

Unit Plan: Understanding Cells as the Basic Building Blocks of Life

By: Kelsey McMahan

7th Grade

Rationale

A major portion of the seventh grade life science curriculum is devoted to cells. It is important that students understand how and why cells work, so that they can understand deeper concepts in life science as they proceed to the high school level. Genetics, anatomy, and physiology begin to make much more sense when students have a strong understanding of how cells work beforehand. The way this unit is set up, students are involved in a great deal of cooperative learning as they gather information about cells. Before and after learning new concepts, they are asked to think about the things they know and relate them to real life. Models, labs, and diagrams help students to make sense of the new things they are taught.

Unit Big Idea

Organisms are made up of organ systems which are composed of organs. The basic functions needed for life (such as breathing and eating) are served by organs and organ systems. Organs are formed by tissues and tissues are composed of cells. Every known organism, whether single cell or multicellular is made up of cells. Multicellular organisms have different kinds of cells that perform specialized functions. Those cells convert nutrients into energy that can be used to do work throughout the organism. Cells function in similar ways, regardless of the kind of organism they make up. All cells have the same basic structure while small variations between cells exist. Plant cells have a cell wall for stability and chloroplasts that enable photosynthesis to take place. All cells have a selectively permeable cell membrane, a nucleus and nucleolus to control the activities of the cell, and cytoplasm for the organelles to exist in. They also have mitochondria for energy production, smooth and rough endoplasmic reticulum to store and transport materials through the cell, ribosomes to produce proteins, vacuoles to store food and waste, and lysosomes to break down unwanted material.

Michigan Science Content Standards Covered in the Unit

S.IP.07.13 Use tools and equipment (spring scales, stop watches, meter sticks and tapes, models, hand lens, thermometer, models, sieves, microscopes, hot plates, pH meters) appropriate to scientific investigations.

S.IA.07.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.

S.IA.17.13 Communicate and defend findings of observations and investigations.

S.RS.07.15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

L.OL.M.2 Cell Functions- All organisms are composed of cells, from one cell to many cells. In multicellular organisms, specialized cells perform specialized functions. Organs and organ

systems are composed of cells, and function to serve the needs of cells for food, air, and waste removal. The way in which cells function is similar in all living organisms.

L.OL.07.21 Recognize that all organisms are composed of cells (single cell organisms, multicellular organisms).

L.OL.07.22 Explain how cells make up different body tissues, organs, and organ systems.

L.OL.07.23 Describe how cells in all multicellular organisms are specialized to take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or organism needs.

L.OL.07.24 Recognize that cells function in a similar way in all organisms.

FROM CELLS TO ORGANISMS: LEVELS OF ORGANIZATION
Seventh Grade Science
(60 Minutes)

Big Idea: Organisms are made up of organ systems which are composed of organs. The basic functions needed for life (such as breathing and eating) are served by organs and organ systems. Organs are formed by tissues and tissues are composed of cells. Every known organism, whether single cell or multicellular is made up of cells. Multicellular organisms have different kinds of cells that perform specialized functions. Cells function in similar ways, regardless of the kind of organism they make up.

Michigan Science Content Expectations:

S.IA.07.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.

L.OL.M.2 Cell Functions- All organisms are composed of cells, from one cell to many cells. In multicellular organisms, specialized cells perform specialized functions. Organs and organ systems are composed of cells, and function to serve the needs of cells for food, air, and waste removal. The way in which cells function is similar in all living organisms.

L.OL.07.21 Recognize that all organisms are composed of cells (single cell organisms, multicellular organisms).

L.OL.07.22 Explain how cells make up different body tissues, organs, and organ systems.

L.OL.07.24 Recognize that cells function in a similar way in all organisms.

Learning Objectives: At the end of this lesson, students will be able to:

Process-Related Objectives:

- Summarize information gathered from textbooks or internet resources.

Content-Related Objectives:

- Explain that all organisms are made of cells.
- Describe the levels of organization in organisms in order as cells, tissues, organs, and organ systems.
- Explain that cells function similarly in all organisms.

Motivation-Related Objectives:

- Feel confident about their ability to share science related concepts that they have learned with others.

Materials Needed: potato, plant, (4) posters, textbooks or internet access

Anticipatory Set: When students enter the classroom, a science journal prompt will be written on the board. A potato and a plant will be sitting on a table at the front of the room. Students will be instructed to record their thinking in response to the question, “What do this potato, this plant, and you have in common?” After taking a few minutes to respond, the teacher will ask what students have come up with. All answers should be welcomed and the teacher should then state that the class will be further investigating this question over the next couple of days. (5 minutes)

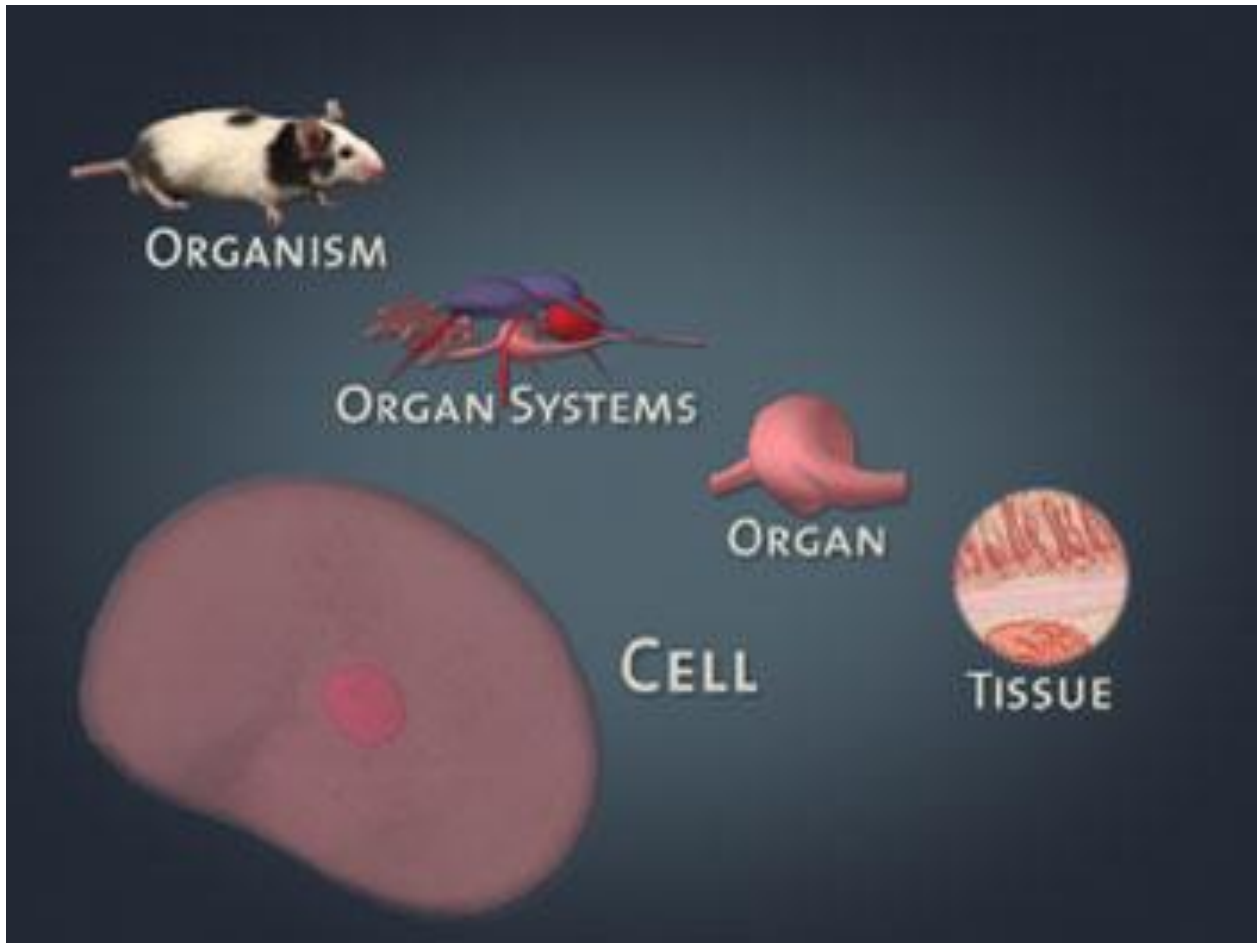
Procedure:

1. Explain to students that cells make up tissues, tissues make up organs, organs make up organ systems, and organ systems make up organisms. Use the picture located at the end of this document to help with the explanation. Talk about examples of each level of organization that the students may know from prior experiences. Also discuss the fact that all living organisms, whether single cell or multicellular, are made up of cells. (5 minutes)
2. Break student up into four groups. Assign each group to a level of organization (cell, tissue, organ, organ system). Instruct students to use their textbooks or internet resources to gather information about their level of organization. After gathering information, each group should create a poster to help them present what they have learned to the class. Tell students that each presentation should include a definition, an example, an illustration, an explanation of how this level of organization relates to the others, and any other relevant information. Also, inform students that every member of their group must participate in the presentation of their poster. (25 minutes)
3. Each group should present their poster and any additional information that they gathered to the class. During presentations, other students in the class should take notes, so that they can refer back to the information later on. (15 minutes)

Assessment: Present an analogy to students and see what they come up with. Tell them to think of themselves, one student, as a cell. In this case, what would a tissue be? an organ? an organ system? an organism? (Example: If a student is a cell, a tissue might be the entire class. An organ might be the whole group of seventh graders at the school. An organ system might be the school district itself.) As students present their ideas, ask them to give evidence that backs up their thinking. (10 minutes)

Closure: Thank students for participating in the day's activities. Encourage them to think of questions they might have about the levels of organization. Let them know that in the following lesson, they will be investigating how cells work.

Adaptations for Students with Learning Disabilities: The teacher should ensure that any students with learning disabilities are placed in groups that create a positive learning environment.



Graphic From:

"Life Science | Session 1 " 11/28/2010

<<http://www.learner.org/courses/essential/life/session1/closer1.html>>.

TOURING THE INSIDE OF CELLS
Seventh Grade Science
(60 Minutes)

Big Idea: All cells have the same basic structure while small variations between cells exist. Plant cells have a cell wall for stability and chloroplasts that enable photosynthesis to take place. Animal cells have centrioles to aid in cell division. All cells have a selectively permeable cell membrane, a nucleus and nucleolus to control the activities of the cell, and cytoplasm for the organelles to exist in. They also have mitochondria for energy production, smooth and rough endoplasmic reticulum to store and transport materials through the cell, ribosomes to produce proteins, vacuoles to store food and waste, and lysosomes to break down unwanted material.

Michigan Science Content Expectations:

S.IA.07.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.

S.RS.07.15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

L.OL.M.2 Cell Functions- All organisms are composed of cells, from one cell to many cells. In multicellular organisms, specialized cells perform specialized functions. Organs and organ systems are composed of cells, and function to serve the needs of cells for food, air, and waste removal. The way in which cells function is similar in all living organisms.

L.OL.07.21 Recognize that all organisms are composed of cells (single cell organisms, multicellular organisms).

L.OL.07.23 Describe how cells in all multicellular organisms are specialized to take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or organism needs.

L.OL.07.24 Recognize that cells function in a similar way in all organisms.

Learning Objectives: At the end of this lesson, students will be able to:

Process-Related Objectives:

- Use an internet source to gather information about a topic.
- Form a valid argument to answer a question and support that argument with evidence.

Content-Related Objectives:

- Explain that all cells function in similar ways.
- Identify the cell membrane as a selectively permeable layer surrounding a cell.
- Define the nucleus and nucleolus as controlling activities within the cell.
- Identify the substance that the organelles are found in as cytoplasm.
- Define mitochondria as the energy producer of the cell.
- Explain that smooth endoplasmic reticulum and rough endoplasmic reticulum function to store and transport materials through the cell.
- Identify ribosomes as the organelles responsible for protein production within cells.
- Explain that lysosomes break down unwanted material within cells.

- Identify vacuoles as locations where things like food and waste are stored.
- Explain the differences between plant cells and animal cells. Plant cells have cell walls for stability and chloroplasts for the process of photosynthesis. Animal cells have centrioles to aid in cell division.

Motivation-Related Objectives:

- Become interested in cells by learning independently or in partners from a virtual cell tour.

Materials Needed: student computers, internet access, Blackboard access, worksheets found at the end of the lesson plan (one per student)

Preparation Before the Lesson: Create a forum in your classroom discussion board on Blackboard. Title the forum: “You’re Fired!” This will be used for the assessment.

Anticipatory Set: As students enter the classroom, a journal prompt will be on the board. The prompt will read as follows: “What do you think a cell might need in order to function? Do all cells need the exact same things? Explain.” After students take a few minutes to respond in their journals, ask for volunteers to share ideas with the class. Welcome all responses. (5 minutes)

Procedure:

1. Explain to students that the class will be using the internet to view a virtual cell. Remind them of proper etiquette in the computer room. Give students the worksheet found at the end of the lesson plan. Ask them to bring their worksheet and a pencil with them to the computer room. (5 minutes)
2. Students use the virtual cell tour to answer the questions on the worksheet. They can work individually or with a partner depending on the teacher’s preference. (25 minutes)

Assessment: At the end of the worksheet, students are given a prompt to answer as a thread in the “You’re Fired!” discussion board forum. They are instructed to ask the teacher for an organelle assignment. To encourage a variety of responses, assign each student a different organelle until all have been assigned. Then, begin repeating assignments. Organelles that can be used include: Nucleus, Ribosome, Mitochondrion, Golgi Body, Smooth Endoplasmic Reticulum, Rough Endoplasmic Reticulum, Vacuole, and Lysosome. (20 minutes)

Closure: Thank students for participating in the day’s activities. Ask them to think about how cells in the human body might become specialized for different tasks. Tell them that in the following day’s lesson, they will be looking at their own cells a little more closely.

Adaptations for Students with Learning Disabilities: The teacher can assign partners to any students with learning disabilities. Those students can work together to complete the worksheet and submit one response to the prompt at the end of the worksheet.

Name: _____ Date: _____ Hour: _____

Directions: Open up an internet browser and go to <http://www.sciencespot.net/>. Click on the “Kid Zone” link in the upper right hand corner of the screen. (It is located under a picture of a crayon box.) Then, click on “Cells & Microscopes” under the category of Life Science. Next, click on “iknowthat.com – Cells” found under the category of Cells & More. Near the bottom of the screen, you will find a button titled “Click here to start your activity”. Click on that button to proceed to the virtual cell tour. When you enter the cell tour, you can move the cursor over any of the organelles to learn more about them. Switch between animal and plant cells by clicking on “Animal” or “Plant” under the words “Part of a Cell”. Answer the questions that follow with the information you find.

1. What is the difference between smooth endoplasmic reticulum and rough endoplasmic reticulum?

2. Which organelle is considered the “powerhouse” of the cell? _____

3. Which organelle is responsible for digesting substances in the cell that are not needed?

4. Protein-filled sacs are formed by which organelle? _____

5. Inside of cells, what substance surrounds organelles? _____

6. Where are cell activities controlled from? What is located inside that organelle?

7. What is the job of ribosomes? Name the two places ribosomes are found.

8. What surrounds both animal and plant cells? What does semi-permeable mean?

9. What process takes place within chloroplasts? _____

10. Place an X on the lines next to each component, indicating whether it is found in only plant cells, only animal cells, or both plant and animal cells.

Only Plant Cells	Only Animal Cells	Both Plant and Animal Cells	Cell Component
			Nucleus
			Nucleolus
			Cytoplasm
			Cell Membrane
			Cell Wall
			Ribosomes
			Mitochondria
			Golgi Body
			Smooth Endoplasmic Reticulum
			Rough Endoplasmic Reticulum
			Vacuole
			Lysosomes
			Centrioles

11. What does a plant cell have that an animal cell does not have?

12. What does an animal cell have that a plant cell does not have?

When you have completed the questions above, ask the teacher for your organelle assignment. Then, log onto blackboard and open the discussion board for this class. Your response to the following question should be submitted as a thread in the forum "You're Fired!"

You are an organelle in a cell and you're boss just gave you some bad news. Unfortunately, the cell is not bringing in the kind of energy that it once was, so he feels he must let some people go. Since he believes that you have not been pulling your weight within the organization, he just told you that, "YOU'RE FIRED!" You know that the cell could never last without you, but you must convince your boss in order to keep your job. Plead your case. What do you do for the cell that no one else does? Why must the cell keep you around? Give at least three reasons to support your argument.

(Borrowed From: Science Stories: Science Methods for Elementary and Middle School Teachers)

EXAMINING PLANT AND ANIMAL CELLS
Seventh Grade Science
(60 Minutes)

Big Idea: All organisms are made up of cells and those cells function in similar ways. In multicellular organisms, cells in various parts of the organism are specialized for different activities. Cells are the basic building blocks of life. They come together to make tissues, than organs, than organ systems, and finally organisms.

Michigan Science Content Expectations:

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L.OL.07.21 Recognize that all organisms are composed of cells (single cell organisms, multicellular organisms).

L.OL.07.22 Explain how cells make up different body tissues, organs, and organ systems.

L.OL.07.24 Recognize that cells function in a similar way in all organisms.

Learning Objectives: At the end of this lesson, students will be able to:

Process-Related Objectives:

- Prepare slides for examination.
- Use microscopes to conduct scientific experiments.
- Draw what they see when looking through a microscope.

Content-Related Objectives:

- Explain that cells make up tissues, tissues make up organs, organs make up organ systems, and organ systems make up organisms.
- Describe how various cells throughout a multicellular organism may be specialized for different activities. (Example: liver cells being specialized for detoxification, stomach cells being specialized for digestion)

Motivation-Related Objectives:

- Feel confident in their ability to use microscopes.
- Enjoy learning about cells in a hands-on fashion.

Materials Needed:

As a Class: iodine, (1) onion, methylene blue

For Each Student: (1) microscope, (2) microscope slides, (2) cover slips, (1) toothpick, (1) set of tweezers, (1) large sugar cookie, frosting, (1) Swedish Fish, (3) Skittles, (3) jelly beans, (1) pretzel M&M, (10) Nerds, (1) piece of Nerd Rope, (1) piece of a pull and peel Twizzler

Anticipatory Set: When students enter the classroom, a science journal prompt will be written on the board. It will read: "In your science journal, record three lab safety rules that we have discussed." After giving students a few minutes to write down the rules that they come up with, the teacher should ask for volunteers to share them. Discuss with students what proper behavior looks like in a lab environment. (5 minutes)

Procedure:

1. Review procedures for use of microscopes. Remind students to always begin viewing a slide with the lowest power lens and to look at the outside of the microscope when switching lenses. (5 minutes)
2. Hand out the worksheet found at the end of this lesson plan. Allow students to go through the lab and answer the questions at the end in their science journals. (30 minutes)
3. As students complete the procedure found on the worksheet, have them move on to the assessment.

Assessment: Give each student the following items: the assessment worksheet, a sugar cookie (cell membrane), frosting (cytoplasm), a Swedish Fish (Golgi body), Skittles (lysosomes), jelly beans (mitochondria), a pretzel M&M (nucleus and nucleolus), Nerds (ribosomes), Nerd Rope (rough endoplasmic reticulum), and a pull and peel Twizzler (smooth endoplasmic reticulum). Have them use the descriptions of the organelles and the knowledge that they have gained to decide which kind of candy represents each organelle. Then have them write at least one sentence with evidence of why that is the case in their science journals. (15 minutes)

Closure: Encourage students to search their houses for items that can represent the parts of a plant cell, similar to the way that each kind of candy represented a part of the animal cell. Have them think about the differences between plant and animal cells. Explain that the following day they will be working in groups to make large scale models of a plant cell and that they should bring in anything they want to use for those models. (5 minutes)

Adaptations for Students with Learning Disabilities: For the microscope portion of this lab, students with learning disabilities could work with a partner, each one creating his or her own slides. This would give them the opportunity to ask questions to better understand the procedure. For the assessment, these students could record the kind of candy that represents each organelle and highlight evidence supporting that conclusion from the description found on the worksheet.

Plant and Animal Cell Microscope Lab

View an Onion Cell

1. **Prepare the Slide:** Place two drops of iodine on a microscope slide. Then, obtain a small, thin piece of the outside of an onion. Using tweezers, put the piece of onion on the slide. Carefully place two more drops of iodine on top of the piece of onion. Then, lower the cover slip onto the slide. Make sure that no air bubbles are formed in this process. If there are air bubbles, try to gently tap the slide until they come out.
2. **Prepare the Microscope:** Make sure that the microscope light is on and the lowest power objective lens is in place. Insert the slide into the microscope.
3. **Focus on the Slide:** Use the coarse focus knob to bring the image into focus. Then, look at the outside of the microscope while you switch to the next higher power objective lens. Make sure that the lens does not hit the slide as you adjust it. After switching lenses, use ONLY the fine focus knob to adjust the focus. Once you have focused on the slide, you can switch to the next higher power objective lens by looking at the outside of the microscope. Again, use ONLY the fine focus knob after switching.
4. **Record the Results:** Draw what you see in your science journal. Label your drawing as "Onion Cell" and record the power of the objective lens that you are using. Set your slide aside and move on to the next section.

View a Human Cell

1. **Prepare the Slide:** Place one drop of methylene blue on a microscope slide. Then rub a toothpick against the inside of your cheek. Afterwards, touch the toothpick to the methylene blue gently. Throw the toothpick away and lower a cover slip onto the slide. Make sure that no air bubbles are formed in this process. If there are air bubbles, try to gently tap the slide until they come out.
2. **Prepare the Microscope:** Make sure that the microscope light is on and the lowest power objective lens is in place. Insert the slide into the microscope.
3. **Focus on the Slide:** Use the coarse focus knob to bring the image into focus. Then, look at the outside of the microscope while you switch to the next higher power objective lens. Make sure that the lens does not hit the slide as you adjust it. After switching lenses, use ONLY the fine focus knob to adjust the focus. Once you have focused on the slide, you can switch to the next higher power objective lens by looking at the outside of the microscope. Again, use ONLY the fine focus knob after switching.
4. **Record the Results:** Draw what you see in your science journal. Label your drawing as "Onion Cell" and record the power of the objective lens that you are using. Set your slide aside and move on to the next section.

Wash off the slides and cover slips in the sink. Then dry them off and place them back in their appropriate places.

In your journal, answer the following questions:

1. Record any differences that you noticed between the plant (onion) cell and animal (human) cell. If you had a higher power objective lens, what other differences would you have noticed?
2. In humans, how might cheek cells be different from liver cells? Would certain organelles be present at a higher frequency in one kind of cells than another?

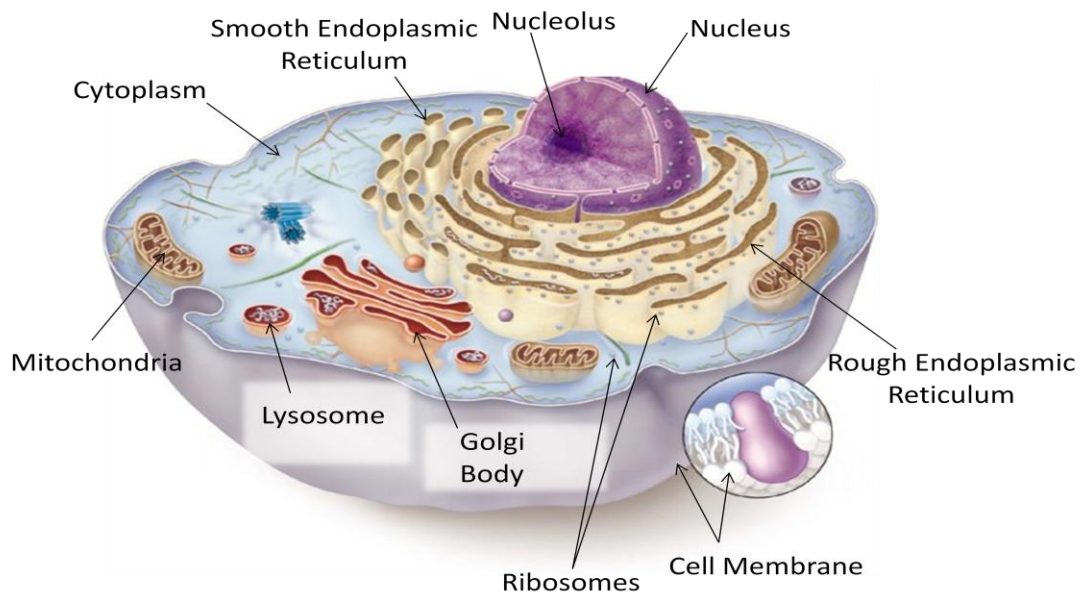
Name: _____ Date: _____

Animal Cell Organelles

In the blanks below, record which candy represents each cell component based on your cell model.

Then, in your science journal, write at least one sentence explaining why each kind of candy represents the organelle that you chose. Also, tell how we know this is a model of an animal cell.

- _____ **Cell Membrane:** semipermeable layer surrounding the cell
- _____ **Cytoplasm:** watery substance that surrounds cell organelles
- _____ **Golgi Body:** produces sacs filled with protein, some sacs are kept in the cell while others leave
- _____ **Lysosome:** sphere-shaped, contains enzymes for digestion of unwanted materials
- _____ **Mitochondria:** powerhouse of the cell, makes ATP from glucose to be used as energy
- _____ **Nucleus:** generally sphere-shaped, controls activities within the cell, houses chromosomes
- _____ **Nucleolus:** found in the nucleus, makes ribosomal RNA
- _____ **Ribosome:** small organelle responsible for making proteins, found attached to rough endoplasmic reticulum and floating in cytoplasm
- _____ **Rough Endoplasmic Reticulum (RER):** flattened channels of folded membranes, ribosomes attached to it, stores and transports proteins
- _____ **Smooth Endoplasmic Reticulum (SER):** flattened channels of folded membranes, responsible for things like production, detoxification, and storage



SEEING IS BELIEVING: CREATING PLANT CELL MODELS
Seventh Grade Science
(60 Minutes)

Big Idea: Multicellular organisms are made up of cells. Those cells work to convert nutrients into energy that can be used to do work throughout the organism. Plant and animal cells work in essentially the same manner, but with slightly different components. Plant cells have cell walls for support and chloroplasts for photosynthesis while animal cells do not have either.

Michigan Science Content Expectations:

S.IA.07.12 Evaluate data, claims, and personal knowledge through collaborative science discourse.

S.IA.17.13 Communicate and defend findings of observations and investigations.

S.RS.07.15 Demonstrate scientific concepts through various illustrations, performances, models, exhibits, and activities.

L.OL.07.23 Describe how cells in all multicellular organisms are specialized to take in nutrients, which they use to provide energy for the work that cells do and to make the materials that a cell or organism needs.

L.OL.07.24 Recognize that cells function in a similar way in all organisms.

Learning Objectives: At the end of this lesson, students will be able to:

Process-Related Objectives:

- Create a model of a cell.

Content-Related Objectives:

- Recognize that cells work in essentially the same manner in all multicellular organisms.
- Explain that cells take in nutrients and then convert those nutrients into energy for use throughout the organism.
- Identify the differences between plant and animal cells. Plant cells have cell walls for support and chloroplasts for photosynthesis while animal cells do not.

Motivation-Related Objectives:

- Enjoy experiencing science by making a model.

Materials Needed: lists of components to be included in cell models, cell organelles riddles worksheets, any items that could be used as cell components (ex: milk jugs, cardboard boxes, pop cans, straws, cotton balls, etc.)

Anticipatory Set: When students enter the room, the following prompt will be written on the board: “In your science journals, record which household materials you found to represent the components of a plant cell. Briefly explain why they are appropriate representations.” After giving students a few minutes to record their ideas, ask for volunteers to share what they came up with. (5 minutes)

Procedure:

1. Break students up into groups of four. Explain to them that they will be working to build a large scale model of a plant cell. They should have brought in materials to use for this project, but the teacher can have odds and ends in the back of the room. Give them the list of components that need to be represented in their model. Inform them that each organelle must be labeled and its function must be identified in the model that they turn in. (5 minutes)
2. Group members work together to create a model of a plant cell. (30 minutes)
3. After each group is done, give them the cell organelle riddles worksheet to complete.

Assessment: Students will complete the cell organelle riddles worksheet, identifying which organelles do which jobs in the cell. Afterward, they will create their own science riddles about cells, tissues, organs, and organ systems in their science journals. (15 minutes)

Closure: The teacher will take a classroom vote on the most creative model, best representation of a cell, and highest quality model. A reward will be offered for each of these categories. Thank students for participating in the lesson and for thinking up unique ways to represent cells. (5 minutes)

Adaptations for Students with Learning Disabilities: Students with learning disabilities should be placed into groups where a positive environment will likely be maintained. They could have a word bank for the cell riddles and work with a partner on creating their own riddles.

GROUP PLANT CELL MODELS

Group Number: _____ Cell Model Name: _____

Group Member Names: _____

Date: _____

Create a model of a plant cell that includes all of the components listed below. Label each component and record the function of that component. Come up with a name for your model and attach it somehow. Also, include the names of everyone in the group. You will be graded on whether or not your model contains all of the required components and their functions, level of creativity, accuracy, and appearance. When you are finished, pick up a Cell Organelle Riddles worksheet to complete.

Each Model Must Include:

- ___ Cell Wall
- ___ Cell Membrane
- ___ Ribosomes
- ___ Nucleus
- ___ Mitochondria
- ___ Cytoplasm
- ___ Rough Endoplasmic Reticulum
- ___ Smooth Endoplasmic Reticulum
- ___ Chloroplasts

CELL ORGANELLE RIDDLES

Name: _____ Date: _____

Fill in each blank with the organelle that best fits that riddle.

1. I'm a real "powerhouse."
That's plain to see.
I break down food
To release energy.

2. I'm strong and stiff.
Getting through me is tough.
I'm found only in plants,
But I guess that's enough.

3. My name means "colored bodies"
And I contain DNA
I pass on traits to new cells
In a systematic way.

4. I'm the "brain" of the cell
Or so they say.
I regulate activities
From day to day.

5. Found only in plant cells,
I'm green as can be.
I make food for the plant
Using the sun's energy.

6. I'm a series of tubes
Found throughout the cell.
I transport proteins
And other things as well.

7. I'm full of holes,
Flexible, and thin.
I control what gets out
As well as what comes in.

8. Proteins are made here
Even though I'm quite small.
You can find me in the cytoplasm
Or attached to E.R.'s wall.

9. I've been called a "storage tank"
By those with little taste.
I'm a sac filled with water,
Food, enzymes, or waste.

10. Since I contain many enzymes,
I can digest an injured cell;
And can break down a large molecule
Into a smaller one as well.

11. Create four of your own science riddles
about cells, tissues, organs, and organelles.
Record them in your science journal.

REFERENCES

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<<http://www.learner.org/courses/essential/life/session1/closer1.html>>.

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Science Stories: Science Methods for Elementary and Middle School Teachers
By: Janice Koch

users.rcn.com/kdaley.massd/Cell_Riddles.doc