

Cell Structure and Function Unit

Day 1:

Warm Up:

How does this picture (on overhead or via projection screen) the same? Different? Than you?



This building looks as if it is made up of many **small similar sections**.

Complex living things are also made up of **small units**.

These small units are called **cells**. The cell is **both a structural unit and a functional unit**. A single-celled organism must carry out the same basic processes carried out in the most complex organism.

Class Discussion

What are some of these processes?

In what ways are you like a single-celled organism?

How are you different?

This is what we will be looking at in this unit.

Administer a short Pre-Assessment Survey:

Found at: http://www.biology.arizona.edu/cell_bio/tutorials/cells/problems.html

Comment: I will also read aloud as we do the profile assessment to accommodate those students who have trouble reading and comprehending

1. Which of the following is not a part of the cell theory?

- A. [All animals are formed by cells.](#)
- B. [Reproduction requires vegetative duplication or the sexual mixing of gametes.](#)
- C. [Cells are the smallest form of life.](#)
- D. [Abnormal cells self destruct by apoptosis.](#)

2. What type of microscope would allow you to study the orderly sequence of events that lead to the separation of chromosomes during mitosis?
(Chromosomes are found inside of the cell's nucleus.)

- A. [scanning electron microscope](#)
- B. [light microscope](#)
- C. [transmission electron microscope](#)
- D. [long-range telescope](#)

3. What is Robert Hooke known for?

- a. the microscope
- b. cork cells
- c. onion cells
- d. Peter Pan

4. List as many types of cells as you can?

5. List any cell structures you can think of

Administer the K-W-L: A Strategy for Learning

The K-W-L chart is a way for you to put in writing some of your ideas about cells. You will be using this chart from time to time, so leave yourself plenty of room for adding ideas, questions, and information. The chart has three columns: K - what you already know about cells; W - what you would like to know about cells; and L - what you have learned about cells. The L column gets filled in as you discover new things, so at first it will have a lot less in it than the other columns. We will keep these in the class—so please hand in at the end of the class period.

Notes: Part I

Comment: I need to make a Study Guide up to follow—to accommodate several students

Robert Hooke, an English scientist, in 1665 made important observations that were the beginning of a major biological theory.



Interesting information and facts about Robert Hooke:

<http://micro.magnet.fsu.edu/optics/timeline/people/hooke.html>

What he is best known for is his discover or work with cork cells

- He took cork which is made from plants—cut super thin and looked at it under a microscope and saw perforated and porous, much like a honeycomb compartments.
- Hooke was describing hollow units which he named *cells*
- The cork Hooke saw was no longer living *so he saw only the outer parts*, the walls of the cells



1665)

The Microscope that Hooke used was very basic (back in



This is what he saw



This is what he drew

We will be drawing similar pictures of what cells we see as well.

Activity: (also connects with math)

Show via computer and projector

<http://micro.magnet.fsu.edu/optics/activities/students/perspectives.html> Interactive Java Tutorial --show both the top and bottom tutorial

Scientists look at things using their eyes, but they also use a wide variety of specialized tools that give them extra capabilities. For instance, some objects are so small that scientists must use powerful microscopes to see them. Other objects may be very large but are so far away that scientists have to use a powerful telescope in order to observe them.

Before you begin the activity that follows, imagine what it would be like to be a flea on a dog's back or the giant in **Jack and the Beanstalk** walking through a normal-sized village. What would things look like to the Indian in the Cupboard or to the Borrowers who live under the floorboards?

Closure: List one thing new you learned today

Day 2

- **Warm Up**
 - What did Robert Hooke do? What was he known for?
- **While taking attendance and giving back papers—hand out and let students read:**
 - Cell cartoon <http://www.rudimentsofwisdom.com/pages/cells.htm>
 - Also Gary Larson cartoons related to cells
- **Notes**
 - Other Important people and discoveries related to cells:
 - French botanist --named **Dutrochet** --1824 --suggested that various **parts of organisms are composed of cells**
 - Scottish scientist, **Robert Brown**, 1831, cell contains a central part called the **nucleus**
 - 1835, French, **Dujardin**, cells not hollow but **filled with thick jellylike fluid**

The Cell Theory

- 1838, Schleiden- all plants are composed of cells and that cells are alive and contribute to the functioning of the organism of which they are a part
- Schwann, 1834, same thing with animal cells
- 1858, Virchow, revealed that all cells come from other living cells

Cell Theory States:

- All organisms are composed of cells or cell fragments which are the basic units of structure and function
- All cells are produced from other cells

Step by step: <http://www.biologylessons.sdsu.edu/ta/classes/index.html> (cells unit)
Also other references and resources to use:

- Start the walk through of the *Cells Are Us* unit—Navigate to *Levels of Organization*--student activity print out pages are available http://peer.tamu.edu/curriculum_modules/Cell_Biology/
- Access the [Gallery of Cells](http://www.cellsalive.com/) (<http://www.cellsalive.com/>) types and navigate to the components related to cells
 - <http://teachers.teach-nology.com/themes/science/cell/> has numerous worksheets, Webquests and other teacher resources (video clips etc..)
 - also Building Blocks of Life <http://www.howe.k12.ok.us/~jimaskew/bcell1.htm#one>
 - <http://www.rit.edu/~comets/pages/lessonplans/cellstructure.html> COMETS LESSON PLAN Cell Structure: Differences between Plants and Animals

Comment: I plan to have a variety of hands on mini activities/ graphic organizes will be used for those students who need to connect—the Venn diagram will also help these students—a lot more mini activities/visual (through slides and computer) and activities will be used

- <http://learnweb.harvard.edu/alps/tfu/pop3.cfm> TfU Teaching for Understanding from Harvards Group (also has Acting out play protocol)
- <http://educ.queensu.ca/~science/main/concept/biol/b02/b02main.htm> *Cellular Biology - Concept Development DemosTips Labs/Activities*
- <http://www.bioanim.com/> Living Cell, Tissue, Human Body Interactive animated atlas of structure and function - Learn easier and faster by using interactive virtual reality worlds!
- <http://www.cellsalive.com/> Cells Alive!
- <http://www.usoe.k12.ut.us/curr/science/sciber00/7th/cells/sciber/intro.htm> Cells & Organisms - 7th Grade Activities (**also give via this interactive quiz—through projector**)
- <http://sunsite.berkeley.edu/cgi-bin/searchkids.pl?searchtype=subject&keywords=cell+science&title=Cell+Science> KidsClick! Cell Science Page
- <http://www.scishop.org/cells.html> Lesson Plans
- <http://www.csc.vill.edu/~ysp/Teacher/Webpages/Owens/mstp1.html> Cell Size Lesson Plan
- <http://www.ncsu.edu/sciencejunction/terminal/imse/lowres/1/cellbiology.htm> IMSE Cell Biology Page
- <http://www.cloudnet.com/~edrbsass/edsci.htm#biology> Biology Lesson Plans (Includes Genetics, Cells, and Evolution)
- http://cybersleuth-kids.com/sleuth/Science/Life_Science/Cells/index.htm CyberSleuth Kids' Cells Page
- <http://www.saddleriverday.org/sciencesites.htm#cells> Links Page
- <http://www.vanderbilt.edu/virtualschool/geneslessonplan.htm> Introduction to Cells and DNA - In this lesson we will describe what a cell and DNA is, focusing mainly on the cell's functions and its important components. To do this, we are going to build cells out of paper plates and candy pieces. We will explain the roles of each compartment as the students assemble their cells. Then we will address the specific matter of DNA, its function, and, if time permits, its replication.
- <http://www.life.uiuc.edu/plantbio/cell/> Virtual Cell - By clicking to cut and zoom, you will explore the organization of the plant cell to the molecular level. Take your time and explore structure all the way down all the way down to the molecular organization of the DNA. Click on anaglyph to switch to 3D mode
- <http://library.thinkquest.org/3564/> ThinkQuest – The Cell
- <http://chroma.mbt.washington.edu/outreach/intro.html> Microscopes, Cells, DNA, and You
- <http://www.ziplink.net/~pik/Cell%20Biology%2C%20Microbiology.html> Cellular Microbiology Links Page
- <http://www.biologylessons.sdsu.edu/ta/classes/index.html> Molecules and Cells
- <http://www.accessexcellence.com/AB/GG> Graphics Gallery - Graphics Gallery is a series of labeled diagrams with explanations representing the important processes of biotechnology. Each diagram is followed by a summary of information, providing a context for the process illustrated.
- <http://www.runet.edu/~sbisset/grp103.htm> Plant & Animal Cell Webquest
- <http://www.tvdsb.on.ca/westmin/science/sbi3a1/Cells/cells.html> Cell Structures & Functions
- http://www.biology.arizona.edu/cell_bio/cell_bio.html Problem Sets & Tutorials, Activities, Web Resources
- <http://www.tela.co.uk/cellcity/> Cell City - Interactive Science Lecture
- http://trackstar.hpptec.org/main/display.php3?option=frames&track_id=3404 Cells: An Interactive Lesson
- http://biologica.concord.org/webtest1/view_3D_cells.htm **Learn about cell structure and function by viewing QuickTime movies and interacting with 3D worlds. EXCELLENT!!**
- <http://www.win.co.nz/bioweb/cell.html> Cell Structure and Function
- http://www.thinkquest.org/library/lib/site_sum_outside.html?tname=12413&url=12413/structures.html Cell biology **EXCELLENT SITE!!**

- <http://www.iacr.bbsrc.ac.uk/notebook/courses/guide/cell.htm> The biology of the cell (good connection overview between cells and real life—also excellent organization overview by function)
- <http://www.hoflink.com/~house/Cell%20Structure.html> links page

WebQuests:

- [BSCD - Webquest 3](#)
... In order to understand how the **cell functions** in your body, we have to take a look at ... These molecules combined to form the **structures** that make up a **cell**. ...
bscd.bsd.uchicago.edu/webquest/webquest3.html
- [organelle x-file webquest](#)
... <http://ampere.scale.uiuc.edu/~m-lexa/cell/cell.html> (Virtual Cell). esg-www.mit.edu:8001/bio/cb/org/organelles.html (Structure and Function of Organelles). ...
www.ottumwa.k12.ia.us/quests/anatomy/Organelle%20X-file%20WebQuest/
- <http://www.bhsonline.org/teachers/Corson/Handout.htm> [Bruce's Student Template Handout](#)
Student Page. A **WebQuest**. To Boldly Go Where No One Has Gone Before. on **Cell Structure & Function**, a **WebQuest** for grades 9/10 Biology. by Bruce P. Corson. Beverly ...
www.bhsonline.org/teachers/Corson/Handout.htm
- [WebQuest Format](#)
... the observable components and **functions** of a **cell**, such as the **cell** membrane. LS-M-A2 comparing and contrasting the basic **structures** and **functions** of animal ...
www.classtech2000.com/techined/full2c/webqtemp/webqtemp.htm
- [Cell City](#)
... where and what their specific **functions** are can be a difficult task. It is my hope that this **WebQuest** will help these students understand how a **cell** is similar ...
edservices.aea7.k12.ia.us/edtech/teacherpages/cwinstead3/
- [webquestpg.1](#)
... This **WebQuest** will help you explore the **structure** and **function** of plant and animal **cells** and discover their similarities and differences enabling you to build ...
www.nksd.net/schools/hes/todd/webquestpg.1.htm

The Cell Model Activity:

Directions found at: <http://www.howe.k12.ok.us/~jimaskew/biolab3x.htm>

Cell Model Lab Report Guide

Date Submitted:	Model Self-evaluation Score : completed
Your Name: (each student completes their own report for this lab)	
The Lab Problem: Build a model of a plant cell.	
Research References:	
Procedures	Model Diagram: Draft
<p>This lab will be done outside of class.</p> <p>Build a model of a plant cell using materials of your choice. Your model must be as follows:</p> <ul style="list-style-type: none">• The model must be free-standing, three-dimensional and large enough for all parts to be seen clearly.• Shapes of structures in your model must resemble actual structures in cells.• The following cell parts must be shown:<ul style="list-style-type: none">• cell wall• cell membrane• nucleus• chromatin• mitochondria• endoplasmic reticulum• ribosomes• chloroplasts• Draw a diagram of your model and	

label all parts.	
------------------	--

Rubric for Cell Model: <http://www.howe.k12.ok.us/~jimaskew/evalmod.htm>

Science Model Evaluation Rubric assignment # _____				
Student Name: _____		Score: _____		
This analytic rubric is used to verify specific tasks performed when building a science model. If the task has been successfully compl No points are awarded if the task is not complete.				
Category	Scoring Criteria	Points	Student Evaluator	
Documentation <i>40 points</i>	<ul style="list-style-type: none">Model is accompanied by a carefully drawn diagram of the model. The important parts of the model are labeled so the diagram may be used as a "key" to understand the model. <i>(The model project should begin with a drawing to use as a construction guide. The drawing should include student name and assignment number.)</i>Model is accompanied by a bibliography showing the research references used in planning the model. <i>(There should always be research references.)</i>	25		
		15		
Report of Research <i>20 points</i>	<ul style="list-style-type: none">Model clearly represents all assigned curriculum concepts. <i>(Curriculum concepts are found on the model planning guide.)</i>Model demonstrates the application of current information about the concept. <i>(The model is scientifically correct.)</i>	10		
		10		
Model Construction <i>40 points</i>	<ul style="list-style-type: none">Model demonstrates the student's pride in its careful construction.The choice of materials for the model indicates the student's use of their creative imagination.Model is constructed of materials that are appropriate for classroom display. <i>(Materials must be sturdy and not offensive.)</i>	10		
		15		
		15		
Score	Total Points	100		
Self-evaluation	Students are expected to honestly evaluate their own work. If the difference between the student evaluation and the teacher evaluation is more than 10 points, 5 points will be deducted from the teacher's score when the grade is recorded.			
Deadline	All "turn-in" assignments are expected to be completed by the assigned deadline. Models will be accepted up to two days after the deadline for 3/4 credit. No credit will be given after this time.			

Name _____

Date _____

Comparing Plant And Animal Cells

Directions: Complete the chart below, then answer the questions.

Cell Part or Organelle	Is It Found In A Plant Cell?	Is It Found In A Animal Cell?
Cell Membrane		
Cell Wall		
Chloroplast		
Chromatin		
Cytoplasm		
Endoplasmic Reticulum		
Golgi Bodies		
Lysosome		
Mitochondrion		
Nucleus		
Nuclear Membrane		
Nucleolus		
Ribosome		
Vacuole		

Questions:

1. What cell parts do Animal cells have that Plant cells do not have?
2. What cell parts do Plant cells have that Animal cells do not have?
3. Why do Plant cells have cell walls and Animal cells do not?
4. Why do think Plant cells have bigger vacuoles than Animal cells?

Name _____

Date _____

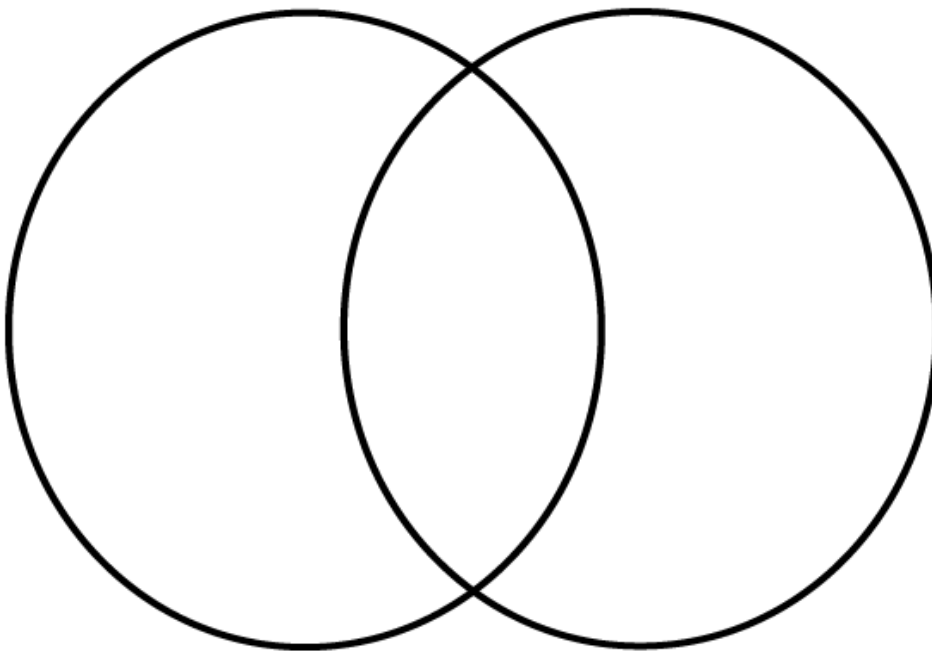
Comparing Plant And Animal Cells VENN Diagram

Directions: Fill in the VENN Diagram to compare *PLANT CELLS* to *ANIMAL CELLS*. Use the words in the word box.

cell membrane	cell wall	chloroplast	cytoplasm
mitochondria	nucleus	ribosome	vacuole

PLANT CELL

ANIMAL CELL



Name _____

Date _____

Cells Group Creative Writing

Directions: As a group, you have 25 minutes to write a brief story using the words below.

MITOCHONDRIA	CHLOROPHYLL	TISSUES	CHROMOSOME
CYTOPLASM	NUCLEOLUS	ORGANS	
CHLOROPLAST	NUCLEUS	VACUOLE	

Name _____

Date _____



If I Was A... ? Worksheet

Cells

Also could use to make a skit-act out

1. Choose a organelle from the cell. Pretend you are this organelle for the remaining questions.	<div>_____</div> <div>Organelle Name</div>
2. What's your job?	<div>_____</div> <div>_____</div> <div>_____</div>
3. How others of you are there in your cell?	<div>_____</div> <div>_____</div> <div>_____</div>
4. Do have any co-workers who's job and appearance is different from you?	<div>_____</div> <div>_____</div> <div>_____</div>

5. When food gets taken into the cell, what do you do?	<hr/> <hr/> <hr/>
--	-------------------

The Incredible, Edible Cell!

Problem: What are organelles? What organelles are found in a cell (plant/animal)? What are the functions of those organelles?

Hypothesis: _____

Materials: * 2 blue or green pieces of fruit roll up .. Golgi Bodies * 2 red or yellow pieces of fruit roll up .. Endoplasmic Reticulum * 1 teaspoon of round cake sprinkles .. Ribosomes * 4 hot tamales .. Mitochondria * 4 chocolate covered raisins .. Vacuoles * 1 Jello/Knox mixture in plastic cup * 1 paper plate * 1 small Dixie cup full of cell parts (organelle) materials * 1 plastic knife * 1 plastic spoon

Procedures:

1. Getting the Jello Ready (Bill Cosby Impressions are encouraged!) Follow the package directions to mix up batches of Jello gelatin mix. Pick a light colored flavor. Every 6 oz package will make up 4 or 5 cells. Add some unflavored Knox gelatin to the Jello to make it set up a little stiffer (just regular Jello fell apart during our first test). Pour the Jello/Knox mixture into individual 9 oz Solo brand plastic cups until they are about two-thirds full. Put them into a refrigerator to set. This is the end of today's work. Make sure to label your cups! You are going make 2 cells (one animal cell and one plant cell.)

2. Day Two time to eat! Remove the Jello from the plastic cup onto the paper plate. We had some problem with this. The students may need to run the knife around the very outside edge of the Jello to loosen it. There are some suggestions that you might spray the cup with Pam or some other non-stick material. We did not get a chance to try this yet. Running warm water over the cup may also loosen the Jello.

3. Cut the Jello/Knox in half and remove the top half. Turn over the top and set it on the plate beside the bottom half

4. Use the spoon to dig out a hole in the bottom half of the Jello/Knox cytoplasm . Just pushing the food pieces into the Jello causes it to crack and come apart, making for a very messy cell. Place the gumball in this hole to represent the nucleus of the cell.

5. Using the spoon to make spaces and your diagram as a guide, place the other cell parts into the cell. Parts can be put into both the top and bottom half of the Jello/Knox cell

6. Take the top part of the cell and carefully place it on the top. If the cell feels soft, you can put the parts back into the plastic cup, then turn it over onto the paper plate. Then carefully remove the plastic cup.

7. After reviewing the parts one final time, those students who wish to can feast on their cell.
Please use clean spoons in case the spoon you were working with fell on the floor or the table.

Name _____

Date _____

Cells Vocabulary List & Definitions

cytoplasm	inherited genetic material in a cell not specified by its own nucleus.
mitochondrion	any of the very tiny rodlike or stringlike structures that occur in nearly all cells of plants and animals, and that process food for energy.
nucleolus	a small spherical body in the nucleus of a cell, consisting of protein and RNA.
nucleus	in biology, the part of a cell that controls growth and reproduction.
organ	in a plant or animal, a specialized structure that performs a particular function, such as the heart.
tissue	the mass of like cells in an animal or plant body, esp. as they form a specific organ.
vacuole	a membranous enclosure within a cell that contains substances isolated from the protoplasm, such as dissolved acids.
cell membrane	the semipermeable membrane that encloses the contents of a cell; plasma membrane.
cell wall	the rigid outermost layer of a plant cell, which is made of cellulose.
chlorophyll	the green pigment in the leaves and stems of plants that is necessary for the production of plant food by photosynthesis.
chloroplast	a small oval green bit of protoplasm that contains

	chlorophyll and is the location of photosynthesis.
chromosome	one of the tiny, threadlike, DNA-containing bodies found in the cell nuclei of all plants and animals, responsible for transmitting hereditary characteristics.

Name _____

Date _____

Cells Vocabulary Quiz

Directions: Match the vocabulary words on the left with the definitions on the right.

- | | |
|-----------------------------|---|
| 1. tissue | the central, essential, or highly concentrated part around which other parts are grouped. |
| 2. vacuole | a musical instrument consisting of a keyboard attached to a device that forces air through a number of pipes to produce a wide range of sounds; pipe organ. |
| 3. chromosome | a membranous enclosure within a cell that contains substances isolated from the protoplasm, such as dissolved acids. |
| 4. chlorophyll (chlorophyl) | the ground protoplasm of cells that is outside the nucleus. |
| 5. cell membrane | any of the very tiny rodlike or stringlike structures that occur in nearly all cells of plants and animals, and that process food for energy. |
| 6. chloroplast | a small spherical body in the nucleus of a cell, consisting of protein and RNA. |
| 7. cell wall | the mass of like cells in an animal or plant body, esp. as they form a specific organ: |
| 8. nucleolus | one of the tiny, threadlike, DNA-containing bodies found in the cell nuclei of all plants and animals, responsible for transmitting hereditary characteristics. |
| 9. organ | the green pigment in the leaves and stems of plants that is necessary for the production of plant food by photosynthesis. |

10. cytoplasm the rigid outermost layer of a plant cell, which is made of cellulose.
11. nucleus a small oval green bit of protoplasm that contains chlorophyll and is the location of photosynthesis.
12. mitochondrion the semipermeable membrane that encloses the contents of a cell; plasma membrane.

Name _____

Date _____

Cells Word Chop Worksheet

Directions: The table below contains words that have been chopped in half. Find the pieces that fit together and write them in the answer area below.

osome	vac	sues	chrom
tis	cell	chlor	org
leus	embrane	ophyll	eolus
ans	ondria	cell m	oplast
nucl	nuc	chlor	plasm
cyto	mitoch	uole	wall

Answers:

Name _____

Date _____

Cells Word Search Worksheet

Directions: All words are positioned left to right.

P O N T Z E J U I N N B M B R H R D B T B J D
A T I S C P M F B T J S Z D F P A J O A B A X
C J N Y T Z C H U N Z N U C L E O L U S B N C
E C H L O R O P L A S T G I X N R A Z H E D O
D W H R A Z P B C M N P F R L G H P X Z H N M
I P Y O C H R O M O S O M E Y C I T D C S Y X
N T A D G M Y W E M N L J X O R G A N S H X S
R T Z C I W D S Z E V K A J B L M V C A U K I
D E M P K A K R W J O D C J C W V F D I X I F
B F X O P I G S T I S S U E S V D Z L J G M R
Z W P I C H L O R O P H Y L L V B P I A H D W
L W I G E B J I D D E H V A C U O L E M O R L
T R Z I E O J G V S M P Y X L N U C L E U S E
E V H V P M M M U Q U B E A M O H W N T S G C
S N I D Y N Z M X C Y Q D Y O F L Y S M A L S
B M I T O C H O N D R I A V O C C F S A Y V I

C Y T O P L A S M W K L F L L A K U F O C G V
P B K T R R R Q T A M U T J W U R J B W G G G

MITOCHONDRIA	CHLOROPHYLL	TISSUES	CHROMOSOME
CYTOPLASM	NUCLEOLUS	ORGANS	
CHLOROPLAST	NUCLEUS	VACUOLE	

TITLE: CELL ANALOGIES COLLAGE

AUTHOR: KATHARINE M. NOONAN

<http://www.accessexcellence.com/AE/ATG/data/released/0164-KatharineNoonan/index.html>

TYPE OF ACTIVITY: PROJECT

ARTWORK

CRITICAL THINKING

TARGET AUDIENCE: BIOLOGY

INTEGRATED SCIENCE

ADVANCED BIOLOGY

ABSTRACT: This project challenges students to make 15 original and appropriate functional analogies between cell structures and everyday objects. The students draw a typical plant or animal cell on a small (6" X 8") piece of drawing paper. They paste the drawing in the center of a large sheet of construction paper. Pointers from the cell structures lead to pictures cut from magazines or newspapers and a functional analogy expressed in the student's own words. When the collages are displayed, each one is different. Students enjoy reading one another's analogies and displaying their own wit and ingenuity. By reading and discussing different analogies, students become familiar with the structure and function of cell parts.

BACKGROUND INFORMATION:

Background required of students: Students should have been introduced to cell structures and their functions through reading and lecture.

Preparation time: Materials for collages must be gathered and set up for student use.

Class time needed: Part of a day to define an analogy, give one or two examples, and explain the collage format. The collage may be done at home or during 2 or 3 class periods.

MATERIALS: 6" X 8" pieces of drawing paper, 14" X 28" pieces of colored construction paper, text with illustration of cell structure to refer to, scissors, paste, drawing pencils or pens, magazines and newspaper ad sections.

PROCEDURE: Define analogy: "A comparison between two things which are similar in some respects, but otherwise are different. An explaining of something by comparing it

point by point with something else." -- Webster's

Discuss the difference between structure and function, and structural and functional analogies.

Give examples from areas other than cell biology. Give only one or two examples of functional analogies for cell parts (so students will be able to think of as many "original" analogies as possible). Solicit examples from students for extra credit and post them in the room along with Webster's definition.

Explain collage format: I use the assignment sheet below.

Instructions for:

CELL ANALOGIES COLLAGE

"It takes 3 million cells to cover the head of a pin, but only one cell collage to cover a large part of your Biology grade!"

1. Draw a plant or animal cell in pencil on 6" X 8" white paper. Include the following structures:

BASIC TEN EXTRA CREDIT

cell or plasma membrane cell wall

cytoplasm chloroplast

chromatin centriole

nucleus cytoskeleton

nucleolus cilia

mitochondrion flagellum

Golgi apparatus lysosome

ribosome vacuole

endoplasmic reticulum * Check with me about other

nuclear envelope EC structures

2. Correctly identify your cell as a plant cell or an animal cell.

3. Find out the function (or main job) each structure has in the cell. (Read your book, check the glossary, color sheets, and class notes.)

4. Find a magazine or newspaper picture of an everyday object which has a similar **function (or use) as each cell structure**. Write an analogy to show the similarity between the cell part and the everyday object. Be sure to explain the reasoning behind your analogies. (The nucleus is like a brain because it controls and coordinates the activities of the whole cell in the same way the brain controls and coordinates activities of the body.)

5. Paste your cell drawing in the middle of a poster-size piece of construction paper.

6. Paste the pictures of everyday objects at the edges of the construction paper paper. Label the pictures with your neatly written analogies and make a pointer to the correct structure in your cell drawing.

GRADING POLICY:

A - Neat, complete, 15 analogies, 5 original ones that apply to your cell.

B - Neat, complete, 12 total analogies, 2 or more original ones that apply.

C - Complete, no original analogies and/or no EC structures.

D - Messy, incomplete, or wrong.

F - Too messy for words, wrong, incomplete.

0 - No collage turned in will result in 0 points

Travel Brochure

http://www.accessexcellence.org/AE/AEC/AEF/1995/porter_cell.html

TYPE OF ACTIVITY:

- Authentic assessment
- Hands-on project
- Creative

TARGET AUDIENCE:

- Life science
- Biology
- Integrated science (level 1&2)
- ESL, LEP

This activity offers an alternative to cell models to help students understand cell organelles and their functions.

BACKGROUND INFORMATION

NOTES:

Students may begin this project with little or no knowledge of cell structure, as the project is investigative in nature. A background in cell theory is helpful for students and increases motivation. Class time needed can be as little as 30 minutes to explain the requirements for the brochure. I have found that students understand the concept more easily if they look at examples of travel brochures that I have collected from my travels. My inspiration came from the brochures that can be found in racks inside restaurants, the more outlandish the better!

STUDENT REQUIREMENTS:

Students are required to produce a travel brochure that describes a plant or animal cell as if it were a large exhibit/amusement park. They must accurately describe/draw/explain at least 8 (10?) organelles (attractions) and their functions. Humor and creativity are strongly encouraged (this makes this project very enjoyable to grade!).

PROJECT DESCRIPTION

ABSTRACT:

Students produce a travel brochure to attract visitors to spend money to visit an animal or plant cell. Students can think about their cell as a huge amusement park, or even better, a small roadside attraction. The brochure must describe at least 8 "attractions" (organelles or cell processes) that will "delight and amaze" their potential customers. Humor and creativity are encouraged. Brochures are evaluated by accuracy of organelle descriptions, design and creativity.

PROCEDURE:

Using small roadside attractions as an inspiration, students produce a travel brochure to entice visitors to take the next exit and visit the "incredible!, amazing!, and unbelievable!" sights of an animal or plant cell. For example, visitors might want to "visit the ribosomes, located just outside the nucleus, and watch as proteins are synthesized RIGHT BEFORE YOUR VERY EYES!". Students should be allowed creative license in their descriptions, such as "be sure to visit the Golgi center inside the gift shop, and have your purchases gift wrapped for you before you leave."

This exercise seemed to appeal to nearly all the students, and definitely to all achievement levels. Since there was no limit to what was expected, the high achieving students tended to go the extra step. Some described protein synthesis or mitosis which had not yet been mentioned in class. Those who were not as artistic found other ways to make their brochures attractive, such as computer images or cut-outs from magazines.

EVALUATION:

Brochures were evaluated on accuracy in describing functions of organelles, design, and creativity. After completing the project, test scores were the highest I have had in my career, and organelles and their functions seemed to be second nature in class discussions. Students report that the project was fun to do, and many have mentioned how it made studying easier and more enjoyable. For me, the project was very enjoyable to grade, and I got to see a side of my students that just cannot be expressed in a traditional lab report.

EXTENSION:

This activity can be adapted for ESL/LEP students by requiring a bilingual brochure. Individual or class models of a "cell amusement park" can be constructed concurrently or after the brochures have been produced.