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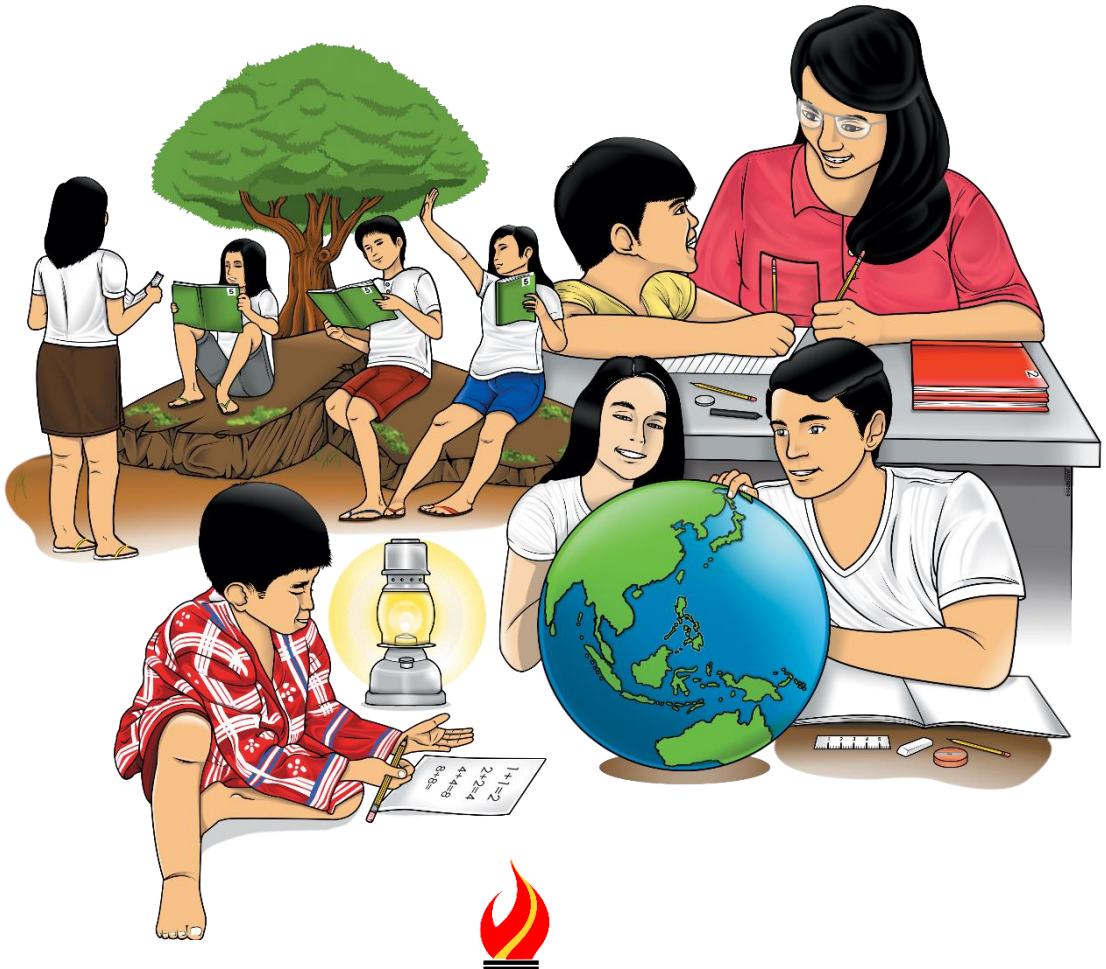
DepED
DEPARTMENT OF EDUCATION

Science

Quarter 2 – Module 4:

Eggs are White, Lemons are Yellow Like Me and You They're Made of Cells Too



CO_Q2_Science 7_ Module 4

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Quarter 2 – Module 4: Eggs are White, Lemons are Yellow Like Me and You They're Made of Cells Too
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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLM is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and tests. And read the instructions carefully before performing each task.

If you have any questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.

What I Need to Know

Hello there, dear learner! I am glad to be with you again. Are you the kind of person who asks the Whys and Hows around you? Do you consider yourself a unique organism? Did you ever wonder what made you a human? If the gadgets you use are made up of small circuits then what about you; what are you made of? How about animals and plants, are they made up of the same material as you are? How do they differ? What are their similarities?

This module will help you answer those questions you have in mind. All organisms, from ants to zebras, algae to trees are basically alike. Their bodies are made up of cells. Located within the cell are minute organelles that have specific functions for the cell to be able to perform various cellular processes including replication and cell division.

Most Essential Learning Competency:

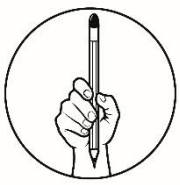
1. Differentiate plant and animal cells according to presence or absence of certain organelles.

This module is divided into two lessons, namely:

Lesson 1 – Animal Cell
Lesson 2 – Plant Cell

After going through this module, you are expected to:

- define cell;
- identify the major parts of the animal and plant cell; and
- describe the function of each organelles present in animal and plant cell.



What I Know

Directions: Read and understand the question in each item. Choose the letter of the correct answer from the questions below. Write your answer on a separate sheet of paper.

1. What is a cell?
   A. A cell is small organ in the body.
   B. A cell is a kind of micro-organism that infects the host's body.
   C. A cell is a microscopic organism that inhabits another organism's body.
   D. A cell is the smallest unit of an organism's body that is capable of performing life function.
2. Which major part of a cell is composed of jelly-like substance of mainly water as well as substances like dissolved nutrients?
   A. Nucleus
   B. Nucleolus
   C. Cytoplasm
   D. Cell membrane

3. What is the function of the cell's nucleus?
   A. It is the site for protein synthesis.
   B. It keeps all the parts of the cell inside and act as a boundary.
   C. It is the place within the cell where all cellular activities happen.
   D. It controls and regulates all cell activities and it contains the cell's DNA.

4. How does the cell membrane of an animal cell works?
   A. It holds the organelles in place.
   B. It contains water and food for cell.
   C. It directs the activity of the cell – for example, when it grows and divides.
   D. It controls what enters and exits the cell such as water, nutrients and waste and thereby protects and supports the cell.

5. Which organelle is responsible for the transport of undigested material to cell membrane for removal?
   A. Centriole
   B. Chromosome
   C. Lysosome
   D. Peroxisome

6. Mitochondria is one of the important organelles in an animal cell and is essential for vital cellular activities to happen. Why does the mitochondria known as the "powerhouse" of the cell?
   A. It has a flagellum.
   B. It has double membrane structure.
   C. It is one of the major organelles in the cell.
   D. It produces energy through chemical reactions.

7. What organelle is made up of RNA and functions for protein synthesis?
   A. Lysosome
   B. Ribosome
   C. Golgi Apparatus
   D. Endoplasmic Reticulum

8. In your homes there is a need to ensure that the food supplies are well-kept, stored and labelled for easy access and usage and to avoid spoilage. In an animal cell there is also an organelle that functions the same way like your refrigerator at home. Why is the Golgi apparatus similar to the refrigerator you have at home?
   A. It moves materials around the cell.
   B. It clean up the cell's waste products.
   C. It breaks down food and release energy for the cell.
   D. It packages, stores, and secretes energy for the cell.

9. Which organelle is responsible for the movement of materials, substances and nutrients around and serves as the canal of the cell?
   A. Endoplasmic Reticulum
   B. Nucleolus
   C. Peroxisome
   D. Vesicle

10. The protoplasm is composed of inorganic and organic compounds like carbohydrates, proteins, lipids and nucleic acids. Where is the protoplasm located inside the cell?
    A. Cell Membrane
    B. Cytoplasm
    C. Nucleus
    D. Organelle

11. To ensure that our homes are free from pathogens we make sure to use disinfectants. The animal cell has also an organelle that serves like a disinfectant to ensure that cells are healthy and can proceed with growth and reproduction. Why are lysosomes called as the "Lysol's" of the cell?
    A. They digest fatty acids and ethanol.
    B. They clean up cells wastes products.
    C. They are involved and active during cell division.
    D. They carry food materials into the cell and wastes out products out.

12. Is it TRUE that nucleus is the brain of the cell?
    A. Yes, because it leads the entire activity of the cell
    B. No, because it is the mitochondrion who make it.
    C. No, because it is the cell wall who controls the cell.
    D. Yes, because it commands on the entire activity of the cell.

13. Ribosomes can be free or attached. What type of endoplasmic reticulum has attached ribosomes?
    A. Long Endoplasmic Reticulum
    B. Short Endoplasmic Reticulum
    C. Rough Endoplasmic Reticulum
    D. Smooth Endoplasmic Reticulum

14. How is cell wall compared to a perimeter fence?
    A. It guards the activity of the cell.
    B. It protects the entire part of the cell.
    C. It helps the cell to check what goes in and goes out.
    D. It defends the entire cell from any foreign bodies that will invade the entire parts.

15. Why is DNA called to be the blueprint of an organism?
    A. It contains direction that leads an organism.
    B. It contains signals for normal functioning of an organism.
    C. It contains instructions for traits and characteristics of an organism.
    D. It contains nutrients and substances for the development of an organism.

Lesson 1 Animal Cell

What's In

Living organisms are diverse in form and structure. As you have observed around you, there are various kinds of organisms: big and small, tall and short, two-legged and four-legged and many others. Have you ever wondered what made them the way they are? This lesson will bring you to the world of tiny machines in living organisms – the cells. We have two types of multicellular organisms and for this lesson we will enter the cellular level of the animal kingdom.

Directions: Identify the organelles that correspond to the community base on their functions. Complete the table below by identifying the missing data. Write your answer on a separate sheet of paper.

Community Worker	Animal Cell Organelle
Garbage Collector	
Delivery Man/Courier	
Factory Worker	
Electrical Line Man	
Milk Man	

What's New

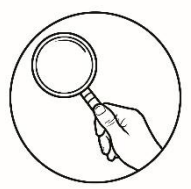
Directions: There are various types of cells in the human body. Match the body parts in Column A from its location in Column B. Write your answer on a separate sheet of paper.

Column A

1. Central Nervous System (CNS)
2. Arteries, veins and capillaries
3. Intestinal walls
4. Testes
5. Marrow

Column B

a. Sperm cell
b. Muscle cell
c. Nerve cell
d. Bone cell
e. Blood cell



What is It

Let us learn more about the cell found in us humans - the animal cell. Let us read the history of the cell below and learn how it was discovered by the scientists from hundred years ago.

The Cell Story

The history of the cell started with the invention of the microscope in the 1600s. Due to the limitations of the human eye, scientists during this period concentrated on developing tools to examine very small objects. Anton van Leeuwenhoek (1632-1723), a Dutch naturalist and craftsman, is known to have made over 500 microscopes throughout his lifetime.

His invention of the microscope paved the way for other scientist to study small organisms and or structures in their respective field.

However, the term cell was first introduced in 1665 by Robert Hooke, an English physicist. Examining thin slice of cork from the bark of an oak tree with a crude compound microscope, Hooke observed empty, honeycomb-like boxes which he called cells because they resemble the box-like rooms of monks in monasteries.

What he actually observed, though he was not aware of it, was the outermost covering of plant cells now called cell wall.

How did you find the story? What do you think would have happen if cell was not discovered? Let us learn more.

The cell is the smallest basic structural and functional unit of an organism.

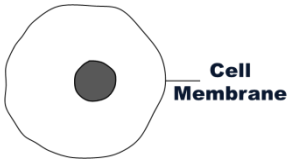
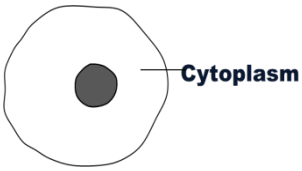
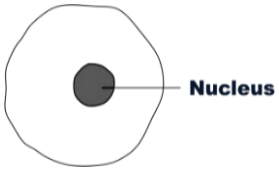
There are two types of multicellular organism (contains 2 or more cell in its body): Animal Cell and Plant Cell. We humans have the animal cell.

Trivia time!

An adult human is estimated to have at least 70-100 trillion cells. There are about 200 types of cells spread in 4 different types of tissues in the human body. These cells form the structures of the human body and act together to help it function. It is truly amazing that all these trillions of cells came from a single cell and now makes up our body. Isn't it amazing?

Cell just like our skin and the cake that we eat has layers or we can also call major parts. Their existence is very important in the normal functioning of the cell in general.

The table below summarizes the function of the major parts of the animal cell.

MAJOR PART	FUNCTION
	▪ It is the outermost layer in the animal cell. ▪ It keeps all the parts of the cell inside. ▪ It controls what enters and exits the cell such as water, nutrients and waste and thereby protects and supports the cell.
	▪ It is large and fluid-filled (called protoplasm) ▪ It fills up the space between the nucleus and the cell membrane. ▪ It is jelly-like substance compose of mainly water as well as dissolved nutrients ▪ It is where membrane-bound organelles are embedded.
	▪ It is located in the cytoplasm of the cell. ▪ It controls and regulates all cell activities. ▪ It is the control center of the cell and it contains the cell's DNA.

The Egg-Cell

Directions: The major parts of the animal cell can be illustrated using an egg. Label the egg below with the major parts of the cell. Refer to the tabulated data in the previous page. Use a separate sheet of paper to answer this.

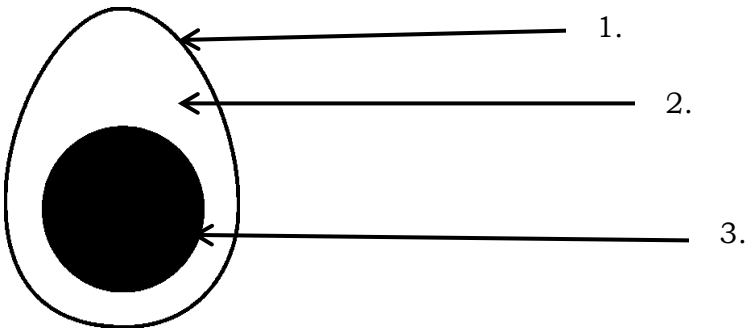


Figure 1 The Egg-Cell

Organelles are small structures inside the cell that carry specific function. They are membrane-bound and are embedded in the fluid-like substance located in the cell's cytoplasm.

Below is the animal cell diagram with the embedded organelles.

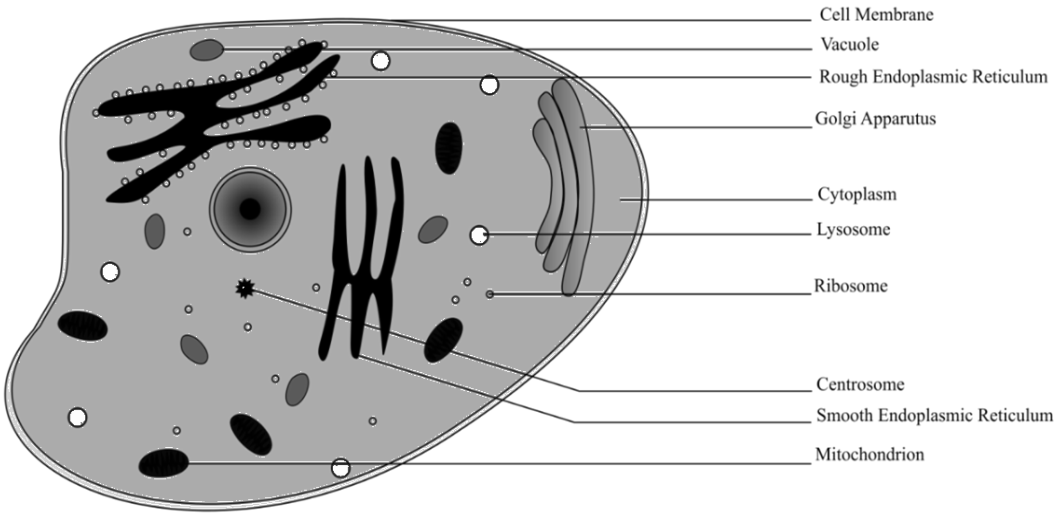


Figure 2. The Animal Cell

The organelles embedded in the cytoplasm of both animal and plants cells are almost the same but there are few distinct organelles that are unique in both of them.

Organelles Found Only in an Animal Cells

These organelles are found in animal cells but are not present in plant cells.

1. Centrosomes

It is a microtubule-organizing center found near the nuclei of animal cells. It contains a pair of centrioles. The centrosome replicates itself before a cell divides.

2. Lysosome

These are small, spherical organelles that contain digestive enzymes for proteins, fats, and carbohydrates. They transport undigested material to cell membrane for removal. Cell breaks down if lysosome explodes.

Organelles Found Only in Plant Cells

1. Chloroplasts

The chloroplasts contain the chlorophyl which capture light energy that drives the process photosynthesis

Organelles Found in Both Animal and Plant Cell

1. Endoplasmic reticulum

It is referred to as the "highway" of the cell that moves materials around to other parts. It serves as canal for substances. Its two kinds are:

a. smooth: without attached ribosomes
b. rough: with attached ribosomes

2. Golgi bodies

It is a set of flattened sacs that serves as the packaging and distribution center of the cell. It packages, stores, and secretes energy.

3. Mitochondria

It breaks down food and release energy to cell - the *"Powerhouse"* of the cell. It also produces energy through chemical reactions – breaking down fats and carbohydrates. It is most common in animals although present in plants in few numbers. The mitochondria produce ATP (adenosine triphosphate). The inner membrane is folded into cristae to increase surface area.

It has double membrane:

a. Cristae -inner folds
b. Matrix -fluid part

4. Ribosomes

Each cell contains thousands of ribosomes. They can either attach to the endoplasmic reticulum or free. It is made up of RNA and other protein. It main function is for synthesizing proteins.

5. Vesicles

They carry materials in and out of the cell. These include food particles needed by the cell and waste products secreted by the cell.

6. Peroxisomes

They absorb nutrients that cell has acquired. They digest fatty acids and play a role in the digestion of alcohol, cholesterol synthesis and digestion of amino acids.

7. Chromosomes

Located in the nucleus and is made up of DNA. Contain instructions for traits & characteristics.

8. Nucleolus

It is located inside the nucleus and contains RNA to build protein. It is surrounded by a fluid called nucleoplasm.

9. Vacuole

The vacuole stores food or nutrients a cell might need to survive. They may also store waste products, so the rest of the cell is protected from contamination. In plants, the central vacuole regulates the plant cell's concentration of water in changing environmental conditions.

What's More

Activity 1: The Organelle Tracker

Directions: Locate the 11 organelles present in an animal cell from the puzzle below. Copy and encircle your answer in a separate sheet of paper.

C	H	R	O	M	O	S	O	M	E	S	R
G	Y	S	E	E	X	T	X	Q	T	E	B
O	A	T	L	M	R	B	R	S	H	L	C
L	C	R	O	O	C	K	N	G	L	C	S
G	R	U	I	S	W	U	U	P	U	I	U
I	I	P	R	O	K	O	T	S	D	S	L
B	B	Q	T	S	R	E	J	U	S	E	O
O	O	N	N	Y	V	Y	L	T	I	V	E
D	S	L	E	L	S	V	K	E	O	U	L
I	O	D	C	U	J	M	S	B	T	Y	C
E	M	X	Y	Z	N	L	M	R	X	O	U
S	E	M	O	S	I	X	O	R	E	P	N
M	I	T	O	C	H	O	N	D	R	I	A

Activity 2: Mix and Match

Directions: Arrange the scrambled letters that correspond to an organelle located in an animal cell in Column A. Match the organelle with its appropriate function in Column B. Write your answer on a separate sheet of paper.

Column A	**Column B**
1. OSMESOBRI	A. Interior framework of animal cell
2. AIRDONCHOTMI	B. Cleans cell waste products
3. OSMELYOS	C. Inside the nucleus and contains DNA
4. ONDELPASICM UMLUCITER	D. Contains RNA to build proteins
5. SELICSEV	E. Packages, stores and secretes energy
6. OSMESIXOREP	F. Protein synthesis
7. SELOITRCEN	G. Moves materials around the cell
8. SULEOLUNC	H. Breaks down food and releases energy
9. ILGOG SIEBDO	I. Absorb nutrients and digest fatty acid
10. ONTLEKESTYCO	J. Functions during cell division
11. SOMESMOROCH	K. Carry materials in and out of the cell

Activity 3: Acro-name

Directions: Complete the CELL acronym with the learning that you have acquired from the lesson. Refer to the first word in each letter and follow through with your answer. Write your answer in a separate sheet of paper.

C : Contains _____
E : Enables _____
L : Located _____
L : Layered _____
S : Smallest _____

What I Have Learned

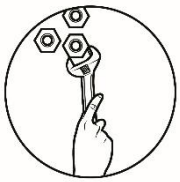
Directions: Read the paragraph carefully and identify the correct words that fit in the given sentences in the box below. Write your answer on a separate sheet of paper.

Robert Hooke	Cell Membrane	Cell
Cytoplasm	Nucleus	Organelles
Mitochondria	Cytoskeleton	Centriole
Endoplasmic	Reticulum	

(1)_____ is the smallest basic structural and functional unit of an organism. It was discovered by (2) _____ in 1665. In multicellular (many-celled) organisms like animals and plants it has major parts.

In an animal cell these are: (3)_____, that controls what enters and exits the cell such as water, nutrients and waste and thereby protects and supports the cell; (4) _____, which is a jelly-like substance compose of mainly water as well as dissolved nutrients and (5) _____, which controls and regulates all cell activities.

Embedded in the cytoplasm are small structures with specific functions for cell growth and development called the (6) _____. These are of different types and functions. (7) _____ produces energy through chemical reactions – breaking down fats & carbohydrates. (8) _____ provides interior framework for the animal cell. (9) _____ functions during cell division. (10)_____ moves materials around to other parts of the cell.



What I Can Do

Directions: Draw an animal cell and label its major parts and organelles present. Use a separate sheet of paper.

RUBRICS:

Criteria	Excellent (5)	Good (4)	Fair (3)	Poor (2)
Relevance to the Lesson	The illustration is relevant to the topic with all the basic parts are illustrated	The illustration is relevant to the lesson with most of the basic parts are illustrated	The illustration is relevant to the lesson with some of the basic parts are illustrated	The illustration is relevant to the lesson with few basic parts are illustrated
Complete ness of the Organelles Present	All of the organelles in an animal cell are present in the illustration.	Most of the organelles in an animal cell are present in the illustration.	Some of the organelles in an animal cell are present in the illustration.	Few of the organelles in an animal cell are present in the illustration.
Appropriate-ness	All of the organelles are appropriately labelled	Most of the organelles are appropriately labelled	Some of the organelles are appropriately labelled	Few of the organelles are appropriately labelled

Assessment

Directions: Read the questions carefully. Write your answer on a separate sheet of paper.

1. What is the term used to refer to the smallest basic structural and functional unit of an organism?

   A. Atom
   B. Cell
   C. Organ
   D. Tissue

2. Which of the basic parts of the animal cell functions like a classroom door with entrance and exit points to controls students from coming in and out of the room?

   A. Cell Membrane
   B. Cytoplasm
   C. Nucleus
   D. Protoplasm

3. What basic part of the animal cell has a similar function to the brain of the body which is helping to control eating, movement, and reproduction?

   A. Cell Membrane
   B. Cytoplasm
   C. Nucleolus
   D. Nucleus

4. How is the cell's cytoplasm similar to the kids' rubber swimming pool?

   A. It is the outermost layer of the cell.
   B. It keeps all of the parts of the cell inside.
   C. It is the control center of the cell and contains the cell's DNA.
   D. It is the largest part of the cell where organelles are embedded.

5. What is the function of the mitochondria?

   A. Synthesizes proteins.
   B. Transport of wastes out of the cell.
   C. Important in animal cell during cell division.
   D. Produces energy through chemical reactions by breaking down fats and carbohydrates.

6. Peroxisomes are important in the digestion of alcohol (ethanol), cholesterol synthesis and digestion of amino acids. Where in the human body can you locate cells with large number of peroxisomes?

   A. Brain
   B. Heart
   C. Kidney
   D. Liver

7. The DNA is the genetic material of an organism and contains instructions for traits and characteristics. Which organelle contains the DNA?

   A. Centriole
   B. Chromosome
   C. Cytoplasm
   D. Nucleolus

8. Endoplasmic reticulum (ER) is responsible for movement of materials around the cell. It functions like a highway or a canal. What type of ER has attached ribosomes?

   A. Long ER
   B. Short ER
   C. Rough ER
   D. Smooth ER

9. What organelle contains a fluid portion called the matrix?

   A. Lysosome
   B. Cytoskeleton
   C. Mitochondria
   D. Endoplasmic Reticulum

10. How does lysosomes' disruption affect the cell?

   A. It will make the cell healthier.
   B. It will cause the cell to break.
   C. It will cause the cell to shrink.
   D. It will enable the cell to proceed to cell division.

11. The cell has its own fence called cell membrane to guard its parts. Is it TRUE that nutrients and materials pass through the cell membrane and into the cell?

   A. Yes, because the cell membrane is fluid-filled.
   B. Yes, because the cell membrane is stiff and rigid.
   C. Yes, because the cell membrane is semi-permeable.
   D. Yes, because the cell membrane has embedded organelles.

12. The protoplasm is an aqueous material that fills the cell's cytoplasm. The mitochondria have the same material called matrix inside its surface area but unlike protoplasm this material is rather viscous. Why is mitochondrial matrix viscous?

   I. It is where mitochondrial DNA is located.
   II. It contains less water than the protoplasm.
   III. It is the site for citric acid cycle in aerobic respiration
   IV. It is the place inside the cell where organelles are embedded.

   A. I, II and III only
   B. I, II and IV only
   C. II, III and IV only
   D. I, II, III and IV

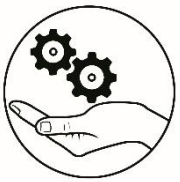
13. Animals and plants have mitochondria in their cells. Is it TRUE that animals have more mitochondria than plants?

   A. Yes, because animals are rigid and have less motion.
   B. Yes, because animals are always in motion than plants.
   C. Yes, because animals have a greater number of cells than plants.
   D. Yes, because animals have a smaller number of cells than plants.

14. A typical human cell contains 3000 to 5000 mitochondria. Cells that need more energy contain more mitochondria. Which of the following cells contains more mitochondria?

   A. Nerve cell
   B. Sperm cell
   C. Muscle cell
   D. Red blood cell

15. Which major organelle does red blood cell loses during its maturity?
   A. Cell Membrane
   B. Cytoplasm
   C. Nucleolus
   D. Nucleus



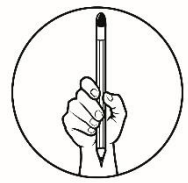
Additional Activities

Directions: Complete the name of the organelles by filling in the missing letter. Choose the letter that corresponds to the function of the organelle from the box. Write the letter of the correct answer in a separate sheet of paper. After you finish you will discover a word related to the current lesson.

A. Protein synthesis	G. Supports the shape of the cell
B. Functions during cell division	H. Contains RNA to build protein
C. Packaging and distribution	I. Absorbs nutrients, digest fatty acid
D. Energy source of the cell	J. Contains DNA
E. Waste removal in the cell	K. Deliver materials around
F. Carry materials in and out of the cell	

1. MITOCHONDRI__
2. CE__TRIOLES
3. R__BOSOMES
4. CHRO__OSOMES
5. ENDOPL__SMIC RETICULUM
6. __YSOSOMES
7. VESI__LES
8. P__ROXISOMES
9. CYTOSKE__ETON
10. GO__GI BODIES
11. NUCLEOLU__

Write the word here: ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ ___



What I Know

Directions: Read the questions carefully. Choose the letter of the correct answer from the questions below. Use a separate sheet of paper for your answers.

1. What is the shape of a plant cell?
   A. Hexagonal
   B. Oval
   C. Rectangular
   D. Spherical
2. How many major parts does a plant cell have?
   A. Five
   B. Nine
   C. Seven
   D. Three
3. Which of the major parts of the plant cell is responsible for photosynthesis?
   A. Cell wall
   B. Cytoplasm
   C. Chloroplast
   D. Cell membrane

4. How do vacuoles work?

   A. It carries materials in and out of the cell.
   B. It breaks down food and releases energy for the cell.
   C. It transports nutrients and other materials around the cell.
   D. It stores food, enzymes, and other materials needed by the cell.

5. What do we call the set of organelles that are double-membraned and are only found in plants?

   A. Lysosomes
   B. Mitochondria
   C. Peroxisomes
   D. Plastids

6. Where in the plant cell are organelles located?

   A. Nucleus
   B. Cell Wall
   C. Cytoplasm
   D. Cell Membrane

7. Willie is asked to investigate the different color of leaves. He found out that leaves have different colors from one another because of the different plastids present in plants? Is it TRUE that plastids are the reason why plant leaves have different colors?

   A. No, because cell wall makes the color of the leaves.
   B. No, because plants colors are made by the nucleus.
   C. Yes, because plants have one type of plastids that make its leaves have different appearance from one another.
   D. Yes, because plants have different type of plastids that make its leaves have different appearance from one another.

8. How does the plants' nucleus function?

   A. It is involved in the photosynthetic process.
   B. It gives additional support for the outer layer of the cell.
   C. It contains protoplasm where organelles are embedded.
   D. It is the control center of the cell and contains the cell's DNA.

9. Katie is asked to evaluate the different membranes of the cell. She found out that plant cell has both cell wall and cell membrane while animal cell has cell membrane only. Is the result of her investigation TRUE?

   A. No, because cell wall is present in plant and animal cell.
   B. No, because cell membrane is present in plants and animal cell.
   C. Yes, because this makes plants and animal different from one another.
   D. Yes, because plant cell has both cell wall and cell membrane and animal cell have cell membrane only that make it unique from one another.

10. Some root crops and most plant roots are non-pigmented. What type of plastid is present in these plant parts?

    A. Amyloplast
    B. Chlorophyll
    C. Chromoplast
    D. Leucoplast

11. The leaves of the plants are its food factory. What is the process of food-making undergone by plants?

    A. Cell division
    B. Decomposition
    C. Photosynthesis
    D. Protein synthesis

12. Plant cells have large vacuoles. What do you think is the reason why plants have large vacuoles?

    A. Vacuoles are the storage site for food, enzymes and other materials.
    B. Vacuoles are responsible for the transport of nutrients around the cell.
    C. Vacuoles are essential in carrying material inside and outside of the cell.
    D. Vacuoles package and export proteins and materials to another organelles.

13. What organelle in plants causes tomatoes turning red when ripe and bell peppers turning yellow from green?

    A. Amyloplast
    B. Chloroplast
    C. Chromoplast
    D. Leucoplast

14. Unlike animal cells, plant cells have an additional external protective layer called cell wall. Why do plant cells have this additional layer?

    A. For filtering nutrients and waste materials.
    B. For protection and structural support of the cell.
    C. For capturing solar energy needed for photosynthesis.
    D. For storing food and nutrients as products of photosynthesis.

15. Where does photosynthesis occur in plants?

    A. In the roots
    B. In the fruits
    C. In the leaves
    D. In the flowers

Lesson 2 Plant Cell

What's In

Animals and plants are direct complementary to each other. We take in oxygen as a product of plants' transpiration and they take in carbon dioxide as by-product of our respiration. If us humans have the animal cell, what about the plants around us? Do they also have cells? How do their cells look like? Are there any similarities or differences between the two?

For this lesson, we will enter the minute world of the plant cell. We will identify its major parts, organelles present and compare it with that of the animal cell.

Plant-astic

Directions: Plants are our complementary. For this activity, you are going to choose a plant of any kind which you think have been very useful for you, your family or your community. Draw it in the space provided below and include a brief description of its usage and importance. Use a separate sheet of paper.

RUBRICS:

Criteria	Outstanding (5)	Satisfactory (4)	Poor (3)
Content	The description of the plant's usage and importance is clearly stated.	The description of the plant's usage and importance is somehow stated.	The description of the plant's usage and importance is not clearly stated.
Relevance	The description of the plant's usage and importance is completely relevant to the illustration.	The description of the plant's usage and importance is somehow relevant to the illustration	The description of the plant's usage and importance is not clearly relevant to the illustration
Neatness and clarity	All parts of the output /illustration are neat, clean and clear.	Some parts of the output /illustration are neat, clean and clear.	Few parts of the output /illustration are neat, clean and clear.

What's New

It is indeed very natural that in our daily life we can encounter a certain kind of plant, whether it's a flower for your altar at home, eggplant for your breakfast or a cactus for your table top. What do you think will happen if plants will perish or be extinct? Read the poem below as introduction to our lesson on the plant cell.

The Flora Cellula

Myrna V. Deniega

All around are plants we see,
From tree to grass, fruit to veggie;
All of these are of value to humanity.

Like me and you,
Plants are made of cells, too;
They're bigger and fast to grow.

Plant cells are unique and great,
They're rectangular in shape;
Compared to animals that looks like a plate.

The outer layer is called the cell wall
This is stiff and rigid like a coal;
It keeps its shape and the inside organelles not to fall.

The chloroplast gets light from the sun,
Capturing energy for photosynthesis to run;
To make food available for everyone.

Chlorophyll makes the chloroplast green,
A pigment needed for photosynthesis to happen;
Starch, water and oxygen as products at the end.

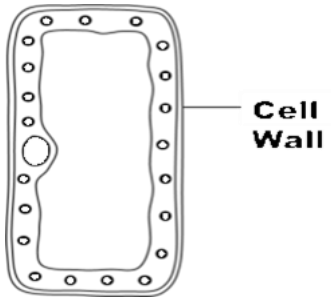
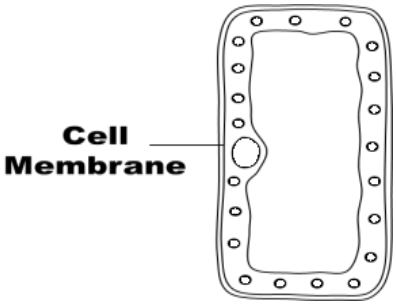
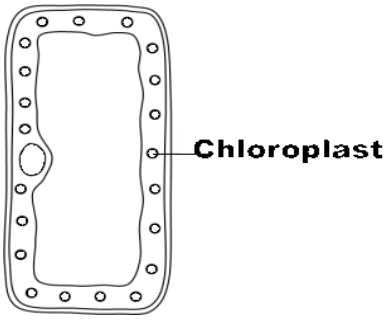
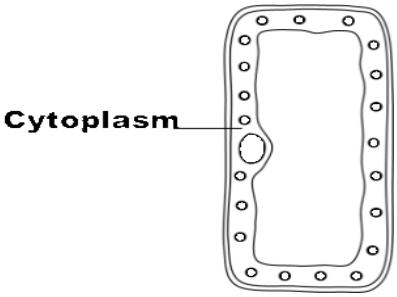
Chromoplast gives fruit and flower,
Its distinct yellow and red color;
Leucoplast is where starch and oil are in store.

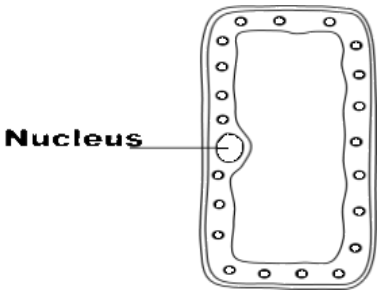
Vacuoles is a membrane-bound sac,
Where food and nutrients in the cell is stack;
The Flora Cellula is small but comes in a pack.

What is It

Plants play an important role in the sustainability of our ecosystem. Plants that produce grains, fruits and edible leaves and parts are our basic food; we use some of them for medicinal and aesthetic purposes. Plants are mainly multicellular (many-celled). They belong to Kingdom Plantae and are predominantly photosynthetic (they can make their own food). Therefore, we must study plants at the cellular level.

The table below summarizes the function of the major parts of a plant cell.

MAJOR PART	FUNCTION
	▪ Found in plant cells but not in animal cells. ▪ The outermost layer in the plant cell. ▪ It is stiff and rigid and helps a plant keep its shape. ▪ Allow materials like water and nutrients; waste, oxygen and carbon dioxide to pass to and from the cell membrane.
	▪ It is the second layer in the plant cell. ▪ It keeps all the parts of the cell inside. ▪ It is semi-permeable and controls what enters and exits the cell such as water, nutrients and waste and thereby protects and supports the cell.
	▪ It is only found in plant cells. They are responsible for photosynthesis. ▪ It is color green because of the pigment called chlorophyll. ▪ Every green plant you see is working to convert the energy from the sun into sugars during the process of photosynthesis. ▪ Plants are the basis of all life on Earth. They make sugars, and the by-product of photosynthesis is the oxygen that we breathe.
	▪ It is large and fluid-filled *(called protoplasm)* ▪ It fills up the space between the nucleus and the cell membrane. ▪ It is jelly-like substance compose of mainly water as well as dissolved nutrients ▪ It is where membrane-bound organelles are embedded.

	▪ It is located in the cytoplasm of the cell. ▪ It controls and regulates all cell activities. ▪ It is the control center of the cell and it contains the cell's DNA.

Directions: The major parts of the plant cell can be illustrated using a slice of lemon. Label the lemon below with the major parts of the plant cell. Refer to the tabulated data above. Write your answer on a separate sheet of paper.

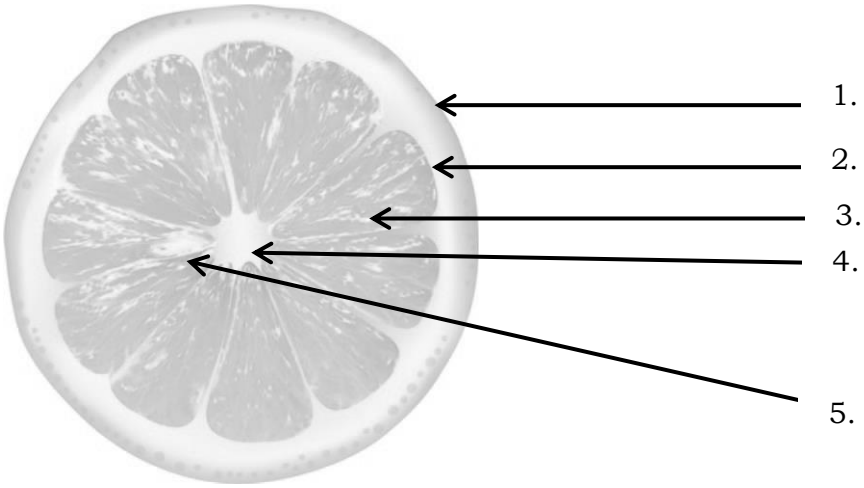


Figure 1 Lemon-Made

Trivia time!
There are about 320,000 species of plants on Earth. Most of the species are located in tropical rainforest like our country, the Philippines. Aren't we lucky?
Below is the plant cell diagram with the embedded organelles

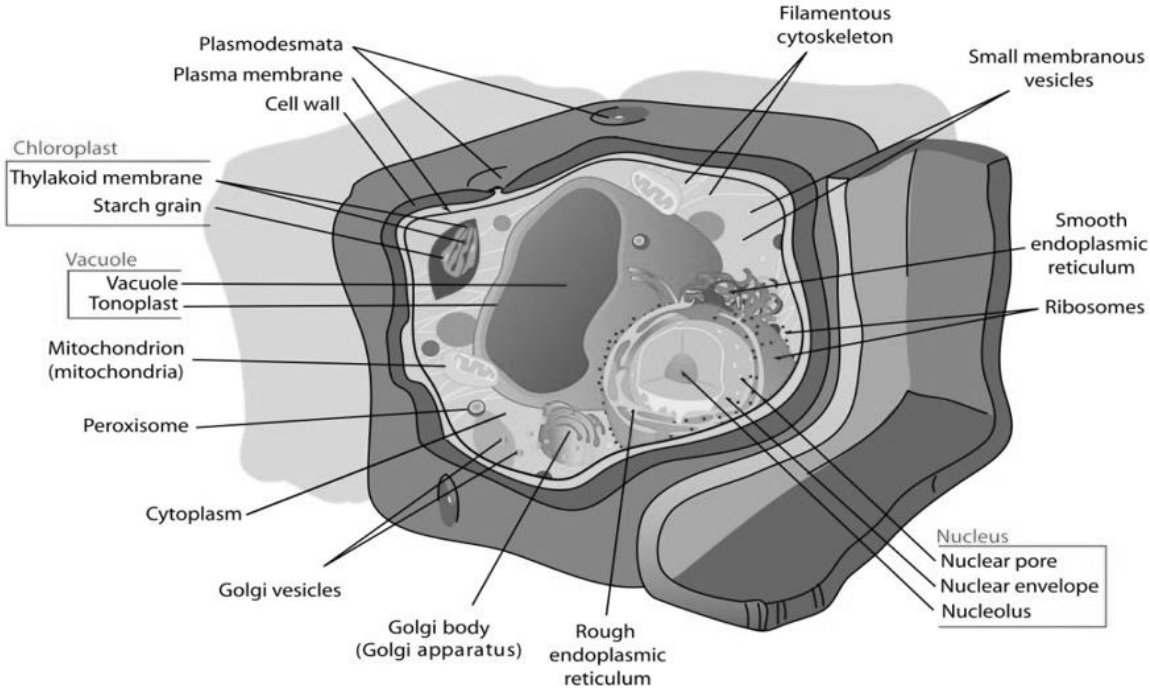


Figure 2 Plant Cell

The organelles embedded in the cytoplasm of both plants and animal cells are almost the same but there are few distinct organelles that are unique and is only found in plant cell.

Plant cell organelles (Only found in plant cells)

1. Plastids

These are double-membraned organelles found mainly in plants.

Types:

a. Chloroplasts: it contains the green pigment chlorophyll which enables the plants to undergo the process of photosynthesis.

b. Chromoplasts: gives yellow, orange and red color to fruits and flowers.

c. Leucoplasts: are non-pigmented, located in roots, it stores carbohydrates, proteins and fats.

2. Vacuoles

It stores food, enzymes, and other materials needed by the cell. Some vacuoles store waste products. Plant cells contain large vacuoles, called central vacuoles that contain liquid called cell sap. The cell sap is made up of water, dissolved sugars, mineral salts and amino acids.

Remember: The organelles that can be found in both plant and animals cells are already presented in lesson 1.

What's More

Plant Cell Analogy

Directions: Complete the missing analogy for a pair of words in each item. Write your answer on a separate sheet of paper.

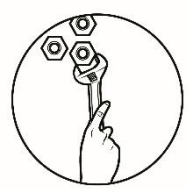
1.	Cell wall	:	stiff and rigid
	Cell membrane	:	_____
2.	Non-pigmented	:	Leucoplast
	_____	:	Chromoplast
3.	Chloroplast	:	_____
	Vacuole	:	Cell Sap
4.	_____	:	Plant Cell
	Spherical	:	Animal Cell
5.	Cytoplasm	:	Compose mainly of water and dissolved nutrients
	Nucleus	:	_____

What I Have Learned

Directions: Read the paragraph carefully and identify the correct words that will complete the sentences. Choose your answers from the words inside the box. Write your answer in a separate sheet of paper.

Rectangular	Cytoplasm	Non-Pigmented	Vacuoles
Cell sap	Chromoplasts	Cell membrane	Cell wall
Plant cells	Central vacuoles	Chloroplasts	Nucleus
Semi-permeable	Photosynthesis	Chlorophyll	Bigger
			Five

(1) _____ are (2) _____ in shape and are (3) _____ than animal cells. It has (4) _____ major parts, these are the: (5)_____, the outermost layer and is stiff and rigid to help plants keep its shape;
(6) _____, the second layer and is (7)_____ and controls what enters and exits the cell such as water, nutrients and waste; (8) _____, it is responsible for (9) _____ and is green in color due to the presence of the pigment called (10) _____; (11)_____, large and fluid-filled where membrane-bound organelles are embedded and (12) _____, that controls and regulates all cellular activities. These cells have organelles present only to them. (13)_____ gives fruits and flowers there yellow orange and red color. Leucoplasts are (14) _____ and found in roots. (15) _____, stores food, enzymes, and other materials needed by the cell. Large vacuoles called (16) _____ contains (17) _____ that is made up of water, dissolved sugars, mineral salts and amino acids.



What I Can Do

Directions: Draw a plant cell and label its major parts and organelles present. Use a separate sheet of paper.

RUBRICS:

Criteria	Excellent (5)	Good (4)	Fair (3)	Poor (2)
Relevance to the Lesson	The illustration is relevant to the topic with all the basic parts are illustrated	The illustration is relevant to the lesson with most of the basic parts are illustrated	The illustration is relevant to the lesson with some of the basic parts are illustrated	The illustration is relevant to the lesson with few basic parts are illustrated
Complete ness of the Organelles Present	All of the organelles in an animal cell are present in the illustration.	Most of the organelles in an animal cell are present in the illustration.	Some of the organelles in an animal cell are present in the illustration.	Few of the organelles in an animal cell are present in the illustration.
Appropriate-ness	All of the organelles are appropriately labelled	Most of the organelles are appropriately labelled	Some of the organelles are appropriately labelled	Few of the organelles are appropriately labelled

Assessment

Directions: Read the questions carefully. Write your answer on a separate sheet of paper.

1. Which of the following are present in plant cell and are absent in animal cell?

   A. Cell Wall and Chloroplast
   B. Lysosomes and Ribosomes
   C. Golgi Bodies and Mitochondria
   D. Cell Membrane and Cytoplasm

2. How do the major parts or layers of the plant cell and animal cell differ?

   A. Plant cells and animal cell have both four major parts.
   B. Plant cells have six major parts while animal cells have four.
   C. Plants cell have three major parts while animal cells have five.
   D. Plants cells have five major parts while animal cells have three.

3. What is photosynthesis?

   A. It is the ability of plant cells to reproduce.
   B. It is the capability of plant cells to undergo cell division.
   C. It is the process of the plants cells to make their own food.
   D. It is the capacity of plant cells to have additional support and protection.

4. What are the end products of photosynthesis?

   A. Starch, water and fats
   B. Fats, water and nitrogen
   C. Sugar, water and oxygen
   D. Water, energy and carbon dioxide

5. Which of the following is the external stiff and rigid additional support for plant cell that cannot be found in animal cell?

   A. Cell Wall
   B. Chromoplast
   C. Plastid
   D. Vacuole

6. What fluid is located inside the central vacuoles?

   A. Water
   B. Cell sap
   C. Protoplasm
   D. Nucleoplasm

7. Papayas, tangerines, sunflower and yellow bells are yellow and orange. What kind of plastid is causing their fruits and flowers with these colors?

   A. Amyloplast
   B. Chloroplast
   C. Chromoplast
   D. Leucoplast

8. What kind of plastid is located in the roots and other non-pigmented parts of plants that stores starch, carbohydrates, proteins and fats?

A. Amyloplast
B. Chloroplast
C. Chromoplast
D. Leucoplast

9. Which of the following in general is true for plants in terms of the number of mitochondria present in its cells?

A. Plant cells have less mitochondria than animal cell.
B. Plant cell have more mitochondria than animal cell.
C. Plant cells and animal cells have the same number of mitochondria.
D. Plant cells and animals cells number of mitochondria depends on the cell's size.

10. What do you think is most likely to happen if plants do not have cell wall and chloroplast?

A. Plant cells will undergo cell division and reproduce.
B. Plant cells will shrink in size and will be non-pigmented.
C. Plant cells will be more protected and can do photosynthesis.
D. Plant cells will be easily damaged and cannot do photosynthesis.

11. Which of the following best describes a plant cell?

I. It has a cell wall and a chloroplast. II. It undergoes photosynthesis. III. It has a lot of mitochondria. IV. It has large vacuoles for storage.

A. I, II, and IV only
B. I, II and III only
C. II, III and IV only
D. I, II, III and IV

12. Which part of a mitochondrion is an adaptation that increases the surface area and enhances its ability to produce ATP?

A. Cristae
B. Matrix
C. Stroma
D. Intermembrane space

13. The process of photosynthesis always begins with the energy from the light (solar energy) is absorbed by proteins that contains green chlorophyll pigments. Is it TRUE that photosynthesis is important process in plants?

A. No, because it is just a process of surviving.
B. No, because it is just a natural-occurring process.
C. Yes, because it aids in plant growth and reproduction.
D. Yes, because it is the process in which plants make their own food and energy.

14. Animals and plants coexist in a natural occurrence cycle in nature. During this process animal releases CO_2 to the atmosphere and is being utilized by plants as requirement for photosynthesis. What by-product of photosynthesis is being utilized by animals as counterpart to this cycle?

A. Carbohydrates
B. Oxygen
C. Sugar
D. Water

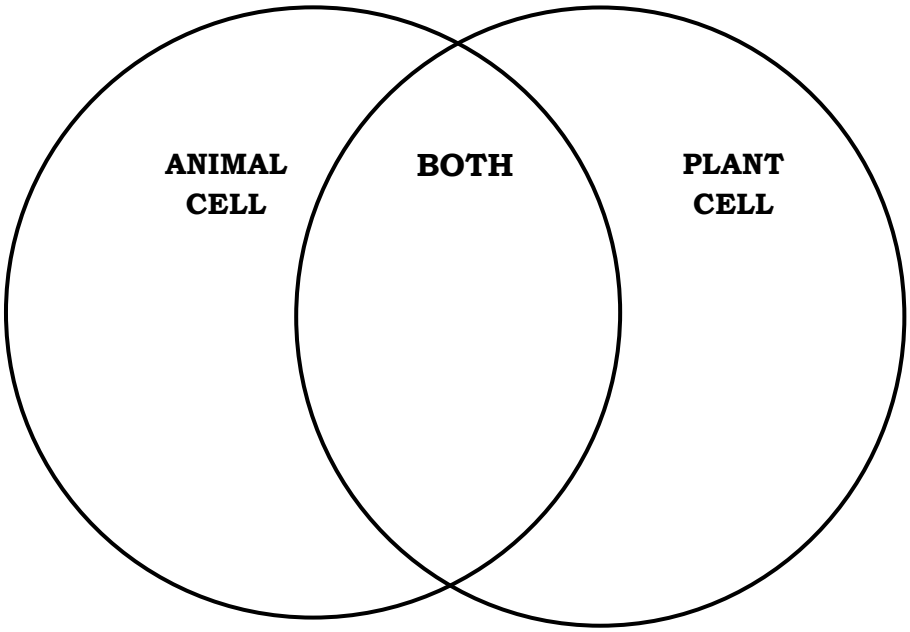
15. Plant cell are larger than animal cells in size. Is the previous statement about the cell size TRUE?

A. No, because plants and animal cell have the same size.
B. No, because plants and animal cell have the same parts.
C. Yes, because plants have larger central vacuole that functions as storage.
D. Yes, because plant cell is rectangular in shape and animals are spherical that makes it different.

Additional Activities

Directions: To compare and differentiate the animal and plant cell base on the presence and absence of certain organelles. Fill in the corresponding organelles in the Venn diagram. Use another sheet of paper for your answer.

The Venn D. Machine



Answer Key

Lesson 1: Animal Cell

What I Can Do

Draw and label an animal cell. Make sure to identify the organelles present in animal cell by labelling it with its name.

Student's Output: Animal Cell Illustration

What I Have Learned

1. Cell
2. Robert Hooke
3. Cell Membrane
4. Cytoplasm
5. Nucleus
6. Organelles
7. Mitochondria
8. Cytoskeleton
9. Centriole
10. Endoplasmic Reticulum

What's More

Activity 2
Mix and Match

1. RIBOSOMES: F
2. MITOCHONDRIA: H
3. LYSOSOMES: B
4. ENDOPLASMIC RETICULUM: G
5. VESICLES: K
6. PEROXISOMES: I
7. CENTRIOLES: J
8. NUCLEOLUS: D
9. GOLGI BODIES: E
10. CYTOSKELETON: A
11. CHOROSOMES: C

What's More Activity 3: Acro-name

C	Contains membrane-bound organelles
E	Enables the body to function properly
L	Located within the different body part
L	Layered into 3 major layers: cell membrane, cytoplasm and nucleus
S	Smallest basic structural and functional unit of an organism

What's More

Activity 1
The Organelle Tracker

1. CHROMOSOMES
2. GOLGI BODIES
3. MITOCHONDRIA
4. RIBOSOMES
5. PEROXISOMES
6. LYSOSOMES
7. VESICLES
8. CYTOSKELETON
9. CENTRIOLE
10. NUCLEOLUS
11. ROUGH ER

What Is It

1. Cell Membrane
2. Cytoplasm
3. Nucleus

What's In

Community Worker	Animal Cell Organelle
Garbage Collector	Lysosome
Delivery Man/Courier	Endoplasmic Reticulum
Factory Worker	Golgi Body
Electrical Line Man	Mitochondrion
Milk Man	Ribosome

What's New

1. C
2. E
3. B
4. A
5. D

What I Know

1. D
2. C
3. D
4. D
5. D
6. D
7. B
8. D
9. A
10. B
11. B
12. A
13. C
14. D
15. C

Additional Activities
The Venn D. Machine

Organelles Located In Animal Cell Only	Organelles Located In Both	Organelles Located In Plant Cell Only
Centriole	Endoplasmic Reticulum	Cell Wall
Cytoskeleton	Vesicles, Nucleolus	Chromoplasts
Lysosome	Ribosomes, Mitochondria	Leucoplast
	Golgi Bodies	Chloroplasts
	Peroxisomes	Vacuoles

Assessment

1. A
2. D
3. C
4. C
5. A
6. B
7. C
8. D
9. A
10. D
11. A
12. D
13. D
14. B
15. D

What I Can Do

Draw and label a plant cell.

Students Output:
Plant Cell Illustration

What's More
Plant Cell Analogy

1. Semi-permeable
2. Yellow, Orange, Red
3. Chlorophyll
4. Rectangular
5. DNA and RNA

What Is In

Plan-tastic

Students answer may vary. Refer to the given rubrics as guide.

What Is It

Lemon-made

1. Cell Wall
2. Cell Membrane
3. Cytoplasm
4. Nucleus
5. Chloroplast

What I Know

1. C
2. A
3. C
4. D
5. D
6. C
7. D
8. D
9. D
10. D
11. C
12. A
13. C
14. B
15. C

Lesson 2: Plant Cell

Additional Activities

1. MITOCHONDRIA: D
2. CENTRIOLES: B
3. RIBOSOMES: A
4. CHROMOSOMES: J
5. ENDOPLASMIC RETICULUM: K
6. LYSOSOMES: E
7. VESICLES: F
8. PEROXISOMES: I
9. CYTOSKELETON: G
10. GOLGI BODIES: C
11. NUCLEOLUS: H

ANIMAL CELLS

Assessment

1. B
2. A
3. D
4. D
5. D
6. D
7. D
8. C
9. C
10. B
11. C
12. A
13. B
14. C
15. D

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