

Cell Campaign

Objective: To have students learn each cell component's function.

Standard:

Strand IV. Sub-Strand A.

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

Benchmark 6: The student will understand that all organisms are composed of cells that carry on the many functions needed to sustain life.

Materials Needed:

- 1. Power Point on Organelles and their functions**
- 2. Cell Campaign Introduction Sheet**
- 3. Grading Requirements and Grading Sheet**
- 4. Schedule**
- 5. Organelle List**
- 6. Hat to draw from**
- 7. Slogan Design and Approval Form**
- 8. Preparation Grading Sheet**
- 9. Art Supplies**
 - Poster Board**
 - Markers/ Colored Pencils**
- 10. Final Test**

Cell Campaign Schedule:

Monday:

1. Cell Component Lecture
2. Draw for Organelle and Start Working

Tuesday:

1. Research Organelle – use text book
2. Campaign Buttons Due

Wednesday:

1. Campaign Signs and
2. Campaign Banner Due

Thursday:

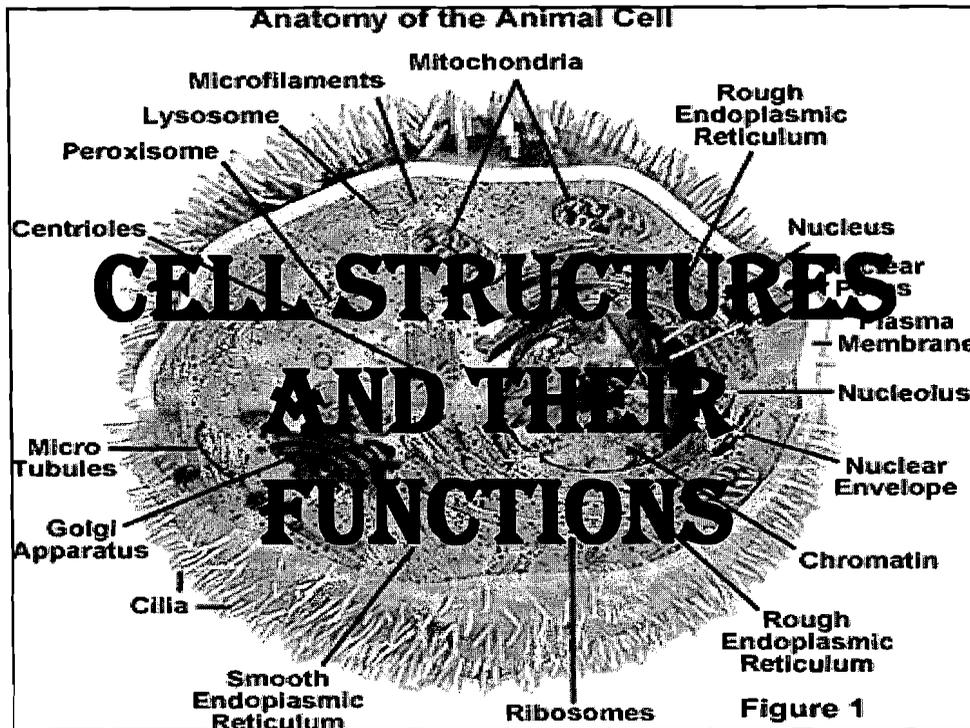
1. Speech Outline Due
2. Questions for other Organelles Due
3. Smear Campaign Due

Friday:

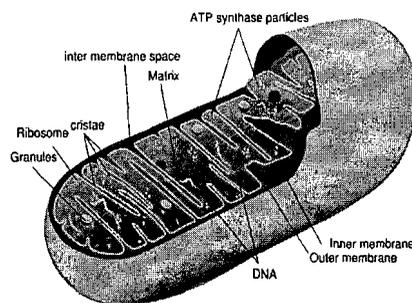
1. Give Speech – Campaign Day

Monday:

1. Organelle Test



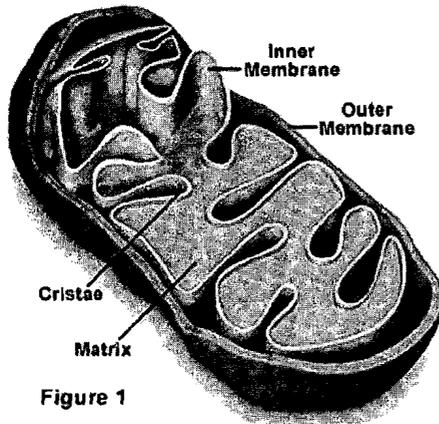
Mitochondria



- Rod shaped organelle that is the “Power Center” of the Cell
 - Converts nutrients and oxygen into cellular energy (ATP)
- Found exclusively in Eukaryotic Cells
- Has inner and outer membrane
 - Membranes composed of phospholipid bi-layers and proteins.

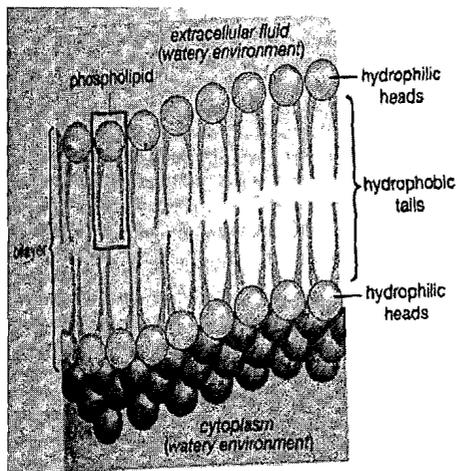
Mitochondria II

Mitochondria Inner Structure



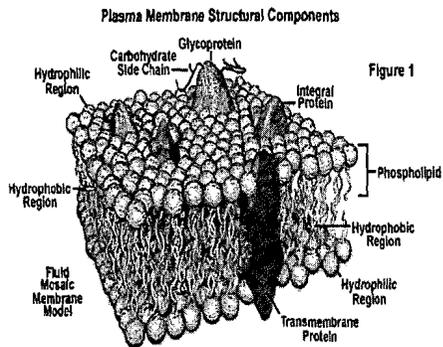
- Two areas in Mitochondria
 - Inter membrane Space
 - Cristae are the folds of inner membrane
 - Matrix
- Mitochondria have own DNA similar to prokaryotes.
 - DNA reproduce independently of the host cell.
 - Mitochondrial DNA inherited from your mother

Cell Membrane



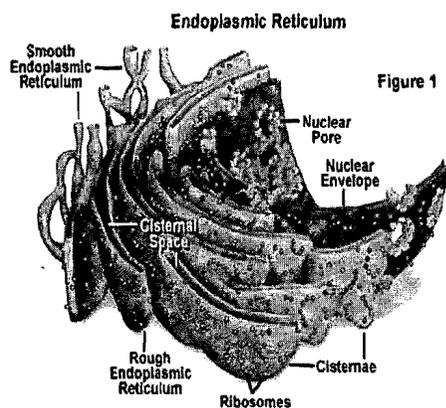
- Outside Coating of the Cell
- Serves as a semi-porous barrier
 - Keeps the insides in and the outsides out!
 - Allow specific molecules to enter the cell, molecules that the cell requires.
- Membrane composed of a lipid bi-layer that's made up of hydrophilic heads on the outside and a hydrophobic inside. Uses these forces to hold its shape

Cell Membrane II



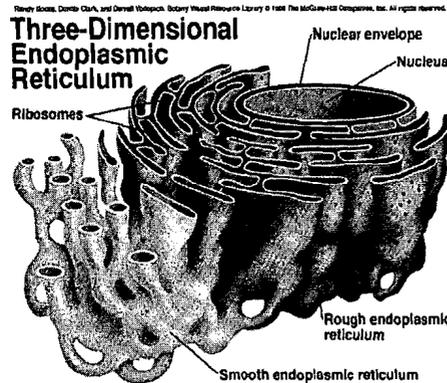
- Membrane also helps to remove waste.
- Many proteins are embedded to aid in transport.
- All living cells have one.

Endoplasmic Reticulum



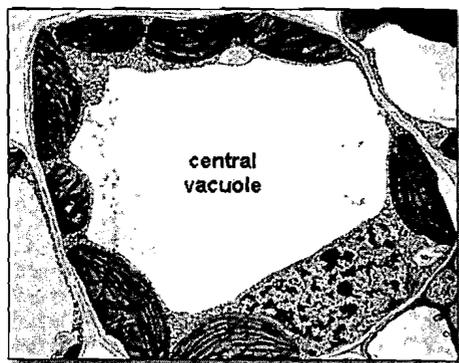
- Network of flattened sacs and branching tubules that extend through cytoplasm and surrounds the nucleus.
- The ER manufactures, processes, and transports many biochemicals that are used inside and outside the cell.

Endoplasmic Reticulum II



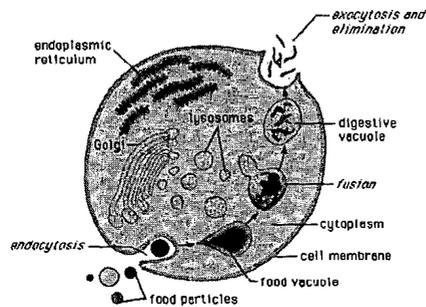
- Provides selective transfer between the internal space of the cell and the cytoplasm.
- Also a pipeline between the nucleus and the cytoplasm
- The rough ER contains ribosomes that are vital in making proteins from amino acids.

Central Vacuoles



- Membrane bound compartments in a cell.
- Perform excretory and storage functions.
 - Remove waste products
 - Remove toxins
 - Serve as storage unit for cell
 - Maintain turgor pressure
- Vacuoles take up a lot of space and help maintain the shape of the cell.

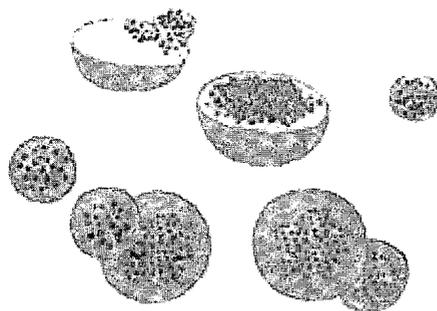
Lysosomes



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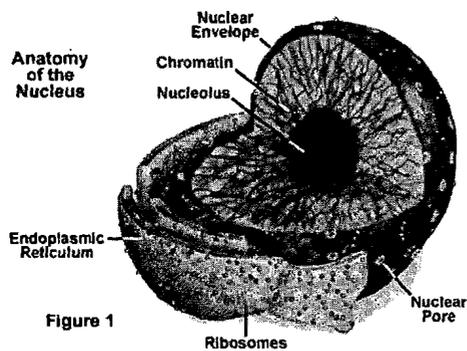
- Digest cellular materials that are no longer needed.
- Recycler's of the cell's used up parts and pieces.
- Break down compounds such as cellular waste products, fats, carbohydrates, and proteins into products that the cell can use again.

Lysosomes II



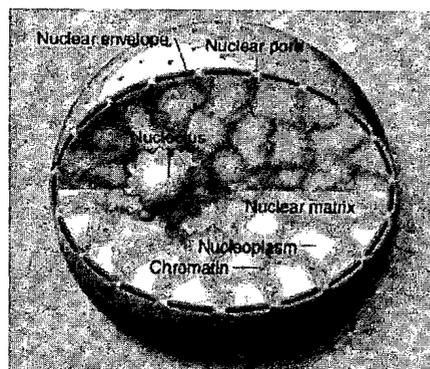
- Spherical in shape
- Contained by a single layer membrane.
 - Membrane protects the rest of the cell from the harsh digestive enzymes in lysosomes.
- Common in white blood cells because white blood cells break down so much material (germs)

Nucleus



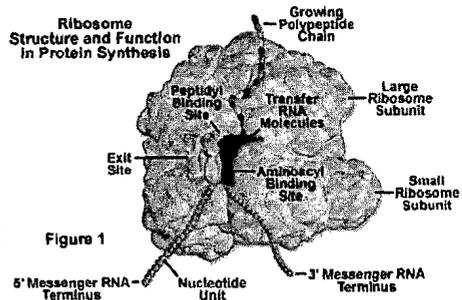
- Highly specialized organelle that serves as the “brain” of the cell.
 - Stores the DNA for the cell
 - Coordinates the activities of the cell.
 - Growth
 - Metabolism
 - Protein Production
 - Cell Division
- Only found in eukaryotic cells

Nucleus II



- The Nucleolus is a structure inside the nucleus that manufactures ribosomes.
- Nuclear Envelope
 - Double layered membrane that encloses nucleus
 - Is absent during cell division.

Ribosomes



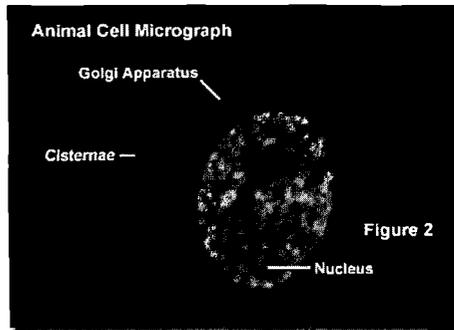
- Tiny, membraneless organelles made of ribosomal RNA and protein in a 60/40 ratio.
- Purpose of ribosomes is to make protein for the cell.
 - Takes mRNA, converts it into amino acids, and then strings the amino acids into polypeptide chains that become proteins.

Ribosomes II



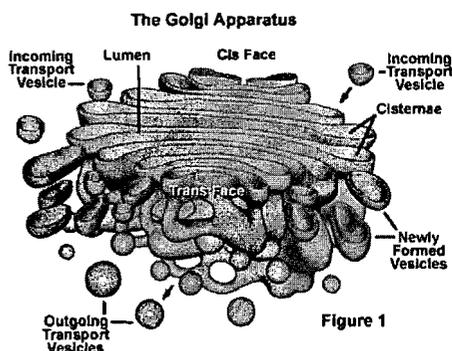
- Some ribosomal products are used outside the cell.
- Also found inside the chloroplasts of plants.
- Concentrated around the ER, but also found all over the cytoplasm.

Golgi Apparatus



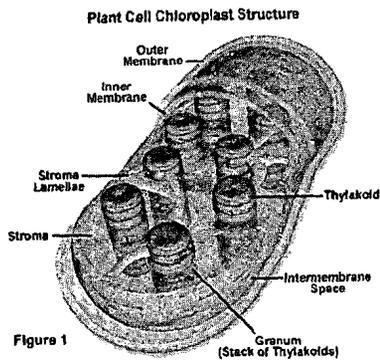
- Group of five to eight membrane coated sacs.
- Usually located close to the cell nucleus.
- Distribution area for the cell's chemicals.
 - Modifies proteins, carbohydrates and lipids. It prepares them to be exported out of the cell or to another area of the cell.
- One of first organelles discovered because of size

Golgi Apparatus II



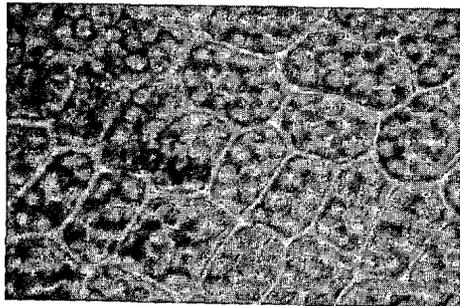
- Golgi has two different ends (or faces).
 - Cis end is where the molecules enter.
 - Trans end is where the molecules leave to be exported from the cell or moved to a different part of the cell

Chloroplasts



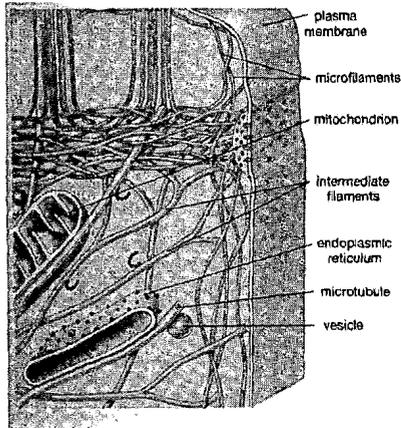
- Found exclusively in plant cells, mostly found in the leaves.
- Allows plant to perform photosynthesis
 - Harvesting energy from the sun in order to make food.
 - Take the light energy (photons) and turn light energy into chemical energy. Chlorophyll molecules absorb the photons and emit electrons.
 - Also use water and CO₂
 - Chlorophyll molecules absorb the photons and emit electrons.

Chloroplasts II



- Stroma contain dissolved enzymes and make up much of the chloroplast.
- Enclosed in a double membrane
- Thylakoids are stacked disks that help to absorb light.

Cytoskeleton



- Helps to maintain the cells shape.
 - Like the studs in a house.
- Allows cell to maintain homeostasis
- Composed of proteins
- Contains microtubules that aid in chromosome movement

Cell Campaign

The rumors, accusations, and chest pounding resounded throughout the community of Cellutopia. Organelles, though normally an organized group working together well, were a fragmented group. It seems that certain organelles had the notion they were more important or performed a more important function than other fellow organelles.

"If it wasn't for us, you couldn't exist", shouted the mitochondria.

"Well, I beg to differ!", exclaimed the endoplasmic reticulum. Cellutopia was divided.

"Please, please", pleaded Abraham Lysosome, "A Cell divided can not stand."

"I say I perform the most important function in Cellutopia and I know that, if asked, the majority of the other organelles would agree", boasted the cell membrane.

Being used to the role, the lysosome stepped forward to straighten up this mess but was interrupted by the DNA.

"Yes, I think Do Nothing Accurately has a point", added the golgi apparatus. "Let's take some time to organize a campaign to inform the other organelles of our important functions and then put it to a vote.

"I feel more secure if everything is in its place", muttered the cytoskeleton, "so we need to establish the procedures, rules, and requirements.

The organelles, after much deliberation, and of course argument, decided on the following aspects of the campaign:

- 1) The selection of "Organelle Supreme" will be made by ballot vote at the end of the campaign. Each organelle will have one vote. In case of a tie, those organelles involved in the tie will be in a run-off election.
- 2) Campaign slogans, campaign jingles, pictures of candidates, lists of qualities, etc. can be designed, constructed, and displayed to help sway opinion.
- 3) One of each organelle will be allowed to expound on the organelles qualities, describe how absence of this organelle would affect the cell and other organelles, and basically convince the others that it should be "Organelle Supreme".
Please limit speeches to 5 minutes.
- 4) Most campaigns have debates or question periods. At the end of each speech, the other organelles may question the speaker. This period of time has traditionally been a time when opposing organelles can expose the weaknesses of other campaigns or even slip in support for themselves through their questions.

Organelle Selection

The names of each of these organelles will be placed in a “Hat” and your group representative will draw your organelle. After your organelle has been drawn you will be given three minutes to try and convince another group to switch organelles. If all of the organelles are not used, you will have one opportunity for a redraw. The order of redrawing will be the reverse of the first drawing.

Mitochondria

Cell Membrane

Endoplasmic reticulum

Central vacuoles

Lysosomes

Nucleus (DNA, Chromosomes)

Ribosomes

Golgi Apparatus

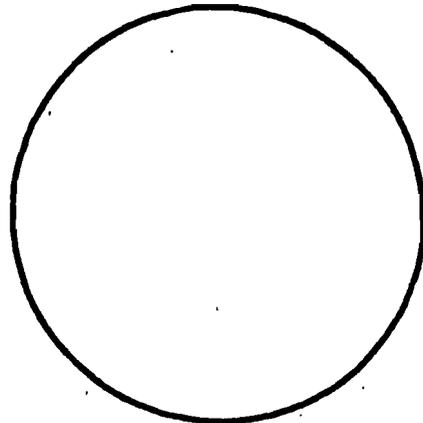
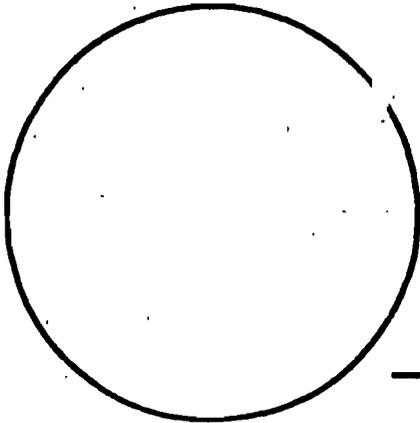
Cholorplasts

Cytoskeleton

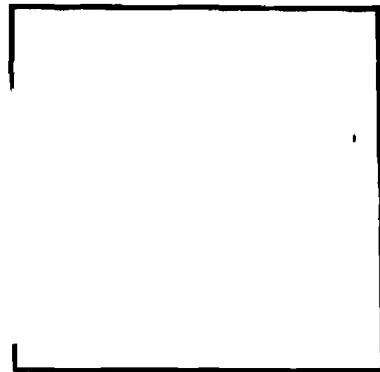
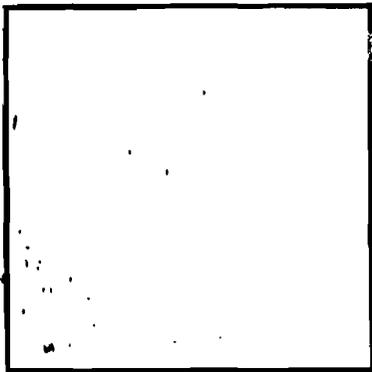
Slogan Design and Approval

Names _____

Campaign Buttons



Campaign Signs



Campaign Banner: (2 lines)

10 Questions for other organelles

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Smear Campaign- Discredit the Opponents

1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

Grading Requirements

- 1) Two line or sentence campaign slogans displayed in the classroom.
- 2) Campaign wear: buttons, hats, ribbons, etc. that have symbols or slogans.
- 3) Campaign speech: (hints)
 - A. Convincing statements that you are the most important organelle.
 - B. Weaknesses of opponents.
 - C. Why can't others function without you.
 - D. Skeletons in the closet; little things the public needs to know about your opponent.
- 4) Questions asked of speaking organelles.

Each opposing organelle group is expected to question the speaker as to their qualifications, motives, etc.

Groups asking a question must identify themselves.

Organelle _____ Group _____, _____
_____, _____

Preparation: Grading At the end of the Period

Tuesday:

Has researched Organelle 0 1 2

Campaign Buttons Complete 0 1 2

Wednesday:

Campaign Signs Complete 0 1 2

Campaign Banner Complete 0 1 2

Thursday:

Speech Outline Complete 0 1 2

10 Organelle Questions Complete 0 1 2

Smear Campaign Complete 0 1 2

Organelle _____

Group _____

Grading

Points

| | | | | | |
|-------------------------------------|---|---|----|---|------------------|
| Campaign Buttons | 2 | 4 | 6 | 8 | 10 |
| Campaign Signs | 2 | 4 | 6 | 8 | 10 |
| Banner | 2 | 4 | 6 | 8 | 10 |
| Other Visual or Auditory campaign | 1 | 2 | 3 | 4 | 5 (Extra Credit) |
| Outline of speech (prior to speech) | 0 | 5 | 10 | | |

Campaign Speech

| | | | | | | | | | | | |
|---|---|---|----|---|---|---|---|---|---|---|----|
| Speech attempted | 0 | 5 | 10 | | | | | | | | |
| Detailed Description of organelle's importance. | 0 | 5 | 10 | | | | | | | | |
| Description of weakness of opponent or what would happen to cell in your absence. | 0 | 5 | 10 | | | | | | | | |
| Mudslinging | 0 | 5 | 10 | | | | | | | | |
| Did your group ask a legitimate question of each speaker? | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

Test on Cell Structures and Their Functions

Multiple Choice (2 points each)

1. Mitochondria is the _____ of the cell.
A. Building blocks B. Brain C. Distribution Center D. Power Plant
2. _____ modifies proteins, carbohydrates, and lipids. It then prepares them to be exported out of the cell or transported to a different area of the cell.
A. Mitochondria B. Chloroplasts C. Golgi Apparatus D. Ribosomes
3. If it were not for the “studs” of the _____ the cell would lose shape and could not maintain homeostasis.
A. Cytoskeleton B. Vacuole C. Cell Membrane D. Lysosomes
4. Endoplasmic Reticulum does what?
A. Removes waste B. Make Protein C. Transform Light Energy
D. Divide Cell from outside world
5. _____ are found exclusively in plant cells and allow cell to harvest light energy.
A. Nucleus B. Chloroplasts C. Mitochondria D. Lysosomes
6. _____ is a selectively permeable barrier that keeps insides in and outsides out.
A. Cell Membrane B. Ribosomes C. Vacuole D. Cytoskeleton
7. _____ serve as a storage unit for the cell and help to remove toxins from the cell.
A. Chloroplasts B. Nucleus C. Vacuoles D. Endoplasmic Reticulum
8. If I were to say a organelle digested cellular material that was no longer needed I would be talking about _____.
A. Golgi Apparatus B. Central Vacuoles C. Chloroplasts D. Lysosomes
9. _____ make protein that is vital to the cell.
A. Ribosomes B. Lysosomes C. Cytoskeleton D. Mitochondria
10. When we talked about the organelle that stores DNA and coordinates cell activities, we were talking about _____.
A. Endoplasmic Reticulum B. Cell Membrane C. Nucleus D. Mitochondria

True and False (1 point each)

11. The nucleus is found only in prokaryotic cells.
12. Most of the ribosomes are found stuck to the cell wall.
13. Lysosomes are the “cells recycling center”.
14. Cell membranes have hydrophobic tails on the inside and hydrophilic heads on the outside.
15. Mitochondria are inherited from your mother.

Short Answer (2 points each)

16. The cell membrane has special _____ embedded in it to help it function.
17. _____ are large stacks of disks in the chloroplast.
18. The endoplasmic reticulum acts as a pipeline between the _____ and the _____.
19. Mitochondria contain their own unique set of _____, similar to a prokaryote.
20. The cytoskeleton contains _____ that aid in the movement of chromosomes.
21. The _____ end of the Golgi Apparatus is where the molecules enter and the _____ end is where they exit.
22. The central vacuole of the cell helps maintain the cells _____ because of all the liquid in it.
23. Lysosomes break down materials such as _____ and _____. (Name 2 of 3).
24. The nucleus coordinates _____ and _____ in the cell. (Name 2 of 4)
25. The ribosome takes mRNA and converts it into _____.

Essay (5 Points)

26. List your organelle and name 4 reasons why it should win the Campaign. Then list one reason why each other organelle should not. Please write in complete sentences and paragraph form.