

Name: _____

ANSWER KEY

#. _____

Matter Cycles

STEMscopes: Most of the matter on Earth is the same matter that existed when the planet was formed. The substances that make up living things have been recycled over and over again since the planet's beginning.

Standards that will be addressed:

- **5-LS2.1:** Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.
- **5-LS2.A.1:** The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food or other animals eat the animals that eat plants. Organisms can only survive in environments in which their needs are met.
- **5-LS2.B.1:** Matter cycles between the air and soil and among plants, animals, and microbes as organisms live and die. Organisms obtain gases and water from the environment and release waste matter (gases, liquids, solids) back into the environment.

Remember to look at the Science tab on our class website for additional resources, information, and updates.

Pages included in the packet:

1. Explore Activity: Composting
2. STEMscopedia
3. Linking Literature:
 - a. Cycle Models
4. Communicate: Should we burn yard waste?
5. Content Connection Videos
 - a. Penguins
 - b. Excreting Animals
6. Science Today: The Earthworm Project
7. Independent Practice
8. Concept Attainment Quiz

Optional Extension Activities:

- At Home Connection Piece (see class website)
- Web Surfing Science (see STEMscopes account)

Test Date & Journal Collection: *tentatively November 16th*

- The test will be 5 Multiple Choice Questions and 3 Open-Ended Questions.
- Student journals and packets will be collected and graded on neatness and completion.



Do

Name: _____ Date: _____ Group: _____

Composting Student Journal

The Problem

Students in the recycling club have noticed the large amount of trash that is produced in the cafeteria each day. The students have asked the principal if they could start a compost heap to help reduce the amount of trash.

The Challenge

The principal said he would consider the idea, but the students needed to present him with a plan and blueprint model.

Criteria and Constraints

The following criteria must be addressed:

- Outdoor location and scale drawing of compost area.
- Plan that includes materials allowed in compost, indoor collection, and recycling club responsibilities.
- The students will be given the following constraints:
 - 10 ft. X 10 ft. maximum
 - Limited to recycling club and school staff as workers.

Expert Roles

Write the names of the people in your group taking on each expert role.

- Design Team Expert _____
- Material Engineer _____
- Architectural Engineer _____
- Mechanical Engineer _____

Design

Draw a blueprint of your composting heap.



Do

Composting

Student Journal, continued

What materials are allowed in the compost heap?

How will you collect the materials to compost?

What are the recycling club's responsibilities?

Reflect

Every environment has living and nonliving things in it. Living things use some of the nonliving things in their environment, like water and gases, to live. Matter is constantly cycling between living things (plants, animals, and microbes) and nonliving things (air, water, soil).

How are plants and animals involved in the cycling of gases like carbon dioxide and oxygen?

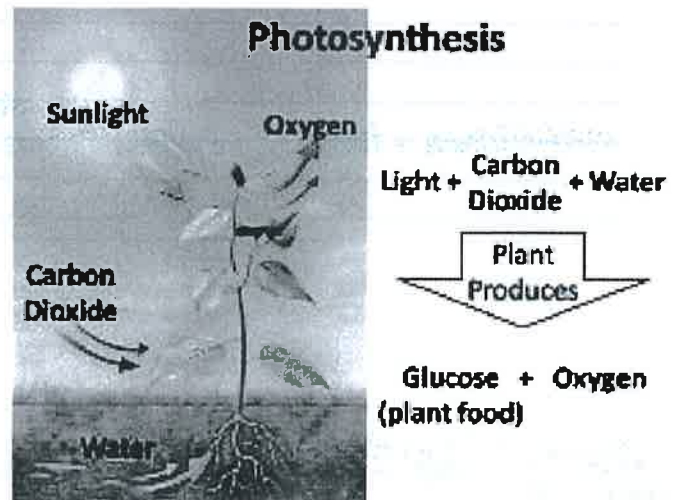
Carbon dioxide and oxygen are two gases that are very important to life on Earth. Carbon dioxide is found in the air. The cells of organisms, including humans and other animals, also produce it. Carbon dioxide is released from the body when organisms breathe out or *exhale*. Plants need carbon dioxide to make their own food, and they release oxygen in the process.

Oxygen is also found in the air. Organisms like plants and green algae make their own food. During this process, these organisms release oxygen into the air. Many living things, including animals and humans, get oxygen from the air when they breathe in or *inhale*. Oxygen helps their bodies' cells function normally.

The cycle of carbon dioxide and oxygen on Earth is dependent on plants and animals. Plants provide the oxygen that animals and other living things need to survive. Animals and other living things provide the carbon dioxide that plants need to make their own food.

What is the relationship between plants and animals? Where is oxygen produced? Where is carbon dioxide produced?

Plants and animals are linked to each other through the carbon dioxide and oxygen cycle. Plants produce oxygen, a gas that animals and other living things need. Animals and other living things produce carbon dioxide, a gas that plants need to make their own food. How are oxygen and carbon dioxide produced in plants and animals?



Plants make their own food from sunlight in a process called *photosynthesis*. In photosynthesis, sunlight, water, and carbon dioxide combine in special cells inside the plant. Glucose is one product of photosynthesis. *Glucose* is a sugar that plants use for energy. It's their food. Another product of photosynthesis is oxygen. Plants release oxygen as a waste product. Plants and other **producers**, such as green algae, are the source of the oxygen in the air we breathe.

Reflect

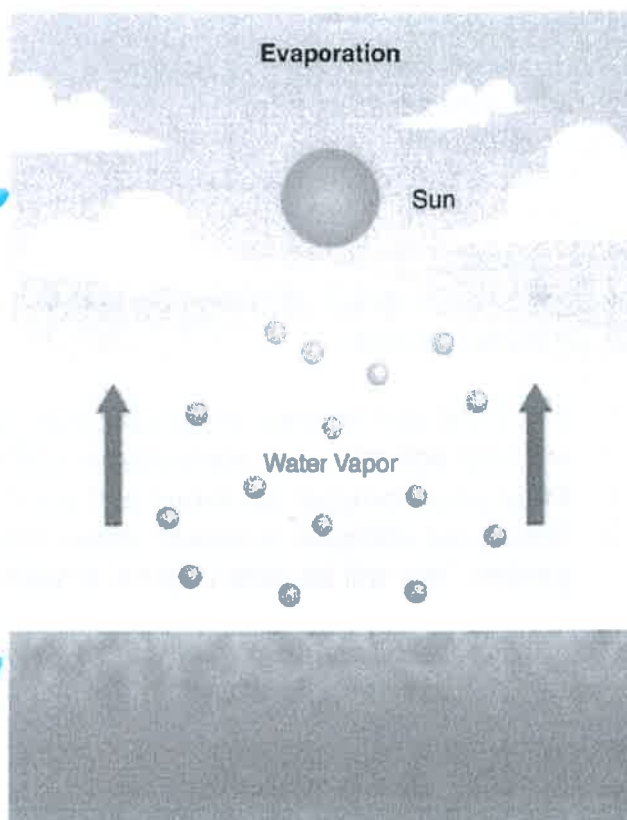
Animals and other living things release carbon dioxide when they exhale. It is a waste product. Where does the carbon dioxide come from? When organisms eat, their bodies break the food down into very small parts. The process of breaking down food produces carbon dioxide and other substances. Too much carbon dioxide in the body can be poisonous, so organisms release it back into the air. **Decomposers**, such as mushrooms and bacteria, also release carbon dioxide when they break down dead material.

How does the Sun move water in the water cycle from the oceans?

The water cycle is another important matter cycle. Water is the only substance on Earth that exists in all three states of matter naturally. Water can be solid ice, a flowing liquid, or gaseous vapor. When water moves through the water cycle it changes between these states of matter over and over again. The water cycle is the process that water moves through between the air and Earth's surface. The water cycle is powered by heat energy from the Sun.

A cycle is like a circle—it has no beginning and no end. However, we'll start by looking at the water cycle in the ocean. Approximately 71% of Earth's surface is covered in ocean water. When water at the ocean's surface is heated by the Sun it gains energy. With enough energy, the molecules of liquid water change into water vapor and move into the air. This process is called *evaporation*. The water in the ocean is mostly *saltwater*, a mixture of salt and water. When evaporation takes place, only the water evaporates. The salt is left behind.

Whenever water is heated by the Sun, evaporation can occur. Water evaporates from lakes, rivers, puddles, soil, and even your body. When sweat dries on your skin, it is because the water in sweat has evaporated into the air. You may have noticed that when sweat evaporates off you, your skin feels and tastes salty. Similar to the oceans, sweat is saltwater. The water evaporates, and the salt is left behind on your dry skin.



Energy from the Sun causes water in the oceans to evaporate. The water vapor rises into the air. The salts remain behind.

Reflect

Matter cycles are what make the world go round. Without them we wouldn't be able to breathe and we wouldn't have water on Earth. Organisms get matter from their environment, including humans, animals, and plants. We need to remember that matter is anything that has mass and takes up space. People tend to forget that when we breathe we are taking matter into our bodies. When precipitation falls to the ground during the water cycle, it is matter falling to the ground. Without matter cycles, the world wouldn't be the world we know today.

Try Now

Build a composting pile!

You will need:

- A bin or tub to place materials in
 - A lid
 - A shovel
 - Soil, leaves, grass clippings and other living things that you will no longer use, like apple cores or banana peels
1. Place the soil, leaves, grass clippings, and food pieces all into the bin you have chosen. These will help activate your compost bin and make it successful.
 2. Keep your compost bin moist and stir it with your shovel every few days.
 3. Once your compost is broken down into a rich black crumbly material, it's ready to use in your garden. You will be able to grow amazing plants and fruits with your compost!

Compost piles are a great example of getting matter from the environment. The pile gets matter from the dead plants, soil, and air.

What Do You Think?

Which matter cycle do you think is more important, the carbon dioxide/oxygen cycle or the water cycle? Why?



Look Out!

Plants produce more than just oxygen. They also produce carbon dioxide, just like other organisms. Plants break down the glucose (or sugar) they make during photosynthesis to fuel their cells. The process of breaking down sugar makes carbon dioxide, which plants release into the air. The plants also take in water, which comes from the water cycle, through their roots. This is important when they are making their own food through photosynthesis.



Name: _____ Date: _____ Group: _____

Cycle Models

Use the space below to draw a model of each cycle. Be sure to describe what is happening at each stage in the cycle.

Carbon Dioxide and Oxygen Cycle

People and other animals breathe in air that has oxygen in it and breathe out air that has carbon dioxide in it. (Drawings will vary.)



Plants take in carbon dioxide to create their own food and release oxygen back into the air. (Drawings will vary.)

Water Cycle

Precipitation falls when water vapor in the air becomes a liquid and falls back down to Earth and collects in puddles, streams, and bodies of water. (Drawings will vary.)



The Sun heats up the oceans and other bodies of water and causes the liquid water to evaporate, or become water vapor, which rises into the air. (Drawings will vary.)



Explain: Communicate

Name: _____ Date: _____ Group: _____

Driving Question:

Should we burn yard waste?

Directions:

- Be sure to include evidence and reasoning to support the position.
- Expectations for the debate:
 - Active listening
 - Wait turn to speak
 - Build on the discussion
 - Everyone must contribute to discussion

Opinion:

ANSWERS WILL VARY

Brainstorm:

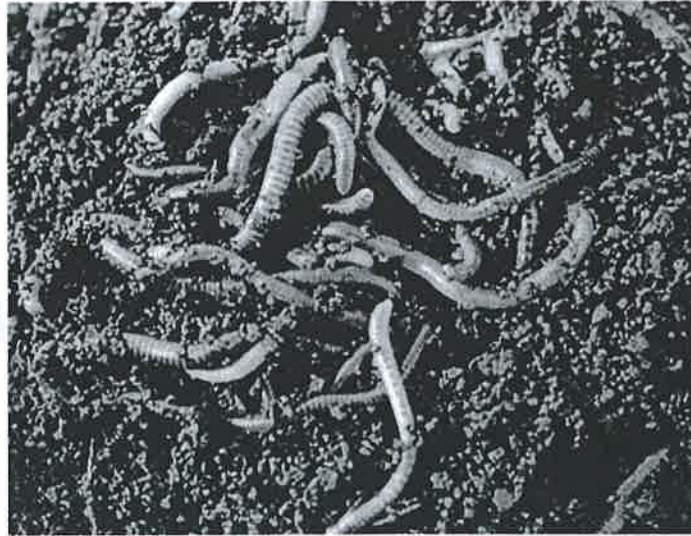
Reasoning:

Notes During Debate:



Name: _____ Date: _____ Group: _____

The Earthworm Project



1. What do the earthworms do to the kitchen scraps? How is this helpful?
The earth worms eat the kitchen scraps and turn it into compost. This compost makes good, nutrient-rich soil for growing more plants.
2. What food items should not be given to the earthworms?
Coffee, tea, acidic fruit, or meat should not be given to the worms.
3. Draw and label the complete cycle that begins and ends with the vegetables in the kitchen.

(answers will vary)



Content Connections Video

Name: _____ Date: _____ Group: _____

Penguins

1. How do the penguins shown in the video hunt fish? (Pause 0:18)

They hunt fish as a group.

2. What causes waste to exit the penguins? (Pause 0:36)

When penguins eat, ~~the~~ waste exits the penguins.



Content Connections Video

Name: _____ Date: _____ Group: _____

Excreting Animals

1. What do all animals do after digesting their food? (Pause 0:20)

All animals get rid of waste after digesting their food.

2. How does a polar bear's waste differ from a bird's waste? (Pause 0:47)

A polar bear's waste is bigger and darker than a bird's waste.

3. Why do you think animals' waste differs? (Pause 0:47)

Their waste differs when ~~it~~ they eat different things.



Independent Practice

Name: _____ **Answer Key** _____ Date: _____ Group: _____

Part I: Picture Match



conductor



reflection



soluble



volume



magnetic



weight/mass



temperature



Independent Practice

Name: _____ **Answer Key** _____ Date: _____ Group: _____

Part II: Fill in the Blanks

1. measurements
2. conductor
3. temperature
4. volume
5. magnetic
6. reflection
7. soluble
8. properties



Concept Attainment Quiz

Name: ANSWER KEY Date: _____ Group: _____

I. Vocabulary Matching

<p><u>B</u> A mixture of plant and animal remains, clay, and rock particles</p> <p><u>C</u> An organism that is very small and cannot be seen without the help of a microscope</p> <p><u>D</u> A substance that is necessary for growth and survival</p> <p><u>A</u> Anything that has mass and takes up space</p>	<p>A. Matter</p> <p>B. Soil</p> <p>C. Microbe</p> <p>D. Nutrients</p>
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II. Identification Use the word bank to fill in the blanks below.

Ecosystem

Nitrogen

Carbon dioxide

Energy

- Plants absorb carbon dioxide from the air and combine it with water to produce their own food in a process called photosynthesis.
- At each level of a food web, energy is released from living organisms back into the environment as waste.
- Nitrogen is another example of something that flows through a(n) ecosystem, because it is absorbed by plants and returned to the soil by people and animals.

