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Cells [6th grade]

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UNDERSTANDING BY DESIGN

Unit Cover Page

Unit Title: Cells

Grade Level: 6

Subject/Topic Area(s): Cells → Key Words: Prokaryotic, Eukaryotic, Organelles, Nucleus, Mitochondria, Endoplasmic Reticulum, Golgi Complex, Cell Wall, Cell Membrane, Vacuole, Cytoplasm, Lysosome, Vesicle, Ribosome

Designed By: Roxanne Hammonds

Time Frame: Four Weeks (20 days)

School District: East Central Independent School District

School: Legacy Middle School

School Address and Phone: 5903 SE Loop 410 San Antonio, TX 78222

Brief Summary of Unit (Including curricular context and unit goals):

Students will be able to identify, illustrate, and describe the main types of cells and their organelles. They will determine the major differences between eukaryotic and prokaryotic cells. They will know that all living things are made of cells, and that each part of the cell performs a specific function. They will also recognize the organization of living things from cell to organism. More importantly, students will understand that cells are part of a system. The performance assessment will gauge their knowledge of this by comparing the structures and functions of a cell to those of their own school.

Unit: Cell Basics**Grade: 6****Stage 1: Desired Results****Understandings***Students will understand that...*

- * All living systems are composed of one or more cells
- * Cells are made up of many parts and each part performs a different function
- * The organization of living things follows a distinct pattern

Essential Questions**Knowledge & Skill**

How do prokaryotic cells differ from eukaryotic cells?
How is the structure of an organelle related to its function?
How would you explain the idea that “form follows function”?

(NEISD scope & sequence; TEKS; Core; etc.)
TEKS 6.10 A- Differentiate between structure and function
TEKS 6.10 B- Determine that all organisms are composed of cells that carry on functions to sustain life
TEKS 6.10 C- Identify how structure complements function at different levels of organization including organs, organ systems, organisms, and populations
TEKS 6.11 B- Identify cells as structures containing genetic material

Stage 2: Assessment Evidence

Performance Task 1: Cells are the basic units of living things. They are composed of many parts, and each part performs a different function (job). You have enough knowledge to know which type of cells contain some or all of the organelles. Your task is to compare the parts of a cell to the parts of a school, and describe correlations between the functions of the two. You must use at least 5 organelles in your descriptions, and your comparisons must show how the parts of a cell and the parts of a school perform similar functions.

You have a choice of how to compare a cell to a school. The choices are listed on the Cells Performance Assessment sheet that will be given to you.

Other evidence:
(quizzes, tests, academic prompts, self-assessments,
Quiz 1- Prokaryotic vs. Eukaryotic Cells
Quiz 2- Identifying Organelles
Quiz 3- Describing the Role of Organelles
Exit Slips
Self Assessments
Quarter 3 District Test (Multiple Choice)

Vocabulary Development:
Word Wall
Frayer Model vocabulary
Thinking Maps
Warm-ups
Science Investigation Journals

Stage 3: Learning Activities

(Steps taken to get students to answer Stage 1 questions and complete performance task)

Day 1

Introduce cells by giving a short diagnostic assessment (1-3 questions). Review this assessment with the students after everyone has completed it. The complete assessment should take about 15 minutes of class time. Once students have checked their misconceptions from the assessment, review or describe troublesome vocabulary that students may not be familiar with. Use the Frayer model for key words, do not simply ask students to copy definitions! Students may work in pairs or groups of 3 to complete Frayer Model vocabulary on the Frayer Model Assignment Sheet. (See appendix A) You may wish to make the Frayer Model smaller to fit more on one page.

Day 2

Most cells can only be observed through a microscope. Today, students will review how to use a compound light microscope. Students will need a picture of a light microscope to label, and should be able to locate all of the appropriate knobs and switches associated with the microscope. They may put a piece of their own hair on the stage. The following link has a printable version an unlabeled diagram of the light microscope:
<http://www.sciencespot.net/Media/microquiz.pdf> Once students have correctly focused the lens and can see their own hair under the microscope, students will write observations in their investigation journal and draw a simple picture of what they see.

Tell students that the next day they will be observing prokaryotic and eukaryotic cells under the microscope. Exit question: What do you think living cells will look like under the microscope? Will you be able to see all the parts of the cells?

Day 3-4

Begin with a quiz on the parts of the microscope. **How do prokaryotic cells differ from eukaryotic cells?** Today students will learn about the two major types of cells- Prokaryotic and Eukaryotic. Review definitions of prokaryotic and eukaryotic using the Frayer Model from Day 1. Students will have pictures of Prokaryotic cells and Eukaryotic cells on the overhead and will determine if the picture is of a prokaryotic cell or eukaryotic cell. Then, review how to properly use a compound light microscope. Students will work in pairs to discover what prokaryotic and eukaryotic cells have in common and what is different about them when viewed under the microscope. They will use the Microscopic Discoveries sheet in appendix A.

Day 5

Warm-up question: If you had discovered cells, what are three things you would say are important about them? Why would this information be useful to people who were studying cells? Introduce the cell theory. 1) All organisms are made of one or more cells. Show students examples of unicellular and multi-cellular organisms, especially single-celled eukaryotes so that students will understand the difference between bacteria (single-celled prokaryotes with no membrane-bound organelles) and fungi or protists (single-celled eukaryotes with organelles). 2) The cell is the basic unit of all living things. Ask students to identify some things that are made of cells. Be sure to point out the misconception between molecules and cells, and misconceptions about non-living vs. living things. 3) All cells come from existing cells. Explain that cells follow a definite pattern and either replicate themselves as more single cells (prokaryotes) or are part of an organism that requires groups of cells multiplying together to make up organ systems.

Exit question: How did your cell theory compare to the cell theory that scientists formed?

Day 6

Short quiz on three tenets of the cell theory. Have a visual aid to explain the concept that living things follow a definite pattern. It would help that the visual aid is a living thing, but it does not necessarily need to be alive. You could make an analogy to a non-living thing. Show pictures of organisms being built up from cells, tissues, organs, organ systems, and ending in the organism to allow students to see that there is a definite pattern to the way living things are organized. Ask, "From which type of cells (prokaryotic or eukaryotic) did this organism form from?" For single celled organisms, ask, "What is a major difference between how eukaryotic cells and prokaryotic cells multiply? Students will create a flow map of the organization of living things and will also match cells to descriptions of an organism (prokaryote or eukaryote).

Day 7 -9

Today, students will receive the performance assessment. Review what the students will be required to do, and discuss the rubric with them. Answer any questions they may have about the performance assessment and cells in general. They may formulate their groups today and begin brainstorming with one another about how to complete the assessment.

Now that you know what cells look like, you need to know what they do and why they are so small! What do you think cells do for an organism? Why would it be important for cells to be small? In groups of four, write your individual responses in a Pizza Talk format. After one minute turn the Pizza one quarter turn so you can respond to that section. Everyone must write something on each other's comments. Then we will discuss this as a class.

Each cell takes in food and gets rid of wastes through its surface. The larger the cell, the more food it requires. There are important parts of the cell called organelles that help it take in food and get rid of wastes. Today you will answer the question: **How is the structure of an organelle related to its function?** The structure of the organelle is what it looks like, what it is shaped like and where in the cell it is found. The function refers to the particular job the organelle does. As you discover what each part of the cell does, try to relate it to the parts of a school.

In teams of four, research which parts of the cell help take in food for energy and which parts help the cell get rid of wastes. What are the major parts of an animal cell? What are the three organelles found in plants that are not found in animals? Also research three implications of damaged cells in an organism. Which organelles help to maintain the health of the cells?

Discuss your findings with the class through a PowerPoint or poster presentation.

Day 10-11

Quiz on identifying parts of the cell. **How would you explain the idea that form follows function?** Students will go to the computer lab. To help students get an idea of how to compare cells to non-living systems, they will draw comparisons between a cell and a factory. This lesson can be found at: <http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=5&DocID=88>. All worksheets and reading supplements are provided. Comparing cell to a factory reading can be found at: <http://www.beyondbooks.com/lif71/4a.asp>. Students may take the short quizzes after each section.

Collect factory comparison sheets before students leave.

Day 12-13

Quiz on function of the organelles. Students will create models/examples of eukaryotic cells. There is a detailed description of how to make cells out of play-doh at the following site: <http://www.col-ed.org/cur/sci/sci82.txt>. Additional information for this lesson and assessments can be found at: <http://www.sciencenetlinks.com/lessons.cfm?BenchmarkID=11&DocID=101>. Students should use the Making a Model of the Cell page in Appendix A or use the one on the website.

Review the structures and functions again and collect Making a Model of the Cell page as students leave.

Day 14

Students will review for the District Assessment (multiple choice exam) by playing Jeopardy today. Divide class in teams of three or four and ask questions regarding the organelles, tenets of the cell theory, organization of living things, and comparing the cell to a non-living system.

Day 15

Distribute District Assessment.

Day 16-18

Allow students to continue working on performance assessment in class. Students may go to computer lab to do more research or build their models of the cell-school comparison.

Day 19-20

Students present their projects for a grade and turn in self-assessments.

Rubric for Q3 Performance Assessment- Cells and School

Points →	4 Exceeds Expectations	3 Meets Expectations	2 Approaches Expectations	1 Does Not Meet Expectations
Cell Type	Clearly identifies whether the cell being compared is plant or animal and includes why it is eukaryotic	Identifies whether the cell being compared is plant or animal	Indicates a cell, but it is not identified correctly	Does not identify the cell type
Structure (Organelles)	Clearly identifies all cell structures in plant or animal cell correctly	Identifies less than 5 cell structures correctly	Identifies less than 3 cell structures correctly	Identifies only 1 cell structure correctly
Function	Correctly identifies and explains the function of each of the structures of the cell	Identifies and explains less than 5 functions of the structures of the cell	Identifies and explains less than 3 functions of the structures of the cell	Identifies or explains only 1 of the functions of the cell
Comparison	Compares the parts of a school to the structures of the cell in detail, giving specific examples of why the functions of the two are similar	Compares less than 5 parts of a school to the structures of the cell, and gives some examples of why the functions are similar	Approaches comparing the cell to parts of a school, but does not indicate how they are similar	Compares only 1 part of the cell to 1 part of a school

Appendix A

Frayer Model Vocabulary Worksheet.....A-1

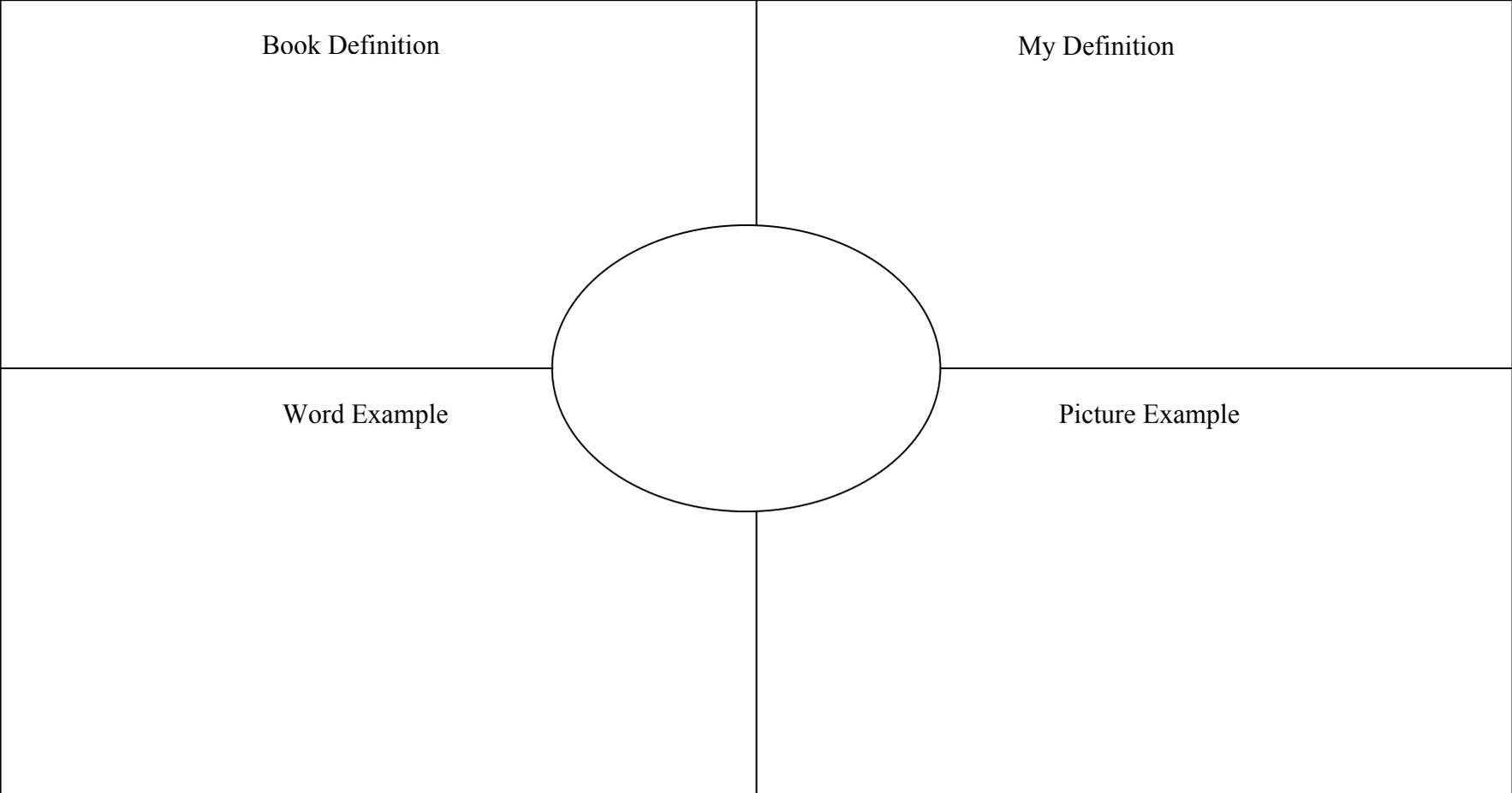
Microscopic Discoveries.....A-2

Making a Model of the Cell..... A-3

Frayer Model Vocabulary

A-1

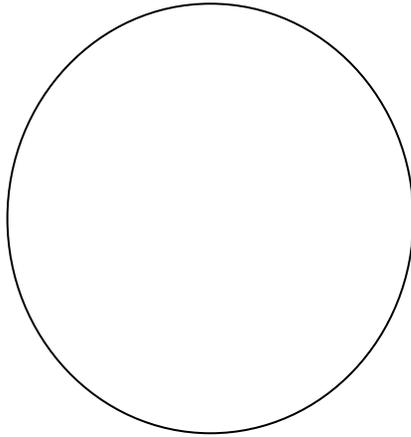
Book Definition	My Definition
Word Example	Picture Example

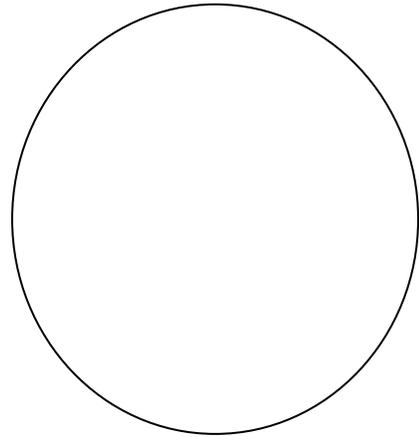


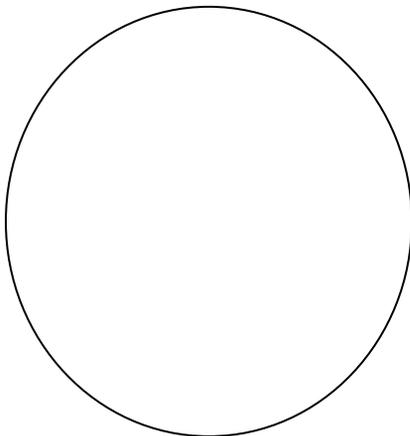
A-2

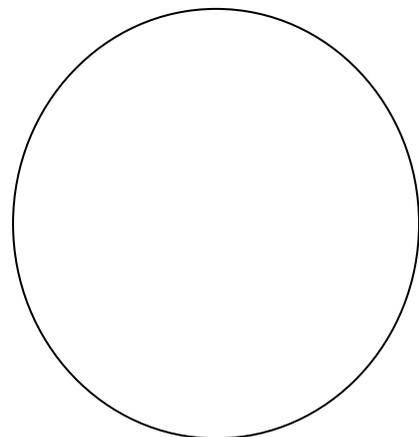
Microscopic Discoveries

Draw a picture of what you see in the microscope. Then, describe it in the space provided.









A-3**Making a Model of the Cell**

Use your knowledge of cells to complete this worksheet for “Making a Model of the Cell” lab. For each structure, be sure to indicate whether that structure is found in a plant or animal cell by placing a check mark (✓) in the box.

Structure	Plant	Animal	Function	Material Used to Represent Organelle	Why Did You Choose This Material to Represent the Organelle?
Cell Wall					
Cell Membrane					
Nucleus					
Cytoplasm					
Mitochondrion					
Golgi Complex					
Endoplasmic Reticulum					
Chloroplast					
Lysosome					
Vacuole					

Adapted from ScienceNetLinks.com

Cells Performance Assessment Sheet

By now, you have plenty of information on the types of cells and organelles. You also know that cells are part of a larger system. Your task is to compare a eukaryotic cell to a school. You may choose from the following options to make your comparisons:

- ◆ Create a mini model of our school that shows how the parts of the school operate like the parts of the cell. Next to each part of the school, write the comparison to a cell organelle.
- ◆ Make a brochure for science that help make a 5th grader understand the similarities between the organelles of a cell and the parts of the school. Make sure to include information and colors that will make the brochure interesting to read.
- ◆ Writing prompt: A lysosome takes a trip to another world and is on the loose to find defective organelles! He is confused however, because the environment he is in is not another cell. He's in our school! Write about what the lysosome's journey through our school by describing how the parts of the school are like the lysosome's familiar environment.
- ◆ Make a poster-sized drawing of a eukaryotic cell and label the parts of the cell as the parts of a school. For example, the nucleus would be labeled as a part of the school instead of a 'nucleus'. Describe how and why the structures of the cell and the school have similar functions.
- ◆ Create and perform a song or musical comparing organelles to the parts of the school.

Make sure to follow the rubric to include all the information I am asking from you!

Self-Assessment

After you have finished the performance assessment, answer these questions about yourself and this assignment.

1. How well did you understand the assignment? Very Well Somewhat Not at All
2. How well did you participate in your group? Very Well Somewhat Not at All
3. What would you change about this assignment?

4. What was the part of this assignment that you enjoyed most? Least?

5. What grade would you give yourself for this assignment? _____

Why? _____
