Disclaimer: This packet is intended ONLY for the use of students enrolled in Leon County Schools.

Complete the assignments below.

Biology

Week 1:
☐ Abiotic vs. Biotic Factors (SC.912.L.17.5) ☐ Human Population Growth (Carrying Capacity) (SC.912.L.17.5) ☐ Content Area Reading: Seeing the Invisible

Week 2:
☐ Animal and Plant Cells (SC.912.L.14.3) ☐ Prokaryotes and Eukaryotes (SC.912.L.14.3) ☐ Photosynthesis and Cellular Respiration (SC.912.L.18.9)

Week 3:

Week 4:

Biology

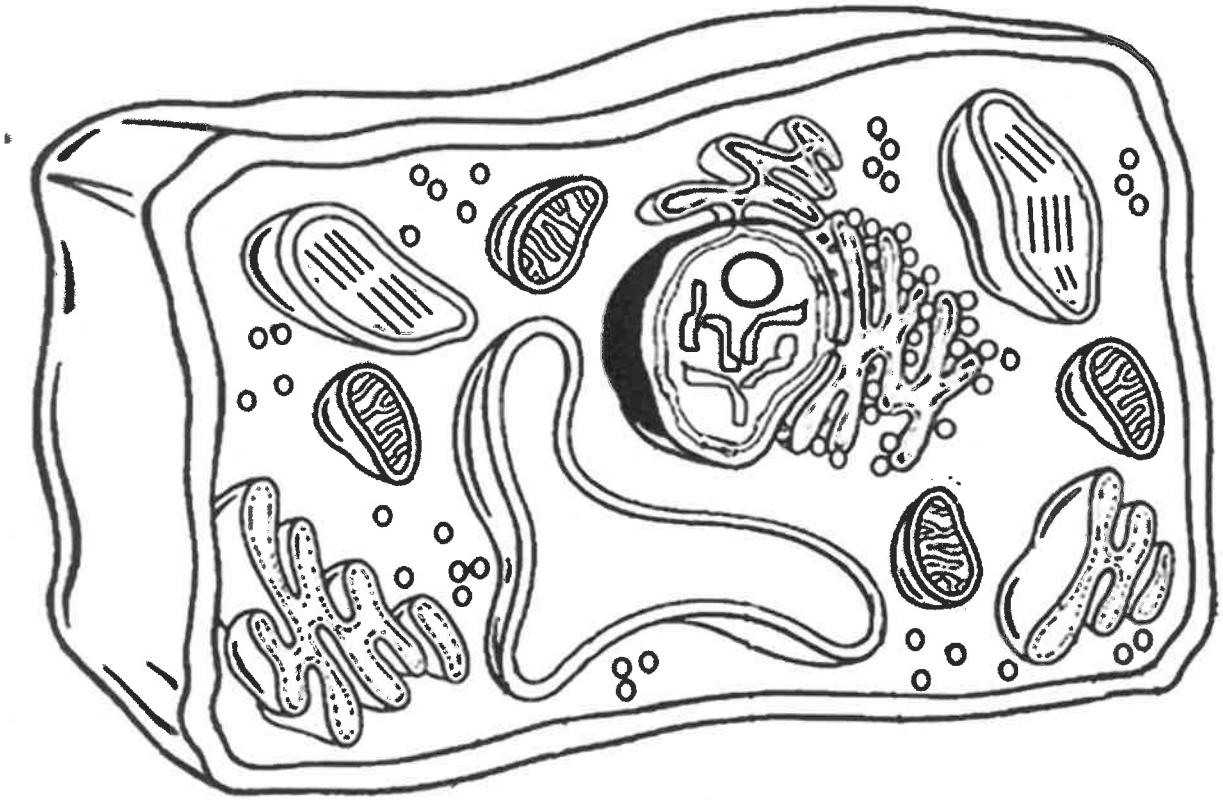
Week

2

Name _____ Date _____ Per _____ CELL COLORING AND LABELING

Color and Label the PLANT CELL and answer the questions

- ☐ Cell Membrane (orange)
- ☐ Vacuole (lt. Blue)
- ☐ Nucleolus (brown)
- ☐ Cytoplasm (white)
- ☐ Nucleoplasm (yellow)
- ☐ Golgi Apparatus (dk blue)
- ☐ Chloroplasts (light green)
- ☐ Chromatin (gray)
- ☐ Mitochondria (red)
- ☐ Cell Wall (dark green)
- ☐ Ribosome (purple)
- ☐ Rough Endoplasmic Reticulum (pink)
- ☐ Smooth Endoplasmic Reticulum (pink)



Analysis

1. Name two things found in a plant cell that are not found in an animal cell:

2. How does the shape of a plant cell differ from that of an animal cell?

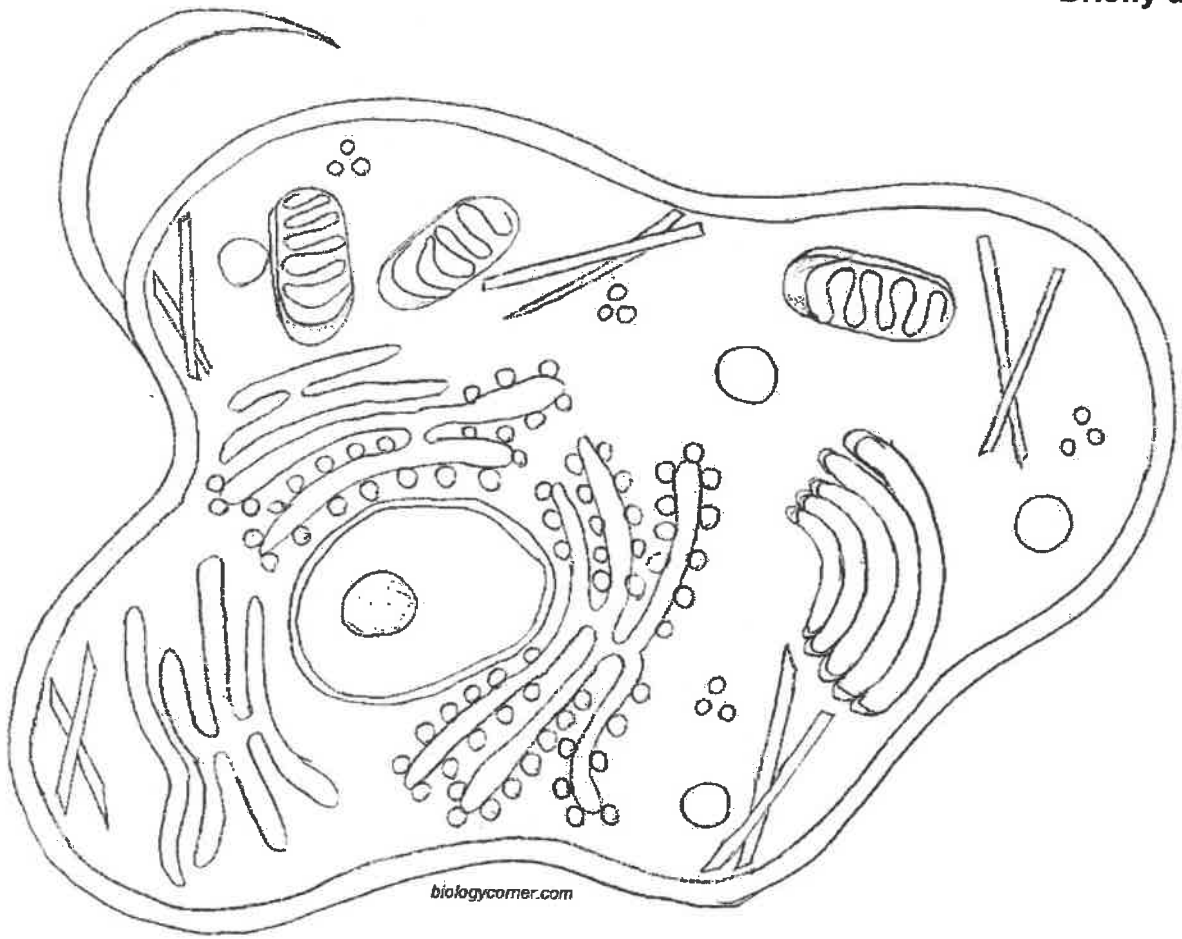
3. What is the function of the chloroplasts?

4. What is the function of the vacuole?

Name _____ Date _____ Per _____ CELL COLORING AND LABELING

Color and Label the ANIMAL CELL and answer the questions

Cell Membrane(light brown) ☐
Cytoplasm (light yellow) ☐
Nucleoplasm (pink) ☐
Nuclear Membrane(dark brown) ☐
Nucleolus (black) ☐
Golgi Apparatus (pink) ☐
Flagella (red/blue striped) ☐
Rough Endoplasmic Reticulum (dark blue) ☐
Ribosome (red) ☐
Mitochondria (orange) ☐
Lysosome (purple) ☐
Microtubules (dark green) ☐
Smooth Endoplasmic Reticulum(light blue) ☐



Briefly describe the function of the cell parts.

1. Cell membrane

_____

2. Endoplasmic Reticulum

_____

3. Ribosome

_____

4. Mitochondria

_____

5. Nucleus

_____

Prokaryotes and Eukaryotes

Biologists have come to realize that the difference between plants and animals are not as significant as the differences between the two basic cellular types-prokaryotic and eukaryotic. The eukaryotic cell is the structural unit of all modern or higher organisms, including animals and plants. Bacteria are the only known prokaryotic cells. It is generally thought that eukaryotic cells represent a more advanced stage of evolution than prokaryotic cells. As a result of genetic evolution, there are fewer similarities between prokaryotic and eukaryotic cells than there are between plant and animal cells.

The nature of cellular organization and reproduction in prokaryotic cells is quite different from that of eukaryotic cells. The nuclear material of a prokaryotic cell is found in an irregular mass in the cytoplasm called a nucleoid, while that of a eukaryotic cell is enclosed within a nuclear membrane. Prokaryotic cells also lack the mitochondria, endoplasmic reticulum, Golgi apparatus and lysosomes found in eukaryotic cells. When chlorophyll is present in prokaryotic cells, it is not organized into chloroplasts as it is in the eukaryotic cells that contain chlorophyll.

In addition, the cell wall of prokaryotic cells is made up of different chemical composition than the cell wall of eukaryotic cells. Prokaryotic cells reproduce simply by dividing in half while the reproductive process of the eukaryotic is made of several complex steps.

It is thought that prokaryotic cells exhibit a very primitive structure. Because of this primitive structure, bacteria are believed to be the first living things to have developed on earth and that eukaryotic cells evolved from the prokaryotic cells.

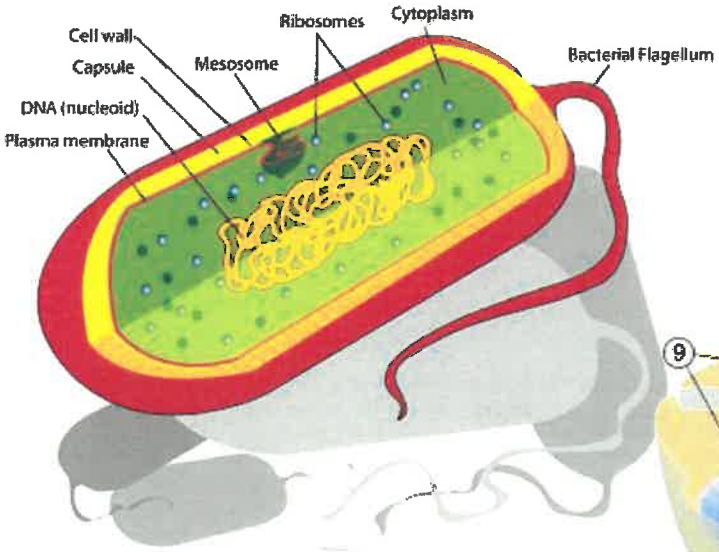
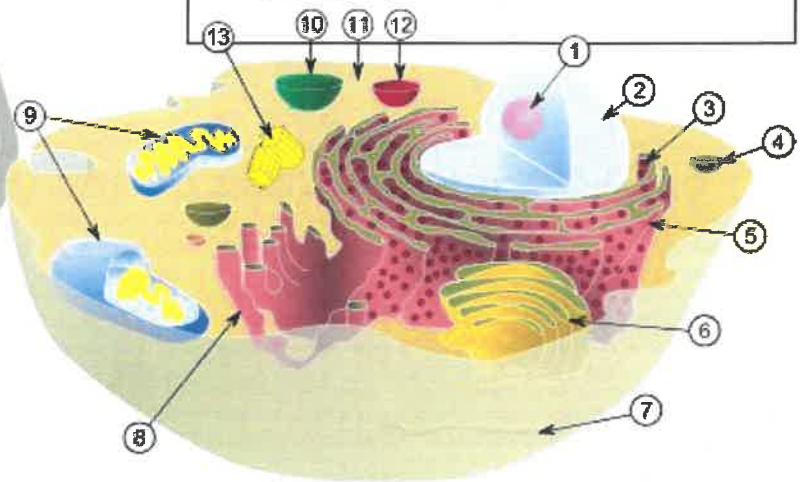


Diagram of a typical eukaryotic cell, showing Organelles: (1) nucleolus (2) nucleus (3) ribosome (4) vesicle (5) rough endoplasmic reticulum (ER) (6) Golgi apparatus (7) Cytoskeleton (8) smooth ER (9) mitochondria (10) vacuole (11) cytoplasm (12) lysosome (13) centrioles



Biology Name_____

Period_____

Prokaryote and Eukaryote Reading Answers

Answer the following questions in effective sentences:

1. What are the two main types of cells?

2. List five differences between prokaryotes and eukaryotes.
   a.
   b.
   c.
   d.
   e.

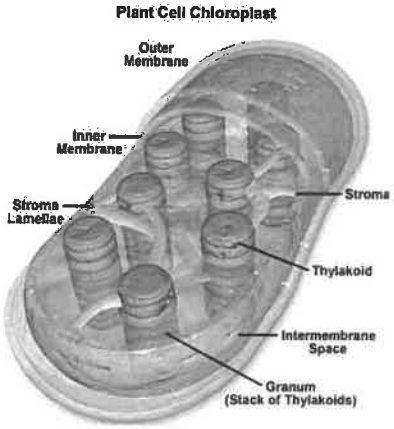
3. Why are prokaryotes considered to be primitive compared to eukaryotes?

4. What is the only example of a prokaryotic cell?

5. What are two examples of eukaryotic cells?

Photosynthesis: Making Energy

Chloroplasts



Photosynthesis is a process in which sunlight energy is used to make glucose. The site of photosynthesis is in the **chloroplast** – an organelle found in the leaves of green plants. The main functions of chloroplasts are to produce food (**glucose**) during **photosynthesis**, and to store food energy. Chloroplasts contain the pigment, *chlorophyll*. Chlorophyll absorbs most of the colors in the color spectrum, and reflects only green and yellow wavelengths of light. This is why we see leaves as green or yellow – because these colors are reflected into our eyes.

1. What is photosynthesis? _____

   _____
2. Where does photosynthesis occur? _____
3. What are chloroplasts and where are they found? _____

   _____
4. What are the two main functions of chloroplasts? _____
5. Why doe most leaves appear green? _____
6. What is the primary pigment found in the chloroplast? _____

Photosynthesis

Glucose is another name for sugar. The molecular formula for glucose is $C_6H_{12}O_6$. Plants make sugar by using the energy from sunlight to transform CO_2 from the air with water from the ground into glucose. This process, called photosynthesis, occurs in the chloroplast of the plant cell. During this process, oxygen (O_2) is created as a waste product and is released into the air for us to breath. The formula for photosynthesis is:

(reactants) (products)

$$6CO_2 + 6H_2O + \text{sunlight} \longrightarrow C_6H_{12}O_6 + 6O_2$$

This formula says that carbon dioxide + water molecules are combined with the energy from sunlight to produce sugar and oxygen. The reactants in photosynthesis (what is used) are CO_2, water and sun. The plant gets water from the ground through its roots. The plant collects carbon dioxide from the air. Much of the carbon dioxide comes from living organisms that exhale (breath it out) it, but some also comes from factory smokestacks and car fumes.

7. What is the formula for photosynthesis? _____

8. What three things are used to make glucose in photosynthesis? _____

_____

9. Where does the water come from? _____

10. Where does the water enter the plant? _____

11. Name 3 sources of CO_2. _____

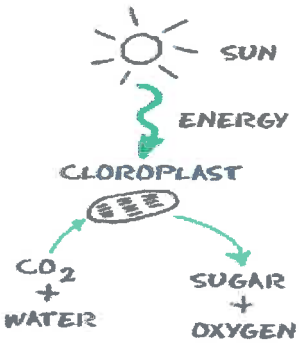
12. What type of energy does the plant use to convert CO_2 and H_2O into sugar? _____

The products are **glucose** and **oxygen**. The glucose produced is used by the plant for energy and growth. We obtain this glucose by eating plants. The oxygen produced is released into the air for us to breath. Photosynthesis is essential for all life on earth, because it provides food and oxygen. Plants are considered autotrophs because unlike us humans, they can make their own food using this process.

13. What is produced in photosynthesis? _____

14. What is the glucose used for? _____

15. What is the oxygen used for? _____

Photosynthesis in pictures	Photosynthesis in words	Photosynthesis in symbols
	Carbon dioxide and water combine with sunlight to create oxygen and glucose.	light $6CO + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$

<u>Essential Question</u>: Describe, using scientific terms, how plants turn sunlight into energy? Make sure to refer to the chemical equation to photosynthesis and discus the reactants and products.

_____

_____

_____

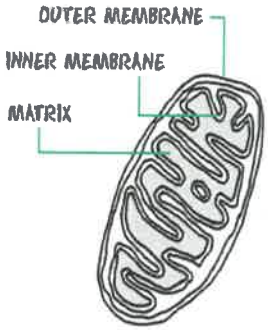
_____

_____

_____

Cellular Respiration: Breaking down Energy

Mitochondria are known as the powerhouses of the cell. They are **organelles** in a cell that act like a digestive system that takes in nutrients, breaks them down, and creates energy for the cell. The process of creating cell energy is known as ***cellular respiration***. Most of the chemical reactions involved in cellular respiration happen in the mitochondria. A mitochondrion is shaped perfectly to maximize its efforts.



1. What are mitochondria (not the powerhouse)?

2. What process occurs in mitochondria?

Introduction to Cellular Respiration

Organisms, such as plants and algae, can trap the energy in sunlight through photosynthesis and store it in the chemical bonds of carbohydrate molecules. The principal carbohydrate formed through photosynthesis is ***glucose***. Other types of organisms, such as animals, fungi, protozoa, and a large portion of the bacteria, are unable to perform this process. Therefore, these organisms must rely on the carbohydrates formed in plants to obtain the energy necessary for their metabolic processes. This means they must eat plants and other animals in order to gain energy.

4. Some organisms perform photosynthesis to produce energy. Other organisms cannot do photosynthesis. What can they do in order to obtain energy?_____

_____

Cells take the carbohydrates into their cytoplasm, and through a complex series of metabolic processes, they break down the carbohydrates and release the energy. The energy is generally not needed immediately; rather it is used to combine adenosine diphosphate (ADP) with another phosphate to form adenosine triphosphate (ATP) molecules. The ***ATP*** can then be used for processes in the cells that require energy, much as a battery powers a mechanical device. During the process of cellular respiration, carbon dioxide is given off. Animals exhale the carbon dioxide. Plant cells can use this carbon dioxide during photosynthesis to form new carbohydrates.

5. Animals and other organisms obtain the energy available in carbohydrates through the process of ***cellular respiration***. What is the purpose of cellular respiration? _____

_____

_____

6. What happens to carbohydrates during cellular respiration? _____

_____

_____

7. What is the chemical energy in the cell called? _____

8. What does ATP stand for? _____

9. How do animals get rid of the carbon dioxide? _____

10. What body system is involved with removing this waste? _____

Energy-producing process	Reaction	Location in cell
Photosynthesis	**11.** _____	**Chloroplast**
Cellular respiration	$C_6H_{12}O_6 + 6\ O_2 \rightarrow 6\ H_20 + 6CO_2 + \text{energy}$	**12.** _____

<u>Reflection Question</u>: Explain the relationship between photosynthesis and cellular respiration. Be sure to include the main purpose of both and where they occur inside the cell. You may draw a diagram as part of your explanation.