity with Google Sketch up

Prior to Lesson:

Teacher Prep:

- Recommend an introductory lecture on cell structures/functions
- Pearson Biology Chapter 7.2, pages 173-181.
- Pearson Biology, Figure 7-5 page 174.

Student Prep:

- ∞ See handout - Cell Structure & Function with Google Sketch Up

Time Needed for Lesson:

- 3 - 4 periods

Directions:

- ∞ See handout - Cell Structure & Function with Google Sketch Up

Extension / Challenge:

- Students can use something other than their house for the analogies: a school, a circus, a hospital

Name _____ Date _____ Period _____ Due Date _____

Cell Structure & Function with Google Sketch Up
or
“Feeling at Home with the Cell”

Purpose: To describe and visualize an analogous structure and function for each cell organelle.

I can:

- ∞ “sketch up” realistic representations of a cell’s organelles.
- ∞ develop an analogy that compares an organelle’s function to the function of an everyday object in my home.
- ∞ digitally share these representations and analogies with others.

Introduction: An analogy is a comparison made for the sake of illustrating a point.

Many analogies are made for cell organelle structures and functions. For example, a cell is like a factory (see your text p. 182), the nucleus being the main office. The office is the information center of the cell. From the main office, all instructions go out to the factory floor. Each ribosome is like a factory machine turning out proteins instead of products.

The goal in this activity is to drive “home” the names of organelles (structures) and their jobs (functions) so that you will feel at home with your knowledge of the cell. You are to compare the cell to your very own home or to any other topic important to you.

Materials:

Laptop
Google Sketch Up

Directions, Day 1:

Working in groups of 3:

Person 1. Using Google Sketch Up, sketch and label ten cell organelles using Figure 7-5 on page 174 of your text.

Person 2. Using Google Sketch Up, sketch a ***very simplified*** version your house. You will later add simple objects or people to this sketch.

Person 3. Using Microsoft Excel and Figure 7-5 on page 174 of your text, generate a list of cell organelles. (Follow the auto-fill demonstration given in class.) Next, in your mind, consider parts, objects, people or anything related to your house. Generate a second list of something or someone in your house that has an analogous function to each organelle.

What you choose is your choice but it must best show the organelles you are attempting to compare. You may want to reference pages 173-181 or the glossary or index of your text to find the function of each structure.

Directions, Day 2/3:

As a group, develop the analogies you will use and add their descriptions to your Excel Spreadsheet and the objects to your house sketch.

For example, if the organelle is the cell membrane, the analogy may be as follows:

The sides of a house are like a cell membrane because the cell membrane allows substances to move in or out of the cell. The sides of a house may have windows allows air to move in but the walls keep other substance out.

There are 14 organelles you can choose from to include. You must include 10 of them!!!

Directions, Day 4:

Groups will present their analogies to the class reading from their Excel Spreadsheets and projecting their sketches.

Grading:

Analogies: Correctness, creativity and originality of 10 analogies – 4 points each = 40 points

Sketches: Completion and artistic design of two sketches at 20 points each = 40 points

Presentation: 10 organelles with analogies are presented, all group members participate equally in presentation = 20 points

Total = 100 points.