

Cells & Heredity: 6.C.6

Cell Analogy

Grade Level	6
Sessions	1 – 50 minutes each
Seasonality	N/A
Instructional Mode(s)	Small groups
Team Size	2-4
WPS Benchmarks	06.SC.LS.06 06.SC.LS.07
MA Frameworks	6-8.LS.3-4
Key Words	plant cell, animal cell, analogy, organelle

Summary

The students will use what they have learned about each organelle in plant and animal cells to create analogies. The students will brainstorm as a team to come up with analogies that relate the functions of each organelle to objects they come in contact with on a daily basis.

Learning Objectives

2002 Worcester Public Schools (WPS) Benchmarks for Grade 6

03.SC.LS.06 Observe a range of plant and animal cells to identify the cell wall, cell membrane, chloroplasts, vacuoles, nucleus and cytoplasm when present.

03.SC.LS.07 Recognize that within cells, many of the basic functions of organisms (e.g., extracting energy from food and getting rid of waste) are carried out. The way in which cells function is similar in all living organisms.

Additional Learning Objectives

1. 6-8.LS.3 Observe a range of plant and animal cells to identify the cell wall, cell membrane, chloroplasts, vacuoles, nucleus and cytoplasm when present.
2. 6-8.LS.4 Recognize that within cells, many of the basic functions of organisms (e.g., extracting energy from food and getting rid of waste) are carried out. The way in which cells function is similar in all living organisms.

3. The students will practice brainstorming analogies.
4. The students will practice creating analogies.

Required Background Knowledge

1. The students should be familiar with the different organelles in both plant and animal cells and their functions.
2. The students should be familiar with what an analogy is.

Essential Questions

1. What are the functions of the organelles within a cell?
2. How can I relate the functions of the organelles within a plant cell to the jobs that machines, systems, or objects carry out within my house?

Introduction / Motivation

Ask the students if they know what an analogy is? Give them an example.

Suggested examples:

- Shoe is to foot as Tire is to wheel
- Hot is to cold as Fire is to ice

Procedure

The instructor will:

1. Divide the students into groups of 2-4.
2. Have them Draw and label a plant cell. Rather than directly labeling the organelles within the cell use the letter in the following list and draw an arrow to its corresponding part. Label them as follows:

A: Nucleus
B: Endoplasmic Reticulum
C: Golgi Apparatus
D: Mitochondrion
E: Lysosome
F: Vacuole
G: Cell Membrane
E: Cytosol
F: Cell Wall

G: Chloroplast

3. Pass out the attached **Cell Analogy Worksheet**. Go over the instructions for each worksheet (see **Cell Analogy Example**).
4. If the students haven't brainstormed in a group before or if the teacher feels necessary, review the rules of brainstorming (see attached **Brainstorming Supplemental Sheet**).
5. After the students have been given adequate time to complete their analogies ask the students to share their analogies with the class and to discuss why they chose their analogies.

Materials List

Materials per class	Amount	Location
None	N/A	N/A

Materials per student	Amount	Location
Handouts	N/A	N/A

Vocabulary with Definitions

1. *Cell membrane* – Organelle in animal cells that is the barrier between the cell and the environment. It is a semipermeable membrane; it allows nutrients to enter and waste products to leave the cell.
2. *Cell wall* – Organelle in plant cells that are the outermost layer. This organelle is thick and rigid. It gives plant cells an inflexible structure. It also keeps materials in the cell inside and keeps out unwanted things.
3. *Centriole* – Organelle found in animal cells that is important to cell division.
4. *Chloroplast* – Organelle in plant cells where photosynthesis occurs.
5. *Cytoplasm* – A fluid within plant and animal cells, which surrounds all organelles.
6. *Endoplasmic Reticulum (ER)* – Organelle found in both plant and animal cells. It modifies proteins, creates macromolecules, and transports proteins. Proteins

modified here are sent to the cell membrane in plant cells or sent to the central vacuole in the plant cells to be excreted.

7. *Golgi Bodies* – A complex organelle in both plant cells and animal cells that is considered to be the “post office” of the cell and also helps in the production of protein. It handles all incoming fat, protein, and other molecules and controls which molecules leave the cell. It works with the ribosomes and endoplasmic reticulum to make proteins for the cell.
8. *Mitochondria* – Organelle in plant and animal cells that process sugar and oxygen to produce energy. The mitochondria is also referred to as the “power plant” of the cell.
9. *Nucleus* – Organelle in both plant and animals cells that controls all activities in the cells. It stores chromosomes, which hold DNA. It also creates ribosomes, structures that grow off the nucleus and help generate proteins to be used in the rest of the cell.
10. *Organelle* – Structure within a cell that performs a specific function.
11. *Photosynthesis* – A process in green plants where sunlight, water, and nutrients are turned in to sugars that can be stored and then used as energy.
12. *Ribosomes* – Small structures within both plant cells and animal cells that contains proteins and RNA. These structures act like a platform or template on which the cell's proteins are made.
13. *Semipermeable* - Partially permeable. Allowing passage of certain, especially small, molecules or ions but acting as a barrier to other things.
14. *Vacuole* – Organelle in both plant and animal cells. Vacuoles are small compartments in cells that store food, water, and waste. Animal cells typically have many small vacuoles while plant cells generally have one large vacuole.

Assessment / Evaluation of Students

The instructor may assess the students in any/all of the following manners:

1. Check worksheets
2. Observe group brainstorming

Lesson Extensions

None

Attachments

1. “Cell Analogy Worksheet”
2. “Brainstorming Supplemental Sheet”
3. “Cell Analogy Example”

Troubleshooting Tips

None

Safety Issues

None

Additional Resources

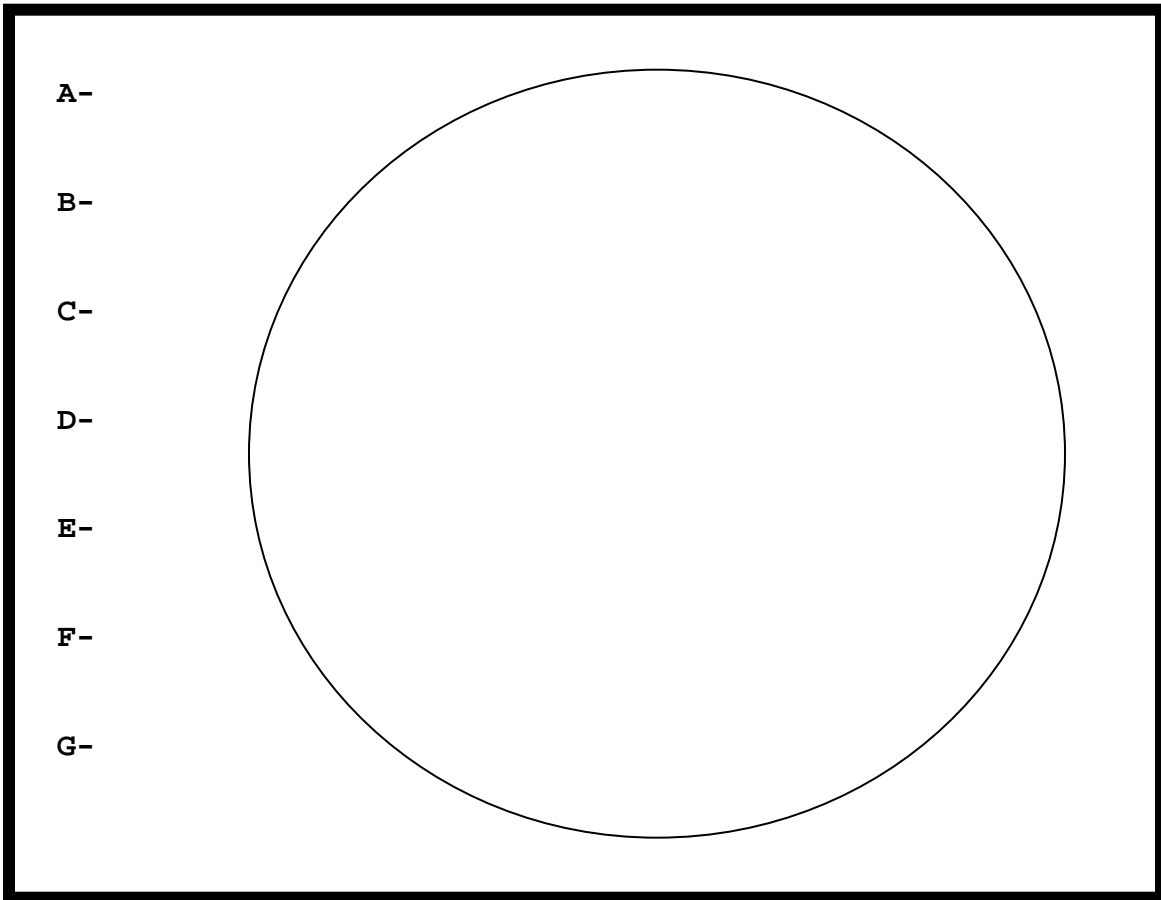
None

Key Words

Plant cell, animal cell, analogy, organelle

CELL ANALOGY WORKSHEET

Draw the cell in space below
Connect the letter to its corresponding organelle



CELL ANALOGY WORKSHEET

FILL IN THE NAME OF THE ORGANELLE NEXT TO EACH LETTER. BESIDE THE ORGANELLE NAME WRITE YOUR ANALOGY.

A: _____

B: _____

C: _____

D: _____

E: _____

BRAINSTORMING SUPPLEMENTAL SHEET

RULES OF BRAINSTORMING:

- Criticism of ideas isn't allowed
- All ideas, no matter how wild, are encouraged
- The more ideas, the better
- Every participant should try to build on or combine the ideas of others.

Cell Analogy Example

What is an analogy?

a comparison between things which have similar features, often used to help explain a principle or idea.

Brain → **Airport Control Tower**

Why?

The brain knows and controls what is going on in your body just like the control towers at airports see and control everything that's going on at an airport.

Mitochondria → **Refrigerator**



http://encarta.msn.com/media_461555116_761582165_-1_1/Mitochondria.html

<http://www.pplmotorhomes.com/parts/rv-refrigerators/motorhome-refrigerator-1200lr.htm>