

**GRADE LEVEL:** PreK, 2

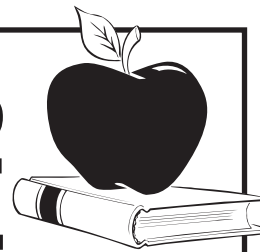
**NEXT GENERATION SCIENCE STANDARDS:** 2-LS4-1

**ILLINOIS EARLY LEARNING STANDARDS:** 11.A.ECa, 11.A.ECb, 11.A.ECd, 11.A.ECe, 11.A.ECf, 11.A.ECg, 12.A.ECa, 12.A.ECb, 12.B.ECb, 12.C.ECa, 12.F.ECa

**SKILLS:** observing, gathering information

**OBJECTIVE:** Students will learn that leaves lose their green color as the days grow shorter and the weather becomes colder and that other colors become visible, while still other new colors are created.

# TEACHER'S GUIDE



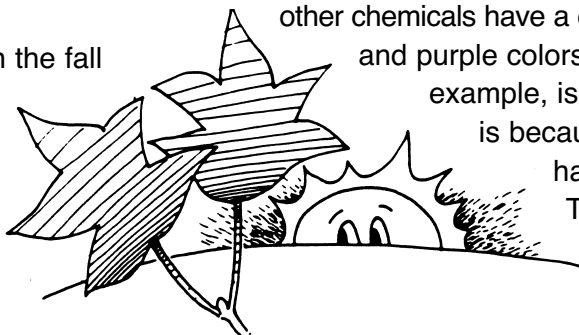
## UNIT TWO ■ LESSON ONE

# Where Does the Green Go?

### BACKGROUND

Leaves change color in the fall because the days grow shorter with fewer hours of sunlight.

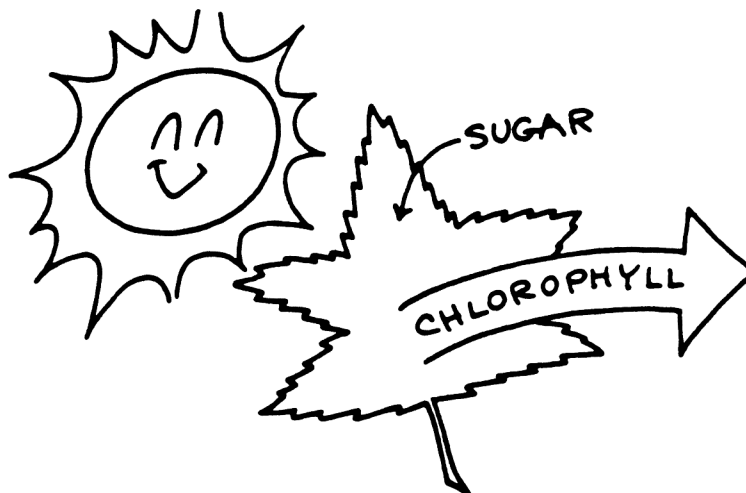
When there's not enough sunlight, the green chlorophyll cells in plants stop making food and break down. As they break down, chlorophyll cells lose their green color, but other colors that have been in the leaf all along then can be seen. Still other new colors are formed through new chemical reactions that become possible once the chlorophyll is gone.



other chemicals have a chance to react with sunlight. Bright red and purple colors are the result. The sugar maple, for example, is one of the most colorful fall trees. This is because the leaves are full of sugars that have been produced by the chlorophyll. The sugars react to the sunlight and to the cooler weather by turning bright colors.

**When the Little Green Food Factories Shut Down.** All leaves have some yellow pigment in them, and many have red tones as well. But these colors can't be seen in the spring and summer because they are overpowered by the green color of chlorophyll. Chlorophyll cells need sunlight to do their job. Once there is not enough light, leaves stop producing food and lose their green color. Then the other colors can be seen. Leaves become yellow or red-brown.

Many of the brightest fall colors have not been present all along. They are made once the chlorophyll is gone. Now



**The Best and the Brightest.** All leaves change color before they fall from the tree. But some leaves are more colorful than others. Just as some people's hair changes color as they get older, some leaves can only change to yellow or green. Weather conditions are another factor that affects the color of fall leaves. The best and the brightest colors occur in years that have wet summers, cool fall nights and warm, sunny fall days.

In Illinois, the best and the brightest fall trees are sugar maples, red oaks, ashes, sweet gum and sassafras trees.



SPRING



SUMMER



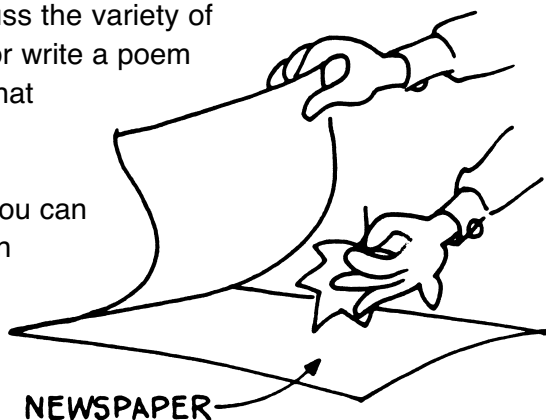
FALL

## PROJECTS AND ACTIVITIES

At the beginning of the school year have each student bring in a leaf from the tree of his or her choice. Have students press the leaves between newspaper sheets and then mount them on a piece of paper, preferably under clear adhesive plastic, leaving room for a companion leaf. In the fall, after the leaves have changed, have each student bring in a leaf from the same tree. Press and mount alongside the original leaf and have the class discuss the variety of colors represented or write a poem about the changes that have occurred.

Using watercolors, you can show how the green chlorophyll pigment in leaves can hide other colors. Start with yellow and cover it with green.

What happens? Start with red and cover that with green. Again, what happens? Now discuss what would happen if the green were removed. This can also be done with colored acetate swatches and an overhead projector.

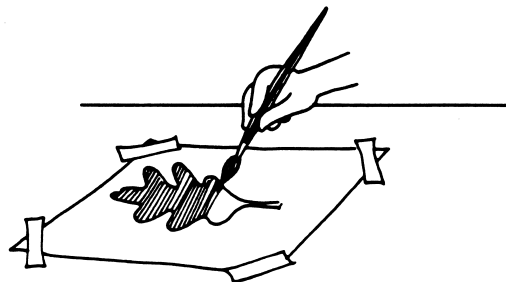


Have children bring to class pictures from magazines that depict colorful fall scenes. Compare the pictures. Are the colors the same? Why are they different? Are they from different localities, different types of trees? Can students determine, with a good tree identification book, which trees are pictured?

Make a chlorophyll leaf print. Place a leaf on the right half of a piece of white, cotton cloth. Fold the left half of the cloth over the leaf (to cover it). Place a piece of waxed paper under the cloth and another piece of waxed paper on top of the cloth. Use a hammer to pound the leaf. Be sure to do this on a hard surface that will not be damaged by the pounding. Wear safety glasses when you are pounding. The pounding brings out the

chlorophyll and leaves a green impression of the leaf. Make prints of several kinds of leaves and discuss the different shapes, colors and details.

Take the class on a brief neighborhood color walk. Have younger children identify colors. Older children may make a list of different colors that can be seen and tabulate the number of times each color is viewed.



Have students bring in the most interesting leaf shape they can find. Trace it on graph paper. Count the squares covered by the leaf shape to determine the area, or size, of the leaf. (If a square is more than half covered, it is counted. If a square is less than half covered, it is not counted.) Color the outline in the leaf's summer colors or in its fall colors. Paste a selection of these leaves on one crazy tree poster or make a collage of interesting colors and shapes. Cut leaf tracings in half and have children match shapes.

## EVALUATION

Divide the class into small groups. Each group should discuss and arrive at an answer to this question: If leaves fall off in the autumn, why do they come back in the spring?

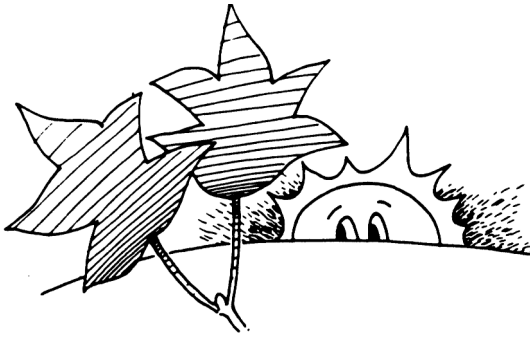
## VOCABULARY

cells  
chemical reaction  
chemicals  
chlorophyll  
pigment

# Where Does The Green Go?

# STUDENT'S GUIDE

The days are short in the fall, and the sun is low in the sky. There is not enough sunlight for leaves to make food.



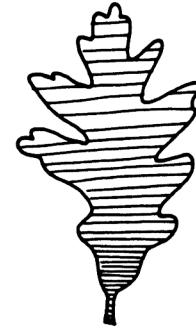
## Little Green Food Factories Shut Down

When leaves stop making food, they lose their green color. Then you can see other colors that have been there all along. You can see yellow, brown and red.



SUMMER

DARK GREEN

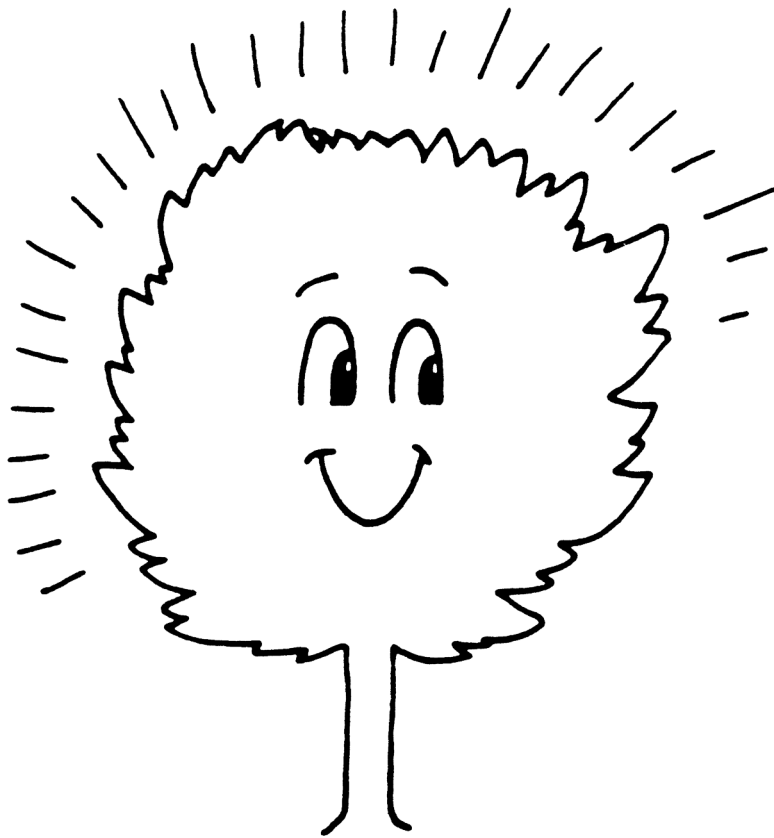


FALL

YELLOW

RED

BROWN



SUGAR MAPLE

## The Best and the Brightest

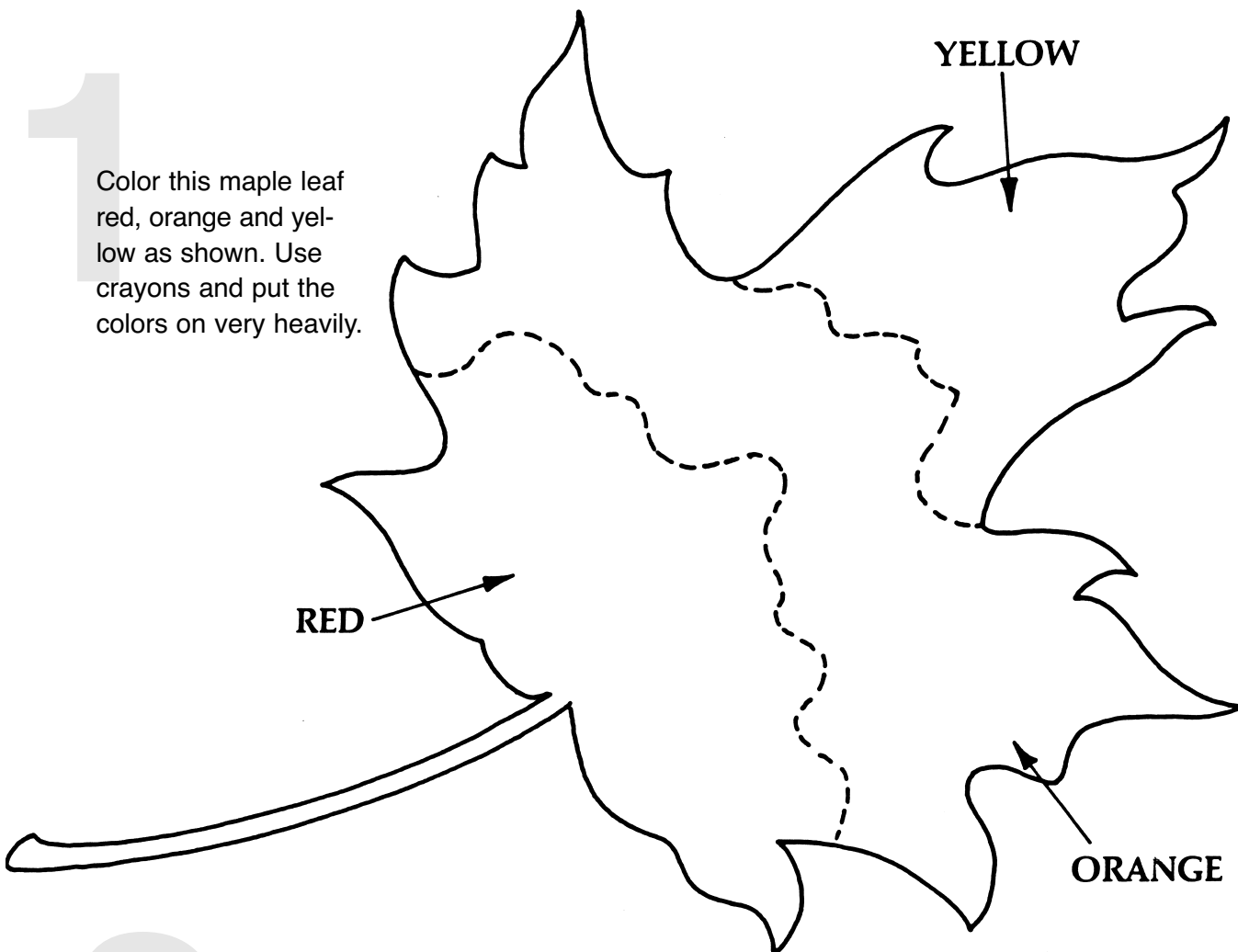
Some leaves make new colors when the green is gone. They make bright red and purple. Maple leaves make the brightest colors.

# When the Green Goes

## What you will need

- red, orange and yellow crayons
- green tempera paint, slightly thinned with water
- plastic spoon or other tool for scratching off the paint
- paper towels and water for clean up

When the green fades from leaves in the fall, you can see other colors that have been there all along. See for yourself how the green covers the other colors.



2

Now carefully paint over your colored leaf with green tempera paint. When all the other colors are covered, let the paint dry.

3

You can scratch off the green with a plastic spoon—or even your fingernail. Scratch any pattern you like—and see what happens when the green goes.