Cellular Structure AND Function Projects

Five Project Options

1). Cell Analogies Book (individually)

2). 3D Cell Model (in pairs or individually)

3). The Organelle Rap (groups 2-4)

4). Visiting the Cell – Travel Brochure (individually)

5). Cell Song Video (groups of 2-4)

Cell Analogies Book

You will be making a children's book to show the functions of the organelles in a cell.

1. **Choose either a plant or animal cell. Below are the organelles required to be included in your children's book:**

Plant Cell	Animal Cell
Cell Membrane	Cell Membrane
Nucleus	Nucleus
Cytoplasm	Cytoplasm
Mitochondria	Mitochondria
Golgi Body	Golgi Body
Endoplasmic Reticulum	Endoplasmic Reticulum
Ribosome	Ribosome
Cell Wall	Lysosome
Chloroplast	Cytoskeleton
Central Vacuole	Cilia

2. **Select an everyday object that has a *similar* function as each of the cell organelles required in your chosen cell.**

3. **Write an analogy to show the similarity between each cell organelle and the everyday object.**
   *YOU MUST INCLUDE YOUR JUSTIFICATION. (Ex. The nucleus is like a brain ***because*** it controls and coordinates the activities of the cell in the same way the brain controls and coordinates the activities of the body.)
   *YOU MAY NOT USE ANY LIVING ORGANISMS OR THINGS THAT COME FROM LIVING ORGANISMS IN YOUR ANALOGIES (Note: you would not be able to use the nucleus example above because a brain comes from a living organism).

4. **Create a visual for your analogies.**
   *EACH ORGANELLE PAGE IN YOUR BOOK SHOULD HAVE AT LEAST TWO VISUALS: AN IMAGE OF THE SPECIFIC CELLULAR ORGANELLE IN QUESTION and AN IMAGE OF THE OBJECT SELECTED WITH SIMILAR FUNCTION.
   ****Remember this is a children's book so it should be **colorful** and **easy to read**!!!****

5. **Here are the *specific* requirements:**
   a. Front Page: needs to contain a multi-colored, detailed, **labeled** picture of a plant or animal cell. You may draw this cell or print one out, but the labeling needs to be hand written. Please do not include an already labeled cell from the Internet. Also… be sure to include your name, the date, and your class period.
   b. Page two: List all 10 of the required organelles and their corresponding functions.
   c. Contents: Each organelle with its analogy should have its own page. (Ex. cell membrane + analogy = page 1, nucleus + analogy = page 2, cytoplasm + analogy = page 3, etc…)

Grading Rubric

Characteristic	Score
Correctly identified and labeled cell on the front cover (10 points-1 point for each of the organelles) ***(-5 for a colorless image)***	
List of organelles with corresponding functions on the second page (30 points-3 points for each organelle and function)	
Analogy for each of the cell organelles (50 points-5 for each of the organelles)	
Colorful visuals on each page (10 points-1 point for each visual)	
Total Score (100)	

3D Cell Model Project

You will be creating a 3-dimensional model to represent either a plant cell or an animal cell.

1. **Choose either a plant or animal cell. Below are the organelles required to be included in your model:**

Plant Cell	Animal Cell
Cell Membrane	Cell Membrane
Nucleus	Nucleus
Cytoplasm	Cytoplasm
Mitochondria	Mitochondria
Golgi Body	Golgi Body
Endoplasmic Reticulum	Endoplasmic Reticulum
Ribosome	Ribosome
Cell Wall	Lysosome
Chloroplast	Cytoskeleton
Central Vacuole	Cilia

2. **Create a 3-dimensional cell model.**
   *YOU MAY USE ANY TYPE OF MATERIALS TO CREATE THIS MODEL – Styrofoam, string, cardboard, clay, beads, random everyday objects, or even edible items such as candy, cakes, etc.
   * **To view several examples go to: http://www.cwinstead.com/cells/3dcellexamples.html**

3. **Here are the *specific* requirements:**
   a. If you choose to work on this project in a group… THIS PROJECT MUST BE DONE AS A GROUP – do not have one person make the model and others just put their name on it. You'll have an ***individual*** evaluation after projects have been turned in
   b. Each of the 10 organelles listed above must be, of course, included on the model, but also positioned in a logical place (use cell pictures to help with this)
   c. All organelles **must be labeled** by using a key – you can use colors, numbers, or some other labeling mechanism.
   d. If you choose to work on this project in a **GROUP**… *EACH* member of the group must turn in:
      i. ORGANELLE KEY: A key to the group-made model
      ii. ORGANELLE FUNCTIONS: A list of all organelles with corresponding functions
         - Example: Cell Membrane – *functions* to…
      iii. INDIVIDUAL WRITE-UP: A description of which parts of the model **you** completed
         - Example: I gathered materials for the cell membrane, nucleus, and cytoplasm, assembled the organelles and as a group we placed them on the model.
   e. If you choose to work on this project **INDIVIDUALLY**, you must turn in:
      i. ORGANELLE KEY: A key to the group-made model
      ii. ORGANELLE FUNCTIONS: A list of all organelles with corresponding functions
         - Example: Cell Membrane – *functions* to…

Animal Cell Model Example

Plant Cell Model Example

GRADING RUBRICS

Animal Cell Model Grading Rubric

Characteristic	**Total**
Cell Membrane correctly shaped and positioned on model	5 points
Nucleus correctly shaped and positioned on model	5 points
Cytoplasm correctly shaped and positioned on model	5 points
Mitochondria correctly shaped and positioned on model	5 points
Golgi Body correctly shaped and positioned on model	5 points
ER correctly shaped and positioned on model	5 points
Ribosome correctly shaped and positioned on model	5 points
Cell Wall correctly shaped and positioned on model	5 points
Chloroplast correctly shaped and positioned on model	5 points
Central Vacuole correctly shaped and positioned on model	5 points
Organelle Key	10 points
Organelle Functions (6 pts per correct organelle function)	30 points
Individual Write-up	10 points
TOTAL	**100 points**

Plant Cell Model Grading Rubric

Plant Cell	**TOTAL**
Cell Membrane correctly shaped and positioned on model	5 points
Nucleus correctly shaped and positioned on model	5 points
Cytoplasm correctly shaped and positioned on model	5 points
Mitochondria correctly shaped and positioned on model	5 points
Golgi Body correctly shaped and positioned on model	5 points
ER correctly shaped and positioned on model	5 points
Ribosome correctly shaped and positioned on model	5 points
Cell Wall correctly shaped and positioned on model	5 points
Chloroplast correctly shaped and positioned on model	5 points
Central Vacuole correctly shaped and positioned on model	5 points
Organelle Key	10 points
Organelle Functions (6 pts per correct organelle function)	30 points
Individual Write-up	10 points
TOTAL	**100 points**

The Organelle Rap

You've just been offered the chance of a lifetime...

You and your friends formed a rap group 2 years ago and have been performing at various locations for the last year and a half. You have finally been recognized by the producer, Mr. D.N.A., of the Cell Factory Records, Inc. This is a huge break for you and you really want this job- this could put money in your pocket, world wide fame and thousands of adoring fans. All the details and paper work are complete and the deal is almost finalized except for one thing- the Cell Factory Records, Inc. likes to have at least one song on every album that deals with cells- a kind of gimmick to promote the Cell Factory name. Mr. D.N.A. has asked you to compose a rap about the cell and its organelles for your first CD.

Although you are allowed to compose the song anyway you like, Mr. D.N.A. has given you the following guidelines which you MUST follow in order to close the deal. Follow these guidelines carefully- your reputation and future as a performer depends on it.

Guidelines:

1) You must have a name for your rap group in order to sell CDs and promote your music. Think of a name and try to use the name of your rap group in your song at some point.
2) The song must mention 10 organelles and the function of each organelle. A list of the options for organelles is provided below-make SURE that you have the proper function of each organelle; points will be deducted for incorrect organelle function.
3) The song MUST be at least 10 lines.
4) The song MUST be appropriate-Cell Factory Records does not allow their artists to have parental advisory CDs, therefore your rap must be appropriate for ALL children under 17. ☺
5) Lyrics MUST be clean and accurate-they are going to be printed on the CD cover and they must be legible.
6) In addition to writing your song, you must also design the cover for your CD. Mr. D.N.A. believes it adds a personal touch to the CD. Design the front and back CD cover. The front should have the name of your rap group, the members of the group, and some colorful image. The back should include the name of your rap song and the lyrics to your rap song. Be creative!

NOTE: I have Googled and looked up every cell/organelle song out there, if you find one and attempt to pass it off as your own I will know. If you still attempt to try it you group will received a zero for this project.

Organelles

cell membrane	cell wall		
endoplasmic reticulum	mitochondria	cytoplasm	nucleolus
chromatin	lysosomes	nucleus	Golgi body
	cytoskeleton	chloroplast	vacuole

Grading Rubric

Characterisitic	Total
10 organelles mentioned in the Organelle Rap (2 pts per organelle)	20 points
Correct function expressed for each organelle in Organelle Rap (5 pts per included organelle function)	50 points
Creativity and Rhyme in the Organelle Rap lyrics (10 pts overall)	10 points
Front cover with name, members, and image (10 pts)	10 points
Back cover with name of rap song and lyrics (10 pts)	10 points
TOTAL	**100 points**

*******EXTRA CREDIT*******

Mr. D.N.A. has offered you a signing bonus. If you perform your rap LIVE at the opening of the CD (hint: one day in class), you will receive an extra $50,000 (10 points extra credit). The whole group does not have to perform the rap but ONLY the members that perform will receive the bonus. A member who just stands at the front of the room while the others rap do NOT get the extra credit!!

Visiting the Cell – Travel Brochure

You will be designing a Travel Brochure that describes a plant or animal cell as if it were a real life attraction.

*Think of attractions like: amusement parks, ball parks, zoos, farms, malls, etc., there are certainly more possibilities than this.

The Task: Accurately describe/paste/draw/explain the **10 organelles** (attractions) in the table below and *justify* how they have represented their functions.

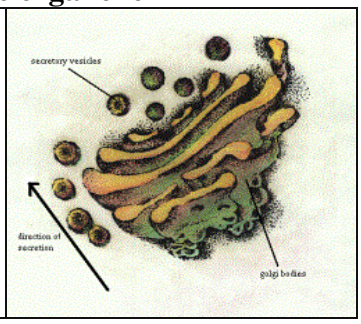
Plant Cell	Animal Cell
Cell Membrane	Cell Membrane
Nucleus	Nucleus
Cytoplasm	Cytoplasm
Mitochondria	Mitochondria
Golgi Body	Golgi Body
Endoplasmic Reticulum	Endoplasmic Reticulum
Ribosome	Ribosome
Cell Wall	Lysosome
Chloroplast	Cytoskeleton
Central Vacuole	Cilia

The Requirements:

1. Front cover includes student name, date, class period, as well as the attraction that is being used (i.e. amusement part, mall, etc.)
2. Brochure includes the 10 specified organelles and their corresponding functions
3. An organelle picture and a 'real-world' attraction picture should be included for each organelle.

-Possible entry for a sample organelle-

The golgi packages secretions. Be sure to visit the Golgi center inside the gift shop, and have your purchases gift wrapped for you before you leave."



4. Must be in a brochure-like format. Please do not turn in random pages stapled together – be creative!
5. Make sure you have a good justification as to why you have represented your organelles in the manner you have in your brochure.

Grading Rubric

Characteristic	Total
Includes the 10 required organelles with picture representation (2 pts each)	20 points
Function for each organelle (5 pts each organelle)	50 points
Justified 'real-world' attraction entry with picture for each organelle (3 pts each)	30 points
Total	**100 points**

Cell Song Video Project

You will be filming a video of you and your group members performing one of three provided cell songs.

1. Choose one of the three songs below (see song lyrics to these songs on the next few pages)

- Two main types of Cells – Song
- Cell Theory – Rap
- The Cell Song – Song

2. Brainstorm for your video

*Decide WHERE your video will be filmed, WHEN you will get together with your group to film the video, WHICH group member will perform each part of the chosen song, and WHAT music the lyrics will be performed to

3. Memorize the lyrics!

*You *cannot* be reading the lyrics during the video – if you want to make large note cards that the camera and viewers will not see that is fine, but you cannot film yourself reading the song on off a piece of paper.

4. Here are the *specific* requirements:

a. All group members must be in the video at some point. (If a group member is not seen in the video at some point they will not be getting ANY credit for participating. Yes, even if you are the cameraman!)
b. Whenever a cell organelle is mentioned in the song/rap the group must illustrate that organelle in some way (this can be done with a hand drawn picture or any organelle representation that creatively shows the organelle *structure*). I WILL COUNT THESE… ☺
c. There must be some type of background music – it can be a real song or you can make up your own beat, either way, please do not turn in a video of you and your group members talking the lyrics. The group will NOT receive credit if that is done!
d. The lyrics of the song/rap must be understandable (if you would like to edit your video and put the words as subtitles on the bottom of the screen that always helps, but is NOT required)
e. The video must be at least 1 minute long. It is expected for them to be much longer, but your requirement is more then 1minute.
f. BE CREATIVE! Google or YouTube some examples for ideas, they are out there!
    *You can create a storyline to the video, you can dress up, create a backdrop that goes along with the song, etc. It doesn't matter what you do to make it creative just understand that creativity is part of your grade therefore simply performing the lyrics to some type of music will not earn an A grade.

Grading Rubric

Characteristic	**Total**
Picture, drawing, or representation for EACH organelle mentioned	30 points
Background music/beat	10 points
Video is over 1 minute long	10 points
Lyrics are understandable	20 points
A creative touch is added	30 points
Total	**100 points**

*******EXTRA CREDIT*******

All of your group members have the option of receiving 5 extra credit points if you offer to show your music video during classtime. ☺

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
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.

YOU CAN TELL IT'S A CELL - SONG

You can tell it's a cell by the way it looks
When it's under a microscope or in a book
It may be an animal or a plant it's true
But I know it's a cell, cause I see all the clues

Chorus:
You can tell
You can tell it's a cell
Yeah, you can tell
You can tell it's a cell

Now you and I've got a brain, it helps us do what we do
It helps with walkin' and talkin' and eatin' our food
And cells need one too, to keep 'em stayin' alive
It's called a NUCLEUS and floats around inside

Chorus

Well CYTOPLASM is that jelly-like goo
That oozes round inside a cell, yeah, it's in you too!
But if there wasn't something there called the
CELL MEMBRANE
There'd be cytoplasm everywhere, we'd really complain!

Chorus

Now plant cells are unique, they're really something to see
Yeah they've got a CELL WALL to make 'em stronger, you see
They've got CHLOROPHYLL and CHLOROPLASTS on their list
And they make their own food by PHOTOSYNTHESIS

Chorus

Now cells are really small, yeah, they're hard to see
But look on down through a microscope there they'll be
And you and I are made of cells and so are birds and bees
Just like apples and bananas and the leaves on the trees

Chorus

THE CELL SONG

Chorus:
Cells of the animal, cells of the plant
Cells are basic units of all that I am
Cells help the plant to bloom and grow
Cells are in every organism I know!

The nucleus is the brain
The center of the cell could be its name
Chromatin, in long strands
With dna and chromosome bands

Chorus

Two types of cells we all know
We're eukaryotic and the other one's pro
Animals and plants are with our eu
Prokaryotic's scum and bacteria, too

Chorus

Cytoplasm is like egg whites
It's very fluid and jelly —like
Parts in the cytoplasm — organelles
Are like baby organs inside of a cell

Chorus

The endoplasmic reticulum
Pronouncing it is lots of fun
It winds from the nucleus — out in the cell
Moving materials extremely well

Chorus

The ribosomes — look like dots
Looking like the er's covered in spots
"Ribes" make proteins, it's what they do
Proteins are the building blocks for me and you

Chorus

Mitochondria's the powerhouse
It breaks down food to get energy out
Or lysosomes — that break down waste
Without them — what a problem we'd face

Chorus

Golgi bodies are like garbage men
Removing waste is part of their plan
They lead from the cytoplasm — out of the cell
Moving waste and proteins out of the gel

Chorus

We certainly can't forget the vacuole
Stores food and waste like a storage hole
In plants and animals both, you'll find
And that's the end of our cell rhyme!!!!

Chorus