

## UNIT STUDY

# THE BUSY LIFE OF A LEAF

When we see leaves growing quietly around us, we don't think of them as being busy living things. They are! They are busy all time, even though we can't see or hear what they are doing. Let's look at just a few of the things leaves do all year long.

Plants make their own food.

They take water from the soil through their roots.

They take carbon dioxide from the air.

The sun shines on the plant.

There is **chlorophyll** in their leaves.

All these things work together to make food for the plant.

This process is called **photosynthesis**.

Draw a picture of a plant making food using **photosynthesis**. Show the plant taking water into its roots, and taking carbon dioxide and sunlight in through its leaves. The **chlorophyll** is what gives the leaves their green color.

**How will you show that the leaves have chlorophyll in them?**

# WHY DO LEAVES CHANGE COLOR IN THE FALL?

When summer ends and fall comes, the days get shorter. There is less light. Trees know it is time to get ready for winter.

During winter, there is not enough light or water for photosynthesis. The trees will rest during these months. They shut down the food-making process. They can live off the food they have stored from the summer.

The green chlorophyll fades from the leaves. Yellow and orange colors begin to show. These colors were there all the time, but they were covered by the green chlorophyll.

Draw a picture of a leaf with chlorophyll still present, and a leaf after chlorophyll is gone.

<p style="text-align: center;"><b>Leaves with chlorophyll.</b></p>	<p style="text-align: center;"><b>Leaves without chlorophyll.</b></p>
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Some leaves turn bright red and purple. These colors are made in the fall, from food still left in the leaves.

Some leaves turn brown. The brown colors come from wastes left in the leaves.

All these things working together make the beautiful colors we see in the fall.



## Math Connection

# COLLECT DATA AND MAKE A GRAPH

Take a walk near your home. Make tally marks to record the numbers of trees you see with different colors. Write the main color you see in the tree.

Color	How Many?
Green	
Yellow	
Orange	
Red	
Purple	
Brown	

Use the information from the table above to make a bar graph. Show how many different colors of trees are near your home.

15						
14						
13						
12						
11						
10						
9						
8						
7						
6						
5						
4						
3						
2						
1						
	Green	Yellow	Orange	Red	Purple	Brown

## History Connection:

# WHO DISCOVERED PHOTOSYNTHESIS?



Meet Joseph Priestly! He was born in England in 1733. When he was 33 years old, he met Benjamin Franklin, and the two of them became friends. Joseph became interested in Ben Franklin's experiments with electricity. He began doing some of his own science experiments.

In 1772, he made an interesting discovery. He put a green plant in a container of water. He put a lighted candle beside it, and covered both the plant and candle with a jar. He let the candle burn out, but left the plant and the candle covered. Later, he was able to burn the candle inside the jar again.

By observing this, he was able to tell that plants take in a certain gas, and give off a different gas. This is called **plant respiration**. The gas that the plant gave off was what the flame needed so it could burn. He was the first person to notice this and write it down.

Joseph also found that mice could stay alive in a covered container, if they had plants in with them. This also proved that the plants gave off the same gas, which the mice could breathe to stay alive.

He knew that green plants grew on the inside walls of his jars when they were left in the sunlight. He observed that these plants gave off the same gas. He was the first person to notice and write down the process of **photosynthesis**.

Another scientist, Antoine Lavoisier, repeated Joseph's experiments. He was the one who named the gas **oxygen**.

Joseph Priestly made many other scientific discoveries.

He discovered a heavy gas, which floated close to the ground. He found that when he mixed it with water, it had a pleasant, tangy taste. He had discovered soda pop! The *heavy gas* was later named **carbon dioxide**.

He discovered **nitrous oxide**, which is what we know as *laughing gas*. Much later, it was used as a way to help people who had to have surgery.

He also discovered **carbon monoxide, hydrogen sulphide, and ammonia**.

He discovered that India gum could be used to *rub* out lead pencil writing. He had invented the eraser! He called this material **rubber**.

Joseph Priestly lived during the time of the American Revolution, when England and America were at war. Although he was English, and lived in England, he was on the side of the Americans. That meant trouble for him! His home and church were burned to the ground by people who were angry with him for supporting America. Finally, in 1794, he and his family moved to America. They settled in Pennsylvania and were able to live peacefully.

The most amazing thing about Joseph Priestly is that he was not even a scientist! He had no education as a scientist. He wasn't even interested in science until he met Benjamin Franklin. He made all of his discoveries just by experimenting, and paying close attention to what he saw happening around him.

# PEOPLE AND EVENTS

Write and draw about the people and happenings you have read about.

## Location

*Where did these events happen?*

## People

*Who were the people involved?*

## Events

*What happened?*

## Impact

*Why were these events important?*

# COLOR CODED GRAMMAR WORKSHEET

Use with any writing assignment.

**Using crayons or colored pencils:**

Underline nouns in red.

Underline verbs in green.

Underline adjectives in blue.

Underline adverbs in purple.

Circle capitals and end punctuation.

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*Teacher: Add parts of grammar as desired on the above lines: conjunctions, articles, prepositions, verb tenses, pronouns, proper nouns, etc.*

**Using highlighters:**

Highlight nouns in pink.

Highlight verbs in green.

Highlight adjectives in blue.

Highlight adverbs in yellow.

Circle capitals and end punctuation.

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*Teacher: Add parts of grammar as desired on the above lines: conjunctions, articles, prepositions, verb tenses, pronouns, proper nouns, etc.*

# VOCABULARY PAGE

New Word 1:	New Word 2:	New Word 3:
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Definition 1: Word \_\_\_\_\_

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Illustration of new word:

Definition 2: Word \_\_\_\_\_

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Illustration of new word:

Definition 3: Word \_\_\_\_\_

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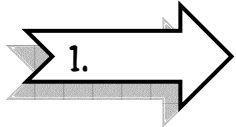
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Illustration of new word:

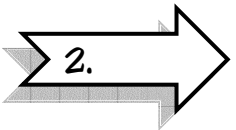
## Science Experiment

# SCIENTIFIC METHOD

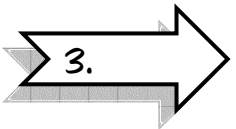
Go through these steps when you do a science experiment. It will help you understand and record your information.



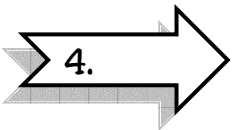
State the question.  
(What am I trying to find out?)



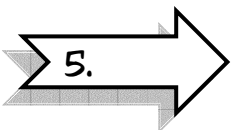
Form a hypothesis.  
(What could the answer be?)



Test the hypothesis through experimentation.  
(How can I test my answer?)




Draw conclusions.  
(What did I learn from my experiment?)



Does this agree with the answer I thought I would get?  
(Or do I need to change my answer?)


# LAB SHEET

What do you want to find out from your experiment? 

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Draw and write about your experiment. 

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Draw and write about what you learned. 

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# AUTUMN LEAVES SCIENCE PROJECT

*Note: Adult supervision is required. Read all instructions carefully before beginning the experiment.*

## Separate Colors in a Green Leaf using Chromatography

### Materials:

- Green leaves, 2 or 3 for each student
- Small jars, such as baby food jars
- Lids, foil, or plastic wrap to cover jars
- Rubbing alcohol
- Coffee Filters cut in ½ inch strips
- Tape
- Large shallow pan
- Hot tap water
- Plastic knives or spoons

### Procedure:

1. Collect 2-3 green leaves from several different trees. Tear the leaves into small pieces and put them into the jars.
2. Add alcohol to cover the leaves. Grind the leaves in the alcohol with the plastic knives or spoons.  
*Safety note: Remind students not to taste or sniff the alcohol. Read the label warnings to them.*
3. Cover the jars loosely with lids or foil or plastic wrap. Place them into the shallow pan containing one inch of hot tap water.  
*Safety note: Water above 150 F can cause burns. Handle jars carefully when putting them into the hot water.*
4. Leave the jars in hot water until the alcohol turns dark green (the darker the better). Swish each jar around every five minutes. Replace the hot water when it cools.
5. Remove the jars from water. Put strips of filter paper into jars with one end in the alcohol. Bend the other end over the top and tape in place.
7. The alcohol will move up the filter paper, bringing different shades of green with it. It will take at least ½ an hour, and maybe longer. The longer you leave the paper in place, the more colors you will see. You may also be able to see some yellow or orange, although those colors will take longer to show up.

## Art Connection

# GLOWING AUTUMN LEAVES

*Note: This project will require the help of an adult.*

The week before: Collect several colorful autumn leaves that have not fallen to the ground. Choose small, thin leaves. Place them carefully between paper towels, and then put them into the center of a large book. In a week, they should be dried and completely flat. Handle them carefully; they're fragile!

### Materials:

Dried autumn leaves

White tissue paper

Decoupage adhesive (original Mod Podge is good for kids – non-toxic and water soluble)

Foam brushes

Glass votive candle holders

### Directions:

Cover the outside of the candle holder with the decoupage adhesive. Carefully place pressed leaves on the glass. You can use a toothpick to move them around a bit. Tear the tissue paper up into pieces about one inch by one inch (make the shapes irregular). Add more glue and place the tissue paper pieces on the glass. Add paper and glue until the entire candle holder is covered with overlapping pieces of paper.

The candlelight will shine through the pressed leaves and tissue paper.

For more about the busy lives of leaves, investigate the fascinating story of the rainforests:

### Rainforests

<http://kids.mongabay.com/elementary/>

<http://www.kidcyber.com.au/topics/biomerainfor2.htm>