Republic of the Philippines
Department of Education

SENIOR HIGH SCHOOL

LIFE SCIENCE WORKSHEETS

PREFACE

Part of a teacher's duties and responsibilities is catering the welfare of students learning process. A teacher must know when to make learning fun, effective and easy to grasp by the learners. As a Science teacher it is sometimes difficult to make learning effective specially in competencies that have critical content, some competencies are untaught or skipped if the teacher is not able to deliver the lesson or the science concept very well. Effective and efficient teaching comes from effective learning approach and learning strategies embedded in the lesson.

To provide students an opportunity to enhance their learning capability and mastery in Science concepts and skills this Life Science Worksheets in Critical Content is a learning materials that will help learners to easily understand and master science skills and concepts in Senior High School.

THE AUTHOR

TABLE OF CONTENTS

Worksheet No. 1

INTRODUCTION TO LIFE

OBJECTIVE: Understand and explain theories and organization of the existence of life. (Learning Competency S11/12LT-IIa-1)

TASK 1. MATCHING TYPE. Match the characteristics of life in column A to the given situation in column B

Column A	Column B
_____1. Levels of organization _____2. Evolution and adaptability _____3. Body Regulation _____4. Utilization of Energy _____5. Growth and Maturity _____6. Environmental interaction _____7. Multiple Reproduction _____8. Organisms diversity	A. The interaction between biotic and abiotic factors in the ecosystem. B. The development of a child from childhood to adulthood C. Plants make their own food through photosynthesis D. Increase in the population size of a grasshopper E. The interaction of different species in an aquatic ecosystem. F. A single cell multiplied to become an organism. G. The change in the skin color of a gecko lizard to complement to its environment. H. A human being with 37 degrees' Celsius body temperature

TASK 2. Complete the table below by filling out the proponents of the different theories of life and briefly describe each.

THEORY	PROPONENT	DESCRIPTION
a. Theory of special creation		
b. Cosmozoic theory		

c. Theory of spontaneous generation or ‘Abiogenesis’		
d. Biogenesis Theory		
e. Oparin’s Theory		
f. Coacervation Theory & J.B.S Haldane’s Hypothesis		
g. Urey-Miller hypothesis		

h. Fossils (evidence of past life, significance and important fossils)		
i. Geologic time scale (emergence of life forms)		

Worksheet No. 2

CELL PARTS AND FUNCTIONS

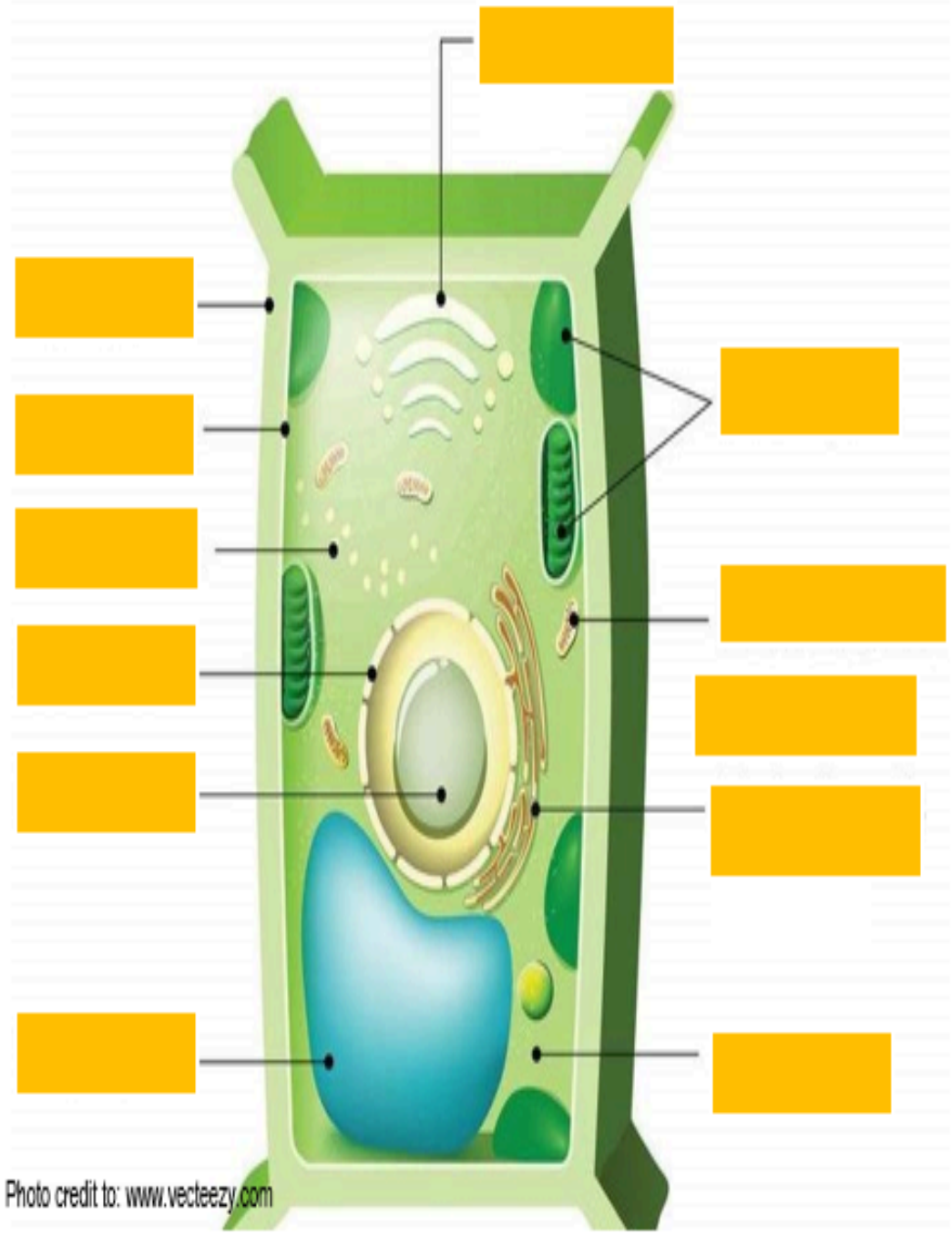
OBJECTIVE: Identify organelles in plant and animal cell, explain the function of each organelle in molecular level and distinguish organelles found only in plant cell. (Learning Competency S11/12LT-IIbd-4)

TASK 1. TEXT READING

Cell is the basic unit of life where growth and development of an organism serves as its own essential function. There are two types of cell Prokaryotic and Eukaryotic. A type of cell that has no nuclear membrane and no nucleus, and it exists among microorganisms like bacteria and viruses is a Prokaryotic. A type of cell that has complex parts and there is the presence of Nucleus and Nucleolus is a Eukaryotic. Animals and plants have Eukaryotic cell, there are organelles found inside the cytoplasm of a Eukaryotic cell these are cell membrane, mitochondria, lysosome, ribosome, vacuole, Golgi body, smooth and rough endoplasmic reticulum, nucleus, nucleolus, microtubule, chloroplast.

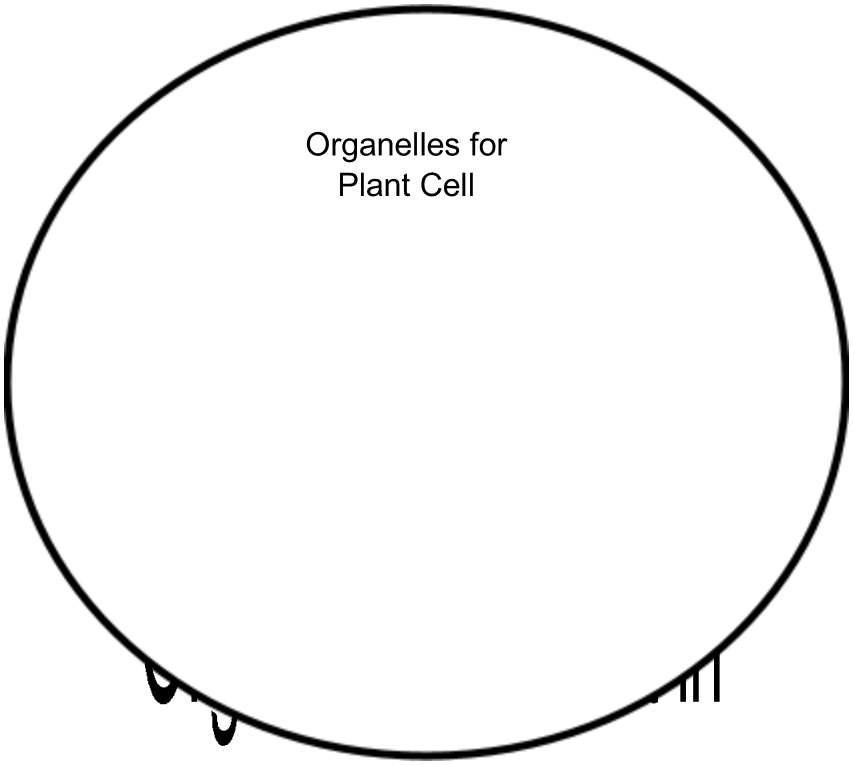
TASK 2. LABELING THE ILLUSTRATION

PLANT CELL

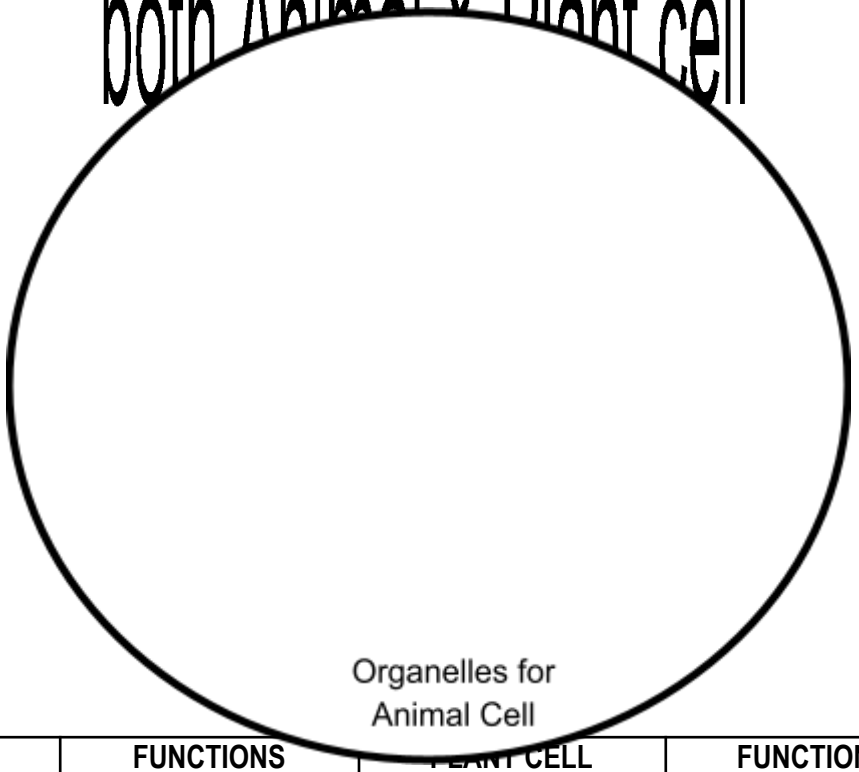


ANIMAL CELL ANATOMY

TASK 3. COMPARE AND CONTRAST: Using a Venn diagram compare what organelles are present in Plant cell and in Animal cell, identify which organelles are found in both Plant and Animal cells.



both Animal & Plant cell



ANIMAL CELL ORGANELLES	FUNCTIONS	PLANT CELL ORGANELLES	FUNCTIONS

TASK 4. ORGANELLES AND ITS FUNCTIONS: List the organelles in Animal cell and Plant cell and describe the function of each.

TASK 5. EXPLORE. Conduct the Red Blood Cell activity

I. Objective

At the end of the activity, students should be able to:

1. Observe actual red blood cells under the microscope.

II. Materials

3 pcs. Glass slides

3 pcs. Cover slip

1 wash bottle with isotonic solution

1 wash bottle with liquid soap

1 lab tray

1 sponge

2 blood lancet

1 compound microscope

III. Procedures:

1. Clean the tip of the middle finger using the cotton ball that was soaked in the alcohol.
2. Massage the middle finger then prick it using the blood lancet.
3. Apply a little pressure on the middle finger to allow blood flow.
4. Hold the middle finger and place the glass slide on the tip and allow the blood to drop on the glass slide
5. Using another glass slide do the smearing technique by sliding it on the drop blood and add 1 drop of water on top and cover it with the cover slip.
6. Place the specimen under the microscope for observation.
7. Observe and take note of your observation.

IV. Post Activity Questions:

1. What have you seen under the microscope? _____
2. Are the red blood cells moving? Why? _____
3. Describe what you see under the microscope. _____

Worksheet No. 3

ENERGY AND PHOTOSYNTHESIS

OBJECTIVE: Explain how energies are utilized by photosynthetic organisms. (Learning Competency S11/12LT- IIbd-5)

TASK 1. VOCABULARY BUILDING. Choose the correct term from the box to complete each statement

Kinetic	Potential	Ionization	Thermal
Mechanical			
Energy	Sonic	Nuclear	Chemical
Electromagnetic			

1._____ gives an organism its ability to do work.

2._____ energy is an energy that is produced from the movement of an object.

3._____ energy is an energy that refers to the temperature within a system.

4. _____energy is the energy processed from reactions in the atomic nuclei of an atom.

5. _____energy is produced after chemical reactions between molecules of matter.

6. _____energy is an energy that comes from electromagnetic waves.

7. _____energy is the energy produced through sound waves.

8. _____energy is energy of a body that is in motion.

9. _____energy is an energy found in objects that are at rest in position.

10. _____is a form of energy that is present in electrons attraction to the nucleus of an atom.

TASK 2. CHEMICAL EQUATION. Analyze the given chemical equation about the process of photosynthesis and answer the given guide questions.

$$6H_2O + 6CO_2 \text{ ----------> } C_6H_{12}O_6 + 6O_2$$

REMEMBER THIS!

Laws of Thermodynamics

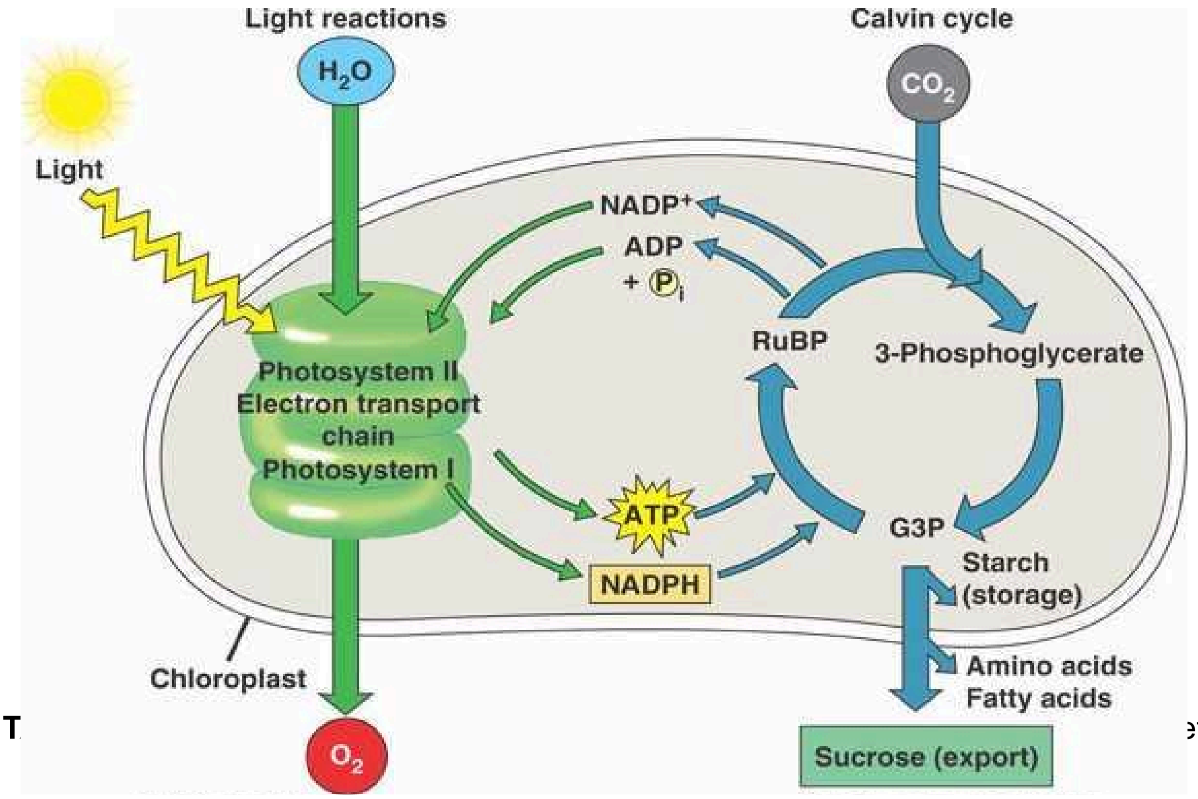
- Energy cannot be created or destroyed but it can transfer from one form to another.

Photosynthesis is the process by which plant and plant like organisms make use of the light energy from sunlight to produce glucose for cellular respiration.

Guide Questions:

1. What are the reactants in the given chemical equation?
2. What are the products?
3. Infer what is the given chemical equation all about and describe how products are formed?

TASK 3. DIAGRAM ANALYSIS. Analyze the given diagram about light and dark reaction during the process of photosynthesis.



LIGHT REACTION	DARK REACTION

TASK 5. EXPLORE. Conduct the application of photosynthesis by planting mongo seeds and exposing them through different areas.

Procedures:

1. Prepare twelve (12) plastic cups, make three sets and labelled as A, B, C, D.
2. Fill the cup with tap soil and implant the 10 mongo seeds in each cup.
3. Place the first set of the labelled cups in the shady area, the second set, inside the classroom, and the last set in the dark room.

SHADY AREA	OBSERVATION (Height of the Plant)	INSIDE A CLASS ROOM	OBSERVATION (Height of the Plant)	DARK ROOM	OBSERVATION (Height of the Plant)
Cup A		Cup A		Cup A	
Cup B		Cup B		Cup B	
Cup C		Cup C		Cup C	
Cup D		Cup D		Cup D	

Guide Questions:

1. In which area do Mongo seeds grow best? Why?

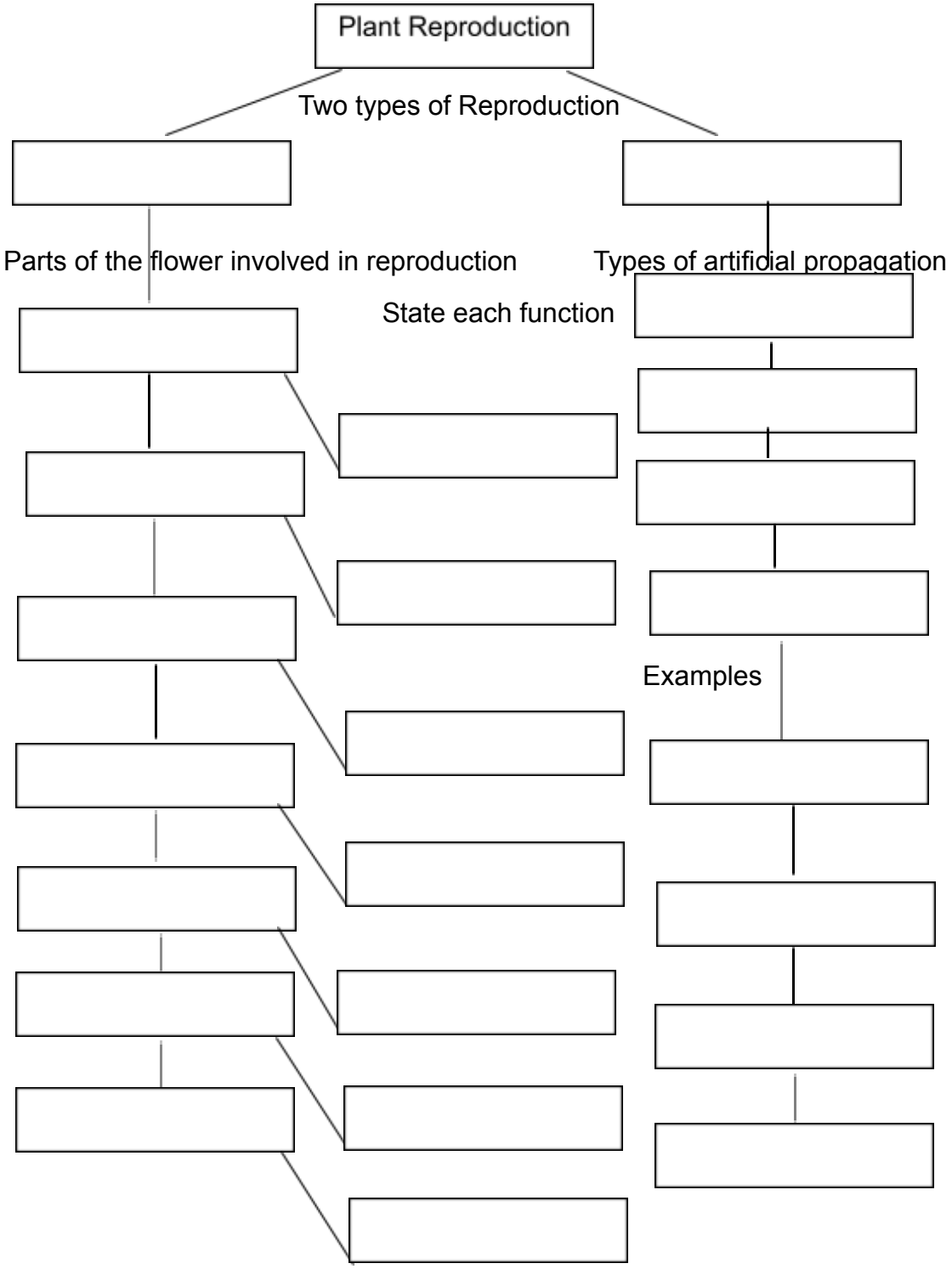
2. In which area do Mongo seeds less likely to grow well? Why?

Worksheet No. 4

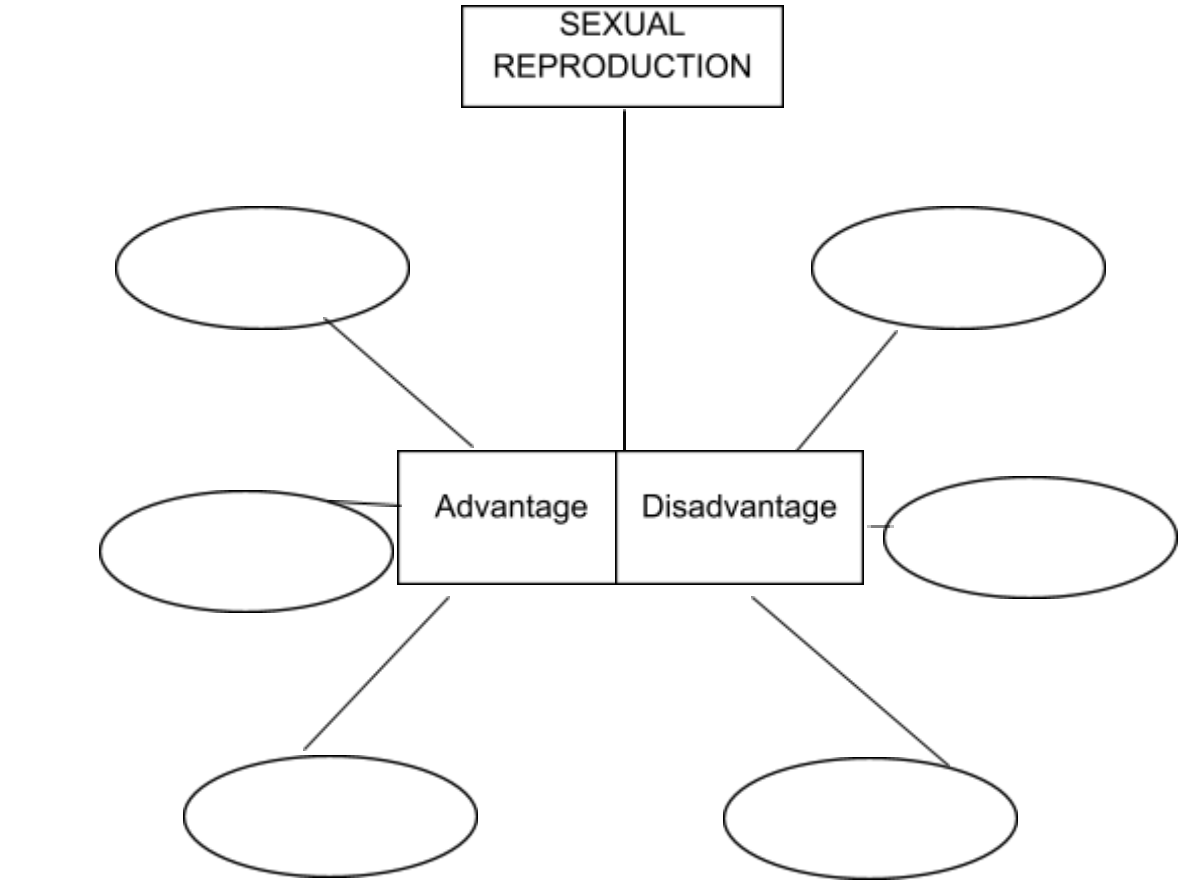
REPRODUCTION IN PLANTS

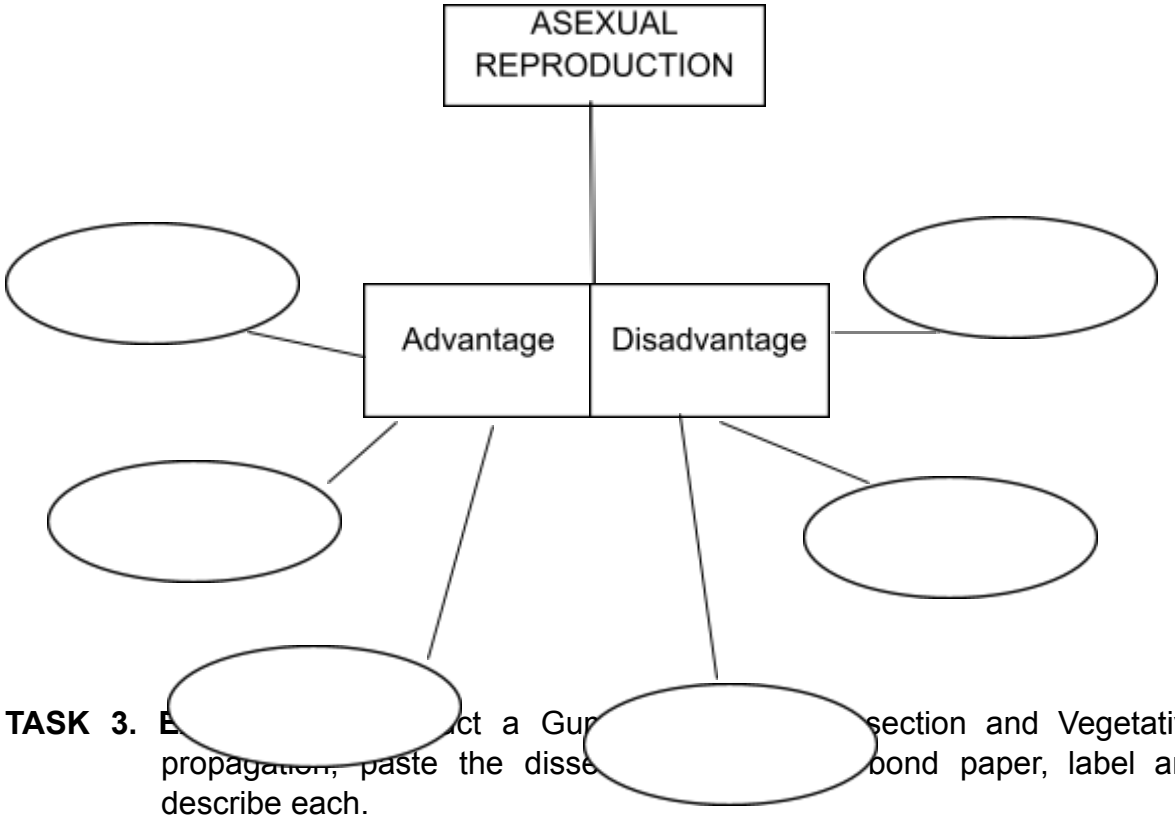
OBJECTIVE: Describe how plants undergo reproduction, state the importance of plant structures in reproduction process. (Learning Competency S11/12LT-IIej-13)

TASK 1. CONCEPT MAPPING. Complete the given concept map about Plant reproduction



TASK 2. CONCEPT WEB. Differentiate the advantages and disadvantages of Sexual and Asexual reproduction.





TASK 3. Ect a Gu section and Vegetative propagation, paste the disse bond paper, label and describe each.

Flower Dissection

Materials:

Flower, forceps, tape

Procedures:

1. Gather all the needed materials, locate and remove each structure using forceps.
2. Paste each structure on a piece of bond paper, label and describe it.

Vegetative Propagation

Materials

Pots, Soil, Onion bulbs

Procedures:

1. Using plastic cups as pots, fill in half of it with soil, plant the bulbs half in soil, with the root-side into the soil.
2. Water the bulbs generously.
3. Over the next several days/weeks, green leaves will start to emerge.
4. Note down your observation and describe the process.

TASK 4. INTERPRET. Study the given life cycle of a bean plant, in the box below make an analogy diagram and describe each stage in the life cycle.

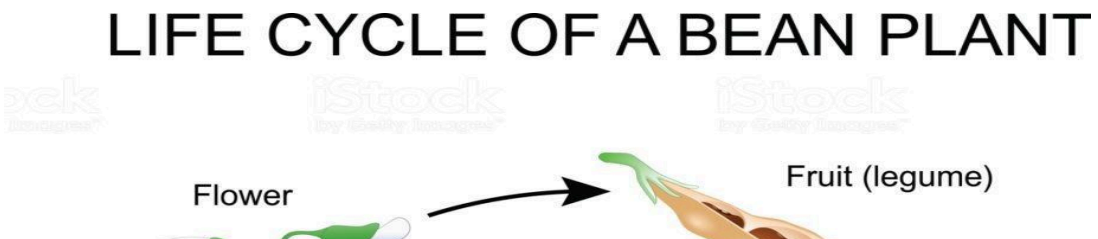


Photo credit to: garden.lovetoknowy.com/ttsz/iStock/GettyImagesPlus

Write It Here:

Worksheet No. 5

Extraction of DNA from Cheek Cells

I. OBJECTIVE:

At the end of the activity learners should be able to extract and observe DNA from cheek cells. *(Learning Competency S11/12LT-IIej-16)*

II. MATERIALS:

Salt
Water
Liquid detergent
Isopropyl Alcohol
Graduated cylinder
Beaker
Stirring rod
Magnetic mixer
Test tube (large)
Dropper/Plastic spoon/Scissor
Cork/Paper tape
Zip Lock plastic bag
Plastic cups

III. PROCEDURES:

1. Get the materials and chemicals in making salt solution. Make the 0.9 percent salt solution by dissolving 2 teaspoons of table salt (NaCl) in 1 liter of water then stir and set aside.

What happened when you mix Sodium chloride (NaCl) to water (H2O)
Answer:

2. Get the materials in making liquid detergent solution and mix 5 mL of liquid detergent in 15 ml of water (H2O) and set aside.

Observation:	**YES**	**NO**

The liquid detergent is fully dissolved in water.		
Formation of bubbles is evident in detergent solution.		

3. Give one test tube for each member and pour 10 ml of salt solution in beaker/plastic cups. Each student gargles the salt water for 1 minute and spit it back to the labelled beaker/plastic cups. (Note: do not swallow)
4. Measure 5 ml liquid detergent solution and pour it to the gargled salt solution in the labelled beaker/plastic cup.
5. Measure and pour slowly the 5 ml of liquid detergent solution in the gargled salt solution. Slowly hold the beaker back and forth to mix the salt water solution and the liquid detergent solution.

Observation:	**YES**	**NO**
Did the bubbles fill the whole beaker/cup?		
Only few bubbles formed.		

6. Measure and pour slowly the 10 ml rubbing alcohol with 2 drops of coloring in the gargled salt solution. Slowly tilt or incline the beaker while pouring the alcohol.

Observation:	YES	NO
Are there two layers of liquid formed?		
Did the alcohol dissolve in water?		

7. Cover the beaker and place it on an ice bath and wait for 3-4 minutes.

Observation:	YES	NO
Are there two layers of liquid formed?		
Did you see the white string forming?		

OBJECTIVE: Explain how genetic materials are transcribed and translated to be use in protein synthesis. (Learning Competency S11/12LT-IIej-16)

TASK 2. DNA TRANSCRIPTION AND TRANSLATION. Complete the Transcription and Translation process in the cellular diagram below. Label it correctly with the terms from the box and describe how Transcription and Translation occurs within the cell.

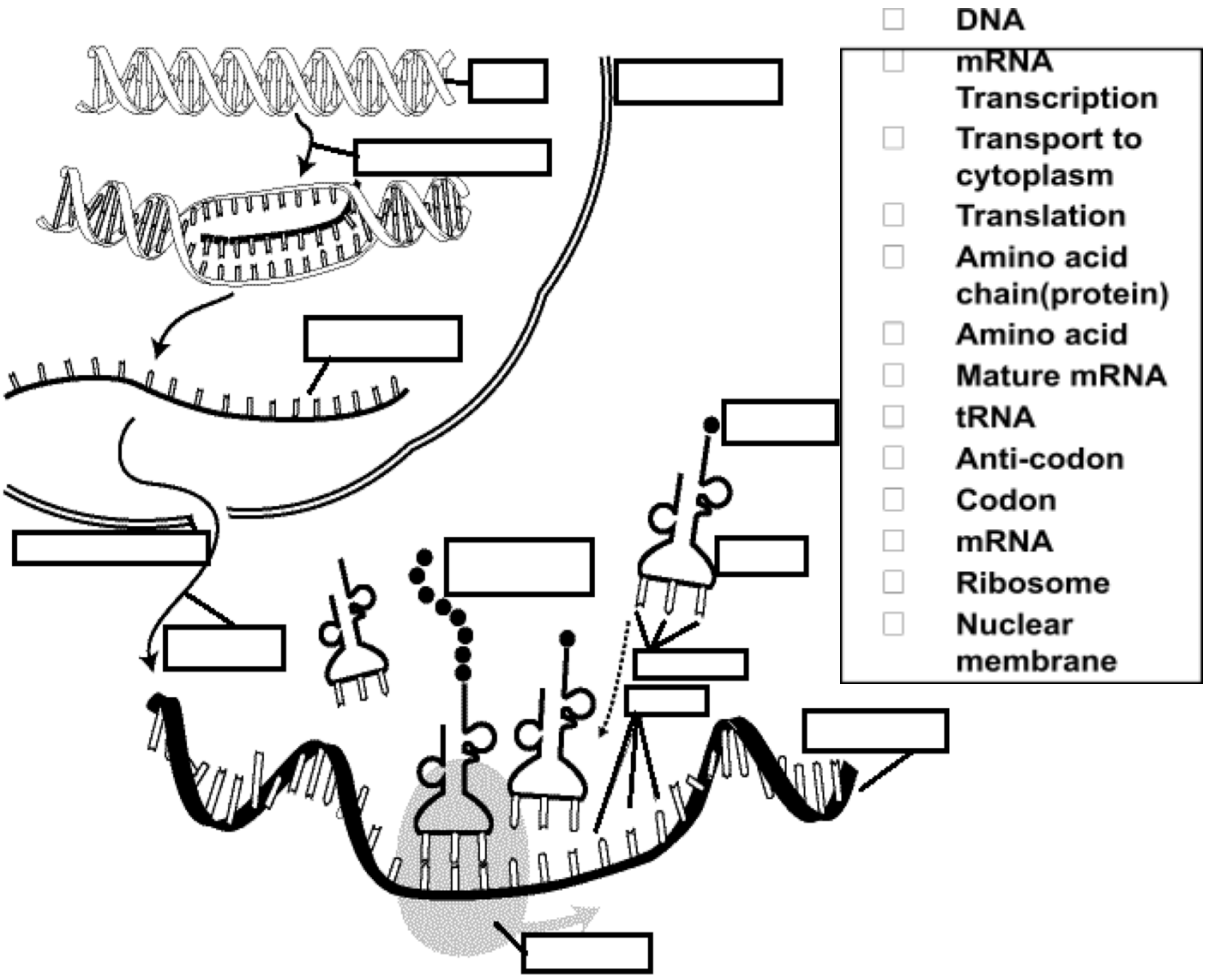


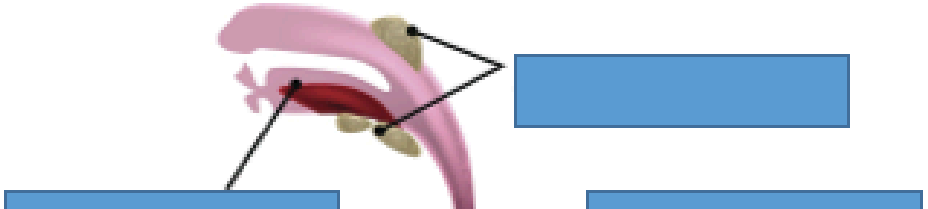
Photo credit to: www.pinterest.ph

Worksheet No. 6

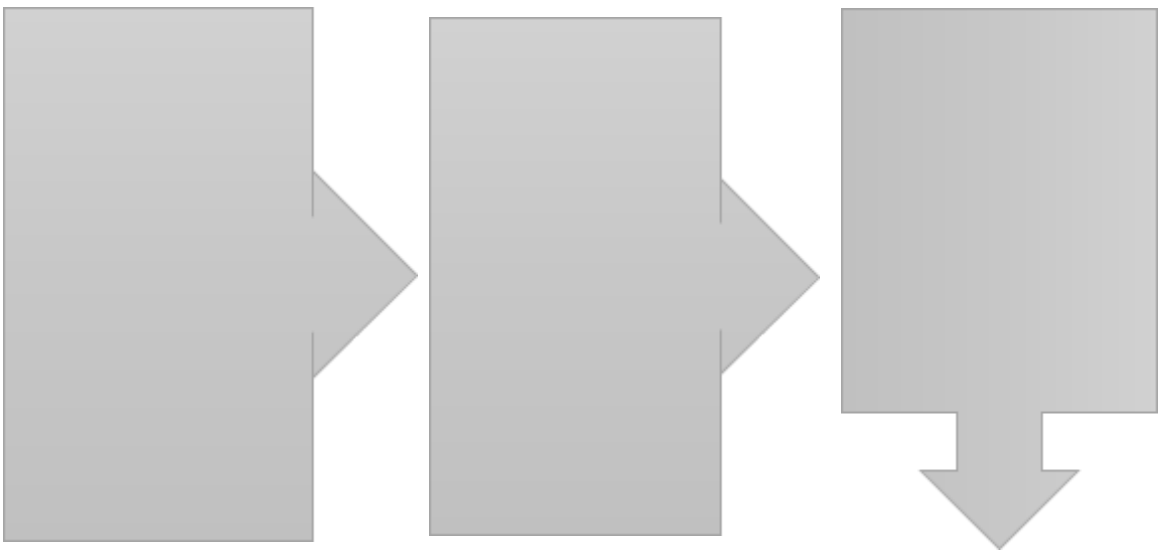
OBJECTIVE: Name the organs that compose the digestive system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-21)

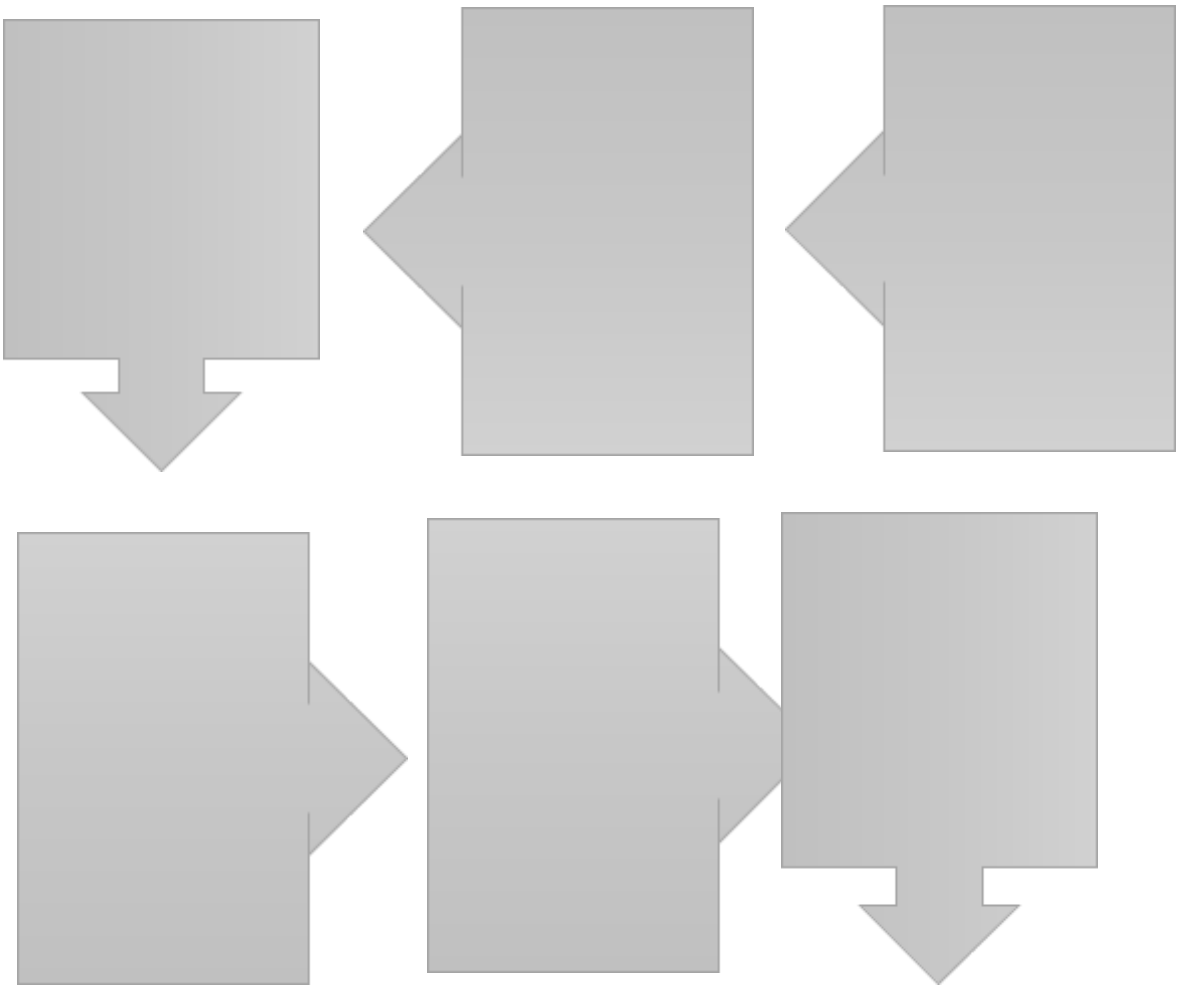
DIGESTIVE SYSTEM

TASK 1. LABELLING OF ANATOMICAL MODEL. Identify the organs that compose the digestive system, write the name of each organ inside the box.



TASK 2. ORGANIZATION AND PHYSIOLOGICAL CONCEPT. In the flow chart provided write the process of digestion by identifying the anatomical organs involve and state the physiological function of each organ in the digestive system.





Worksheet No. 7

OBJECTIVE: Name the organs that compose the respiratory system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-20)

RESPIRATORY SYSTEM

TASK 1. LUNG MODEL. Construct a lung model using a plastic bottle of water.

I. OBJECTIVE: At the end of the activity learners should be able to construct a lung model.

II. MATERIALS:

Rubber band

Paper tape

Ice wrapper

Plastic bottle

Scissors

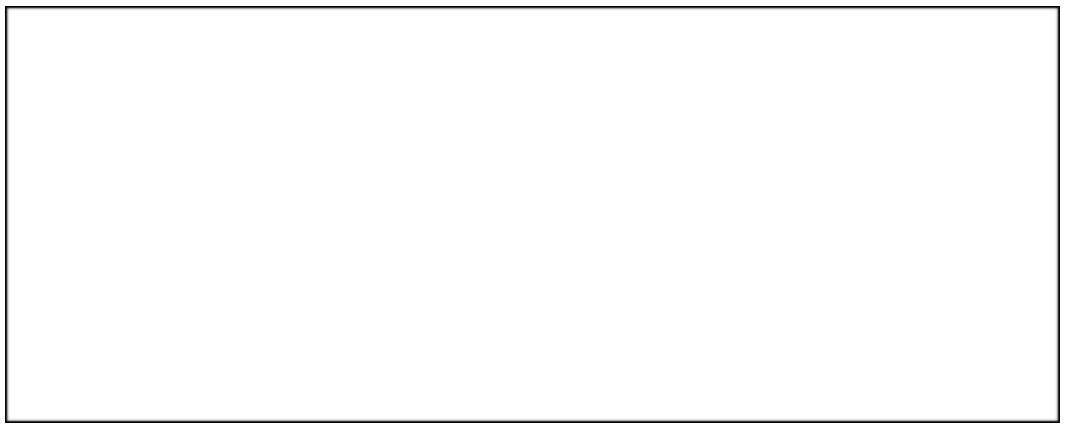
Plastic straw

Balloon

III. PROCEDURES:

1. Prepare the materials needed in making the lung model.
2. Cut the plastic bottle into half, take the lid of the plastic bottle and make a hole on it.
3. Cut the plastic straw until half of the plastic bottle, attach the ice wrapper at the end of the plastic straw using a rubber bond.
4. Fit the other end of the plastic straw on the lid of the plastic bottle be sure that the tip of the plastic straw is higher that the level of the lid.
5. Cover the end of the plastic bottle using a balloon, attach the balloon using a scotch tape.
6. Test your lung model by pulling the rubber band in downward direction. Observe what happen.

TASK 2. ANALOGY OF LUNG MODEL. Illustrate your Lung Model done in Task number 1 and label the part that is analogous to the components of lungs in the Respiratory system.



TASK 3. LABELING OF ANATOMICAL MODEL. Identify the organs in the Respiratory system, write the name of each organ inside the box.

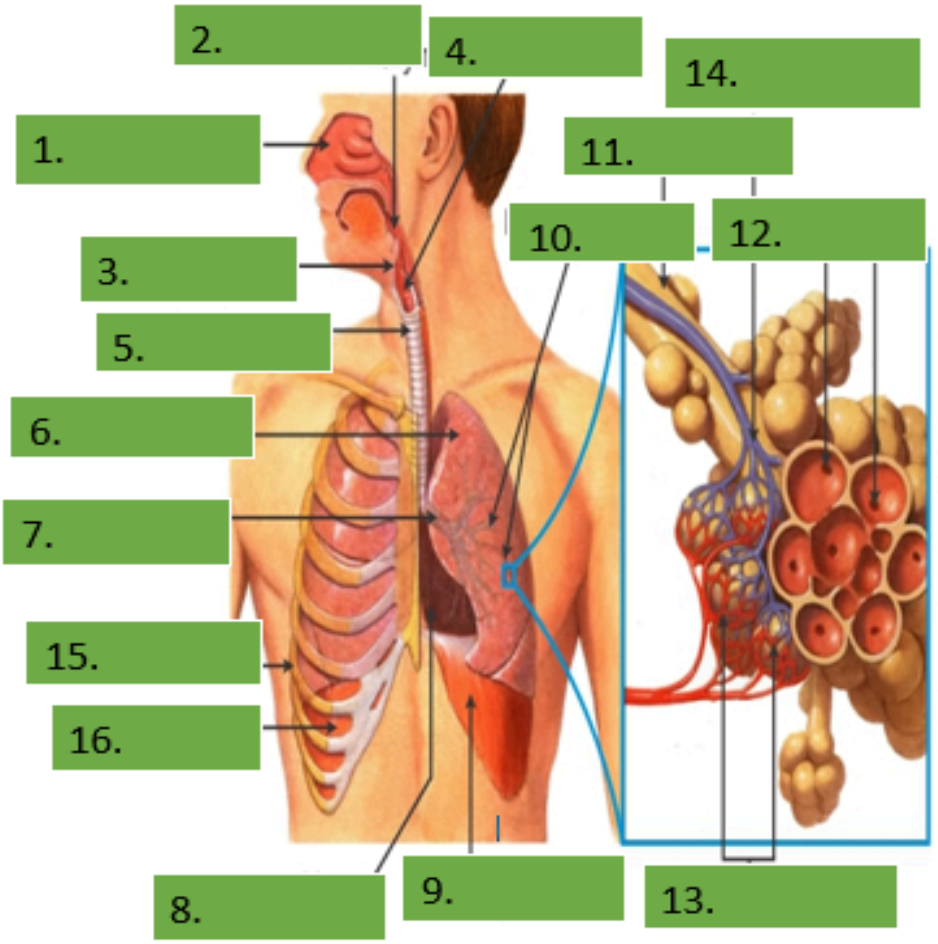
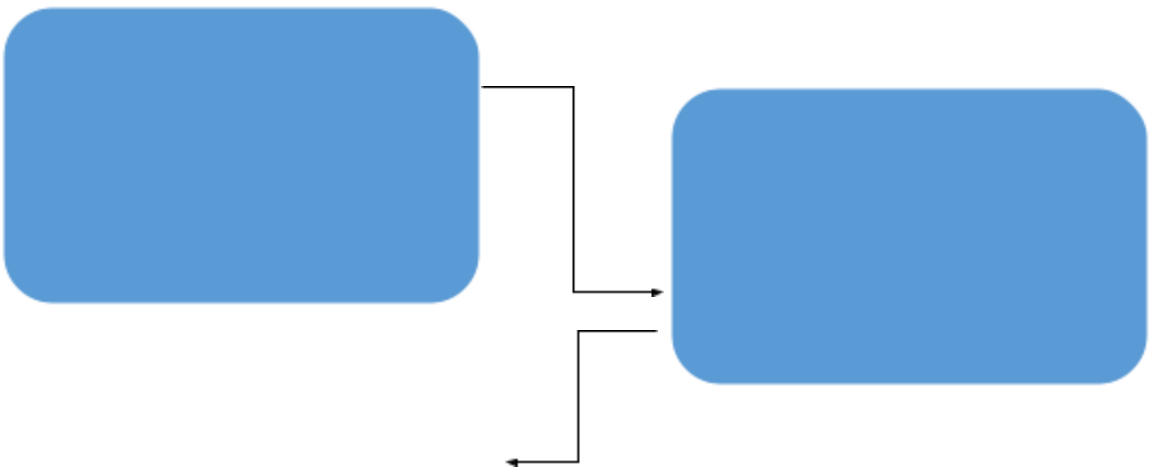
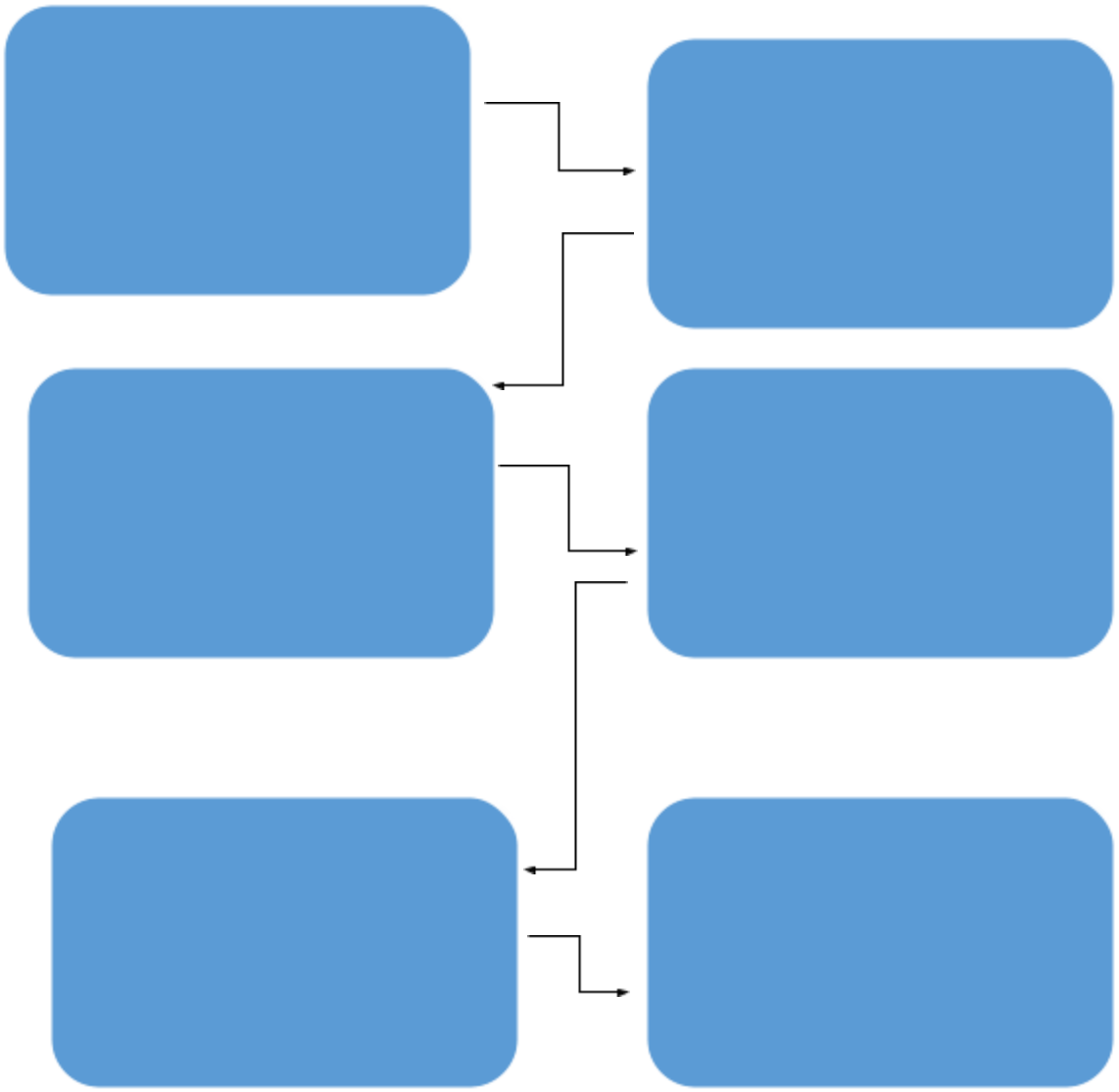


Photo credit to: www.topperlearning.com

TASK t

function of each organ in the Respiratory system.



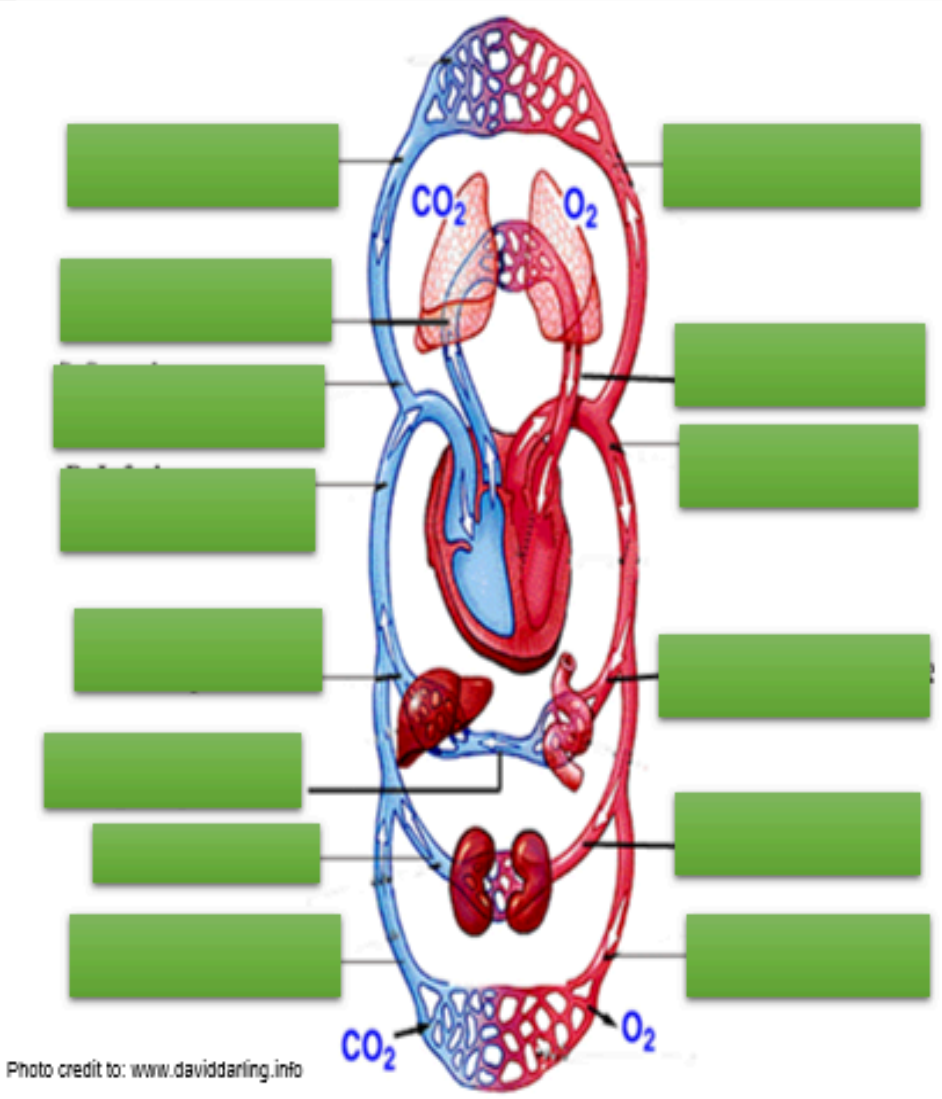


Worksheet No. 8

OBJECTIVE: Name the organs that compose the circulatory system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-20)

CIRCULATORY SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Label the circulation diagram of oxygenated and deoxygenated blood to and from the upper and lower extremities. *(Learning Competency S11/12LT- IIIaj-20)*



TASK 2. PHYSIOLOGICAL CONCEPT. Describe the flow of oxygenated and deoxygenated blood as it circulates from lower extremity to upper extremity.

Oxygenated Blood	Deoxygenated Blood

TASK 3. ANATOMICAL MODEL. Illustrate an anatomical model of the heart and label its part.

Worksheet No. 9

OBJECTIVE: Name the organs that compose the excretory system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-20)

EXCRETORY SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Label the anatomical model of excretory system.

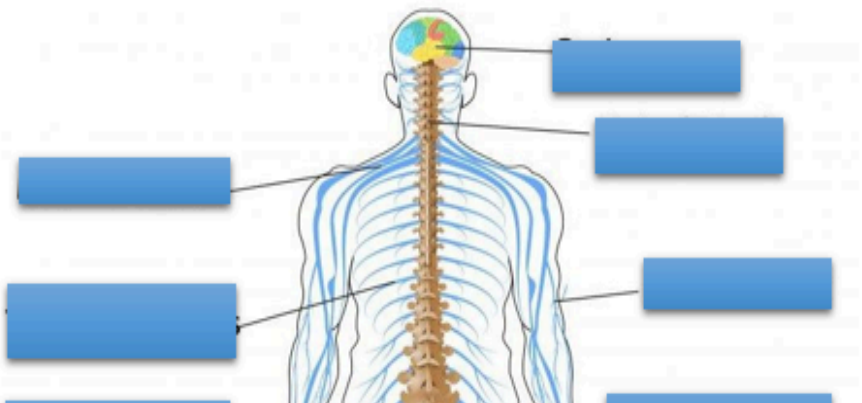
TASK 2. PHYSIOLOGICAL CONCEPT. Describe the function of each organ in the excretory system.

Worksheet No. 10

OBJECTIVE: Name the organs and the nerves that compose the digestive system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT- IIIaj-20)

NERVOUS SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Label the anatomical model of nervous system.



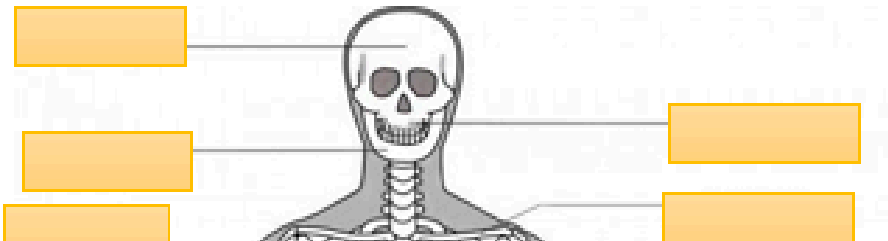
TASK 2. PHYSIOLOGICAL CONCEPT. Describe the function of each organ in the nervous system.

Worksheet No. 11

OBJECTIVE: Identify the bones that compose the skeletal system and explain the physiological function of each bone in the locomotion process of an organism. (Learning Competency S11/12LT-IIIaj-21)

SKELETAL SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Label the anatomical model of skeletal system.

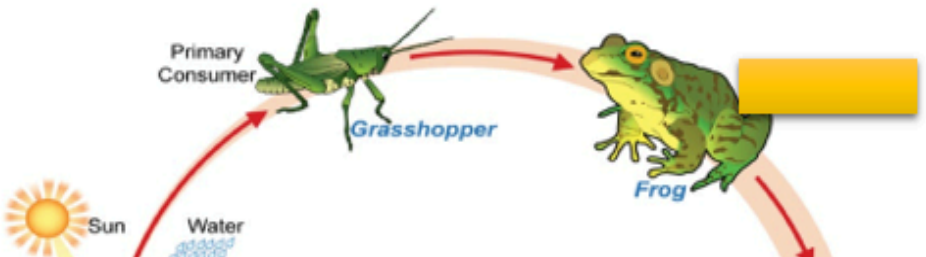


Worksheet No. 12

OBJECTIVE: Describe the interaction within an ecosystem and explain the principle of utilization of energy by biotic and abiotic factors. (Learning Competency S11/12LT-IVhj-29)

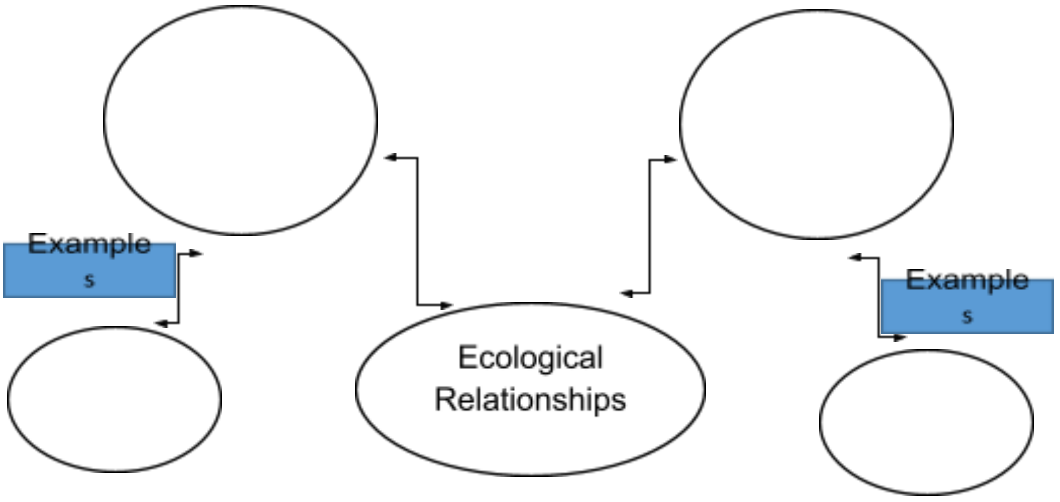
ENVIRONMENTAL INTERACTION

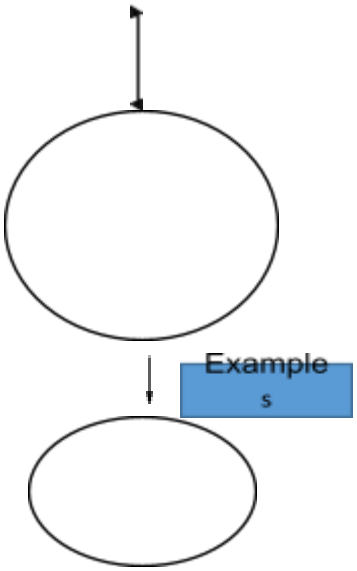
TASK 1. FOOD CHAIN. Study the food chain below identify the order of consumer and write it in the box.



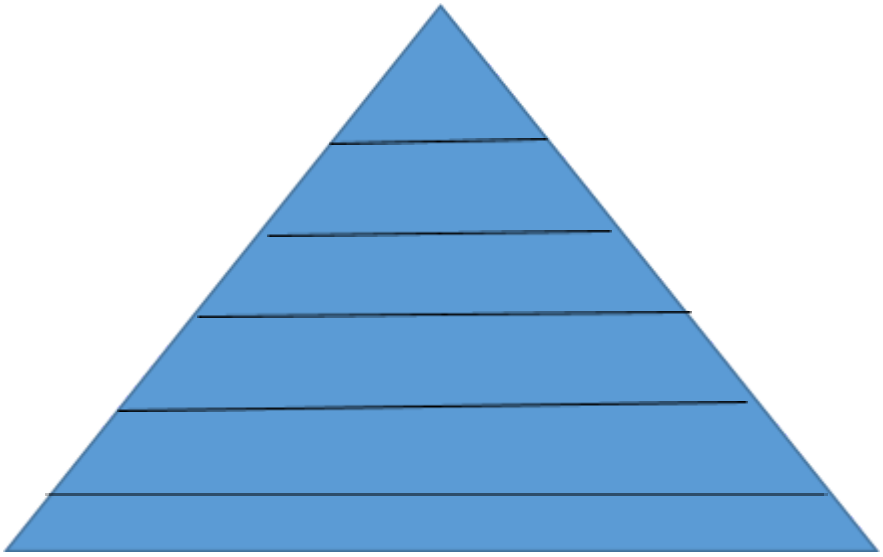
TASK 2. SYNTHESIS. Describe the levels of organization in the food chain and explain the interaction between the producer and consumers.

TASK 3 and explain each component.





TASK 4. LEVELS OF ORGANIZATION. Indicate and explain the trophic levels of energy in the pyramid below.



Worksheet No. 13

OBJECTIVE: Describe the interlink relationship between biotic and abiotic factors in an ecosystem by explaining the process of Water cycle. (Learning Competency S11/12LT-IVhj-28)

ECOLOGICAL INTERACTION 1

TASK 1. WATER CYCLE ANALYSIS. Analyze the given diagram and explain the process of water cycle.

Photo credit to: www.vectorstock.com

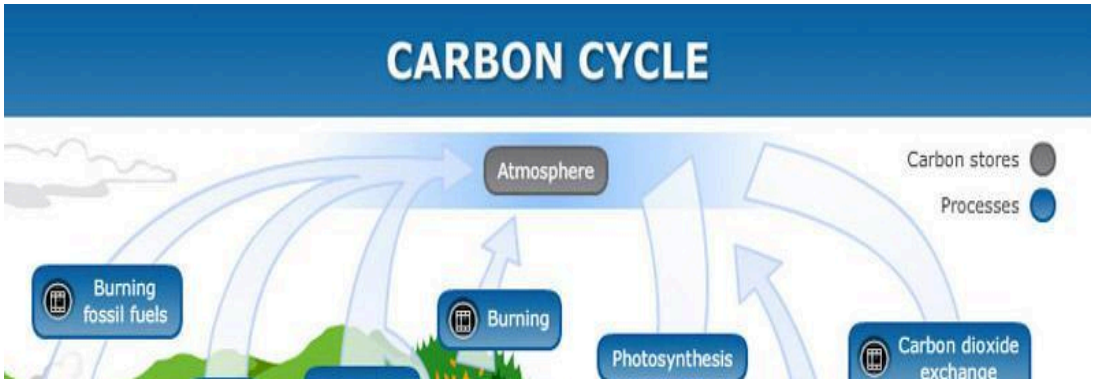
Explain It Here:

Worksheet No. 14

OBJECTIVE: Describe the interlink relationship between biotic and abiotic factors in an ecosystem b explaining the process of Carbon cycle. (Learning Competency S11/12LT-IVhj-28)

ECOLOGICAL INTERACTION 2

TASK 1. CARBON CYCLE ANALYSIS. Analyze the given diagram and explain the process of carbon cycle.



Explain It Here:

Worksheet No. 15

OBJECTIVE: Describe the interlink relationship between biotic and abiotic factors in an ecosystem by explaining the process of Carbon cycle. (Learning Competency S11/12LT-IVhj-28)

ECOLOGICAL INTERACTION 3

TASK 1. NITROGEN CYCLE ANALYSIS. Analyze the given diagram and explain the process of nitrogen cycle.

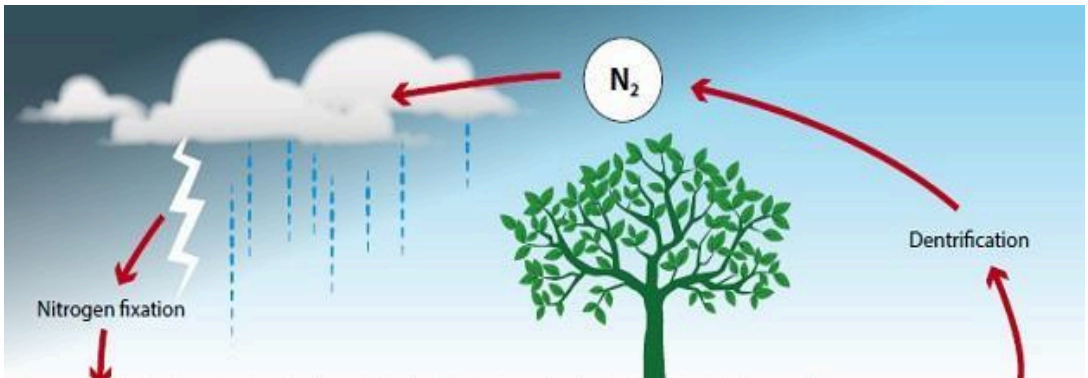


Photo credit to: https://www.studyacs.com/blog-nitrogen-cycle-37.aspx

Explain It Here:

Worksh

OBJECTIVE: Describe Earth's biome and explain its component that affects its environmental temperature. (Learning Competency S11/12LT-IVhj-30)

TERRESTRIAL BIOME

TASK 1. TERRESTRIAL BIOME ANALYSIS. Analyze the given diagram and explain the components of terrestrial biome and the abiotic factors in each component.

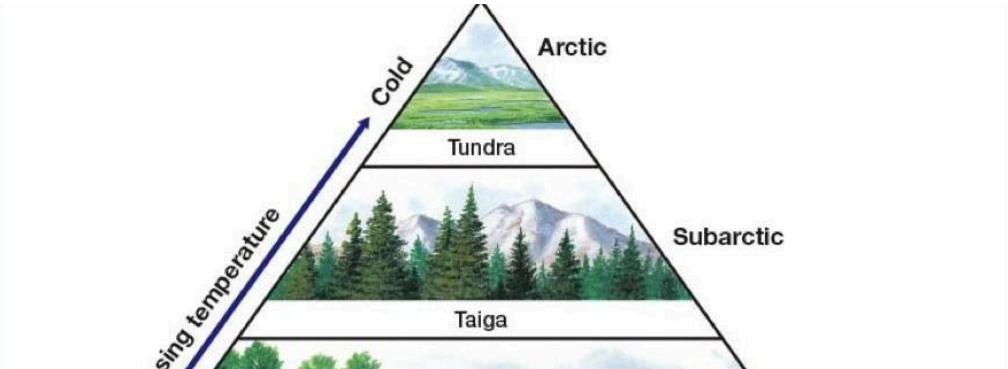


Photo credit to: anamelissa-scienceclass.blogspot.com

Explain It Here:

Worksheet No. 17

OBJECTIVE: Describe how species diversity is affected by organisms' population density in an ecological niche. (Learning Competency S11/12LT-IVhj-30)

POPULATION DENSITY

TASK 1. DATA ANALYSIS. Analyze the given diagram, label the data correctly and interpret/explain the data in terms of organism size and population density.

Explain It Here:

Worksheet No. 1

INTRODUCTION TO LIFE

OBJECTIVE: Understand and explain theories and organization of the existence of life. (Learning Competency S11/12LT-IIa-1)

TASK 1. MATCHING TYPE. Match the characteristics of life in column A to the given situation in column B.

Column A	Column B

F 1. Levels of organization **G** 2. Evolution and adaptability **H** 3. Body Regulation **C** 4. Utilization of Energy **B** 5. Growth and Maturity **A** 6. Environmental interaction **D** 7. Multiple Reproduction **E** 8. Organisms diversity	A. The interaction between biotic and abiotic factors in the ecosystem. B. The development of a child from childhood to adulthood C. Plants make their own food trough photosynthesis D. Increase in the population size of a grasshopper E. The interaction of different species in an aquatic ecosystem. F. A single cell multiplied to become an organism. G. The change in the skin color of a gecko lizard to complement to its environment. H. A human being with 37 degrees' Celsius body temperature

TASK 2. Based on the text reading done, complete the table below by filling in the proponents of the different theories of life and briefly describe each.

THEORY	PROPONENT	DESCRIPTION
a. Theory of special creation	God	The greatest supporter of this theory was Father Suarez. According to this theory life was created by supernatural power. According to the Bible the world was created within six days. (Source: http://www.yourarticlelibrary.com/biology/origin-of-life-5-ancient-theories-of-origin-of-life/13248)
b. Cosmozoic theory	Jöns Jacob Berzelius (1834), Hermann E. Richter (1865), Kelvin (1871), Hermann von Helmholtz (1879)	This theory was proposed by Richter (1865). According to this theory, 'protoplasm' reached the earth in the form of spores or germs or other simple particles from some unknown part of the universe with the cosmic dust, and subsequently evolved into various forms of life. Helmholz (1884) speculated that 'protoplasm' in some form reached the earth with falling meteorites. Arrhenius (1908, Nobel Prize Winner of 1903 in Chemistry) postulated the (= Panspermia Theory) and stated that organisms existed throughout the universe and their spores etc., could freely travel through space from one star to the others. In fact, panspermia theory is the alternative name of cosmozoic theory.

		(Source: http://www.yourarticlelibrary.com/biology/origin-of-life-5-ancient-theories-of-origin-of-life/13248)
c. Theory of spontaneous generation or 'Abiogenesis'	Greek philosophers like Thales, Anaximander, Xanophanes, Empedocles, Plato, Aristotle, Van Helmont (1577-1644)	This theory states that life originated from nonliving things in a spontaneous manner. In ancient Egypt, it was believed that the mud of the Nile could give rise to frogs, toads, snakes, mice and even crocodiles when warmed by the sun. Van Helmont (1577-1644) held that human sweat and wheat grains could give rise to organisms. He placed a dirty shirt in a receptacle containing wheat bran and found that after 21 days the gases from the shirt and wheat had formed living mice. These beliefs have no scientific grounds and hence are discarded. (Source: http://www.yourarticlelibrary.com/biology/origin-of-life-5-ancient-theories-of-origin-of-life/13248)
d. Biogenesis Theory	Rudolf Virchow Louis Pasteur	The 1859 experiment performed by Pasteur unequivocally overturned the theory of spontaneous generation at the microscopic level. He boiled a meat broth in a flask that had a long neck that curved downward, then upward, like a goose neck. The bend in the neck prevented contaminating particles from reaching the broth, while still allowing the free diffusion of air. The fact that the flask allowed for the passage of air was a design breakthrough that finally addressed the critics of Spallanzani. Pasteur's flask remained free of bacterial growth for as long as the flask remained upright. To show where the contaminating elements were located, he tipped the flask enough for the broth to sweep out the bend in the goose neck; the broth would then quickly become clouded with bacterial growth. (Source: https://sciencing.com/theory-biogenesis-5419233.html)
e. Oparin's Theory	Alexander Ivanovich Oparin	According to Oparin, the primitive Earth's surface had a thick red-hot liquid, composed of heavy elements such as carbon (in the form of iron carbide). This nucleus was surrounded by the lightest elements, i.e. gases, such as hydrogen. In the presence of water vapour, carbides reacted with hydrogen to form hydrocarbons. Such hydrocarbons were the first organic molecules. These further combined with oxygen and ammonia

		to produce hydroxy- and amino-derivatives, such as carbohydrates and proteins. These molecules accumulated on the ocean's surface, becoming gel-like substances and growing in size. They gave rise to primitive organisms (cells), which he called coacervates (Source: https://en.wikipedia.org/wiki/Primordial_soup)
f. Coacervation Theory & J.B.S Haldane's Hypothesis	Alexander Oparin and J. B. S. Haldane (1929)	Coacervation is a phenomenon that produces coacervate colloidal droplets. When coacervation happens, two liquid phases will co-exist: a dense, polymer-rich phase (coacervate phase or coacervate droplets) and a very dilute, polymer-deficient phase (dilute phase). This theory proposes that metabolism predated information replication, although the discussion as to whether metabolism or molecules capable of template replication came first in the origins of life remains open (Source: https://en.wikipedia.org/wiki/Coacervate)
g. Urey-Miller hypothesis	Stanley Miller and Harold Urey in 1953	It established that the early Earth atmosphere, as they pictured it, was capable of producing amino acids, the building blocks of life, from inorganic substances. (Source: https://phys.org/news/2009-09-scientists-hypothesis-life.html)
h. Fossils (evidence of past life, significance and important fossils)	Charles Darwin	Fossil remains have been found in rocks of all ages. Fossils of the simplest organisms are found in the oldest rocks, and fossils of more complex organisms in the newest rocks. This supports Darwin's theory of evolution, which states that simple life forms gradually evolved into more complex ones. Evidence for early forms of life comes from fossils. By studying fossils, scientists can learn how much (or how little) organisms have changed as life developed on Earth. (Source: https://www.bbc.co.uk/bitesize/guides/zcqbdxs/revision/7)
i. Geologic time scale (emergence of life forms)	Nicolaus Steno 1669, James Hutton in 1795, Charles Lyell 1800s.	The geologic time scale is used by geologists and other scientists to map the timing and relationships between events that have occurred during the history of the Earth. It combines estimates of the age of geological formations as provided by radiometric dating

		techniques with the direct evidence of sequences and events in the rock record as assembled by geologists. In this way the geologic or deep time of Earth's past can be organized into various units according to events that took place in each period. (Source: https://www.newworldencyclopedia.org/entry/Geologic_time_scale)

Worksheet No. 2

CELL PARTS AND FUNCTIONS

OBJECTIVE: Identify organelles in plant and animal cell, explain the function of each organelle in molecular level and distinguish organelles found only in plant cell. (Learning Competency S11/12LT-IIbd-4)

TASK 1. TEXT READING

Cell is the basic unit of life where growth and development of an organism serves as its own essential function. There are two types of cell Prokaryotic and Eukaryotic. A type of cell that has no nuclear membrane and no nucleus, and it exists among microorganisms like bacteria and viruses is a Prokaryotic. A type of cell that has complex parts and there is the presence of Nucleus and Nucleolus is a Eukaryotic. Animals and plants have Eukaryotic cell, there are organelles found inside the cytoplasm of a Eukaryotic cell these are cell membrane, mitochondria, lysosome, ribosome, vacuole, Golgi body, smooth and rough endoplasmic reticulum, nucleus, nucleolus, microtubule, chloroplast.

TASK 2. LABELING THE ILLUSTRATION

Photo credit to: www.vecteezy.com

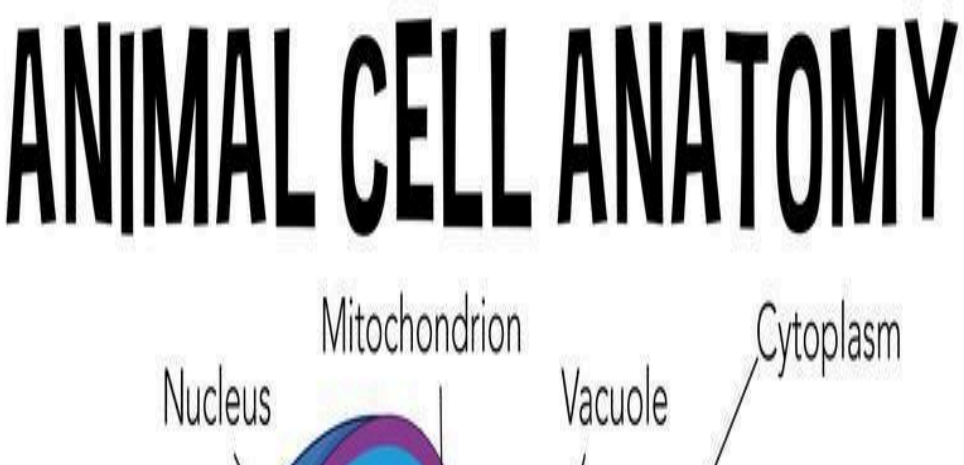
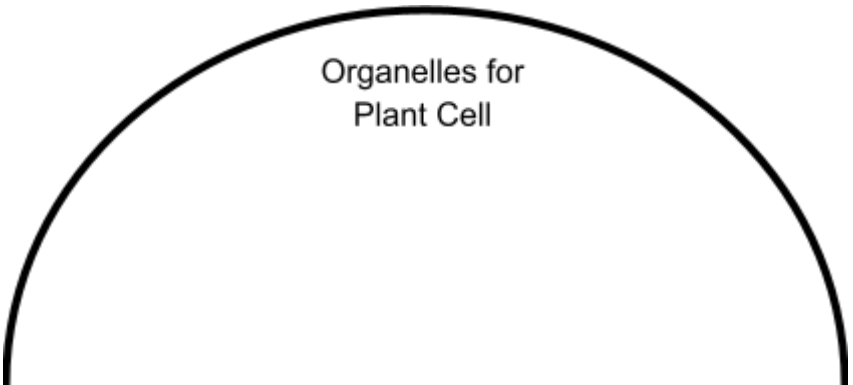


Photo credit to: www.dreamstime.com

TASK 3. COMPARE AND CONTRAST: Using a Venn diagram compare what organelles are present in Plant cell and in Animal cell, identify which organelles are found in both Plant and Animal cells.



Organelles for
Animal Cell

TASK 4. ORGANELLES AND ITS FUNCTIONS: List the organelles in Animal cell and Plant cell and describe the function of each.

ANIMAL CELL ORGANELLES	FUNCTIONS	PLANT CELL ORGANELLES	FUNCTIONS
Nucleus	Nucleus The nucleus is a membrane-bound	Cell Wall	Cell Wall It is a rigid layer which is

	structure that is present only in eukaryotic cells. The vital function of a nucleus is to store DNA or hereditary information required for cell division, metabolism, and growth.		composed of cellulose, glycoproteins, lignin, pectin, and hemicellulose. It is located outside the cell membrane. It comprises proteins, polysaccharides, and cellulose. The primary function of the cell wall is to protect and provide structural support to the cell.
Nucleolus	<u>Nucleolus</u> It manufactures cell's protein-producing structures and ribosomes.		
Golgi Apparatus	<u>Golgi Apparatus</u> They are found in all eukaryotic cells which are involved in distributing synthesized macromolecules to various parts of the cell.	Plastids	<u>Plastids</u> They are membrane-bound organelles that have their own DNA. They are necessary to store starch, to carry out the process of photosynthesis. It is also used in the synthesis of many molecules which form the building blocks of the cell.
Ribosomes	<u>Ribosomes</u> They are the smallest membrane-bound organelles which comprise RNA and protein. They are the sites for protein synthesis, hence, also referred to as the protein factories of the cell.	Leucoplasts	<u>Leucoplasts</u> They are found in non-photosynthetic tissues of plants. They are used for the storage of protein, lipid, and starch.
			<u>Chloroplasts</u>

Mitochondria Lysosome	<u>Mitochondria</u> They are the double-membrane d organelles found in the cytoplasm of all eukaryotic cells. They provide energy by breaking down carbohydrate and sugar molecules, hence they are also referred to as the “Powerhouse of the cell.” <u>Lysosome</u> Lysosomes are called as suicidal bags as they hold digestive enzymes	Chloroplasts Vacuole	It is an elongated organelle enclosed by phospholipid membrane. The chloroplast is shaped like a disc and the stroma is the fluid within the chloroplast that comprises a circular DNA. <u>Vacuole</u> It occupies around 30% of the cell’s volume in a mature plant cell. The vital function of central vacuole apart from storage is to sustain turgid pressure against the cell wall.

(Source: https://byjus.com/biology/plant-cell/)

TASK 5. EXPLORE. Conduct the Red Blood Cell activity

I. Objective

At the end of the activity students should be able to:

1. Observe actual red blood cells under the microscope.

II. Materials

3 pcs. Glass slides
3 pcs. Cover slip
1 wash bottle with isotonic solution

1 wash bottle with liquid soap
1 lab tray
1 sponge
2 blood lancet
1 compound microscope

III. Procedures:

1. Clean the tip of the middle finger using the cotton ball that was soaked in the alcohol.
2. Massage the middle finger then prick it using the blood lancet.
3. Apply a little pressure on the middle finger to allow blood flow.
4. Hold the middle finger and place the glass slide on the tip and allow the blood to drop on the glass slide
5. Using another glass slide do the smearing technique by sliding it on the drop blood and add 1 drop of water on top and cover it with the cover slip.
6. Place the specimen under the microscope for observation.
7. Observe and take note of your observation.

IV. Post Activity Questions:

1. What have you seen under the microscope? Red blood cells (students answer may vary)
2. Are the red blood cells moving? Why? Yes, under the microscope the RBC looks like they are flowing Due to its fluidity property
3. Describe what you see under the microscope. Red blood cells (students answer may vary)

Worksheet No. 3

ENERGY AND PHOTOSYNTHESIS

OBJECTIVE: Explain how energies are utilized by photosynthetic organisms. (Learning Competency S11/12LT- IIbd-5)

TASK 1. VOCABULARY BUILDING. Choose the correct term from the box to complete each statement**.**

Kinetic	Potential			Ionization
	Thermal	Mechanical		
Energy	Sonic	Nuclear		Chemical
	Electromagnetic			

1. Energy gives an organism its ability to do work.

2. Mechanical energy is an energy that is produced from the movement of an object.

3. Thermal energy is an energy that refers to the temperature within a system.

4. Nuclear energy is the energy processed from reactions in the atomic nuclei of an atom.

5. Chemical energy is produced after chemical reactions between molecules of matter.

6. Electromagnetic energy is an energy that comes from electromagnetic waves.

7. Sonic energy is the energy produced through sound waves.

8. Kinetic energy is energy of a body that is in motion.

9. Potential energy is an energy found in objects that are at rest in position.

10. Ionization eneergy is a form of energy that is present in electrons attraction to the nucleus of an atom.

TASK 2. CHEMICAL EQUATION. Analyze the given chemical equation about the process of photosynthesis and answer the given guide questions.

$$6H_2O + 6CO_2 \text{ ----------> } C_6H_{12}O_6 + 6O_2$$

REMEMBER THIS!

Laws of Thermodynamics

- Energy cannot be created or destroyed but it can transfer from one form to another.

Photosynthesis is the process by which plant and plant like organisms make use of the light energy from sunlight to produce glucose for cellular respiration.

Guide Questions:

1. What are the reactants in the given chemical equation? Water (H2O) and Carbon dioxide (CO2)

2. What are the products? Glucose and Oxygen

3. Infer what is the given chemical equation all about and describe the process. The equation is all about photosynthesis the reactants are 6CO2 + 6H20 + (energy) then gives a product of → C6H12O6 + 6O2. Carbon dioxide and water with energy from light produces glucose and oxygen.

TASK 3. DIAGRAM ANALYSIS. Analyze the given diagram about light and dark reaction during the process of photosynthesis.

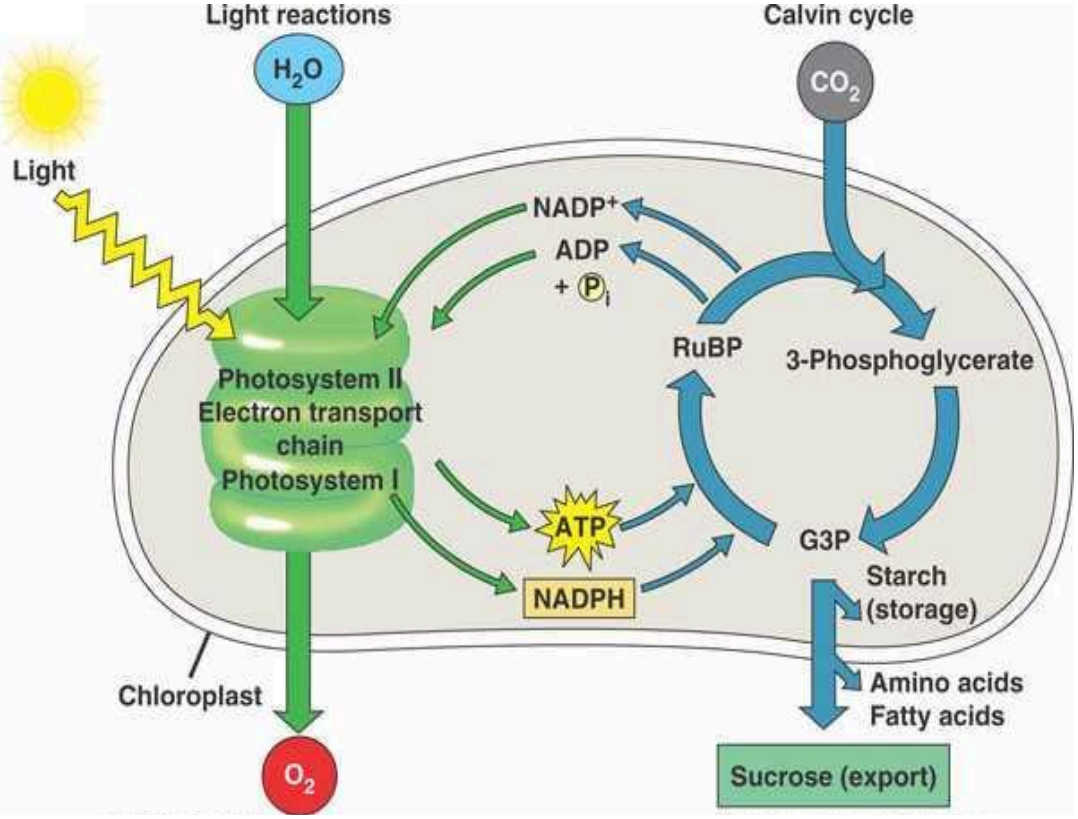


Photo credit to: biologyunleashed.weebly.com

TASK 4. INTERPRETATION. After analyzing the given diagram in task 3, interpret the process of Light and Dark reaction.

LIGHT REACTION	DARK REACTION
Just as the name implies, light-dependent reactions require sunlight. In the light-dependent reactions, energy from sunlight is	In the light-independent reactions or Calvin cycle, the energized electrons from the light-dependent reactions

absorbed by chlorophyll and converted into stored chemical energy, in the form of the electron carrier molecule NADPH (nicotinamide adenine dinucleotide phosphate) and the energy currency molecule ATP (adenosine triphosphate). The light-dependent reactions take place in the thylakoid membranes in the granum (stack of thylakoids), within the chloroplast. The process that converts light energy into chemical energy takes place in a multi-protein complex called a photosystem. Two types of photosystems are embedded in the thylakoid membrane: photosystem II (PSII) and photosystem I (PSI). Each photosystem plays a key role in capturing the energy from sunlight by exciting electrons. These energized electrons are transported by “energy carrier” molecules, which power the light-independent reactions. Photosystems consist of a light-harvesting complex and a reaction center. Pigments in the light-harvesting complex pass light energy to two special chlorophyll a molecule in the reaction center. The light excites an electron from the chlorophyll a pair, which passes to the primary electron acceptor. The excited electron must then be replaced. In photosystem II, the electron comes from the splitting of water, which releases oxygen as a waste product. In photosystem I, the electron comes from the chloroplast electron transport chain. The two photosystems oxidize different sources of the low-energy electron supply, deliver their energized electrons to different places, and respond to different wavelengths of light.	provide the energy to form carbohydrates from carbon dioxide molecules. The light-independent reactions are sometimes called the Calvin cycle because of the cyclical nature of the process. Although the light-independent reactions do not use light as a reactant (and as a result can take place at day or night), they require the products of the light-dependent reactions to function. The light-independent molecules depend on the energy carrier molecules, ATP and NADPH, to drive the construction of new carbohydrate molecules. After the energy is transferred, the energy carrier molecules return to the light-dependent reactions to obtain more energized electrons. In addition, several enzymes of the light-independent reactions are activated by light.

(Source: https://courses.lumenlearning.com/boundless-biology/chapter/overview-of-photosynthesis/)	

TASK 5. EXPLORE. Conduct the application of photosynthesis by planting Mongo seeds and exposing them through different areas.

Procedures:

1. Prepare twelve (12) plastic cups, make three sets and labelled as A, B, C, D.
2. Fill the cup with tap soil and implant the 10 mongo seeds in each cup.
3. Place the first set of the labelled cups in the shady area, the second set, inside the classroom, and the last set in the dark room.
4. Observe.

.

SHADY AREA	OBSERVATION (Height of the Plant)	INSIDE A CLASS ROOM	OBSERVATION (Height of the Plant)	DARK ROOM	OBSERVATION (Height of the Plant)
Cup A	(students answer may vary)	Cup A	(students answer may vary)	Cup A	(students answer may vary)
Cup B	(students answer may vary)	Cup B	(students answer may vary)	Cup B	(students answer may vary)
Cup C	(students answer may vary)	Cup C	(students answer may vary)	Cup C	(students answer may vary)
Cup D	(students answer may vary)	Cup D	(students answer may vary)	Cup D	(students answer may vary)

Guide Questions:

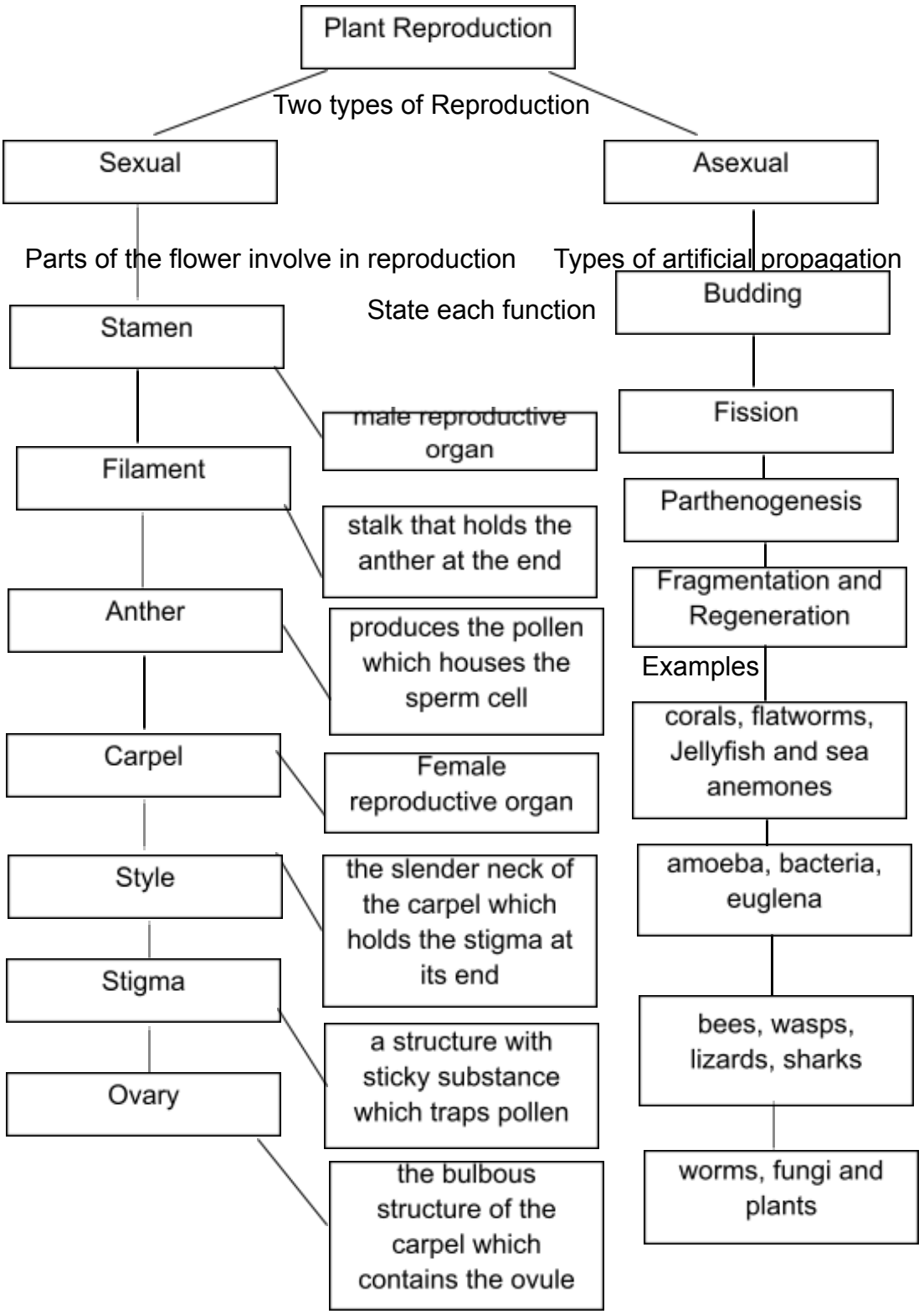
1. In which area do Mongo seeds grow best? Why? (students answer may vary).
2. In which area do Mongo seeds less likely to grow well? Why? (students answer may vary)

Worksheet No. 4

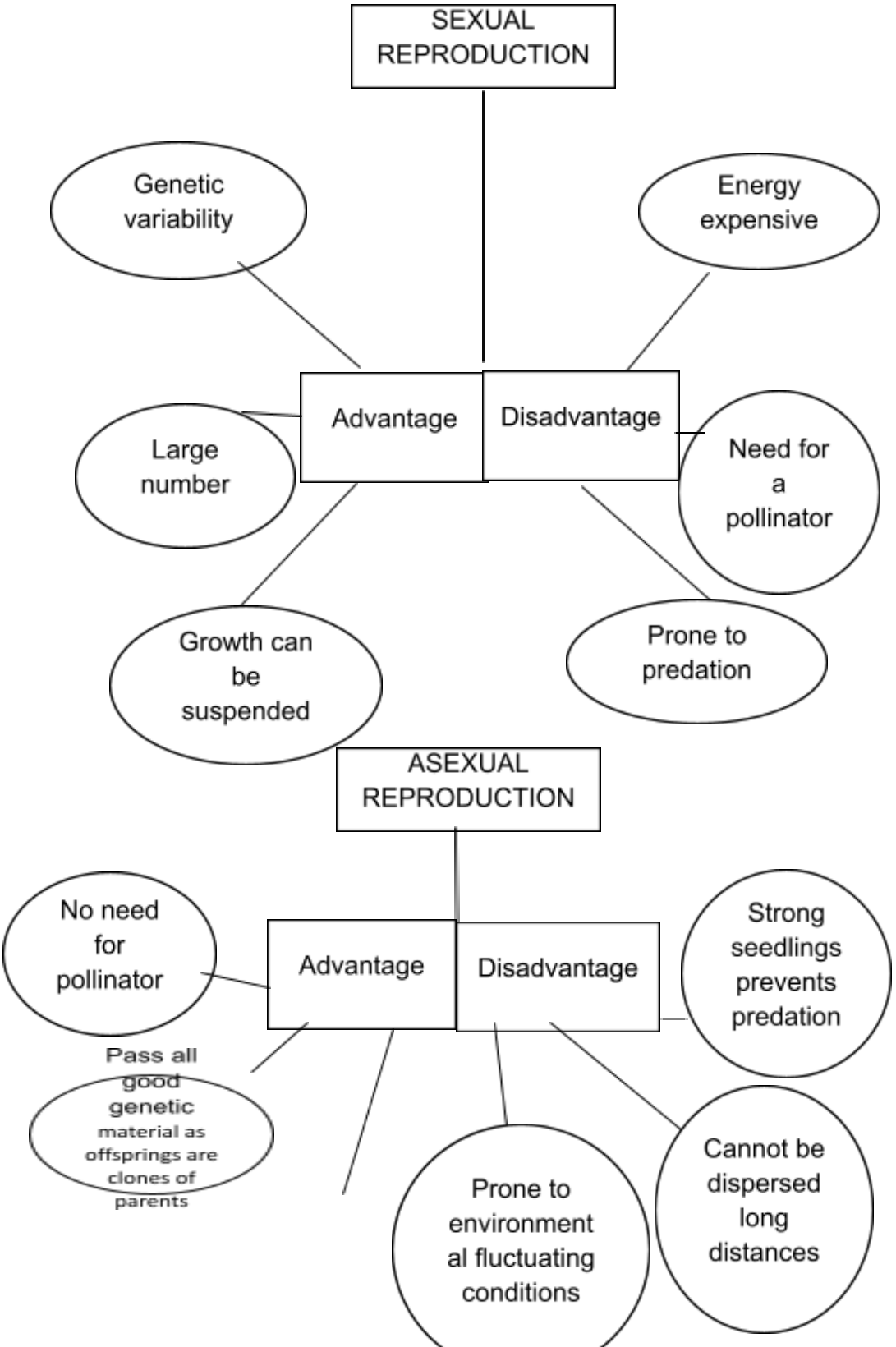
REPRODUCTION IN PLANTS

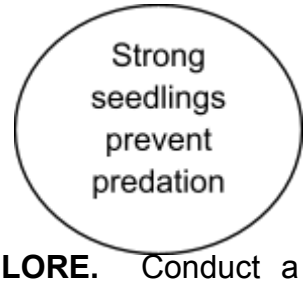
OBJECTIVE: Describe how plants undergo reproduction, state the importance of plant structures in reproduction process. (Learning Competency S11/12LT-IIej-13)

TASK 1. CONCEPT MAPPING. Complete the given concept map about Plant reproduction (source: SHS, TG, Earth & Life Science, pp.195-196)



TASK 2. CONCEPT WEB. Differentiate the advantages and disadvantages of Sexual and Asexual reproduction. (source: SHS, TG, Earth & Life Science, pp.206-207)





TASK 3. EXPLORE. Conduct a Gumamela flower dissection and Vegetative propagation, paste the dissected parts on a bond paper, label and describe each.

Flower Dissection and Vegetative Propagation

Materials:

Flower, forceps, tape

Procedures:

1. Gather all the needed materials, locate and remove each structure using some forceps
2. Paste each structure on a piece of bond paper and label it.

Materials

Pots, Soil, Onion bulbs

Procedures:

1. Using plastic cups as pots and soil, plant the bulbs half in soil, with the root-side into the soil.
2. Water the bulbs generously.
3. Over the next several days/weeks, green leaves will start to emerge.

(students' answer may vary for the actual specimen)

(Source: https://2p113lssportfolio.weebly.com/termly-reflections.html)

TASK 4. INTERPRET. Study the given life cycle of a bean plant, in the box below make an analogy diagram and describe each stage in the life cycle.

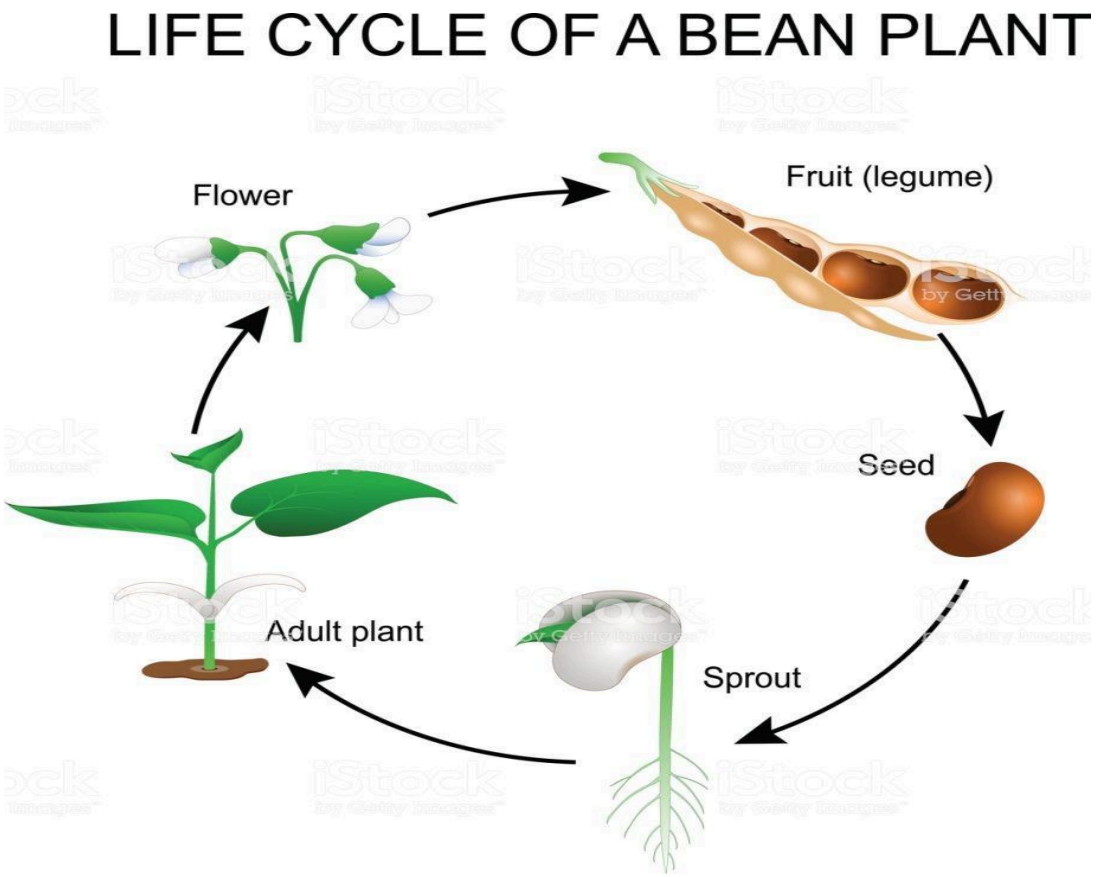


Photo credit to: garden.lovetoknowy.com/ttsz/iStock/GettyImagesPlus

Write It Here:

Life Cycles and Stages of the Bean Plant

There are four stages in the life of a bean plant: The seed is the capsule in which the new plant is housed. Germination is the process in which the baby plant emerges from the seed hull. Leaf growth begins when the seedling grows its true sets of adult leaves (as opposed to the immature initial leaf structures). Flowering stages reveal that the plant has fully matured and is ready to begin

Worksheet No. 5

Extraction of DNA from Cheek Cells

I. OBJECTIVE:

At the end of the activity learners should be able to extract and observe DNA from cheek cells. *(Learning Competency S11/12LT-IIej-16)*

II. MATERIALS:

Salt
Water
Liquid detergent
Isopropyl Alcohol
Graduated cylinder
Beaker
Stirring rod
Magnetic mixer
Test tube (large)
Dropper/Plastic spoon/Scissor
Cork/Paper tape
Zip Lock plastic bag
Plastic cups

III. PROCEDURES:

1. Get the materials and chemicals in making salt solution. Make the 0.9 percent salt solution by dissolving 2 teaspoons of table salt (NaCl) in 1 liter of water then stir and set aside.

What happened when you mix Sodium chloride (NaCl) to water (H2O)

Answer: Sodium chloride (NaCl) dissolves in water (H2O)

2. Get the materials in making liquid detergent solution and mix 5 mL of liquid detergent in 15 ml of water (H2O) and set aside.

Observation:	YES	NO
The liquid detergent is fully dissolve in water.	/	
Formation of bubbles is evident in detergent solution.	/	

3. Give one test tube for each member and pour 10 ml of salt solution in beaker/plastic cups. Each student gargles the salt water for 1 minute and spit it back to the labelled beaker/plastic cups. (Note: do not swallow)
4. Measure 5 ml liquid detergent solution and pour it to the gargled salt solution in the labelled beaker/plastic cup.
5. Measure and pour slowly the 5 ml of liquid detergent solution in the gargled salt solution. Slowly tilt/incline the beaker back and forth to mix the salt water solution and the liquid detergent solution.

Observation:	YES	NO
Did the bubbles fill the whole beaker/cup?		/
Only few bubbles formed.	/	

6. Measure and pour slowly the 10 ml rubbing alcohol with 2 drops of coloring in the gargled salt solution. Slowly tilt/incline the beaker while pouring the alcohol.

Observation:	YES	NO
Are there two layers of liquid formed?	/	
Did the alcohol dissolve in water?	/	

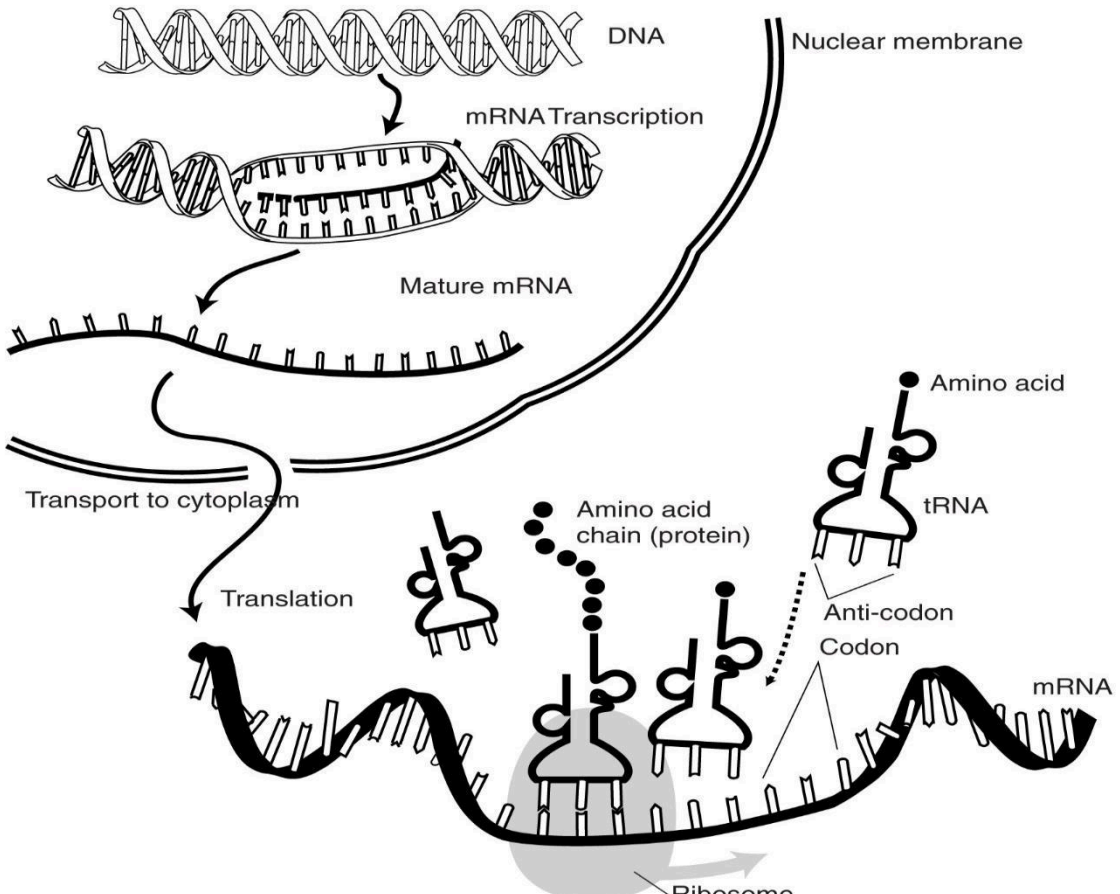
7. Cover the beaker and place it on an ice bath and wait for 3-4 minutes.

Observation:	YES	NO
Are there two layers of liquid formed?	/	

Did you see the white string forming?	/	

OBJECTIVE: Explain how genetic materials are transcribed and translated to be use in protein synthesis. (Learning Competency S11/12LT-IIej-16)

TASK 2. DNA TRANSCRIPTION AND TRANSLATION. Complete the Transcription and Translation process in the cellular diagram below. Label it correctly with the terms from the box and describe how Transcription and Translation occurs within the cell.



(Source: http://kbradleyscienceclass.blogspot.com/2015/03/biology-re-test-on-protein-synthesis.html)

Worksheet No. 6

OBJECTIVE: Name the organs that compose the digestive system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-21)

DIGESTIVE SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Identify the organs that compose the digestive system, write the name of each organ inside the box.

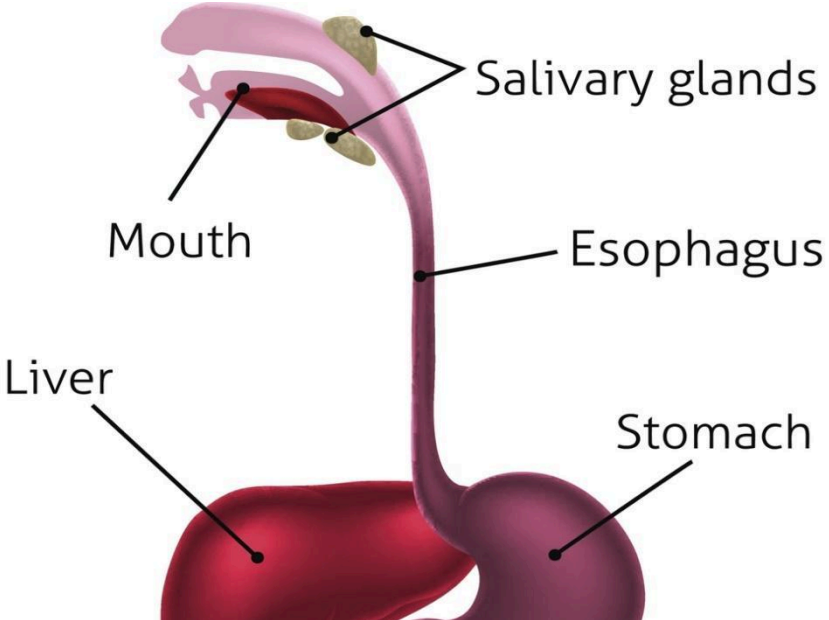
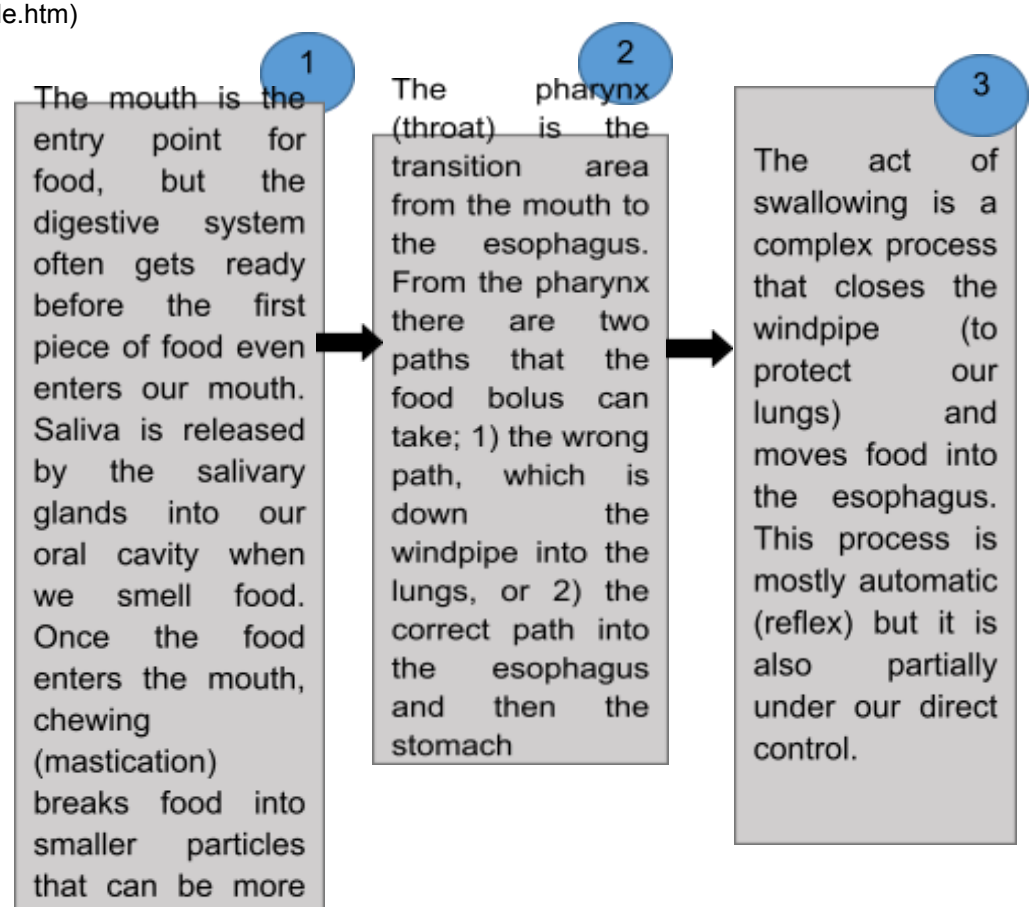
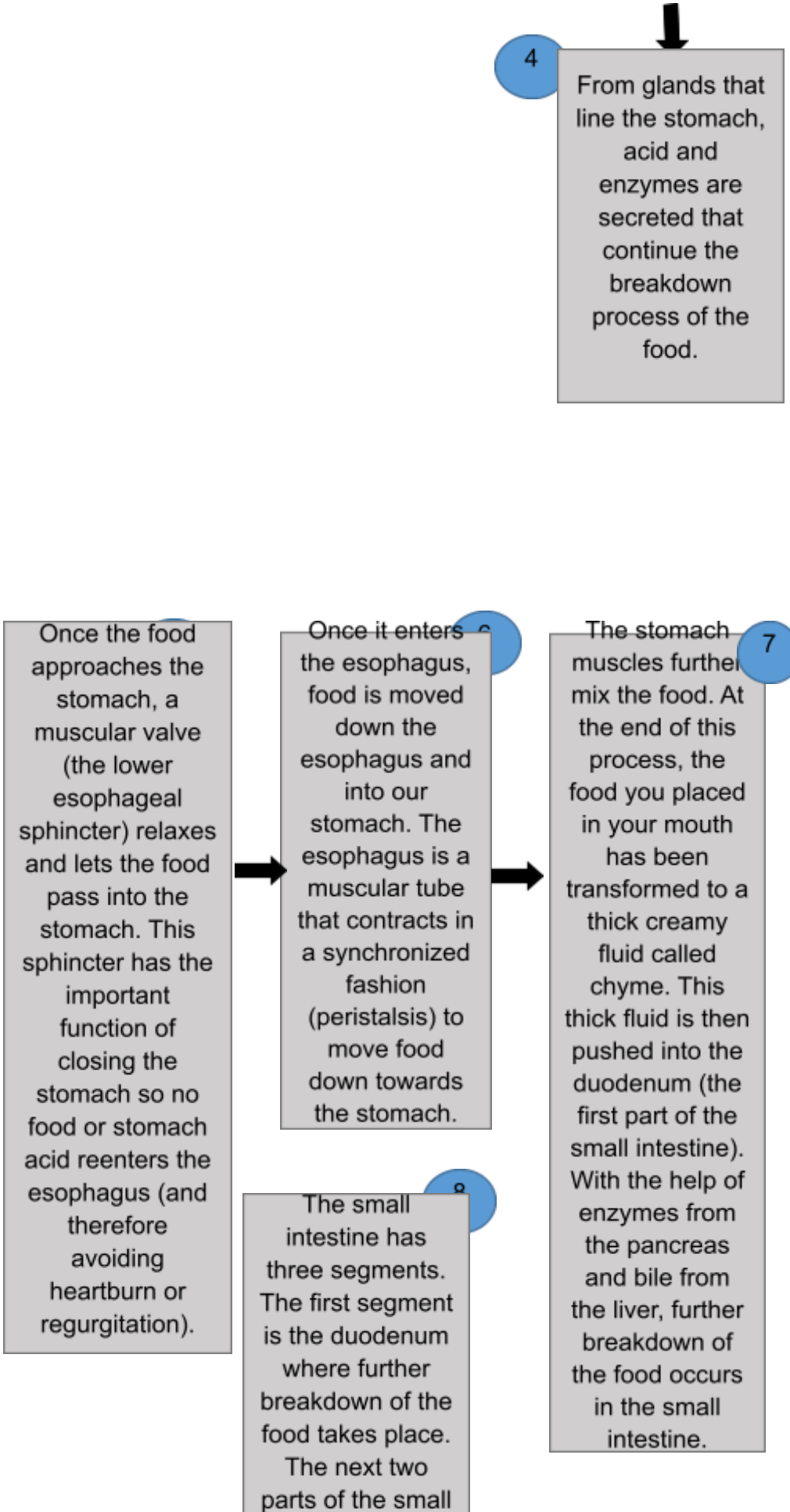


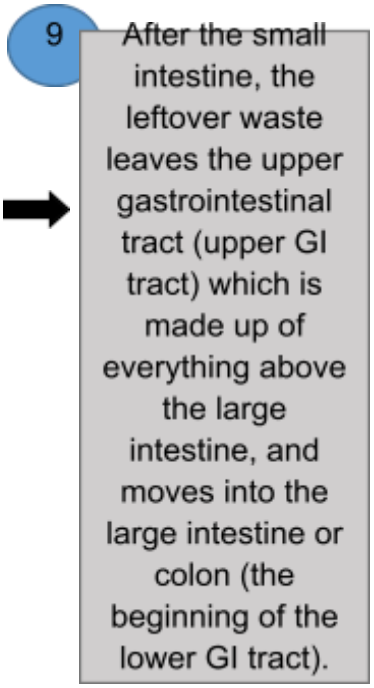
Photo credit to: www.123f.com/ChristosGeorghiou

TASK 2. ORGANIZATION AND PHYSIOLOGICAL CONCEPT. In the flow chart provided write the process of digestion by identifying the anatomical organs involve and state the physiological function of each organ in the digestive system. (Note: follow the sequence of the numbers indicated in each text box to correctly identify the order of digestion process).

(Source:https://www.medicinenet.com/the_digestion_process_organs_and_functions/article.htm)




4
From glands that line the stomach, acid and enzymes are secreted that continue the breakdown process of the food.
Once the food approaches the stomach, a muscular valve (the lower esophageal sphincter) relaxes and lets the food pass into the stomach. This sphincter has the important function of closing the stomach so no food or stomach acid reenters the esophagus (and therefore avoiding heartburn or regurgitation).
Once it enters the esophagus, food is moved down the esophagus and into our stomach. The esophagus is a muscular tube that contracts in a synchronized fashion (peristalsis) to move food down towards the stomach.
The stomach muscles further mix the food. At the end of this process, the food you placed in your mouth has been transformed to a thick creamy fluid called chyme. This thick fluid is then pushed into the duodenum (the first part of the small intestine). With the help of enzymes from the pancreas and bile from the liver, further breakdown of the food occurs in the small intestine.
7
The small intestine has three segments. The first segment is the duodenum where further breakdown of the food takes place. The next two parts of the small



Worksheet No. 7

OBJECTIVE: Name the organs that compose the respiratory system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-20)

RESPIRATORY SYSTEM

TASK 1. LUNG MODEL. Construct a lung model using a plastic bottle of water.

I. OBJECTIVE: At the end of the activity learners should be able to construct a lung model.

II. MATERIALS:

Rubber bond

Paper tape

Ice wrapper

Plastic bottle

Scissors

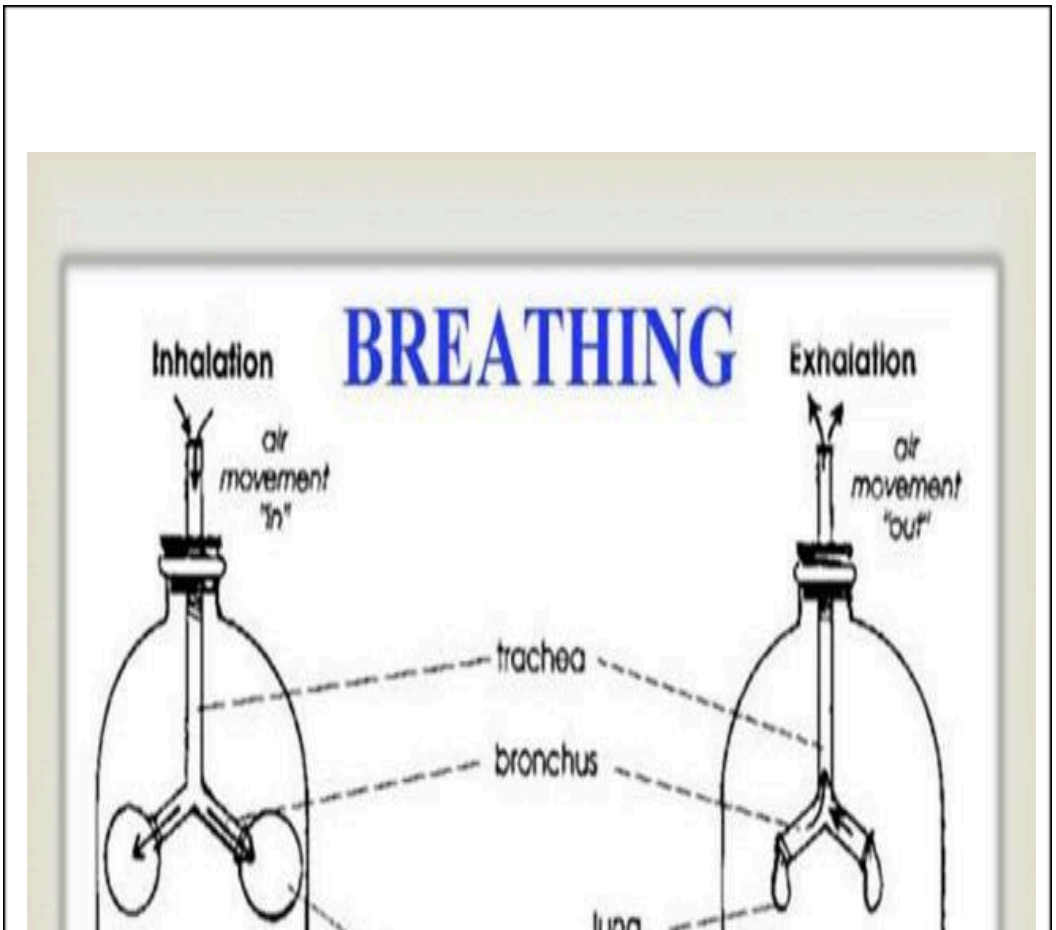
Plastic straw

Balloon

III. PROCEDURES:

1. Prepare the materials needed in making the lung model.
2. Cut the plastic bottle into half, take the lid of the plastic bottle and make a hole on it.
3. Cut the plastic straw until half of the plastic bottle attach the ice wrapper at the end of the plastic straw using a rubber bond.
4. Fit the other end of the plastic straw on the lid of the plastic bottle be sure that the tip of the plastic straw is higher that the level of the lid.
5. Cover the end of the plastic bottle using a balloon, attach the balloon using a scotch tape.
6. Test your lung model by pulling the rubber bond in downward direction. Observe what happen.

TASK 2. ANALOGY OF LUNG MODEL. Illustrate your Lung Model done in Task number 1 and label the part that is analogous to the components of lungs in the Respiratory system. (students' illustration and labelling may vary)



TASK 3. LABELING OF ANATOMICAL MODEL. Identify the organs in the Respiratory system, write the name of each organ inside the box.

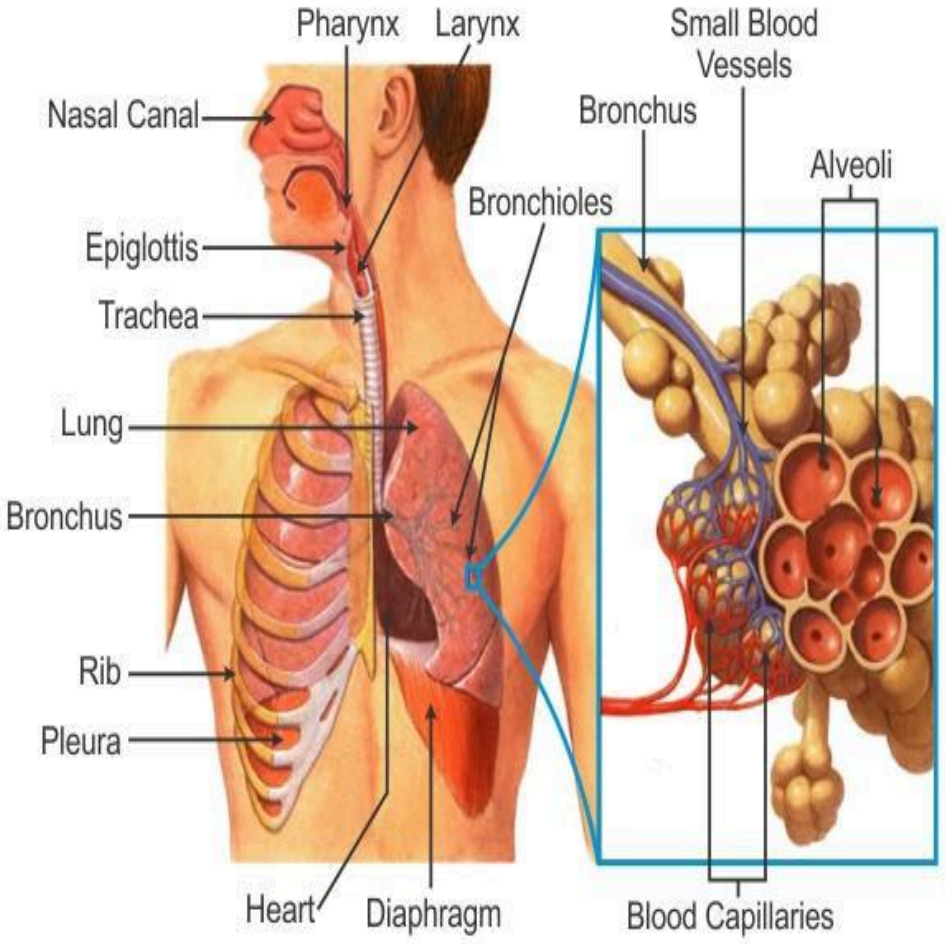
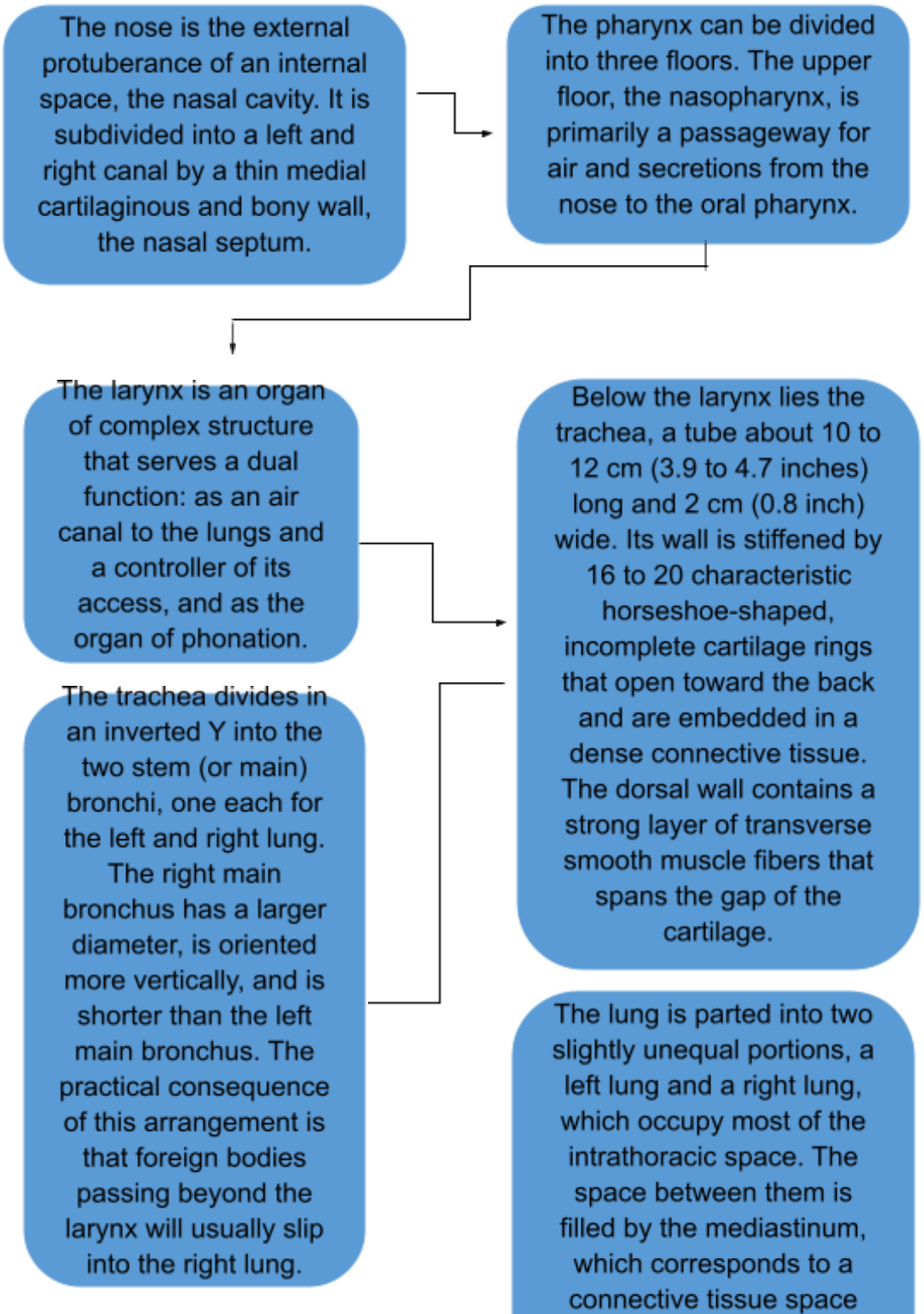
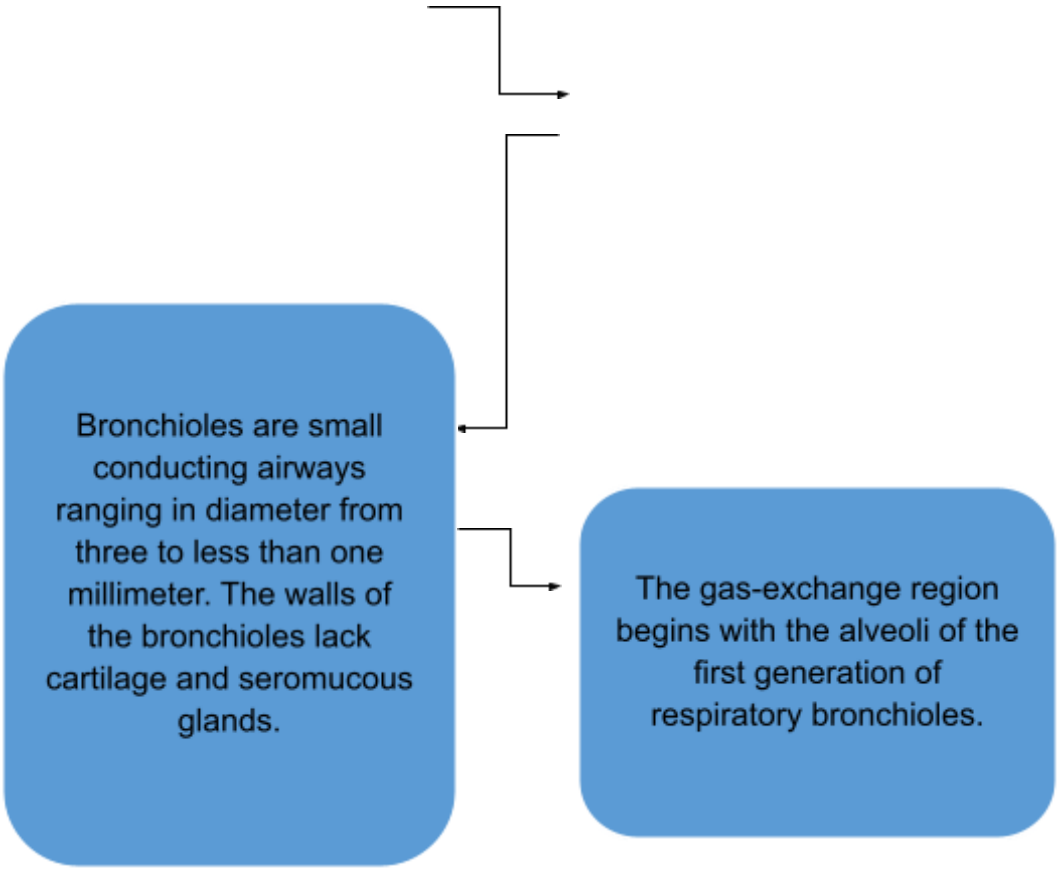


Photo credit to: www.topperlearning.com

TASK 2. ORGANIZATION AND PHYSIOLOGICAL CONCEPT. In the flow chart provided write the process of respiration by describing the physiological function of each organ in the Respiratory system.

(Source:https://www.britannica.com/science/human-respiratory-system/Blood-vessels-lymphatic- vessels-and-nerves)





Worksheet No. 8

OBJECTIVE: Name the organs that compose the circulatory system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-20)

CIRCULATORY SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Label the circulation diagram of oxygenated and deoxygenated blood to and from the upper and lower extremities. *(Learning Competency S11/12LT- IIIaj-20)*

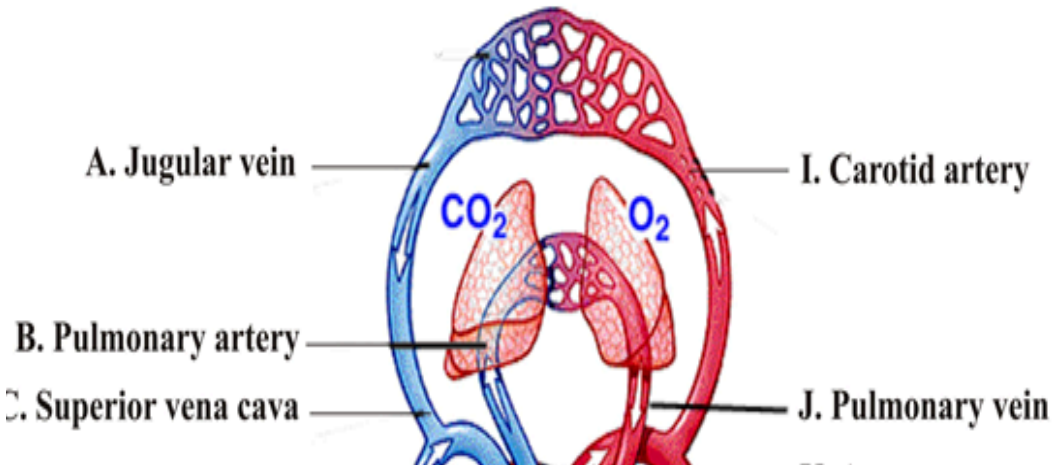


Photo credit to: www.daviddarling.info

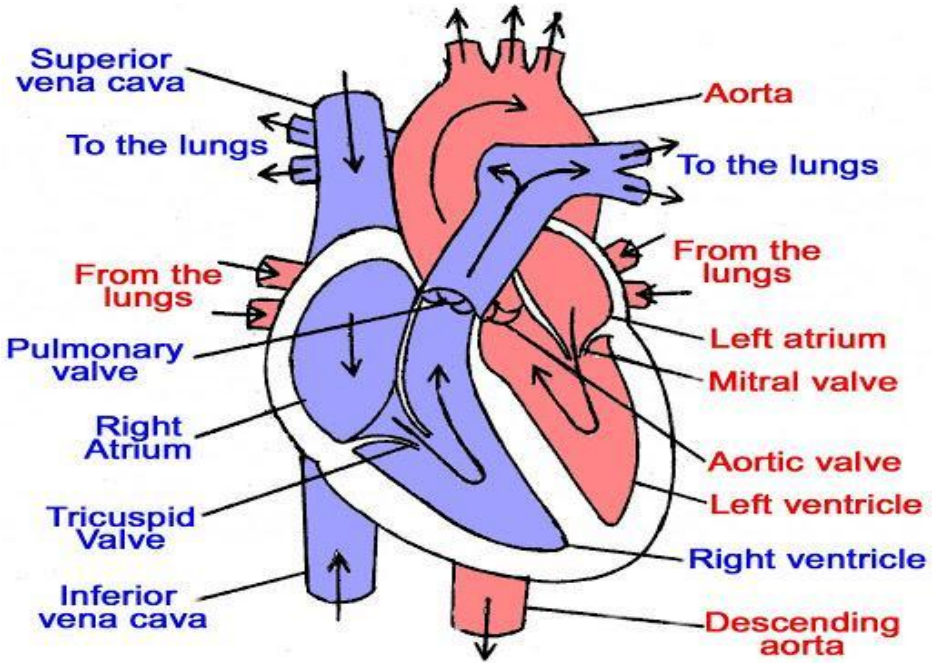
TASK 2. PHYSIOLOGICAL CONCEPT. Describe the flow of oxygenated and deoxygenated blood as it circulates from lower extremity to upper extremity

(Source: https://training.seer.cancer.gov/anatomy/cardiovascular/blood/pathways.html)

Oxygenated Blood	Deoxygenated Blood
The systemic circulation provides the functional blood supply to all body tissue. It carries oxygen and nutrients to the cells and picks up carbon dioxide and waste products. The oxygenated blood that leaves the left ventricle of the heart through the aortic semilunar valve and goes to the aorta and the deoxygenated blood that returns to the right atrium of the heart via the superior and inferior vena cava after traveling to all the organs of the body, including the nutrient arteries to the lung. See also pulmonary circulation, coronary	Pulmonary circulation transports oxygen-poor blood from the right ventricle to the lungs, where blood picks up a new blood supply. Then it returns the oxygen-rich blood to the left atrium. This route of circulation route goes from the right ventricle of the heart through the pulmonary semilunar valve to the pulmonary trunk that branches into the right and left pulmonary arteries, which go to the lungs. Here the deoxygenated blood loses its carbon dioxide and picks up the oxygen and returns to the left atrium of the heart via the four

circulation, hepatic portal circulation, cerebral circulation, fetal circulation.	pulmonary veins, systemic circulation, coronary circulation, hepatic portal circulation, cerebral circulation, fetal circulation.

TASK 3. ANATOMICAL MODEL. Illustrate an anatomical model of the heart and label its part.



(Source: http://myibbiology.blogspot.com/2014/06/topic-62-transport-system.html)

Worksheet No. 9

OBJECTIVE: Name the organs that compose the excretory system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-20)

EXCRETORY SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Label the anatomical model of excretory system.

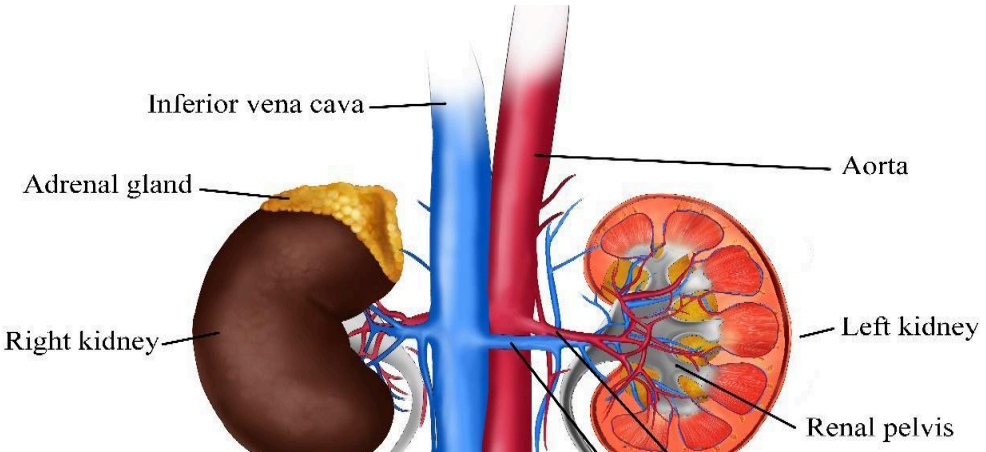


Photo credit to: ciet ncert/cc-by-sa 4.0 unported/nroer.gov.in

TASK 2. PHYSIOLOGICAL CONCEPT. Describe the function of each organ in the excretory system.

(Source: https://www.cliffsnotes.com/study-guides/biology/biology/excretion-and-homeostasis/human-excretory-system)

level of the stomach and liver. Blood enters the kidneys through renal arteries and leaves through renal veins. Tubes called ureters carry waste products from the kidneys to the urinary bladder for storage or for release. The functional and structural unit of the kidney is the nephron. The nephron produces urine and is the primary unit of homeostasis in the body. It is essentially a long tubule with a series of associated blood vessels. The upper end of the tubule is an enlarged cuplike structure called the Bowman's capsule. Below the Bowman's capsule, the tubule coils to form the proximal tubule, and then it follows a hairpin turn called the loop of Henle. After the loop of Henle, the tubule coils once more as the distal tubule. It then enters a collecting duct, which also receives urine from other distal tubules.

Within the Bowman's capsule is a coiled ball of capillaries known as a glomerulus. Blood from the renal artery enters the glomerulus. The force

Worksheet No. 10

OBJECTIVE: Name the organs and the nerves that compose the digestive system and explain the physiological function of each organ in the metabolic process of an organism. (Learning Competency S11/12LT-IIIaj-20)

NERVOUS SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Label the anatomical model of nervous system.

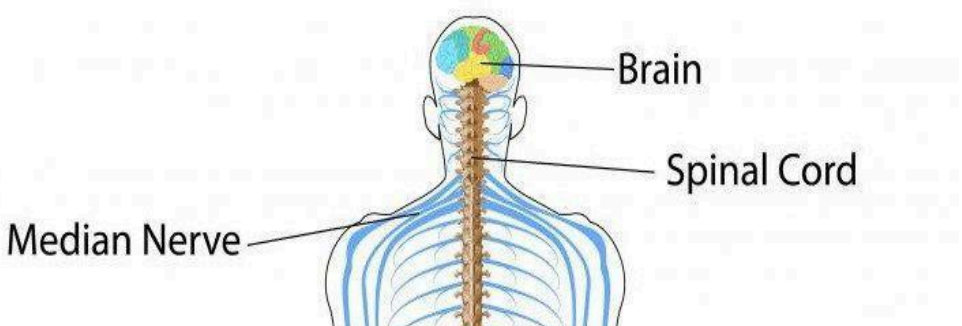


Photo credit to: www.shutterstock.com

TASK 2. PHYSIOLOGICAL CONCEPT. Describe the function of each organ in the nervous system.

transmits signals between the brain and the rest of the body, including internal organs. In this way, the nervous system's activity controls the ability to move, breathe, see, think, and more. The basic unit of the nervous system is a nerve cell, or neuron. The human brain contains about 100 billion neurons. A neuron has a cell body, which includes the cell nucleus, and special extensions called axons (pronounced AK-sonz) and dendrites (pronounced DEN-drahytz). Bundles of axons, called nerves, are found throughout the body. Axons and dendrites allow neurons to communicate, even across long distances. Different types of neurons control or perform different activities. For instance, motor

Worksheet No. 11

OBJECTIVE: Identify the bones that compose the skeletal system and explain the physiological function of each bone in the locomotion process of an organism. (Learning Competency S11/12LT-IIIaj-21)

SKELETAL SYSTEM

TASK 1. LABELING OF ANATOMICAL MODEL. Label the anatomical model of skeletal system.

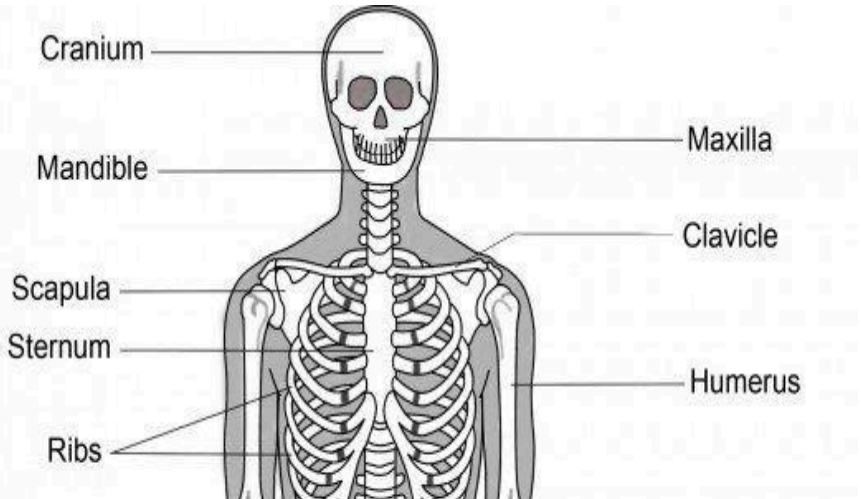


Photo credit to: www.hubpages.com/EdmundCusters

Worksheet No. 12

OBJECTIVE: Describe the interaction within an ecosystem and explain the principle of utilization of energy by biotic and abiotic factors. (Learning Competency S11/12LT-IVhj-29)

ENVIRONMENTAL INTERACTION

TASK 1. FOOD CHAIN. Study the food chain below identify the order of consumer and write it in the box

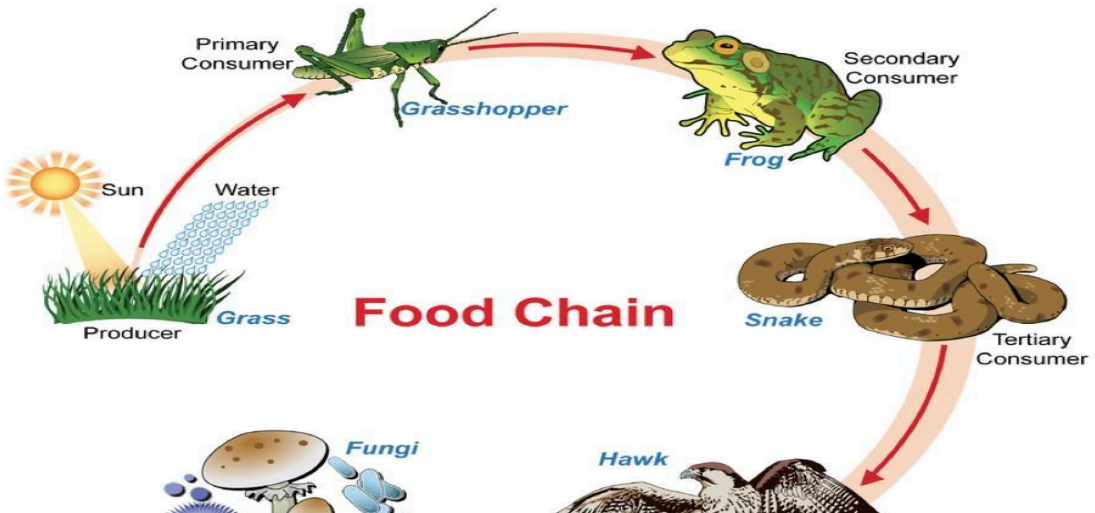


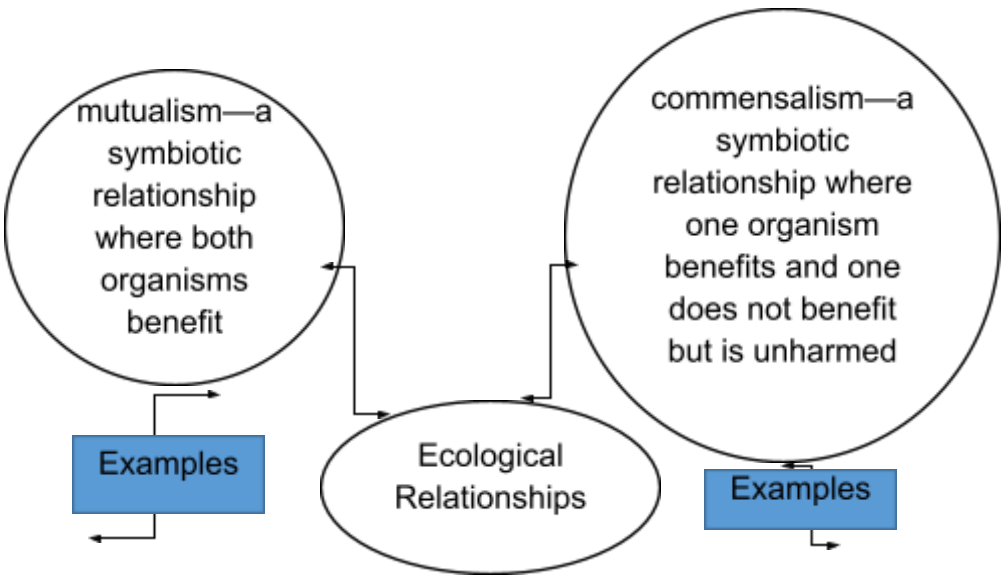
Photo credit to: www.thinglink.com

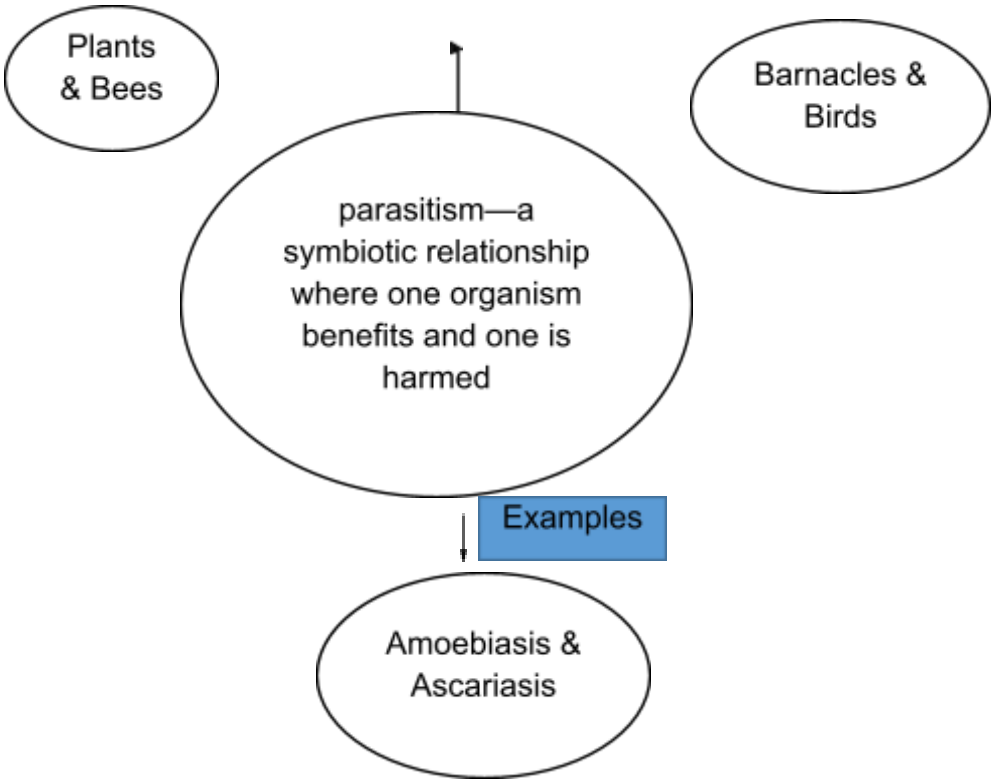
TASK 2. SYNTHESIS. Describe the levels of organization in the food chain and explain the interaction between the producer and consumers.

Feeding relationships show what organisms eat and which are eaten by others and through this the levels of organization in an ecosystem. These can be shown in food chains, which add together to make food webs for a habitat. Radiation from the sun is the source of energy for living organisms. At the base of almost every food chain is a producer. These are plants or algae, which photosynthesize. This means they convert energy from the sun into glucose during photosynthesis, which produces biomass. It is this which feeds the rest of the food chain. All animals above the producer are called consumers. The first is the primary consumer and the next is the secondary consumer. Animals that hunt and kill others are called predators and those that are hunted and killed are called prey. The top animal in the feeding relationship is called the apex predator. Decomposers are bacteria and fungi, which break down dead organisms in a process called decomposition or rotting. They do this by releasing enzymes onto the dead matter and afterwards, consume the broken down substances. They form a vital role in the recycling of matter. When organisms die and decompose, plants absorb the broken down nutrients through their roots. (Source:https://www.bbc.co.uk/bitesize/guides/z2pm3k7/revision/1)

TASK 3. CONCEPT WEB. Complete the concept web of ecological relationships and explain each component.

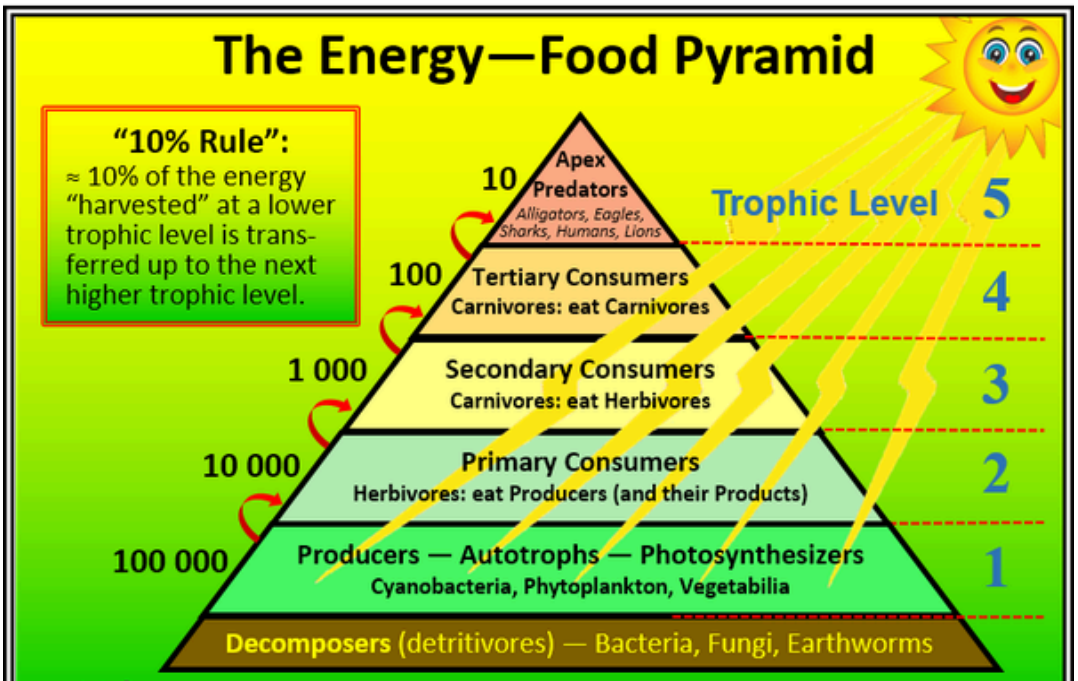
(Source: https://www.nationalgeographic.org/activity/ecological-relationships/)





TASK 4. LEVELS OF ORGANIZATION. Indicate and explain the trophic levels of energy in the pyramid below.

(Source: http://dendro.cnre.vt.edu/forsite/2004presentations/Taylor/forsite/forsite.html/ https://sciencing.com/difference-between-1st-2nd-3rd-level-consumers-food-8458.html



Food webs and food chains illustrate the relationships between different organisms in an ecosystem by indicating "who eats who." In a schematic that usually appears as a pyramid, organisms are divided based on their trophic level, or which consumer level they occupy. These pyramids illustrate the movement of energy from the broad base of producers at the bottom through the decreasing number of consumers up to the top of the pyramid. Food webs illustrate the same information but use lines to connect each consumer to what it eats.

Producers: Photosynthesizing organisms

Producers are any kind of green plant. Green plants make their food by taking sunlight and using the energy to make sugar. The plant uses this sugar, also called glucose to make many things, such as wood, leaves, roots, and bark.

Consumers: any organism that can't make its own food. Consumers have to feed on producers or other consumers to survive. Deer are herbivores, which means that they only eat plants (Producers).

Decomposers: An organism that primarily feeds on dead organisms or the waste from living organisms Decomposers take all the dead animals and plants (consumers and decomposers) and break them down into their nutrient components so that plants can use them to make more food.

Worksheet No. 13

OBJECTIVE: Describe the interlink relationship between biotic and abiotic factors in an ecosystem by explaining the process of Water cycle. (Learning Competency S11/12LT-IVhj-28)

ECOLOGICAL INTERACTION 1

TASK 1. WATER CYCLE ANALYSIS. Analyze the given diagram and explain the process of water cycle.

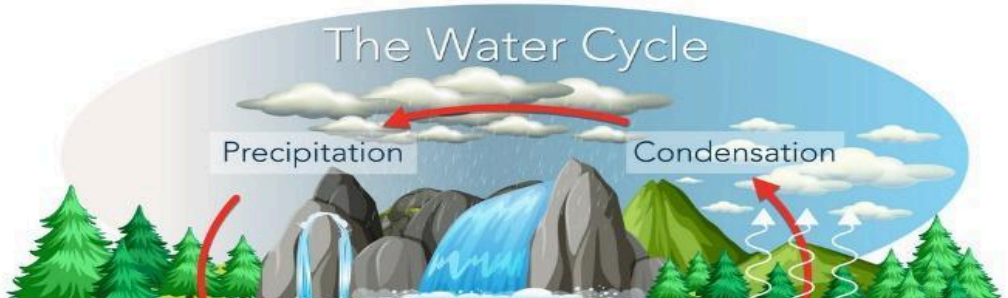


Photo credit to: www.vectorstock.com

Explain It Here:

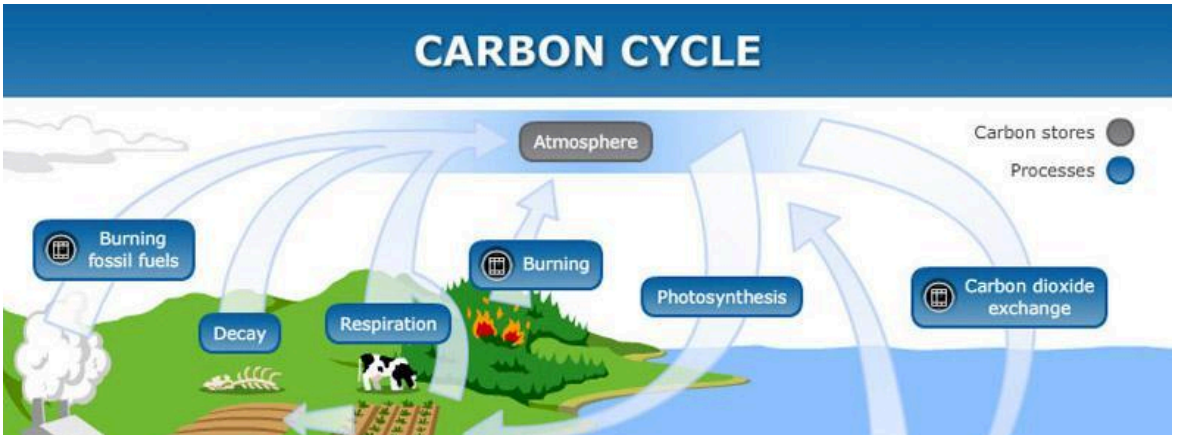
Precipitation is a vital component of how water moves through Earth's water cycle, connecting the ocean, land, and atmosphere. Knowing where it rains, how much it rains and the character of the falling rain, snow or hail allows scientists to better understand precipitation's impact on streams, rivers, surface runoff and groundwater. Frequent and detailed measurements help scientists make models of and determine changes in Earth's water cycle. The water cycle describes how water evaporates from the surface of the earth, rises into the atmosphere, cools and condenses into rain or snow in clouds, and falls again to the surface as precipitation. The water falling on land collects in rivers and lakes, soil, and porous layers of rock, and much of it flows back into the oceans, where it will once more evaporate. The cycling of water in and out of the atmosphere is a significant aspect of the weather patterns on Earth. (Source: https://gpm.nasa.gov/education/water-cycle)

Worksheet No. 14

OBJECTIVE: Describe the interlink relationship between biotic and abiotic factors in an ecosystem by explaining the process of Carbon cycle. (Learning Competency S11/12LT-IVhj-28)

ECOLOGICAL INTERACTION 2

TASK 1. CARBON CYCLE ANALYSIS. Analyze the given diagram and explain the process of carbon cycle.



Explain It Here:

The carbon cycle describes the process in which carbon atoms continually travel from the atmosphere to the Earth and then back into the atmosphere. Since our planet and its atmosphere form a closed environment, the amount of carbon in this system does not change. Where the carbon is located — in the atmosphere or on Earth — is constantly in flux. On Earth, most carbon is stored in rocks and sediments, while the rest is located in the ocean, atmosphere, and in living organisms. These are the reservoirs, or sinks, through which carbon cycles. Carbon is released back into the atmosphere when organisms die, volcanoes erupt, fires blaze, fossil fuels are burned, and through a variety of other mechanisms. In the case of the ocean, carbon is continually exchanged between the ocean's surface waters and the atmosphere, or is stored for long periods of time in the ocean depths. (Source: https://oceanservice.noaa.gov/facts/carbon-cycle.html)

Worksheet No. 15

OBJECTIVE: Describe the interlink relationship between biotic and abiotic factors in an ecosystem by explaining the process of Carbon cycle. (Learning Competency S11/12LT-IVhj-28)

ECOLOGICAL INTERACTION 3

TASK 1. NITROGEN CYCLE ANALYSIS. Analyze the given diagram and explain the process of nitrogen cycle.

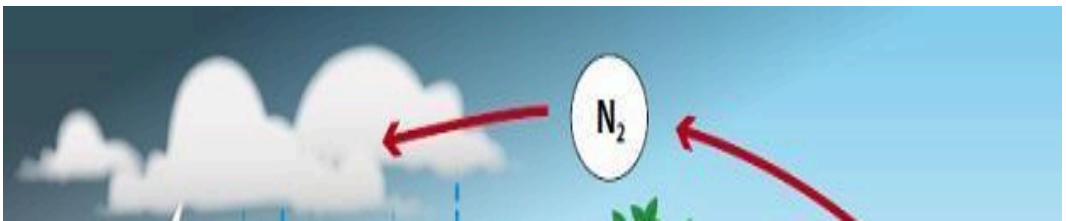


Photo credit to: https://www.studyacs.com/blog-nitrogen-cycle-37.aspx

Explain It Here:

primarily in an inert form (N_2) that few organisms can use; therefore, it must be converted to an organic – or fixed – form in a process called nitrogen fixation. Most atmospheric nitrogen is 'fixed' through biological processes.

First, nitrogen is deposited from the atmosphere into soils and surface waters, mainly through precipitation. Once in the soils and surface waters, nitrogen undergoes a set of changes: its two nitrogen atoms separate and combine with hydrogen to form ammonia (NH_4^+). This is done by microorganisms that fall into three broad categories: bacteria living in symbiotic relationships with certain plants, free anaerobic bacteria, and algae. While ammonia can be used by some plants, most

Worksheet No. 16

OBJECTIVE: Describe Earth's biome and explain its component that affects its environmental temperature. (Learning Competency S11/12LT-IVhj-30)

TERRESTRIAL BIOME

TASK 1. TERRESTRIAL BIOME ANALYSIS. Analyze the given diagram and explain the components of terrestrial biome and the abiotic factors in each component.

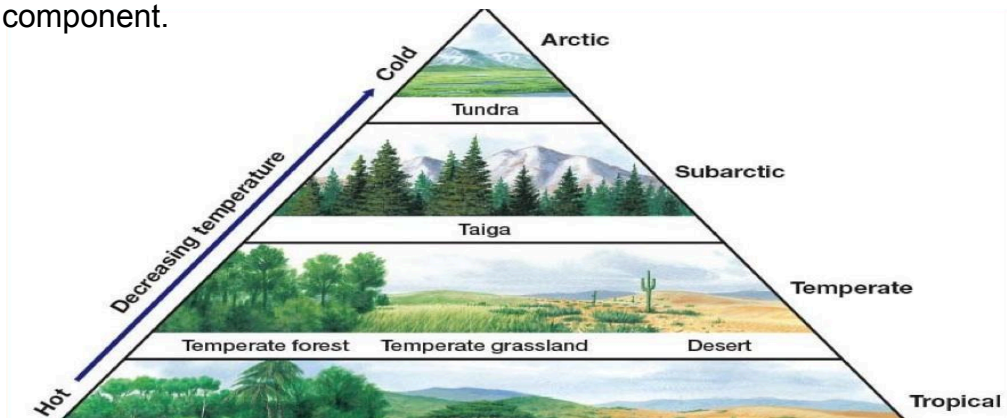


Photo credit to: anamelissa-scienceclass.blogspot.com

Explain It Here: (Source: https://www.nationalgeographic.org/encyclopedia/biome/)

A biome is an area of the planet that can be classified according to the plants and animals that live in it. Temperature, soil, and the amount of light and water help determine what life exists in a biome. A biome is different from an ecosystem. An ecosystem is the interaction of living and nonliving things in an environment. A biome is a specific geographic area notable for the species living there. A biome can be made up of many ecosystems. For example, an aquatic biome can contain ecosystems such as coral reefs and kelp forests. Not all scientists classify biomes in the same way. Some use broad classifications and count as few as six biomes. These are forest, grassland, freshwater, marine, desert, and tundra. Other scientists use more precise classifications and list dozens of different biomes. For example, they consider different kinds of forests to be different biomes. Tropical rain forests that are warm and wet year-round are one biome. Temperate deciduous forests—those that have cold winters, warm summers, and are dominated by trees that lose their leaves—are a different biome. Taiga forests, which are in cold regions and are dominated by cone-bearing firs and spruces, are yet another biome. Boundaries between biomes are not always sharply defined. For instance, there are sometimes transition zones between grassland and forest biomes. Coasts and wetlands are transition zones between terrestrial and aquatic biomes.

Worksheet No. 17

OBJECTIVE: Describe how species diversity is affected by organisms' population density in an ecological niche. (Learning Competency S11/12LT-IVhj-30)

POPULATION DENSITY

TASK 1. DATA ANALYSIS. Analyze the given diagram, label the data correctly and interpret/explain the data in terms of organism size and population density.

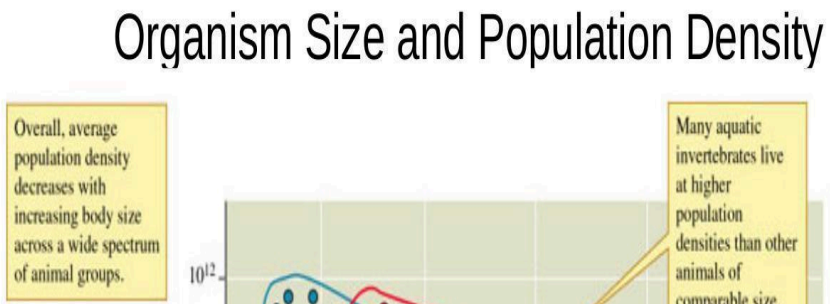


Photo credit to: www.chegg.com

Explain It Here:

Population density is the number of individuals per unit of geographic area, e.g., number per m2, per ha, or per km2. This variable affects a number of other population variables. For example, mean density determines the likelihood of finding mates, hence population viability, and propensity to disperse, hence the probability of colonizing vacant habitat patches. Density also affects the population dispersion pattern and the behavior of swarming species. Densities and intensities of insect populations vary widely. (Source: https://www.sciencedirect.com/topics/earth-and-planetary-sciences/population-density)