

Topic: Animal Cell Project - Analogy

Summary: Students learn about the animal eukaryotic cell using an analogy. This project is to supplement your normal teaching about the cell.

NGSS Standards: 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.

Time Length: Supplements the entire cell unit of class instruction and labs.

Procedures:

1. The first day of the project, introduce what the students will do. Have the students discuss what they would like their topic to be. Give them a little time to think of a topic. No group should have the same project in any of your classes.
2. After all of the groups have a topic, they group should write what each part of the analogy is associated with on their handout.
3. After you have taught a particular part of the cell, have the students write their paragraph. Example, today you teach about osmosis and the lipid bilayer. Tomorrow, have about 20 minutes put aside for the students to write their paragraphs. The first paragraphs are hard for the students to write but it will become easier for them afterward.
4. When reading the paragraph, check to see if the student understands the science and if the analogy concept is correct. Give the paragraphs back to the students with suggestions and corrections.
5. To enhance learning, students can rewrite entire paragraphs to raise poor scores.
6. Students should write their speech onto note cards for the presentation. Have students condense their analogy and sentences into a 3-sentence paragraph. The first sentence should be the comparison. The second sentence should describe the organelle and its function. The third sentence should describe the analogy and its function.
7. The day before the presentation, give students some time in class to finish their presentation posters and to practice the length of their presentations--3 minutes total or one minute and a half for each student in the group.

Accommodations: Students with an IEP can write fewer sentences in a paragraph. English language learners should be partnered with a student who is strong in English.

Editable DOCX File and Answer Key:

Available at www.ngsslifescience.com

Animal Cell Project - Analogy

Objective: Your goal is to create an analogy that relates to an animal eukaryote cell. Your final product is a story about something that has similarities to a cell's structure. There are 8 main parts to an animal cell.

Required Cell Parts

1. *Cell Membrane:*
2. *Vacuole:*
3. *Lysosome:*
4. *Ribosomes:*
5. *Endoplasmic Reticulum:*
6. *Golgi Apparatus:*
7. *Mitochondria:*
8. *Nucleus:*

Cell Details

- general function, osmosis
 general function, waste
 general function, enzymes
 general function, free and bounded
 general function, rough and smooth
 general function, protein secretion
 general function, reactants & products
 general function, DNA

Optional Going Further

9. *Transport Proteins:* general function, active transport
10. *Receptor Proteins:* general function, signal molecule
11. *Cytoskeleton:* general function, how functions during cell division
12. *Peroxisomes:* general function, purpose of cholesterol

Definition of Analogy: A synonym is a metaphor. For example, the motor in a car is analogous to a power plant, since both are used to produce power.

Topics: Every group needs to have their own analogy. No two analogies can be the same. Example topics: castle, mall, city, Bikini Bottom, school, concert hall, car, football stadium, cruise ship, hospital, USA, restaurant, video game, etc.

Paragraphs: Each paragraph should be about one of the eight parts assigned. There should be 4 or more sentences in each paragraph. There will be eight paragraphs. The teacher may offer advice on how to improve your paragraphs but if you received no advice, that does not mean your paragraph cannot be improved. You must write using complete sentences!

Sentence Order:

- Sentence #1: The first sentence should compare the cell part to the analogy. For example, mitochondria are like the engine of car.
- Sentences #2 and 3: The second and third sentences should describe the details of the cell. Write a definition for each of the cell details using scientific terms.
- Sentences #4: The fourth sentence should describe the comparison of the analogy. Only write about the analogy. Example: The engine of the car generates energy for the car.

Going Further: Students can earn extra points by writing more than eight paragraphs. Class time will be allotted for just eight paragraphs. This means that you either need to work on this outside of class or come to class prepared and work fast during class.

Group / Individual Work: Students will have roughly 20 minutes in class to work with their partner. Paragraphs are due in class. Partners can discuss ideas, concepts, analogies, and supporting evidence. Partners can turn in the same paragraphs, but each member must create their poster individually. Your visual aid is a labeled model of the cell, either hand drawn or built.

Analogy Comparisons: A eukaryote cell can be compared to a house. The outside walls are like the cell membrane. The trash can is like the vacuole. The kitchen knife is like the lysosome. The kitchen is like the ribosomes. The halls and stairs are like the endoplasmic reticulum. The mailbox is like the Golgi apparatus. The food produced by the kitchen is like the proteins. The furnace of the house is like the mitochondria. Last, the people inside the house are like the nucleus.

My Analogy Topic _____

- 1. Cell Membrane _____
- 2. Vacuole _____
- 3. Lysosome _____
- 4. Ribosome _____
- 5. Endoplasmic Reticulum _____
- 6. Golgi Apparatus _____
- 7. Mitochondria _____
- 8. Nucleus _____

	Beginning	Novice	Proficient	Excellent
Visual Aide	Incomplete or visual aide (text and drawings) are too small for people to see clearly. 8 Points	Text is small and/or difficult to read. 12 Points	Visual aide is detailed, large, colored, and labels are easy to read. 16 Points	Everything in Proficient. Plus high quality drawing. You may use a large detailed model. 20 Points
Paragraphs	Vague analogy, incomplete sentences, or no explanation of science. 2 Points Each	Analogy relates to cell, missing two of the six sentences, or the paragraph format is in wrong order. 3 Points Each	Good analogy that relates to cell part but is missing one of the six sentences. 4 Points Each	Creative analogy and has 2+ detailed sentence explanation of science. 5 Points Each

Grading: This is a 60-point project. Paragraphs are 40 points and the poster is 20.