

Topic: Analogy of the Cell Project

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

Goals & Objectives: Students will be able to work in a group to solve a problem. Students will be able to understand the structure and functions of a cell.

Standards: CA Biology 1: A, E, F, G, H, J.

Time Length: Supplements many weeks 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.

Analogy of the Cell Project

Objective: Your goal is to create an analogy that relates to a 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.

Cell Parts

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

Cell Details

general function, lipid bilayer structure, osmosis
general function, facilitated diffusion, active transport
general function, hormones, secondary messengers
general function, free, bounded
general function, rough, smooth
general function, modifies protein, exocytosis
general function, reactants & products, fermentation
general function, nucleolus, nuclear envelope

Definition of Analogy: A similarity between things that are otherwise unlike. For example, the motor in a car is analogous to a power plant, since both are used to produce power. Synonyms: resemblance, similarity, comparison, and metaphor.

Topics: Every group needs to have their own analogy. No two analogies can be the same. To start, your topic needs to be complex. Second, it is easier if it is a place or thing. Example topics: castle, mall, Hogwarts, Bikini Bottom, school, NYC, concert hall, car, football stadium, cruise ship, hospital, USA, restaurant, factory, etc.

Paragraphs: Each paragraph should be about one of the eight parts assigned. There should be 6 or more sentences in the paragraph. There will be eight paragraphs total. 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.

Sentence Order:

Sentence #1: The first sentence should compare the cell part to the analogy. For example, mitochondria is like the engine of a car.

Sentences #2, 3, 4: The second, third, and fourth sentences should describe the details of the cell. Write a definition for each of the cell details using scientific terms.

Sentences #5, 6: The fifth and sixth sentences should describe the comparison of the analogy. Only write about the analogy. Example: The engine of the car generates energy for the car. The engine of the car transfers chemical energy into mechanical energy.

Flash Cards: On _____, your project is due. Both students write up their own presentation flash cards. Write flash card paragraphs in the order listed above. The flash cards will be used as an aide if you forget what to say during your presentation.

Flash Card Requirements: Write the comparison sentence first. The second sentence needs to explain what the cell organelle/part does, and the third sentence must explain the specific part of the analogy and how it works.

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 paragraph but each member must write it up individually.

Grading: This is a 200-point project. Each paragraph is worth 10 points for a total of 80 points. The flash cards and visual aide are 40 points and are due at the end of your presentation. The mandatory presentation is 80 points. Please see the rubric for more details.

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. The following are the extra paragraph possibilities: 1) Do the analogy on a plant cell instead of an animal cell. There are three new items in plant cells: chloroplasts, cell wall, and central vacuole. 2) Describe the cytoskeleton and its structure, as well as how it aides in cell division. 3) Describe other cell organelles including peroxisomes, lysosomes, and vacuoles.

Analogy Comparisons: A eukaryote cell can be compared to a house. The outside walls are like the cell membrane. The front and back doors are like channel proteins. The satellite dish is like a receptor protein. 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. Channel Protein _____
3. Receptor Protein _____
4. Ribosome _____
5. Endoplasmic Reticulum _____
6. Golgi Apparatus _____
7. Mitochondria _____
8. Nucleus _____

Name: _____ Row: _____

Date: _____ Period: _____

Cell Analogy Rubric

	Beginning	Novice	Proficient	Excellent	Grade
Flash Cards	Incorrect format or 3+ cards missing or poor English. 5 Points	Correct format and 1-2 cards missing. 6 Points	Correct format, all cards completed, correct English, and detailed sentences. 8 Points	Everything in Proficient. Advanced explanation of cell theory. 10 Points	
Visual Aide	Incomplete or visual aide (text and drawings) are too small for the audience to see. 15 Points	Text is small and difficult to read. 20 Points	Visual aide is large, and labels are easy to read. 25 Points	Everything in Proficient. Plus colorful, clear and concise, good looking. You may use a large detailed model. 30 Points	
Presentation	Students read from their note cards. 40 Points	Students sometimes read from note cards, and sometimes looking at the audience. 50 Points	Student glances at note cards, looks at the audience, and project their voice. Student may look at the cards while the partner is presenting. 70 Points	Students are dressed up, don't read from note cards while presenting, share equal parts, looking at the audience, and project their voice. 80 Points	
Paragraphs	Vague analogy, not correct format, or no explanation of science. 4 Points	Analogy relates to cell, missing two of the six sentences, or the paragraph format is in wrong order. 6 Points	Good analogy that relates to cell part but is missing one of the six sentences. 8 Points	Creative analogy and has 3+ detailed sentence explanation of science. 10 Points	1 2 3 4 5 6 7 8
				Total Points =	