Lesson Plans for the Animal Cell

Subject: life science

Grade: 7

Class or period 1 2 3 4 5 6 7 8

Content Standard: Minnesota Science Standard

GRADE 7

Strand-IV. LIFE SCIENCE

Sub strand - A. Cells

Standard-. The student will understand that all organisms are composed of cells that carry on the many functions needed to sustain life.

Preparation

Objectives: Students will be able to:

- Differentiate the characteristics of animal and plant cells
- Identify and name at least six organelles in the cell
- Match effectively the function to the organelle on a cell model
- Build a three-dimensional model of a plant or animal cell

Introduction

Day One

Discuss Cell Theory

Formulation of the Cell Theory

In 1838, Theodor Schwann and Matthias Schleiden were enjoying after-dinner coffee and talking about their studies on cells. It has been suggested that when Schwann heard Schleiden describe plant cells with nuclei, he was struck by the similarity of these plant cells to cells he had observed in animal tissues. The two scientists went immediately to Schwann's lab to look at his slides. Schwann published his book on animal and plant cells (Schwann 1839) the next year, a treatise devoid of acknowledgments of anyone else's contribution, including that of Schleiden (1838). He summarized his observations into

three conclusions about cells:

- 1) The cell is the unit of structure, physiology, and organization in living things.
- 2) The cell retains a dual existence as a distinct entity and a building block in the construction of organisms.
- 3) Cells form by free-cell formation, similar to the formation of crystals (spontaneous generation).

We know today that the first two tenets are correct, but the third is clearly wrong. The correct interpretation of cell formation by division was finally promoted by others and formally enunciated in Rudolph Virchow's powerful dictum, "Omnis cellula e cellula"... "All cells only arise from pre-existing cells".

The modern tenets of the Cell Theory include:

- 1. all known living things are made up of cells.
- 2. the cell is structural & functional unit of all living things.
- 3. all cells come from pre-existing cells by division. (Spontaneous Generation does not occur).
- 4. cells contains hereditary information which is passed from cell to cell during cell division.
- 5. All cells are basically the same in chemical composition.
- 6. all energy flow (metabolism & biochemistry) of life occurs within cells.

Activity: Cell Theory Rap

Day 2

Cell Organelles

Discussion of Cell structure and Organelle Animal Cell Organelles/Function

<u>cell membrane</u> - the thin layer of protein and fat that surrounds the cell. It is represented by the plastic bag.

<u>centrosome</u> - a small body located near the nucleus - it has a dense center and radiating tubules. This is where microtubules are made. During cell division (mitosis), the centrosome divides and the two parts move to opposite sides of the dividing cell. It is represented by a gum ball.

cytoplasm - the jellylike material outside the cell nucleus in which the organelles are

located. It is represented by the gelatin.

<u>Golgi body</u> - (also called the Golgi apparatus or Golgi complex) a flattened, layered, saclike organelle that looks like a stack of pancakes and is located near the nucleus. It produces the membranes that surround the lysosomes. The Golgi body packages proteins and carbohydrates into membrane-bound vesicles for "export" from the cell. It is represented by folded ribbons of hard candy.

<u>lysosome</u> - (also called cell vesicles) round organelles surrounded by a membrane and containing digestive enzymes. This is where the digestion of cell nutrients takes place. They are represented by M&M's.

<u>mitochondrion</u> - spherical to rod-shaped organelles with a double membrane. The inner membrane is infolded many times, forming a series of projections (called cristae). The mitochondrion converts the energy stored in glucose into ATP (adenosine triphosphate) for the cell. They are represented by raisins.

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smooth endoplasmic reticulum - (smooth ER) a vast system of

Activity: Comparing the Cell to a Factory

Web site: http://wwwbeyondbooks.comlif71/4a.asp

Day 3

Animal Cell Model

Construct JELL-O Cell

JELL-O worksheet

Class presentations of Models

Enrichment: Cell Organelle Crossword Puzzle, Cell Organelle word scramble

Review of lesson

Students Comments:

Teacher Comments:

Questions

What could I change to make this lesson better? Did students complete the science standard? How successful was the assessment?

Cell Theory Rap Page 1 of 2

Cell Theory Rap

Listen close to the story I tell. It's the rapping story of the living cell. It's a happy tune that's sort of cheery. About a real tough topic called the cell theory.

All animals, plants, and protists too, Are made of cells with different jobs to do. They're the basic units of all organisms, And I hope by now you got the rhythm.

It all started with one dude named Hooke.
Who at some cork cells took a look.
He used a scope and took his time.
'Cause a cell is small and thinner than a dime.

Say 1, 2, 3, 4, Are you ready to learn some more? The animal cell has many parts, And you must know each one by heart.

Like the farmer man in the dell. The nucleus controls the cell. its gives the orders -- kind of like a brain. And it's protected by a nuclear membrane.

Around the cell, you'll find another "skin,"
The cellular membrane holds the whole cell in
But its job isn't simple there's no doubt,
It lets some particles go in and out.

Now please don't lose your science enthusiasm, Listen to the story of the cytoplsm. All around the cell this thick fluid does go, But in the nucleus it will not flow.

And don't forget those ribosomes This is where proteins come from.
These protein factories are so small, you'll agree,
You need an electron microscope to see.

Just when you thought you weren't having any fun, Along comes teh endoplasmic reticulum. These tubelike structures serve as a track, To carry stuff to the membrane and back.

Now have you ever seen any doughnuts without holes? In a cell, they're called vacuoles. They're filled with stuff like H2O

Cell Theory Rap

Page 2 of 2

And they carry food so the cell can grow.

Las of all, but not the very least, Mitochondria - mighty cellular beasts, Since they turn sugars into energy so well, We call them the powerhouse of the cell.

Now my friend, you know it well, The unforgettable story of the living cell.

"Science World" 10-5-90

Comparing a Cell to a Factory The Cell as a System

Name

Fill in the chart below while reading information at the following website:				
A Busy Factory http://www.beyondbooks.com/lif71/4a	.asp			
In the second column of the chart, wrilike the factory worker described in the description of the function of the organization.	e first column. In the third			
Job in the Factory	Cell Organelle	Function of the organelle		
Shipping/Receiving Department				
Chief Executive Officer (CEO)				
Factory floor				
Assembly line (where workers do their work)				
Workers in the assembly line				
Finishing/packaging department				
Maintenance crew				
Support beams (walls, ceilings, floors)				
Power plant				

Science NetLinks Student Worksheet-The Cell as a System.
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Comparing a Cell to a Factory: Answer Key The Cell as a System

Fill in the chart below while reading information at the following website:

A Busy Factory

http://www.beyondbooks.com/lif71/4a.asp

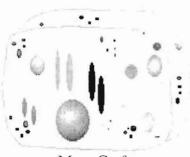
In the second column of the chart, write the name of the organelle that functions most like the factory worker described in the first column. In the third column, write a brief description of the function of the organelle in the cell.

Job in the Factory	Cell Organelle	Function of the organelle	
Shipping/Receiving Department	Plasma membrane	Regulates what enters and leaves the cell; where cell makes contact with the external environment	
Chief Executive Officer (CEO)	Nucleus	Controls all cell activity; determines what proteins will be made	
Factory floor	Cytoplasm	Contains the organelles; site of most cell activity	
Assembly line (where workers do their work)	Endoplasmic Reticulum (ER)	Where ribosomes do their work	
Workers in the assembly line	Ribosomes	Build the proteins	
Finishing/packaging department	Golgi apparatus	Prepares proteins for use or export	
Maintenance crew	Lysosomes	Responsible for breaking down and absorbing materials taken in by the cell	
Support beams (walls, ceilings, floors)	Cytoskeleton	Maintains cell shape	
Power plant	Mitochondria/chloroplasts	Transforms one form of energy into another	

Science NetLinks Student Worksheet-The Cell as a System.

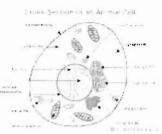
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Jello 3-D Animal Cell Craft



More Crafts

This projects lets the student make an edible, 3-D model of an animal cell. The various organelles of the cell are represented by fruits and candies. When you've finished making your cell and writing about it, you can eat it!



More on Animal Cells

Supplies:

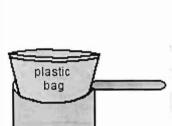
- Gelatin, either a light-colored Jello (like lemon) or unflavored gelatin with sugar or juice added
- Water
- Spoon (to stir the gelatin)
- Microwave or stove (used to heat the water)
- A small but sturdy plastic bag to make the gelatin in (we used 1-gallon ziplock bags)
- Various fruits and candies used to represent the parts of the cell: raisins, gummy worms (plain and sour), gumdrops, gum ball, jelly beans, grapes, mandarin orange sections, sprinkles, M&M's, jaw breakers, a small stone fruit (like a plum), dried fruit, and/or hard candy. Note: marshmallows will float on top of the gelatin, so they don't work well in this craft.
- Refrigerator (used to set the gelatin)

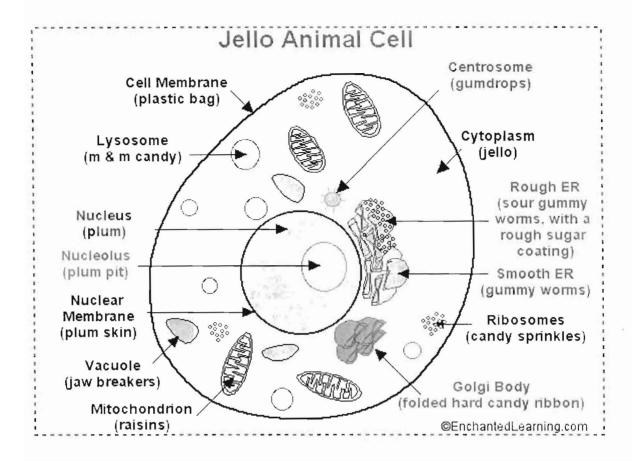
Make the light-colored Jello or gelatin, but make it with a bit less water than the instructions call for (this will make the gelatin a little stiffer and will make the cell components stay in place better). The gelatin will represent the cytoplasm of the cell.

First, heat the water to boiling (use about three-quarters of what is called for in the instructions). Dissolve the gelatin in the hot water and carefully stir it. Carefully add the same amount of cold water.

Place an open plastic bag (we used 1-gallon ziplock bags) inside a sturdy container (like a large bowl or pan) - this makes pouring the Jello easier. Slowly pour the cooled gelatin into the bag -make sure that there is room in the bag for all the cell components that will be added later. Seal the bag and put it in the refrigerator.

When the gelatin is almost set (this takes about an hour, but depends on the temperature of your refrigerator), open the bag and start adding the components of the cell. (Also, have the student label the cell components using this printout, including the name of each cell component and what they used to represent it using the animal cell glossary.)





Cell components (we've included what we used for our model, but you can choose whatever edible parts you like):

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Golgi body - (also called the Golgi apparatus or Golgi complex) a flattened, layered, sac-like organelle that looks like a stack of pancakes and is located near the nucleus. It produces the membranes that surround the lysosomes. The Golgi body packages proteins and carbohydrates into membrane-bound vesicles for "export" from the cell. It is represented by folded ribbons of hard candy.

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<u>vacuole</u> - fluid-filled, membrane-surrounded cavities inside a cell. The vacuole fills with food being digested and waste material that is on its way out of the cell. They are represented by jaw breakers.

Cell components					
Organelles	Food used	Function			
cell membrane					
centrosome					
cytoplasm					
Golgi body					
lysosome					
mitochondrion					
nuclear membrane					
nucleolus					
nucleus					
ribosome					
rough endoplasmic reticulum					
smooth endoplasmic reticulum					
vacuole					

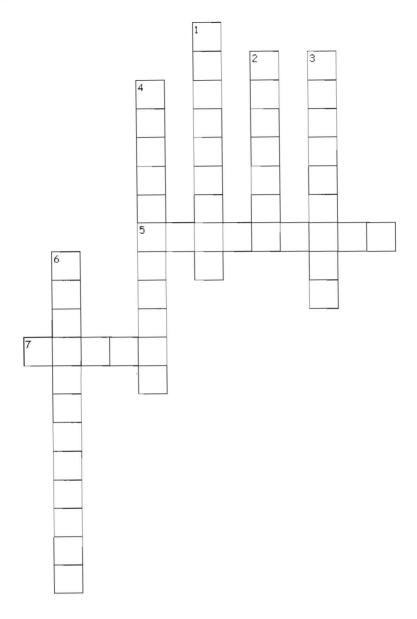
Name: Date:

Cells

Question: What is the basic building block of OUR life as human beings??

SUUNELC	
LELC BAMNMREE	
COYPAMLST	
SICODEMALPN TUILUMREC	
GOILG EDOBIS	
MAOTOHCIIRDN	
SELSYSMOO	

Cell Crossword Puzzle



Across

- 5. Chemicals used to digest waste
- 7. Used for packaging and secreting of energy

Down

- A gel like material inside the cell; it contains water and nutrients for the cell
 Directs the activity of a cell; it contains chromosomes with the DNA
 - - 3. Makes protein for the cell
 - 4. Moves materials around in the cell
 - 6. Breaks down food and releases energy to the cell

Animal Cell Organelles/Function

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Jell-O Cell Project

Jell-O Cell Project Rubric						
Category	Scoring Criteria	Excellent (3 pts)	Satisfactory (2 pts)	Needs Work (1 pt)		
Craftsmanship	Model cell is creative and shows effort					
	The model is 3 dimensional					
	Model stays together, is not too messy or cumbersome to move around					
Cell Parts	Type of cell and student name are found on both the key and the model					
	Key, legend, or labeling easy to use to identify the parts on your model					
	Accurate description of the function of each cell part is provided					
	Appropriate material is used (item looks like the cell part)					
	Shape corresponds to the type of cell: plant or animal					
Written word	Grammar, spelling					
Score	Total Points (out of 30)					

Cell membrane-Dixie cup

Lysosome- m&m

Nucleus-plum

Nucleolus-plum pit

Nuclear Membrane-plum skin

Vacuole-jaw breaker

Mitochondrion-cranraisins

Centrosome-gumdrops

Cytoplasm-Jello

Rough ER-Worms with rough sugar coating

Smooth ER-gummy worms

Ribosomes-candy sprinkles

Golgi Body- fruit rollup

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