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“Respiration” FOLLOW-UP ACTIVITIES

This is a handout with various follow-up ideas on what you can do after watching the video lesson. Just remember that these are suggested not required activities. I would highly encourage you come up with creative experiments, observations or research topics based on your questions and interests.

Plant Experiments Generating Oxygen -

Bubbles, Bubbles, Bubbles

Materials - Green leaf, clear glass, water, sunlight and small hand lens (optional)

a. Cut a green leaf off a plant. Fill the glass with water.
b. Place the leaf in the glass and place the leaf-containing glass in a sunny position.
c. In your Scientific Journal, record the date and time, draw what you see, and make a prediction of what you think you'll see in one hour.
d. After an hour, look carefully at the leaf and the side of the glass.
e. You'll be able to see several tiny bubbles formed on the sides of the plant and the surface of the bottle.
f. If you're having a hard time seeing the bubbles, you might get a small hand lens to look at the edges of the leaf.
g. **The science behind the experiment** - The bubbles you see on the leaf and/or the sides of the glass is oxygen. Leaves take the carbon dioxide in the air, and by the process of photosynthesis, it produces food for the plant. Oxygen is the by-product of photosynthesis, so it comes out in the form of bubbles. The air we breathe comprises of 21% of oxygen. Without plants, we wouldn't have enough oxygen to breathe!

Leaf Transpiration

Materials - Plastic bag (reuse an old one), rubber band and access to a live plant, preferably in the sun.

a. Select a large leaf, still on a plant, in the sun.
b. Cover the leaf with the plastic bag. Seal at the bottom of the bag with a rubber band.
c. In your Scientific Journal, record the date and time, draw what you see, and make a prediction of what you think you'll see in one or two hours.
d. In an hour or two, make observations of what you see.
e. Just remember that this process called transpiration happens when the plant is releasing water and carbon dioxide through the stomata. This water evaporates quickly when it's not trapped by the plastic bag.

"Respiration" FOLLOW-UP ACTIVITIES

Activity: Talking to Plants Experiment

Background Knowledge: The idea that speaking to plants can benefit their growth dates back to 1848 when a German professor suggested that plants thrive on human conversation. More recently, the Royal Horticultural Society conducted a study where 10 gardeners read to tomato plants daily for a month, finding that the plants spoken to grew larger than those in the control group. Interestingly, plants exposed to female voices grew at least an inch taller than those exposed to male voices. The popular TV show MythBusters also found promising results when testing the influence of sound on plant growth. The theory suggests that plants respond to vibrations from sound, which activate growth-promoting genes and increase photosynthesis due to the carbon dioxide produced during speech. While the scientific evidence is not definitive, talking to your plants could be beneficial for both you and your plants.

Materials Needed:

- 10 small tomato plants
- Ruler
- Notebook and pen
- Recording device or access to recorded voices (male and female)
- Quiet, consistent environment for the plants
- Watering can or spray bottle
- Labels and markers

Procedure:

a. Label the Plants: Label each of the 10 tomato plants with a number from 1 to 10. This will help you keep track of which plants are being spoken to and which are not.
b. Divide the Plants into Groups: Separate the plants into two groups of five. Group A will be the experimental group (plants that are spoken to) and Group B will be the control group (plants that are not spoken to).
c. Measure Initial Height: Use a ruler to measure the initial height of each plant and record it in your notebook.
d. Set Up the Experiment: Place Group A plants in an area where you will speak to them daily. Place Group B plants in a separate, quiet area.
e. Speak to the Plants: For the next month, speak to the plants in Group A daily for at least 10 minutes. You can read a book, talk about your day, or even play recordings of voices (both male and female). Ensure that some plants hear male voices and some hear female voices.
f. Water Consistently: Water all the plants regularly, making sure that both groups receive the same amount of water and sunlight.

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“Respiration” FOLLOW-UP ACTIVITIES

g. Monitor and Measure Growth: Every week, measure the height of each plant and record the data in your notebook.
h. Compare Results: At the end of the month, compare the growth of the plants in Group A with those in Group B. Note any differences in height and overall health.
i. Analyze Data: Discuss whether the plants that were spoken to grew more than the control group. Consider the difference in growth between the plants exposed to male and female voices.

This experiment helps you explore the potential benefits of speaking to plants by comparing the growth of tomato plants exposed to human voices with those that are not. It’s a fun way to investigate how environmental factors like sound might influence plant health and growth.

News Flash!

a. Create a news report on any part of this lesson that you'd think the audience would be interested in.
b. Decide if you have a co-anchor or not.
c. Use the "How to Create a News Release" handout from the Essay Cure in the Membership portal.
d. Video tape your news report. Perhaps watch a real news report on TV to get some hints on how to present it. Don't forget to create a station name, maybe a slogan or title for this segment, for example, "Did you know...? today with Jackie Grundberg!"

Coloring Page

a. Download and print out the Stomata coloring page, OR challenge yourself by using it as a guide to draw it by hand in your Scientific Notebook.
b. Don't forget to label the parts of the stomata.

Respiration Skit

a. Create your own skit on how plant respiration works.
b. Use the "How to Write a Skit" handout from the Essay Cure in the Membership portal.
c. Make sure you or your actors get a chance to perform your skit!

Next Generation Science Standards

Disciplinary Core Ideas

LS1.A: Structure and Function

Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow.

LS1.B: Growth and Development of Organisms

LS1.C: Organization for Matter and Energy Flow in Organisms

LS2.A: Interdependent Relationships in Ecosystems

Plants depend on water and light to grow.

Plants depend on animals for pollination or to move their seeds around.

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

Relevant Standards by Grade Level:

K-LS1-1. Use observations to describe patterns of what plants and animals (including humans) need to survive.

2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow.

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction

5-LS1-1. Support an argument that plants get the materials they need for growth chiefly from air and water.

MS-LS1-6. Construct a scientific explanation based on evidence for the role of photosynthesis in the cycling of matter and flow of energy into and out of organisms.

Common Core Alignment for Follow-up Activities

Research W.(K-5).7; W.(K-2).8

Write W.(K-5).1

Create SL.(2-5).5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings.

- a picture/art

Experiment RST.6-8.3; RST.6-8.9

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