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Cell Theory and Cell Function [7th grade]

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UNDERSTANDING BY DESIGN

Unit Cover Page

Unit Title: Cell Theory and Cell Function

Grade Level: 7th

Subject/Topic Area(s): Science

Designed By: Daisy Wang and Amber Schumacher

Time Frame: 19 days, 50 minutes

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

In this unit on cell theory and cell structure and functions, 7th grade students will be able to recognize the different levels of organization in plants and animals including cells, tissues, organs, organ systems, and organisms (7.12C). Students will also learn to differentiate between structure and function in plant and animal cell organelles (7.12D) as well as relating how the functions of the cell helps the organism to carry out the functions necessary for survival (7.12E) Students will be able to recognize the characteristics of the cell theory and that all cells need energy from food to sustain life (7.12F).

Unit: Cell Theory and Cell Functions

Grade: 7th Science

Stage 1: Desired Results

Established Goals (Standards)

SCI.7.12C Recognize levels of organization in plants and animals including cells, tissues, organs, and organisms.

SCI.7.12D Differentiate between structure and function in plant and animal cell organelles including membrane, cell wall, nucleus, cytoplasm, mitochondrion, chloroplast, and vacuole.

SCI.7.12E Compare the functions of a cell to the functions of organisms such as waste removal.

SCI.7.12F Recognize that according to cell theory all organisms are composed of cells and cells carry out similar functions such as extracting energy from food to sustain life.

Understandings

Students will understand that...

- *All living things are made of one or more cells.*
- *Living things have basic levels of organization.*
- *There are differences and similarities between the structure and function of cell organelles in plant and animal cells.*
- *Cells and organisms carry on similar functions such as extracting energy from food to sustain life.*

Essential Questions

How do you know if something is a living thing?

How are plant cells and animal cells alike?

How do different parts of the plant and animal cells keep them alive?

Knowledge

Students will know...

- The levels of organization of living things, beginning with the cell.
- All living things are composed of cell(s).
- All cells come from existing cells.
- Organelles are specialized structures inside a cell that help the cell to function.
- The structure of organelles in animal and plant cells is related to their function.
- Cells carry out functions similar to functions carried out by the whole organism.

Skills

Students will be able to...

- Identify levels of organization in living things.
- Differentiate between structure and function of a plant and animal cells.
- Identify organelle functions in the plant and animal cell.
- Compare the function of a cell to the function of organisms.
- Identify the characteristics of the cell theory.

Stage 2: Assessment Evidence

Performance Task: See Attached

Other evidence:

(quizzes, tests, academic prompts, self-assessments, etc.

note – these are usually included where appropriate in Stage 3 as well)

Quizzes – levels of organization, cell theory, functions of organelles

Exit ticket, Academic Prompt, verbal informal assessment during project work time

Stage 3: Learning Activities

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

Day 1: EQ1: How do you know if something is a living thing?

Concept Attainment: Living vs. non-living thing.

Ice-breaker: If you were stranded on a desert island and could only take three things with you to help you survive, what three things would you bring? Discuss what are something we would need to survive, and where we get it.

Pre-assessment / self-assessment (Know/Want to learn/Learned KWL Chart)

Day 2: Review living things and Cell Theory: *All living things are made one or more cells; cells are the smallest unit of a living organism, and all cells come from previously existing cells.*

Define organelles as a smaller structure inside of a cell that performs a special function to keep cells alive.

Levels of organization: *Define cell, tissue, organ, organ system, organism – model/demo with nesting dolls or boxes. Rap/song:*

<http://www.youtube.com/watch?v=KuJqqiATlqw&feature=related>

<http://www.youtube.com/watch?v=KzMviiBoRtA&feature=related>

Show Legos animation: <http://www.youtube.com/watch?v=ODfJiMaQmvA>

Have students illustrate the different levels of organization.

Day 3: EQ2: How are plants and animal cells alike?

Plant vs. Animal Cells Exploratory Lab: Look at slides (cheek cell vs. onion cell). Illustrate cells and identify parts they might already know. At the end of class, have students look at a diagram of the plant and animal cell, add to their picture and label all parts of the cell. Have students observe and identify similarities and differences between the two cells, including the shape of the cell.

Day 4: Academic prompt: Have students reflect and write a paragraph summary answering the question “Both plants and animals need energy to survive. How do plants get the energy they need to live (what are some things they need to have and why)? How do animals get the energy they need to survive (what are some things they need to have and why)?”

Using their diagrams of the plant and animal cell, create a Venn diagram on plant vs. animal cell structures and functions.

Define and discuss mitochondria and chloroplast. Discuss the importance of having energy for

survival and how plants and animals get the energy they need. Review photosynthesis, cellular respiration, autotrophs and heterotrophs.

Add to their academic prompt: What part of the plant cell helps them to get energy for survival? What part of the animal cell helps the animal to get energy for survival?

Day 5: Review + Quiz

Day 6: BUFFER DAY / Go over quiz

Have students collect and bring in “junk”, recyclables, or household items to put into a community bin. Students will not know what these are for yet until day 9. Students will have a week to bring items in.

Day 7: EQ3: How do different parts of the plant and animal cells keep them alive?

<http://www.youtube.com/watch?v=-zafJKbMPA8&feature=related> rap on organelles

Notes on all organelles – Note taking/foldable (magic window panes).

Day 8: Recap on organelles – Play mile-a-minute. Give students a few minutes to review organelles, and then pair up with a partner. A list of words with be on the screen, and the partner facing the screen will have to give clues to have the partner guess the word. Vocab words can be mixed in with other words.

Discussion: How are these organelles like parts of your body? Make connections card-sort with pictures– nucleus like the brain, cell membrane like the skin, vacuoles like the stomach or bladder, lysosomes like the large intestines etc. See if they can come up with any other connections.

Day 9: Introduce project guidelines – have students look for things that could relate to a cell organelle and continue to bring in items.

Give students a short review sheet for the quiz, including levels of organization, cell theory and organelles.

Day 10: “I have who has” organelles review + Quiz (Community bin items due)

Day 11: Go over project guidelines again, form partners, brain storm ideas with partner.

Day 12: Begin building models

Day 13: Project workday

Day 14: Project workday

Day 15: Projects due – Gallery walk: students will take notes on their favorite items to represent each organelle.

Day 16: Class models – student will vote for their favorite item to represent each organelle in a large class model of the plant and animal cell. Review structure and functions of organelles.

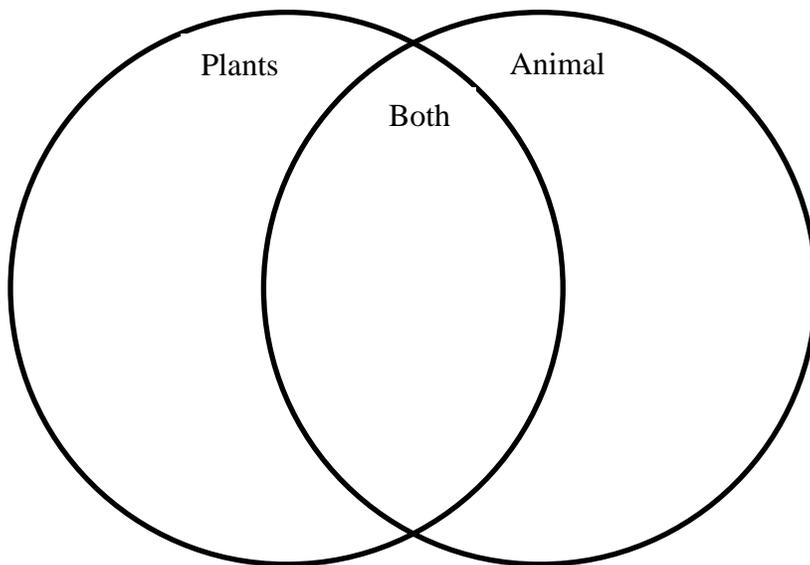
Day 17: Revisit KWL. Quiz (Use pre-assessment) + review sheet

Day 18: Review

Day 19: TEST

Pre-Assessment

1. How do you know if something is a living thing?
2. What do animals need for survival?
3. How do animals get energy?
4. How does a plant get energy?
5. What is a cell?
6. What is an organelle? Do you know any examples?
7. Fill in the Venn diagram on the similarities and differences between the plant and animal cell.



Living Vs. Non-Living Things Concept Attainment

Name: _____

Listed below are two groups of objects. The items listed on the *Example* side all have a common feature. The items on the *Non-examples* list do not share this feature.

Examine the list of items and determine the common feature. Write it down in the Feature Box.

Next, decide if each of the testers fits in the examples or non-examples list. Record the appropriate word on each line.

Examples	Non-Examples	
Spider Tree Slug Cat Buttercup Eagle	Car Rock DVD Soda can Glass Running Shoes	
Feature:		
Testers:		
TV _____	Pond Water _____	Virus _____
Snake _____	Bacteria _____	Cloud _____
Fire _____	Forest _____	Light _____
Mold _____	Sand _____	Hurricane _____

Turn over the sheet to complete the next assignment.

Now that you have determined which feature the examples have in common your next task is to come up with the characteristics that all items must have to fit into the Example group.

Use the space below to record the characteristics and then explain how each of the items listed on the previous page (examples, non-examples and testers) fits the characteristics.

<p>I have Cells</p> <p>Who has? A cell that lacks a nucleus and membrane bound organelles.</p>	<p>I have Prokaryotic Cell</p> <p>Who has? A cell that has a nucleus and membrane bound organelles.</p>	<p>I have Eukaryotic Cell</p> <p>Who has? A group of cells working together.</p>
<p>I have Tissues</p> <p>Who has? A group of tissues working together.</p>	<p>I have Cell/Plasma Membrane</p> <p>Who has? The cell organelle where most of the cell's DNA is found. This organelle directs most of the cell's activity.</p>	<p>I have Nucleus</p> <p>Who has? The jelly-like fluid region between the nucleus and the cell membrane that holds organelles in place.</p>
<p>I have Organs</p> <p>Who has? A group of organs working together.</p>	<p>I have Cytoplasm</p> <p>Who has? The cell organelle that is used as storage for water or food.</p>	<p>I have Vacuole</p> <p>Who has? The cell organelle that is the powerhouse of the cells, that does cellular respiration to that breaks down sugar for ATP energy.</p>
<p>I have Organ systems</p> <p>Who has? The barrier that regulates what enters and exits the cell.</p>	<p>I have Mitochondria</p> <p>Who has? The cell organelle that does photosynthesis, helping the plant to use sunlight to produce sugars.</p>	<p>I have Chloroplast</p> <p>Who has? The smallest unit of all living things?</p>

(Performance Task)

Name: _____

Partner's Name: _____

Due date: _____



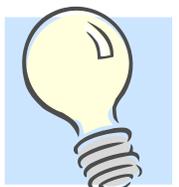
Goals:

Use every day household items to create your own plant and animal cells with a partner.

- Each item will represent a different organelle in each cell.
- Explain how your item's structure relates to the function of that organelle.

Supplies:

Examples of things you can use are: Ziploc bags, buttons, yarn, string, pipe cleaners, beads, tissue boxes, old pens, cotton balls, old watches, kitchen items, etc... or anything else you can find!



Guidelines:

- The shape of your model should correspond to the shape of your cell.
- Label each organelle on your item in your model.
- If an organelle is in both the plant and animal cell, use the same item to represent it in both models.
- *Use your imagination and be creative!!*

Complete the chart according to your cell models for all organelles.

Organelle	Item	Function of organelle. How does the structure of the item relate to the organelle's function?	Plant cell, animal cell or both?
Cell membrane			
Cell wall			
Nucleus			
Cytoplasm			
Mitochondria			
Chloroplast			
Vacuole			
Lysosome			

_____ points / 25 points

Student questions

1. Explain two limitations to your model. For example, how is your model not a perfect representation of the real cell?
2. Which organelle was difficult for you to represent, and why?
3. How are plant and animal cells similar? Why is this important?
4. How are plant and animal cells different? Why is this important?
5. Are plant cells always rectangular/square in shape? Are animal cells always circular? Why?
6. How do plants and animals get energy? What parts the cells help them to do so?

_____ points / 25 points

Partner's name: _____

My partner performed:

lowest 1 2 3 4 5 6 7 8 9 10 highest

Cell Model Rubric

	Awesome!	Good.	Needs improvement.	Unacceptable.
Models	All organelles are represented and labeled in both models. 25 points	All organelles are represented and labeled in both models. 20 points	1-2 organelles or labels are missing. 15 points	What happened? Missing labels and organelles. 10 points.
Creativity	This is amazing! Original thinking. 5 points	Nicely done, but not much creativity. 4 points	Shows lack of creativity. 2 points	Shows lack of effort or understanding. 1 points
Overall Presentation (neatness)	That looks incredible!! Clean, neat and well organized. 10 points	Looking good. Fairly neat and clean. Some organization 8 points	It's okay. Could be better organized. A little cluttered. 4 points	Not done yet – try again. Messy and unorganized 0 points

TOTAL POINTS:

Chart: _____ /25

Questions: _____ /25

Peer Evaluation: _____ /10

Model: _____ /40

TOTAL SCORE: _____ /100

Teacher Notes

Teacher can show students a sample project:



Modification: Have partners work on one cell model together. Teacher can assign a plant cell for a slighter higher challenge than the animal cell. Teachers can also pre-pick relevant items for the students, and have students make their own connections.

Extension: Can you think of an analogy for a plant or animal cell? Make 5 comparisons.

For example, an animal cell is like a car because

1. The engine is like the nucleus because it controls the whole car.
2. The exhaust is the lysosome because it helps get rid of waste.
3. The gas tank is like the vacuole because it stores the “food” and energy needed.
4. Gas is like the sugars made by the mitochondria; it provides energy.
5. The metal on the car is like the cell membrane because it protects the inside.