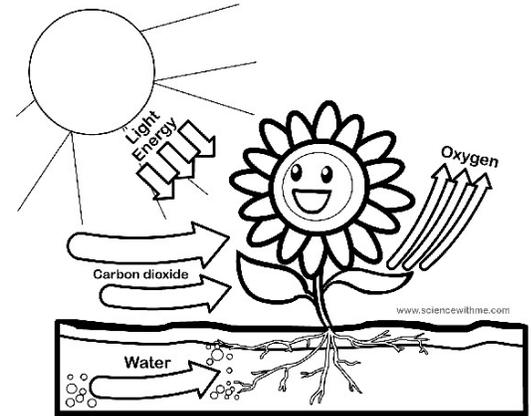


You Are Made From Sunshine

Photosynthesis - How Plants Feed The World

*A lesson from the New Jersey Agricultural Society
Learning through Gardening program*

OVERVIEW: Your students may know that plants need sunlight, but do they know why? Do your students know what it means that plants make their own food? (After all, plants are not going into the kitchen to make a meal.) This lesson will give your students a clear understanding of the process of photosynthesis: what it means, how it's done, and why it feeds the world.



GRADES: 2-5

MATERIALS:

Photosynthesis worksheet for each student

Photosynthesis fill-in-the blank worksheet for each student

A Walk Through Photosynthesis worksheet (*There is a beginner script outline for grades 2-3 and an advanced script outline for grades 4-5.*)

Photosynthesis character cards

Optional: large painting of a plant on a tarp or cardboard to lay on the floor for scenery

PROCEDURE:

Begin a discussion by asking students: Do plants need sunlight? Most if not all students will say yes. Then ask, "Do you know why plants need sunlight?" Some students may answer that plants make their own food. Then ask, "Do you know how plants make their own food? After all, they don't have a kitchen. How do they do this?"

Explain that plants are the only living things on Earth that can make their own food. All animals and plants ultimately depend on plants for their food. Plants need just three things to make food: carbon dioxide, water, and sunlight.

Demonstrate what it means that plants make their food by asking a child to volunteer to stand up at the front of the room. Ask this child we'll call Kelsey what her favorite food is. Perhaps she answers "pizza."

Say "If Kelsey was a plant, this is how she would make her favorite food. She would breath in air, which contains the carbon dioxide plants need. (Kelsey takes a big breath.) She takes in water, which roots do for plants. (Kelsey takes a sip of water.) Then Kelsey would sit out in the sun. (Kelsey pantomimes sunbathing.) Then say, "A pizza appears right in Kelsey's stomach. She doesn't have to shop for it, or make it, or eat it. Plants make their

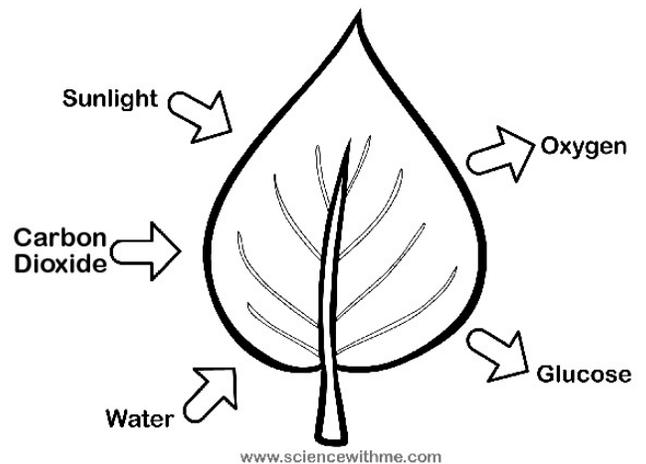
own favorite food right inside them. Of course, plants' favorite food is not pizza, it is glucose, which is a type of sugar. The glucose is distributed all over the plant."

You know that not every part of a plant tastes sweet like sugar. That's because when a plant stores food in its roots or stem or leaves, it changes the glucose into starch, which is not sweet.

Plants contain a special chemical that enables them to use sunlight to make food. This chemical is called chlorophyll. Chlorophyll is green! That is why most plant parts are green.

When people eat food, later they release waste, which is really not fun to talk about. When plants make food, they also release waste, but this waste is wonderful for people because it is oxygen that we breathe!

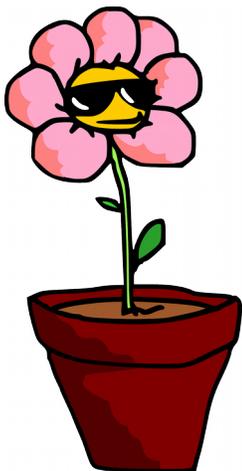
All animals and people depend on plants for their food. Even if an animal is a carnivore – a meat eater - this animal most likely eats an animal that is an herbivore – a plant eater. So basically, all people and animals are made from sunshine.



Next, tell students they are going to create a play to demonstrate photosynthesis. Give each student *A Walk Through Photosynthesis* worksheet and review the steps and characters.

Divide students into groups of nine for the beginner script and groups of 10 for the advanced script. If there are not enough students in your class for two students to play each role, one student can play the roles of the sun, the roots, the stem, the leaves, and the chlorophyll.

Pass out the photosynthesis character cards or have students pull them blindly from a box. Pass out safety pins for students to display their cards on their shirts.



Ask the students to use the photosynthesis script outline to create dialog for their characters. For example, what would the carbon dioxide say to explain what it is doing when it moves through the stomata? Each student must have at least one line of dialog. After all students have worked on their dialog, bring the class together to act out photosynthesis.

Encourage students to be creative and dramatic with their dialog. For example, the chlorophyll could be a mad scientist who says, "Bwa ha ha! I am going to capture sunshine and make food!" Or the oxygen could say, "Boy, it's too crowded in here. I'm going to escape into the fresh air!"

EVALUATION:

Students write dialog for the photosynthesis play.

Ask students to write a paragraph about photosynthesis from the point of view of their character in the play.

EXTENSIONS:

Take the class photosynthesis play on the road and perform it for other classes in the school.

New Jersey Learning Standards

English Language Arts: 2:W.2.2 3:W.3.2.B,C 4:W.4.A,D, W.4.4
5:W.5.2.A,D, W.5.4,7

Science: 2:LS1.A, LS2.A 3:LS1.B 4:LS1.A 5:PS3.D, LS2.B

A Walk Through Photosynthesis

Beginner Script Outline

Grades 2-3

The Characters

Sun	Chlorophyll	Stem
Carbon Dioxide	Roots	Glucose
Leaves	Water	Oxygen

The Plot

The **sun** shines down on the **leaves**.

Carbon dioxide from the air moves into the leaves.

The **roots** collect **water** and moves it up to the **stem**.

The **stem** moves the **water** up to the **leaves**.

The **leaves** now hold the carbon dioxide, **water molecules**, and the **chlorophyll**.

The **chlorophyll** uses the energy of the **sun's** light, the **carbon dioxide**, and the **water molecules** to make **glucose**.

The **leaves** release **oxygen** into the air.

The **glucose** moves to every part of the plant.

A Walk Through Photosynthesis

Advanced Script Outline

Grades 4-5

The Characters

Sun	Oxygen	Roots
Carbon Dioxide	Leaves	Water Molecules
Stomata	Chlorophyll	STEM
Glucose		

The Plot

The **sun** shines down on the plant.

The **stomata** are small pores or holes located on the undersides of leaves. The **stomata** open to let in **carbon dioxide** from the air.

When the **stomata** open, some **water molecules** inside the plant sneak into the air. This is caused *transpiration*. About 10% of the water vapor in the Earth's atmosphere is due to transpiration. Those water molecules will become part of the Earth's water cycle.

Carbon dioxide moves through the **stomata** into the leaves.

The **roots** collect **water molecules** and move them up to the **stem**.

The **stem** moves **water molecules** up to the **leaves**.

The **leaves** now hold the **carbon dioxide**, **water molecules**, and the **chlorophyll**.

The **chlorophyll** uses the energy from the **sun's** light, the **carbon dioxide**, and the **water molecules** to make **glucose**.

The **stomata** release **oxygen** into the air.

The **glucose** moves to every part of the plant.

Character Cards – Beginner Script

Sun

**Carbon
Dioxide**

Sun

**Carbon
Dioxide**

Stomata

Stomata

Leaves

Chlorophyll

Leaves

Chlorophyll

Roots

Roots

Water	Stem
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Water	Stem
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Glucose	Oxygen
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Glucose	Oxygen
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Character Cards – Advanced Script

Sun

**Carbon
Dioxide**

Sun

**Carbon
Dioxide**

Leaves

Chlorophyll

Leaves

Chlorophyll

Stomata

Stomata

Roots

Roots

Water	Stem
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Water	Stem
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Glucose	Oxygen
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Glucose	Oxygen
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Name : _____



Color the Photosynthesis Process

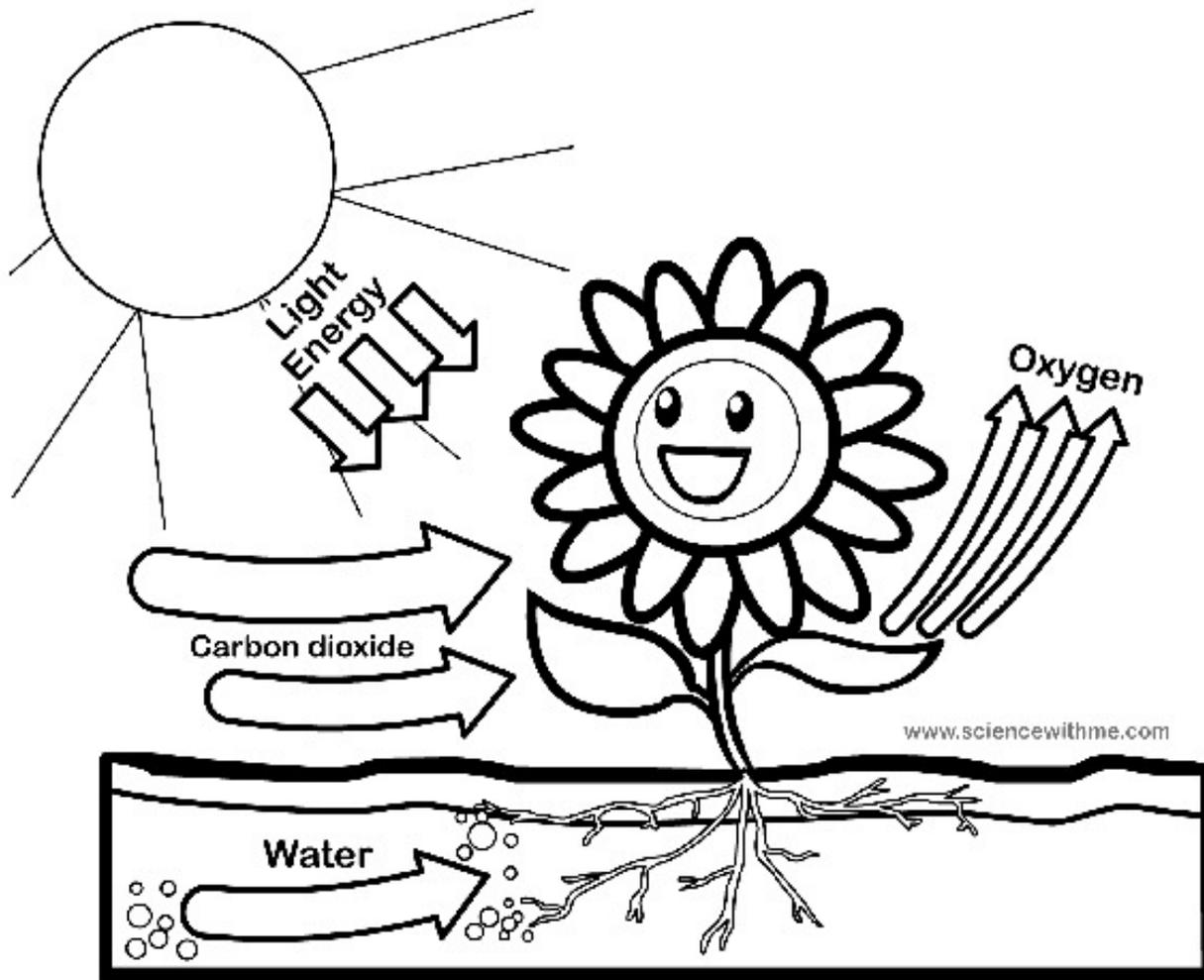


Illustration courtesy of sciencewithme.com

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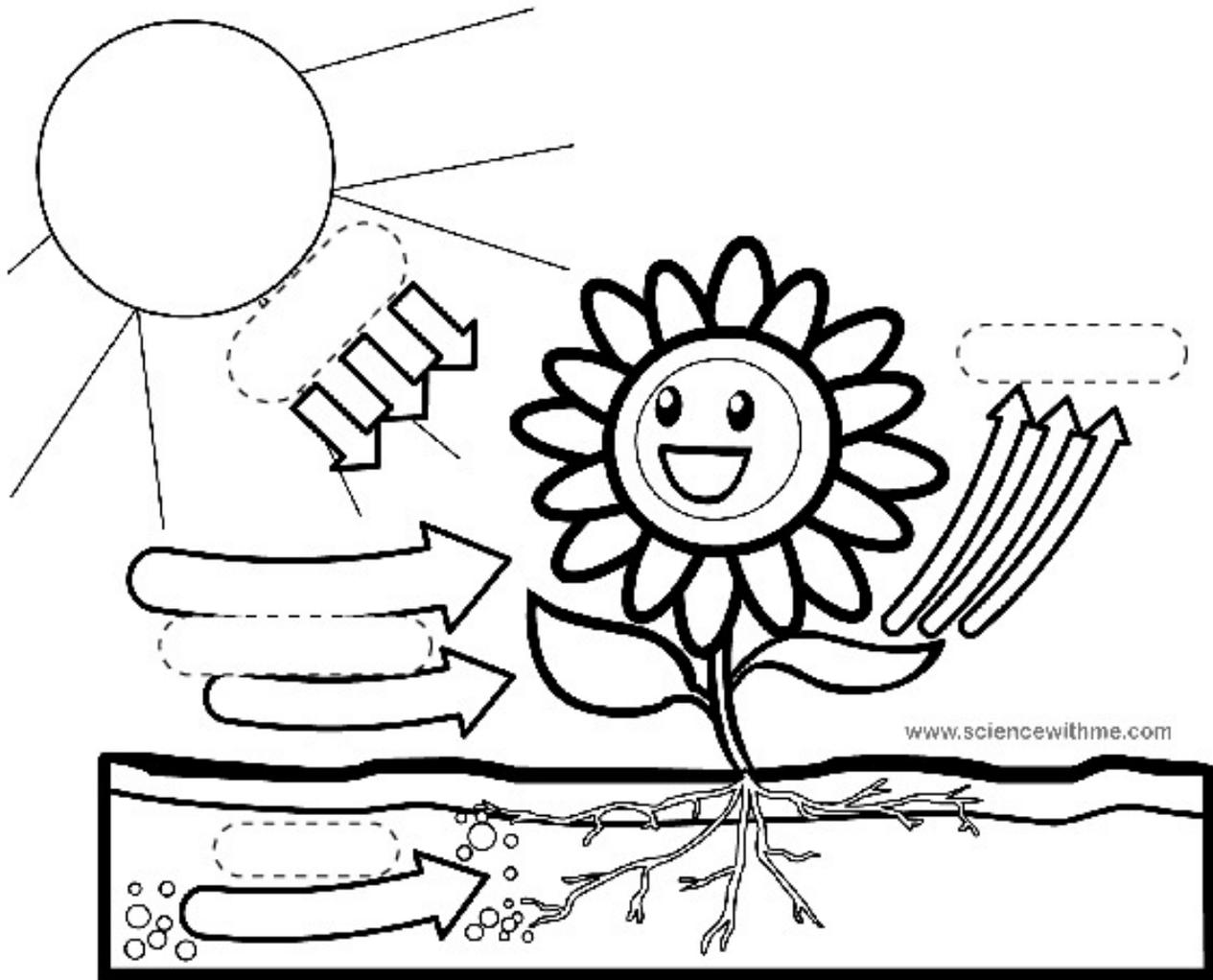


Illustration courtesy of sciencewithme.com