

Monday April 13th

Name: _____

Photosynthesis Packet

Photosynthesis: Critical Reading

Read the text and answer the questions that follow.

Introduction

All living things need **energy**, which is defined as the ability to do work. You can often see energy at work in living things — a bird flies through the air, a firefly glows in the dark, a dog wags its tail. These are obvious ways that living things use energy, but living things constantly use energy in less obvious ways as well.

Why Living Things Need Energy

Inside every cell of all living things, energy is needed to carry out life processes. Energy is required to break down and build up molecules and to transport molecules across plasma membranes. All life's work needs energy. A lot of energy is also simply lost to the environment as heat. The story of life is a story of energy flow — its capture, its change of form, its use for work, and its loss as heat. Energy, unlike matter, cannot be recycled, so organisms require a constant input of energy. Life runs on chemical energy. Where do living organisms get this chemical energy?

How Organisms Get Energy: Autotrophs and Heterotrophs

The chemical energy that organisms need comes from food. **Food** consists of organic molecules that store energy in their chemical bonds. In terms of obtaining food for energy, there are two types of organisms: autotrophs and heterotrophs.

Autotrophs are organisms that make their own food. Most autotrophs use the energy in sunlight to make food in a process called **photosynthesis**. Only three types of organisms — plants, algae, and some bacteria — can make food through photosynthesis.

Autotrophs are also called **producers**. They produce food not only for themselves but for all other living things as well (which are known as consumers). This is why autotrophs form the basis of food chains.

Heterotrophs are living things that cannot make their own food. Instead, they get their food by consuming other organisms, which is why they are also called **consumers**. They may consume autotrophs or other heterotrophs. Heterotrophs include all animals and fungi and many single-celled organisms. What do you think would happen to consumers if all producers were to vanish from Earth?

1. What is energy? Give an example of how energy is used in a living organism.

2. Distinguish between autotrophs and heterotrophs.

For questions 3-7, put A for autotroph or H for heterotroph.

- _____ 3. a giant redwood tree
- _____ 4. a spider
- _____ 5. a rose bush
- _____ 6. a mushroom
- _____ 7. a blue whale

8. How is energy used in a cell?

9. Why are autotrophs considered the basis of food chains?

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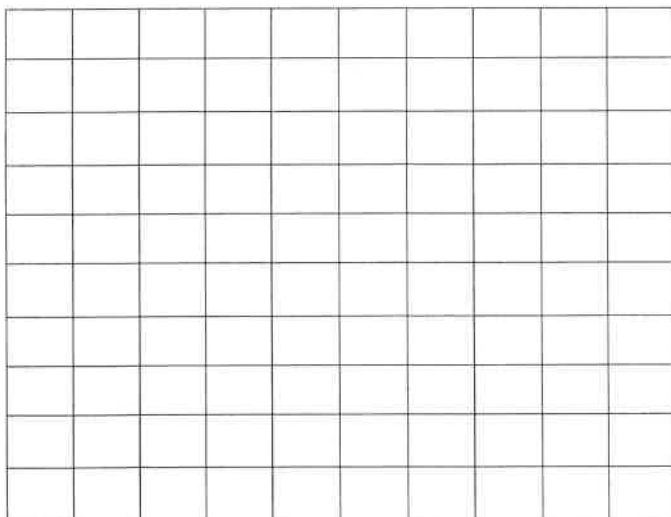
Photosynthesis: Fill in the blank

- | | | | |
|----------------|--------------|--------|-------------|
| Energy | Oxygen | Water | Chlorophyll |
| Chemical | Glucose | Winter | Less |
| Carbon dioxide | Light energy | Green | Pigment |
| Food | Light | Fall | Shorter |

Photosynthesis is a process where plants make their own _____⁽¹⁾ by using _____⁽²⁾. Basically, plants can convert light energy into _____⁽³⁾ energy. Plant leaves absorb red and blue _____⁽⁴⁾ into their leaves, reflecting _____⁽⁵⁾ light. This is why most plants are green in color. A _____⁽⁶⁾ called _____⁽⁷⁾ is found inside most plant's cells. This is the substance that absorbs sunlight. Meanwhile, plants are absorbing _____⁽⁸⁾ through their roots and storing it within their vacuoles. When the sunlight hits the water molecules the water breaks apart into hydrogen (which the plant keeps) and _____⁽⁹⁾ (which the plant release into the atmosphere). Plants also take in _____⁽¹⁰⁾ through tiny holes in their leaves, called stomata. When the carbon dioxide combines with hydrogen, a type of sugar called _____⁽¹¹⁾ is formed. This is the plant's food and it will break it down to obtain _____⁽¹²⁾ (ATP) to live and grow. Trees grow the most in the spring and summer, where there is a lot of sunshine everyday. When fall begins, the days grow _____⁽¹³⁾ and there is _____⁽¹⁴⁾ sunlight. This alerts the tree to begin getting ready for the _____⁽¹⁵⁾ season. The leaves begin to turn red, orange, gold, and brown, because with less sunlight and water for photosynthesis, the green chlorophyll begins to disappear. The variety of leaf colors we see in the _____⁽¹⁶⁾ season have been in the leaves all along, but with so much green chlorophyll, we can't see them until the chlorophyll is gone. As winter begins to approach, the tree uses stored sugar it made from photosynthesis during the spring and summer, and goes into a rest period.

Graphing Practice

Tuesday April 14th



Depth (m)	# of Bubbles/Minute (Plant A)	# of Bubbles/Minute (Plant B)
2	29	21
5	36	27
10	45	40
16	32	50
25	20	34
30	10	20

Tissues, Organs, & Systems

Cross-Curricular Focus: Life Science

Wednesday April 15th

Name: _____

Answer the following questions based on the reading passage. Don't forget to go back to the passage whenever necessary to find or confirm your answers.

1) Which statement supports the fact that bone cells are smaller than bone tissue?

2) What is an organ? Give an example of an organ.

3) List two organ systems.

4) Which organ system do you think is the most interesting? Why? _____

5) Why is it necessary for the respiratory and circulatory systems to work together?

Multi-cellular organisms have many cells that work together in specific ways, each group performing certain functions. When each group does its part, the organism gets everything that it needs.

A **tissue** is a large group of cells that all have the same purpose or function. Each kind of cell has unique characteristics such as shape, size, flexibility, color and texture. Nerve cells combine with other nerve cells to make nerve tissue. Muscle cells combine with other muscle cells to make muscle tissue. Bone cells combine with other bone cells to make bone tissue and so on.

An **organ** is a group of tissues that work together to do a certain job for the body. Some of the human body's organs include the stomach, lungs, heart, kidneys, brain and liver. Some of a plant's organs include roots, stems, fruit and leaves.

When several different organs join to meet the organism's needs, they are working together in an organ **system**. There are several different organ systems constantly working in most multi-cellular organisms. You are probably familiar with some of the human body systems. The respiratory system includes the lungs and all the body parts that allow us to breathe in oxygen and exhale carbon dioxide. The circulatory system includes the heart and all the body parts that help move blood around the body. The blood, in turn, carries nutrients and oxygen to all the cells of the body. The respiratory and circulatory systems work very closely together. The digestive system helps the body get nutrients from food that is eaten, and store energy for future use. The excretory system helps remove waste products that would otherwise harm the body.

Each of the body's systems is necessary for the overall health of the body. As the body's building blocks, cells join to make tissues. Tissues join to make organs. Organs join to make systems. It's all arranged to ensure the organism's survival.

Respiration

By Cindy Grigg

Thursday April 16th



1 Did you know there are two kinds of respiration? One kind of respiration is when we breathe air in and out of our lungs. The other kind happens in both plant and animal cells, including people's cells.

2 Animals and plants need oxygen. When an animal breathes, it takes in oxygen gas and releases carbon dioxide gas into the atmosphere. This carbon dioxide is a waste product produced by the animal's cells during cellular respiration.

3 Cellular respiration occurs in the individual cells.

Digested foods have chemical energy stored in them. Energy to live comes from releasing this energy. Cells use oxygen to "burn" food for energy. Water and carbon dioxide are produced as wastes. The cells in both plants and animals perform respiration. Carbon dioxide is also released into the atmosphere when fuels are burned, such as in automobiles or factories. Plants take in carbon dioxide and release oxygen through their leaves.

4 Plants use a process called photosynthesis to make their own food. During photosynthesis, a plant uses light, water, and carbon dioxide to make its own food. Oxygen is given off during photosynthesis as a waste product.

5 The chemical equation for photosynthesis is:
 $\text{LIGHT (energy) + CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$

6 This is the reaction that only plants and some algae and bacteria can do. They take sunlight and combine carbon dioxide (CO_2) and water (H_2O). They create glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) and oxygen gas (O_2). By this process, plants change energy from the sun into glucose.

7 The reverse of this process is cellular respiration. The sugars made from photosynthesis are broken down with oxygen to release energy. The waste products are carbon dioxide and water.

8 The equation for this is: $\text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2 \rightarrow \text{Usable Energy (ATP) + CO}_2 + \text{H}_2\text{O}$.

9 Cells then use that energy to power the functions of the cell. The energy has been stored in a compound called adenosine triphosphate (ATP). ATP is the molecule used by cells to power the secondary reactions that keep them alive.

10 Some other organisms such as algae, which are not classified as plants or animals, also make their own food by photosynthesis. Most algae live in water. The amazing thing is that eighty percent of the oxygen on Earth is made by algae living in oceans. Plants living on land replace the remaining twenty percent of the oxygen used by animals. This is a vital reason we must protect our oceans from pollutants. The algae living in our oceans are crucial to life on Earth.

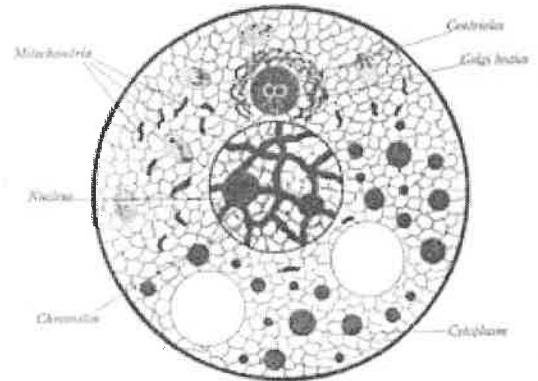


FIG. 26. A Typical Cell

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Name _____

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Respiration

<p>1. Photosynthesis is the process by which:</p> <p><input type="radio"/> A Plants break down food.</p> <p><input type="radio"/> B Animals make their own food.</p> <p><input type="radio"/> C Animals break down food.</p> <p><input type="radio"/> D Plants make their own food.</p>	<p>2. Respiration is the process in which:</p> <p><input type="radio"/> A Cells produce carbon dioxide and water</p> <p><input type="radio"/> B Cells use oxygen to burn food for energy</p> <p><input type="radio"/> C Both a and b</p> <p><input type="radio"/> D Neither a nor b</p>
<p>3. Where do most algae live?</p> <p>_____</p> <p>_____</p>	<p>4. What do you think would happen to the amount of oxygen in the atmosphere if all of Earth's algae suddenly died off?</p> <p>_____</p> <p>_____</p>
<p>5. Plants and animals perform respiration.</p> <p><input type="radio"/> A False</p> <p><input type="radio"/> B True</p>	<p>6. Once animals use oxygen, it can never be replaced.</p> <p><input type="radio"/> A False</p> <p><input type="radio"/> B True</p>
<p>7. Algae cannot make their own food.</p> <p><input type="radio"/> A False</p> <p><input type="radio"/> B True</p>	<p>8. Plants produce oxygen as a waste product of photosynthesis.</p> <p><input type="radio"/> A False</p> <p><input type="radio"/> B True</p>

Respiration

By Cindy Grigg

Friday April 17th



reactions	perform	respiration	or
process	combine	life	equation
individual	reaction	power	atmosphere
reason	molecule	reverse	adenosine
glucose			

Directions: Fill in each blank with the word that best completes the reading comprehension.

Did you know there are two kinds of respiration? One kind of respiration is when we breathe air in and out of our lungs. The other kind happens in both plant and animal cells, including people's cells.

Animals and plants need oxygen. When an animal breathes, it takes in oxygen gas and releases carbon dioxide gas into the atmosphere. This carbon dioxide is a waste product produced by the animal's cells during cellular respiration.

Cellular (1) _____ occurs in the (2) _____ cells. Digested foods have chemical energy stored in them. Energy to live comes from releasing this energy. Cells use oxygen to "burn" food for energy. Water and carbon dioxide are produced as wastes. The cells in both plants and animals (3) _____ respiration. Carbon dioxide is also released into the (4) _____ when fuels are burned, such as in automobiles (5) _____ factories. Plants take in carbon dioxide and release oxygen through their leaves.

Plants use a process called photosynthesis to make their own food. During photosynthesis, a plant uses light, water, and carbon dioxide to make its own food. Oxygen is given off during photosynthesis as a waste product.

The chemical (6) _____ for photosynthesis is:
 $\text{LIGHT (energy) + CO}_2 + \text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + \text{O}_2$

This is the (7) _____ that only plants and some algae and bacteria can do. They take sunlight and (8) _____ carbon dioxide (CO_2) and water (H_2O). They create (9) _____ ($\text{C}_6\text{H}_{12}\text{O}_6$) and oxygen gas (O_2). By this (10) _____, plants change energy from the sun into glucose.

The (11) _____ of this process is cellular respiration. The sugars made from photosynthesis are broken down with oxygen to release energy. The waste products are carbon dioxide and water.

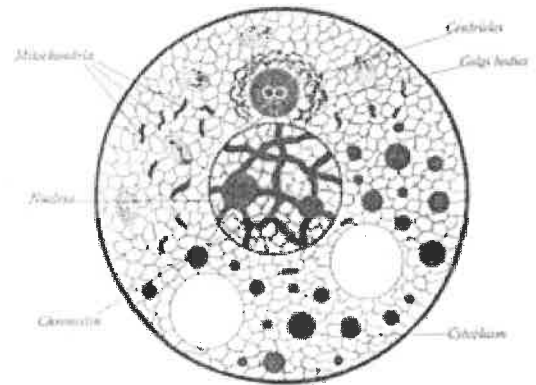


FIG. 26. A Typical Cell

Friday April
17th

The equation for this is: $C_6H_{12}O_6 + O_2 \rightarrow$ Usable Energy (ATP) + $CO_2 + H_2O$.

Cells then use that energy to power the functions of the cell. The energy has been stored in a compound called (12) _____ triphosphate (ATP). ATP is the (13) _____ used by cells to (14) _____ the secondary (15) _____ that keep them alive.

Some other organisms such as algae, which are not classified as plants or animals, also make their own food by photosynthesis. Most algae live in water. The amazing thing is that eighty percent of the oxygen on Earth is made by algae living in oceans. Plants living on land replace the remaining twenty percent of the oxygen used by animals. This is a vital (16) _____ we must protect our oceans from pollutants. The algae living in our oceans are crucial to (17) _____ on Earth.

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