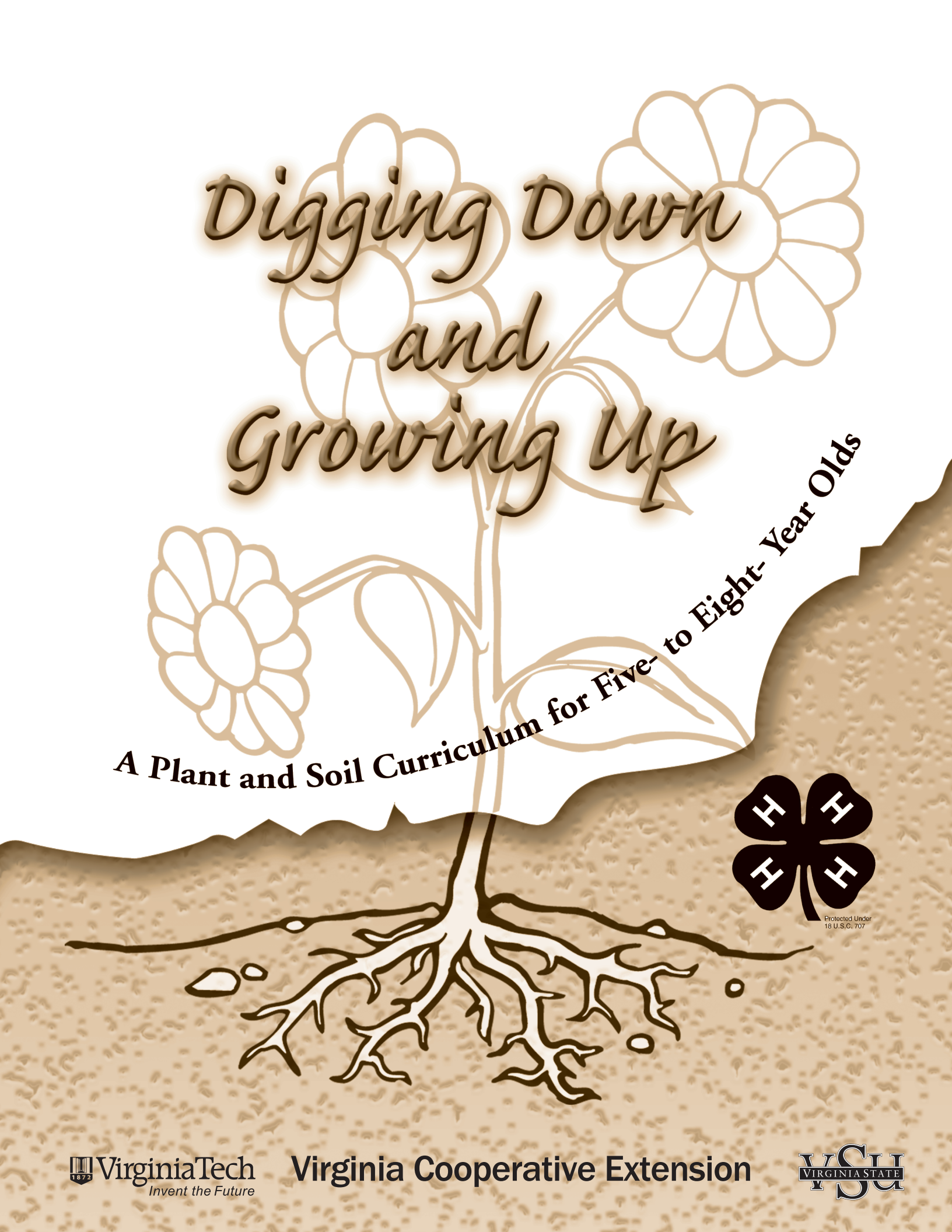
# Digging Down and Growing Up

## A Plant and Soil Curriculum for Five- to Eight- Year Olds





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# Acknowledgments

**Principal Author:** Laurie W. DeMarco, Ph.D.: Horticulture and Education Consultant, Salem, VA

**Project Coordinator:** Kathleen Jamison, Ph.D.: Virginia Polytechnic Institute and State University

**Editing:** Beverly Brinlee, Virginia Polytechnic Institute and State University

**Layout and Design:** Tim FisherPoff, Virginia Polytechnic Institute and State University

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# Digging Down and Growing Up with Plants

**A Plant and Soil Curriculum for Five- to Eight- Year Olds**

## Introduction

A journey into the world of plants and soil can be a delight for young children. Children know about plants and soil from their play, explorations, and everyday interactions with nature. However, in today's fast paced life children are filling their days with activities that have decreased their contact with the natural world. Their times of quiet investigation of roly poly bugs, buttercup bouquets, or pussy willow branches are few and far between. Yet their need for an understanding of the natural world is increasing as we continue to balance nature with greater human need.

Key to an understanding of nature is an understanding of plants and soil - two crucial characters in the story of a balanced ecosystem. Children this age believe they exist within nature, but often do not understand their effect on nature. The hands-on learning activities in this curriculum will introduce children to the positive impact their actions can have on the growing environment. By completing the activities in this curriculum, the children will explore the needs of a growing plant, the make-up of plants, how plants are used by people, plant cycles and cycles in nature, and the importance of positive earth stewardship.

## How to Use This Material

The Digging Down and Growing Up with Plants Cloverbud Curriculum provides a series of plant and soil science activities that promote an understanding of plants, soil, and the environment. The informal presentation of this curriculum provides background material, introductory activities, questions, and step-by-step instructions for each activity.

This curriculum is arranged in seven chapters. Each chapter consists of an introduction containing basic information on a topic area and three, supporting activities. The majority of the material in each chapter stands alone, so that the chapters can be used individually, or in conjunction with each other. The activities are hands-on, experiential explorations that introduce children to features of plants and soil that impact their lives. The activities represent an assortment of experiences in scientific exploration or creativity and self-expression.

Each chapter begins with an introduction that provides basic background information on the topic area. This information will assist in understanding the focus and intent of the activities, and the developmental response of the children. It will also aid in answering student questions. Share any of the background information you deem necessary with the children.

Each activity includes a listing of the emphasized 4-H LifeSkills. There is a text box that lists the materials needed, approximate time allotment, and other pertinent information. Most of the activities are geared toward non-readers or beginning readers, however some activities require the ability to read. For children of this age, it is recommended that a 1:6 adult to child ratio be maintained for all activities unless stated otherwise.

## Activity Suggestions

* Make or grow samples of the projects prior to each activity. It is easier for children this age to understand instructions for an activity if they can see the end result.

* Use a soilless potting mix when growing plants in these activities. Soilless potting mix is a sterile mix of peat moss and perlite or vermiculite often sold as potting soil for houseplants. Do not use topsoil or garden soil. The soilless potting mix is referred to as "potting soil" throughout this curriculum.

* If an activity that involves growing a plant is done in a classroom situation, keep the growing projects in the classroom and observe daily. Growing activities done by 4-H Cloverbud Club members are usually taken home for care and observation. Send a set of growing instructions and questions about the activity home with each child so that an adult can assist them in caring for their project.

* An approximate time allotment for the introduction, activity, and growing time is provided with each activity. The time allotment for each activity will vary depending on the size of the group and the children's age and interest. The activities that involve growing plants may take up to four weeks to see results. Remind the children that they will need to watch, wait, observe, and anticipate the growth of their plants.

* Use the questions provided in each activity to challenge the children to think about plants and earth stewardship. As you read through these activities you will find information and questions that can be used to assist in presenting and thinking about the activity material.

* Working with living systems means unpredictable outcomes. Learning what makes a plant NOT grow is just as important as learning what makes it grow.

* An evaluation is featured at the end of each activity. Use this assessment tool to reinforce the learning goals of the activity.

* The "This is What You Can Do!" section at the end of each activity is to be read to children by the teacher or leader to recap what was learned in the activity. In addition, *Enrichment Activities* related to the topic area are provided.

* Encourage the children to think beyond these activities. During each lesson, ask the children to brainstorm, theorize, and make predictions. Allow them to make mistakes and then to search for alternatives and solutions.

* As the adult leader, do not limit yourself to the activities defined in this curriculum. Use your imagination and experience to improve the interdisciplinary nature of these activities. Read pertinent stories that relate to the activity. Include art and music where appropriate. Add to the experience by doing such things as writing descriptions, drawing pictures, reading poetry, taking photographs, or telling stories.

# Activity Matrix

| Activity | Objectives | Indoor/outdoor Special Habitat | Time of Year* |
|---|---|---|---|
| Plants are Alive! | To differentiate between living and non-living things, and to demonstrate that plants are alive. | indoors | any time |
| The Green Grass Grows | To demonstrate that plants are green because they contain a special substance called chlorophyll, which allows them to make their own food to live and grow. | Activity 1: indoors<br>Activity 2: outdoors | Activity 1: any time<br>Activity 2: seasons when plants are actively growing. |
| Plant Puzzles | To demonstrate that living plants are made of many different parts that work for healthy plant growth. | indoors | any time |
| Plants! Plants! Everywhere! | To identify the many ways that we use plants in our daily lives. | Indoors/outdoors | any time |
| Eating Out | To distinguish and demonstrate the different plants and plant parts that we eat. | indoors | any time |
| Put On a Happy Face! | To identify how plants improve the quality of our lives. | Activity 1: indoors<br>Activity 2: outdoors | Activity 1: any time<br>Activity 2: seasons when flowers are available for collecting |
| Light Up the Way! | To demonstrate that plants need light energy to make their food. | Activity 1: indoors<br>Activity 2: outdoors | Activity 1: any time<br>Activity 2: seasons when plants are growing |
| Sun, Soil, Water, and Air | To demonstrate that plants need light, air, and water to live and grow. | indoors | any time |
| Adventures in Soil | To demonstrate that soil is made up of living and non-living components, and to connect that plants use their roots to absorb nutrients and water from the soil. | indoors or outdoors | anytime, but warmer months are preferable |
| From Seed to Shining Seed | To describe the life cycle of a plant. | indoors | any time |

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| Activity | Objectives | Indoor/outdoor Special Habitat | Time of Year* |
|---|---|---|---|
| A Plant for All Seasons | To differentiate between the seasonal changes made by plants in the course of a year. | indoors | any time |
| Wonderful World of Plants | To describe how plants grow in many different places around the world. | indoors; field trip to a local greenhouse or florist | any time |
| Sowing Seeds | To demonstrate that seeds are found in a plant's "fruit" and that a new plant can grow from a seed. | indoors | any time |
| Rooting Out the Answers | To demonstrate that new plants can be grown from plant parts. | indoors | any time |
| 'Taters from Tubers! | To demonstrate that new plants can be grown from different plant parts, and that plant buds are found on a plant's stem. | indoors | any time |
| The Wonderful Herbs | To look at a special group of plants that share common characteristics. | indoors | any season that allows for the collection of fresh herbs |
| In-dye-scribable! | To demonstrate how the colors found in plants are used for coloring (dyeing) other things. | indoors | any season that allows for the collection of plant materials for dyeing |
| The Language of Flowers | To identify different ways that people have used plants in communication. | indoors | any time |
| Growing Gifts | To demonstrate good earth stewardship by growing plants to prevent soil erosion, and ensure future generations of plants. | outdoors; flowers will be planted in a prepared garden either at home or at a community building | any season except winter |
| Compost Creations | To demonstrate that composting old plants and food, and returning them to the soil, is a way to provide nutrients to growing plants, and to reduce waste. | indoors or outdoors | any time |
| Blooming Beauties | To define how plants bring people together and beautify the world. | indoors | any time |

**For all but tropical areas where activities can be done during the entire year.*

# What is a Plant?

## Chapter Background

Children have a natural curiosity about plants and nature. Without urging, they may happily chain clover flowers into necklaces and crowns, pluck petals from daisies, and roll in the grass. They peek under rocks in the garden in search of squirmy bugs, and pull leaves off trees to float down a rainwater river. In their young, self-centered world children perceive that plants and nature exist for their own enjoyment.

Fortunately, these playful interactions with plants often provide opportunities for intense observation. When asked, "What is a plant?" young children may relate observations from their play such as "plants are things that live outside (and sometime inside!)," "plants are green," and that "plants have leaves, and sometimes flowers." We will start our exploration of the plant world by exploring these simple child-held perceptions.

First let's look at the fact that plants live outside or inside. To a young child all things live somewhere. In their worldview even innate things such as rocks and houses "live" outside or in their neighborhood. In this first activity the children will find out what it means to live or to be alive.

It is hard for children to understand that plants are alive because everything a plant does is carried out very slowly. Observing plant "life" is not easy. Children may know that a living thing will eat, drink, move around, have babies, and grow. It is difficult for adults, let alone children, to understand that plants do all of these things too. Plants are as alive as roaring lions or fluttering butterflies! Children will start exploring the world of plants by observing how living plants grow from seeds (plant babies), grow (change in size), and require water to live.

The next characteristic of plants that children may point out is that they are usually green. Why are most plants green? The children will discover that because plants cannot visit the grocery store or restaurant for their dinner, they must be able to make their own food. In this activity, the complex concept of photosynthesis is simplified for a basic understanding of how plants make their own sugar for food. The children will learn that plants have a special green substance, called chlorophyll, in their leaves and stems that helps them make food for healthy growth.

Finally, children easily recognize that plants are made up of special parts – stems, leaves, flowers, and roots. By comparing the makeup of different living creatures, the children will come to understand that all animals, people, and plants are made up of many parts that work together for healthy living. The following is an overview of the functions of the plant parts covered in this activity:

### Roots

- hold the plant in place in the ground
- absorb water and nutrients from the soil
- store sugars and starch for the plant to use

## Stem

- support the leaves and flowers of the plant
- transport water and nutrients from the roots to the leaves and other plant parts
- transport sugars made in the leaves to the roots and other plant parts

## Leaves

- the place where the energy from light is used to combine water and carbon dioxide into sugar
- provide air to the plant
- regulate the moisture and temperature in a plant

## Flowers

- the part of the plant that produces the seeds

## Seeds

- the part of the plant that carries a new baby plant inside so that the plant can reproduce itself

# Activity 1A: Plants are Alive!

## Life Skills:

Reasoning-Applies principles to a procedure; examines information for relevance.

## Location: indoors

## Time Needed:

**Introduction:** 20 minute

**Activity:** 20 minutes; Growing Time: about 2 weeks

## Best Time of Year: any time

## Materials:

**Introduction:** pictures of living and non-living objects, demonstration plant

**Activity:** pre-constructed growth chamber (found under *Doing the Activity*), clear plastic 2-liter soda bottles, gravel, lima bean seeds (soaked overnight), bush bean seeds, potting soil, dark construction paper, scissors, masking tape, water, copies of Activity Sheet 1A, pencils, crayons

## Objective

To differentiate between living and non-living things, and to demonstrate that plants are alive.

## Activity Summary

The children compare the differences between living and non-living things. They explore what factors determine if something is alive or not alive. They demonstrate that plants are alive by growing new plants from seeds in a growth chamber. The activity shows how plants come from seeds (have babies), grow (change in size), and require water to live. The children record their daily observations by drawing and coloring pictures of the living plants as they grow from seed.

## Doing the Activity


### Introduction

To start this activity, ask the children to describe something in their neighborhood that they think is alive. Let them give several examples. Now ask them to describe things they think are not alive. Again, allow for several examples. How can they tell if something is alive or not alive? Most children will know that living things grow, have babies, move around, eat food, drink water, and breathe air. Hold up the pictures of living and non-living things and ask these questions:

- Does it eat food?
- Does it drink water?
- Does it breathe air?
- Does it have babies?
- Does it move?
- Does it grow?

Using these simple questions, the children will distinguish some of the differences between things that are alive and not alive.

Now, holding up the demonstration plant, ask the children to use the same questions to determine if the plant is alive. Do plants eat food and drink water? Breathe air? Have babies? Move around? Grow? Explain that plants do all of these things but it is often hard to see these actions because plants do them so slowly.

Explain to the children that they are going to put together a demonstration to answer three of the questions. They will see if plants grow (Does it grow?) from seeds (Does it have babies?). They will also see if plants need water to live (Does it need water?).

Activity

## Activity: Bean Babies Growing Up!

First, pass out some lima bean seeds that have been soaked in water overnight. Ask the children to gently split open the seed along the line they see on the outside of the seed. Ask the children to describe what they see inside the seed. They should see the tiny little plant resting inside the seed waiting to grow. A seed is a "plant baby." Describe how in this activity they will be watching to see if the tiny plant in a seed grows into an adult plant. Remind them that the "baby" plant will grow slowly, and it may take a few weeks to watch this happen.

Show them a pre-constructed growth chamber and point out how the seeds will be planted near the side of the container so that they will be easy to see. After they are planted, the seeds will be watered. Ask the children to tell you why they think that seeds need water to start growing. Remind them that all living things need water to live and grow. Ask the children to predict if the seeds will grow without water. Explain that to demonstrate if plants need water to grow, the seeds in the demonstration growth chamber will not be watered. In two weeks the children will compare these seeds with the seeds growing in their watered growth chambers.

Each child will make his or her own "growth chamber" to observe new plants growing from seeds. To make a growth chamber:

- Provide each child with the 8- to 10-inch bottom of a pre-cut, 2-litre soda bottle.
- Fill the bottom of the soda bottle with 2 inches of gravel to aid in bottle stability.
- Fill the bottle with potting soil up to 2 inches from the top of the bottle.
- Place 4 bean seeds (2 inches apart) on top of the soil, but next to the side of the bottle. The bean seeds should be seen from the outside of the bottle.
- Cover the seeds with one inch of soil.
- Water the container thoroughly until water is seen draining into the gravel.
- Make a sheath of construction paper that will fit snugly around the bottle (but not so tight that it does not easily slide up-and-down).
- Label the paper sheath with the child's name and the planting date.
- Surround the bottle with the paper sheath. The child can lift the sheath daily to watch the growth of his or her seeds. Remind them that they must always put the paper sheath back to keep the seeds in the dark.
- Provide each child with a copy of Activity Sheet 1A.

Discuss why the clear bottle must be surrounded by dark paper. Think about where plant roots grow in nature. Is it light or dark under the ground? Explain that a plant's roots will naturally grow away from the light and into the darkness of the soil. The dark paper sheath fools the roots so that we can watch them grow by the side of the clear bottle.

Ask the children to take the time every day to remove the sheath of paper and observe the growth of the seeds. Using Activity Sheet 1A, ask them to draw a picture of the plants as they grow. Record the changes that occur every day on the calendar. Ask the children to think about these questions as they observe their seeds growing: What part of the seed begins to grow first? How long does it take for the little plant to grow above the soil? What do the first leaves look like? What do the second set of leaves look like?

After two weeks, ask the children to share their projects with the others. Let every child describe how their seeds grew into plants. Compare their plants with the seeds in the demonstration growth chamber that have not been watered. Did the seeds that did not get water grow? Were their predictions correct? Was water important to the plants for their growth? Are plants alive?

## Evaluation

After two weeks of watching the beans grow, ask the children if they think that the bean plants are alive. Let every child have a chance to tell you why he or she thinks the plants are alive. Ask these questions: Did the plants change in size or grow? Did they grow from a baby plant? Did the plants need water to grow? Ask the children compare the similarities between the bean plants and themselves.

## This is What You Can Do!

Plants are alive because they grow, have babies, and need water. Just as we respect and care for other living people and animals, we must respect and care for living plants.

## Enrichment Activities

Take the children for a walk through the woods, a field, a park, or the schoolyard. Ask them to find examples of things that are alive (or were once alive) and those that are not alive. If possible, make a collection of these items and sort them into shoeboxes labeled "alive or once alive" and "not alive." Compare the two sets of items. Ask the questions that you used in this activity to determine if something is alive. Remember that some things such as sticks or dried leaves were once alive and should be placed in the "alive or once alive" box. Use plastic containers to hold any insects that are gathered. After this project, release any living creatures that may have been collected.

# Activity 1B: The Green Grass Grows

## Life Skills:

Learning to Learn- Draws upon experiences and prior knowledge; interprets and applies new knowledge and experiences.

## Location:

**Activity 1:** indoors

**Activity 2:** outdoors

## Time Needed:

**Introduction:** 20 minutes

**Activity 1:** 20 minutes

**Activity 2:** 20 minutes; Growing Time: about 1 week

## Best Time of Year:

**Activity 1:** any time

**Activity 2:** seasons when plants are actively growing

## Materials:

**Introduction:** fruit slices

**Activity 1:** copies of Activity Sheet 1B, crayons

**Activity 2:** flat piece of wood, paper clips, paper, student scissors, pencils

## Objective

To demonstrate that plants are green because they contain a special substance called chlorophyll, which allows them to make their own food to live and grow

## Activity Summary

The children determine that plants contain sugar by tasting the sweetness of fruit slices. They learn that plants make their own sugar by a process called **photosynthesis**. They determine that plants contain a green **pigment** called **chlorophyll**, which makes them green. The children learn that plants use chlorophyll, light energy, water, and air to make sugar to use for growth or to store for later use.

Activity

## Doing the Activity

The process of photosynthesis is fundamental to life on earth because it is the way by which plants make their own food, a simple sugar. It is plants' ability to make sugar that sustains the lives of people and animals, which depend on them for their food and energy source. However, it is very difficult for young children to understand something they cannot see. Since photosynthesis is invisible to children, they will explore some simple features of the process to discover that plants have the ability to make their own food.

## Introduction

Pass out fruit slices to the children and ask them to taste the fruit. Ask them to describe the taste using these questions: Why do you like to eat these fruit slices? Is it because they are sour? Bitter? Salty? Is it because they are sweet? Why do you think the fruit slices are sweet? What are other fruits that are sweet? Why do you think they are sweet? Explain to them that it is the sugar in the fruit that makes them sweet. Now, ask them to tell you about their favorite fruit. Let all of the children describe their favorite fruits. Isn't it interesting that the fruits we like are so sweet?

Next, ask them to tell you where the fruits they enjoy come from. Can they tell you that apples come from apple trees? Peaches come from peach trees? Strawberries come from strawberry plants? Ask the children these questions: Since the fruit come from plants, how do the plants get the sugar to make the fruit so sweet? Do they go to the grocery store to pick some up? Do they order some sugar by phone? Let them use their imaginations to think of places where plants might get some sugar. Explain that since plants can't go anywhere to buy sugar, they must be able to make the sugar themselves.

Explain that most green plants can make their own food (plant sugars) inside their leaves. To do this, plants need certain ingredients, just as a cook needs flour, sugar, eggs, and milk to make muffins. The ingredients that plants need to make sugar are light energy, water, air, and chlorophyll. We know what light, water, and air are, but what is chlorophyll?

Describe to the children how there is a green substance in plants called chlorophyll. That is why they are green! Ask if they know of a plant that isn't green (Botanical Note: In case a child does mention a plant that is not green, such as mature wheat or variegated houseplants, be sure to let them know that at some point the plant was green, or has hidden chlorophyll).

Explain how chlorophyll is able to catch the energy from light and use it to combine water and carbon dioxide (a gas in the air) to make sugar. The plant then uses this sugar for food to live and grow. This process is called photosynthesis, which means using light (photo) to make something (synthesis).

Plants also store the sugars they make in their fruit, stems, and roots to use later. We eat this stored sugar when we munch on such things as apples and peaches (fruit), celery (stems), and carrots (roots). Ask what would happen to people and animals if plants stopped making sugars and storing them. What would we eat? How would we live?

Activity

## Activity 1: Plant Sugar Recipe

In this activity photosynthesis will be discussed from a child's point of view. Supply each child with a copy of Activity Sheet 1B. Color the Plant Sugar Recipe together. Discuss each ingredient as you color it.

Mix together:

**Light Energy** The sun gives off energy in the form of light and heat. Ask the children to describe how they can feel the heat energy from the sun when they are outdoors playing ball, swimming, or roller skating in the park.

**Chlorophyll** Plants are green because they contain chlorophyll. Ask the children to describe what they find on the knees of their pants when they take a tumble in the grass. This is the chlorophyll rubbing onto their pant legs.

**Water** Plants use a lot of water. Ask the children to describe what happens to a plant when it doesn't get enough water. Does it droop or wilt? How could someone help a plant that is wilting?

**Air** Plants use the air around them just like other living things. Unfortunately, children cannot see a plant breathe. Explain that the air moves in and out of the plant's leaves through little air holes that we cannot see.

Mix it all together and what do you get?

Plant Sugar! Ask the children to describe how they know that plants make sugar. Do they remember the sugary, sweet taste of the fruit slices?

Activity

### Activity 2: Green Growers

To demonstrate that plants contain chlorophyll have the children place a board on top of the grass growing in a lawn. At the same time have each child use a paper clip to attach a 1" X 1" piece of paper to the top of a leaf on a young tree or shrub. Make sure they have written their names on their piece of paper. Ask the children to predict what will happen to the grass or to the leaf by their next meeting.

The next time your group meets (a minimum of one week) remove the piece of wood from the grass. The children will see that the grass has turned yellow. The substance that makes the plant green (chlorophyll) has disappeared! Explain to the children that the chlorophyll needs light energy to make sugar. When the light is blocked (shaded by the piece of wood) the chlorophyll cannot do its job and starts losing its color. Were their predictions right?

Now, remove the pieces of paper from the leaves. The children will see that the green color in the leaves has also lightened. Plants need light energy for the green chlorophyll to successfully do its job.

## Evaluation

Prepare some apple or other fruit pieces for the children to taste. Use these questions to help the children tell you why the fruit is sweet: What do plants need to make sugar? Why are most plants green? Why is it important that green plants can make and store sugar? What would happen to people and animals if plants could no longer make sugars?

## This is What You Can Do!

Green plants make their own food (sugar) by using light energy, water, air, and chlorophyll. Knowing this, we can provide light and water to plants in our care.

# Activity 1C: Plant Puzzles

## Life Skills:

Thinking Creatively- Recognizes patterns and relationships; actively pursues creative expression.

## Location: indoors

## Time Needed:

**Introduction:** 20 minutes

**Activity 1:** 15 minutes

**Activity 2:** 20 minutes

## Best Time of Year: any time

## Materials:

**Introduction:** demonstration plant, newspaper

**Activity 1:** copies of Activity Sheet 1C, pencils, crayons

**Activity 2:** candy (listed under *Doing the Activity*), wax paper

## Objective

To demonstrate living plants are made of many different parts that work together for healthy plant growth.

## Activity Summary

Children discuss how living things are made up of different parts that work together for healthy growth. They compare the different parts (and their functions) that make up a person with those that make up a plant. They explore the different parts that make up a plant by drawing a plant and all of its working parts, and by building a 3-D plant model.

## Doing the Activities

### Introduction

Ask for a volunteer to be your "example." As the child stands up in front of the group, ask the children to list the different parts of the human body that they see. They should provide a fairly extensive list including such things as eyes, ears, nose, mouth, arms, and legs. Now ask about parts that are inside the human body. Although this is a little more difficult for younger children, they should be able to list such parts as the heart, blood, stomach, and the brain.

From their list choose a few to discuss in detail. Ask such questions as: What does the heart do? What do our eyes do for us? What would life be like if our eyes or our heart did not work? Do other animals have similar parts? Does a dog or a cat have legs, eyes, and a heart? How about a bird or a turtle? What would happen to a turtle if his eyes or heart did not work? Explain how living things are made up of many parts that work together for a healthy life.

Now take the demonstration plant and ask the children to look at it closely. Ask the children to describe the different plant parts they see. Do they see the stem and the leaves? Pull the plant out of the pot and lay it on the newspaper. What part of the plant is found under the soil? The children

may also be able to list flowers and seeds as parts of a plant. Use pictures of these latter parts, as they are often not present on plant examples.

Each part of a plant performs its own special job to help the plant live a healthy life. Discuss the functions of these plant parts (Refer to Background Information). Ask the children to describe what would happen if the plant's roots (stem? leaves? etc.) stopped working. Would the plant be able to continue living? Discuss how the plant needs all of its parts to function properly for it to thrive.

The following activities help children visualize and understand the different parts that make up a plant. Each activity allows the child an opportunity to attend to the different parts of a plant in a creative way.

Activity

### Activity 1:The Missing Plant

Provide each child with a copy of Activity Sheet 1C. Ask them to connect the dots to discover the flower of a plant. Ask them to color the picture using the colors indicated.

Activity

### Activity 2: Yummy plants!

Prior to this activity have the children wash their hands and clean off their desks or tables.

Place a sheet of wax paper in front of each child to provide a clean work area. Using various types of candy, ask each child to create a model of a plant that includes roots, a stem, leaves, flowers, and seeds. Remind the children that some of the candies can be "squished" into different shapes to make their creation look more like a plant. Provide each child with the following:*

- Sheet of wax paper to use as a clean work area
- Roots: licorice whips
- Stem: peppermint or candy stick
- Leaves: spearmint leaf gumdrops, gummi candies
- Flower: marshmallows
- Seeds: red hots, miniature candy coated chocolates, or chocolate chips

* *These are just suggestions. You may find other candies that will work just as well.*

Ask each child to show you the parts of his or her candy plant before the model is eaten. Let them tell you what each part does to help the plant live a healthy life.

## Evaluation

Using the demonstration plant, ask a child to point to and identify a plant part. Let the child describe what that plant part does to help the plant live and grow. Let a different child describe each plant part and its function.

## This is What You Can Do!

Living plants are made up of many different working parts that are needed for healthy plant growth. To help take care of plants we must be careful not to step on them, break their branches or stems, or tear their leaves. Showing respect to plants will help keep them healthy.

## Enrichment Activities

Take the children on a walk through the woods, a field, a schoolyard, or by a garden. Ask them to make a collection of different plant parts that they find on the ground. Remind them not to pick anything off living plants. They will probably find sticks (stems), old leaves, seeds such as acorns or maple samaras, and possibly some old flowers. On a piece of poster board ask them to make a collage of the plant parts they collected in the shape of a plant. They can draw in the roots to make it complete.

My Name is:

*18 U.S.C. 707

# Bean Babies Growing Up

*Instructions: Observe your bean seeds every day. Each day draw and color a picture of your bean seed as it grows into a plant.*

**Week 1**

| Sun | Mon | Tue | Wed |
|---|---|---|---|
| Thur | Fri | Sat | |

**Week 2**

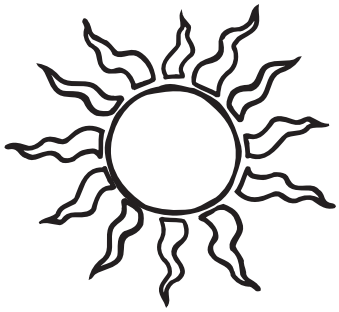
| Sun | Mon | Tue | Wed |
|---|---|---|---|
| Thur | Fri | Sat | |

My Name is:

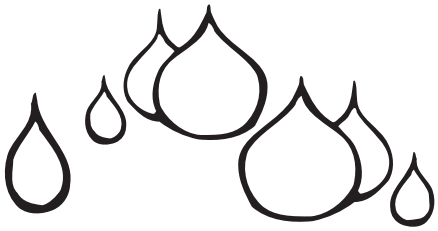
*18 U.S.C. 707

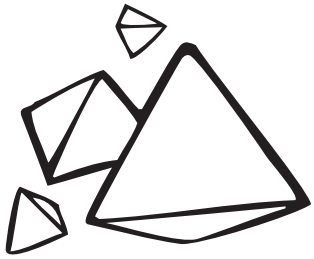
# Plant Sugar Recipe

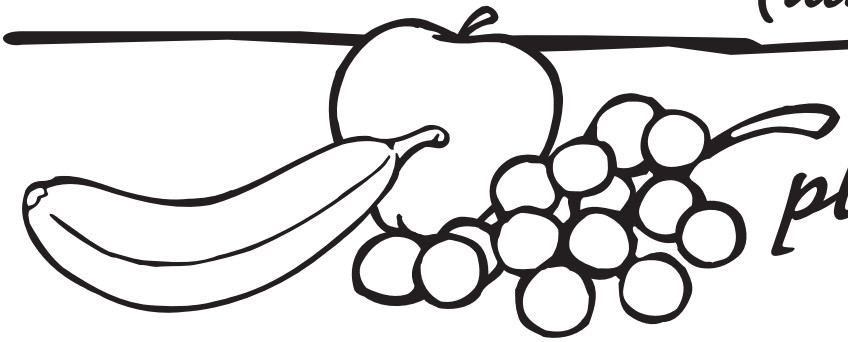
*Instructions: Color the recipe for plant sugar*

1 part  light energy

1 part  chlorophyll

1 part  water

1 part  carbon dioxide (air)

 plant sugar

Activity Sheet 1B

Virginia Cooperative Extension

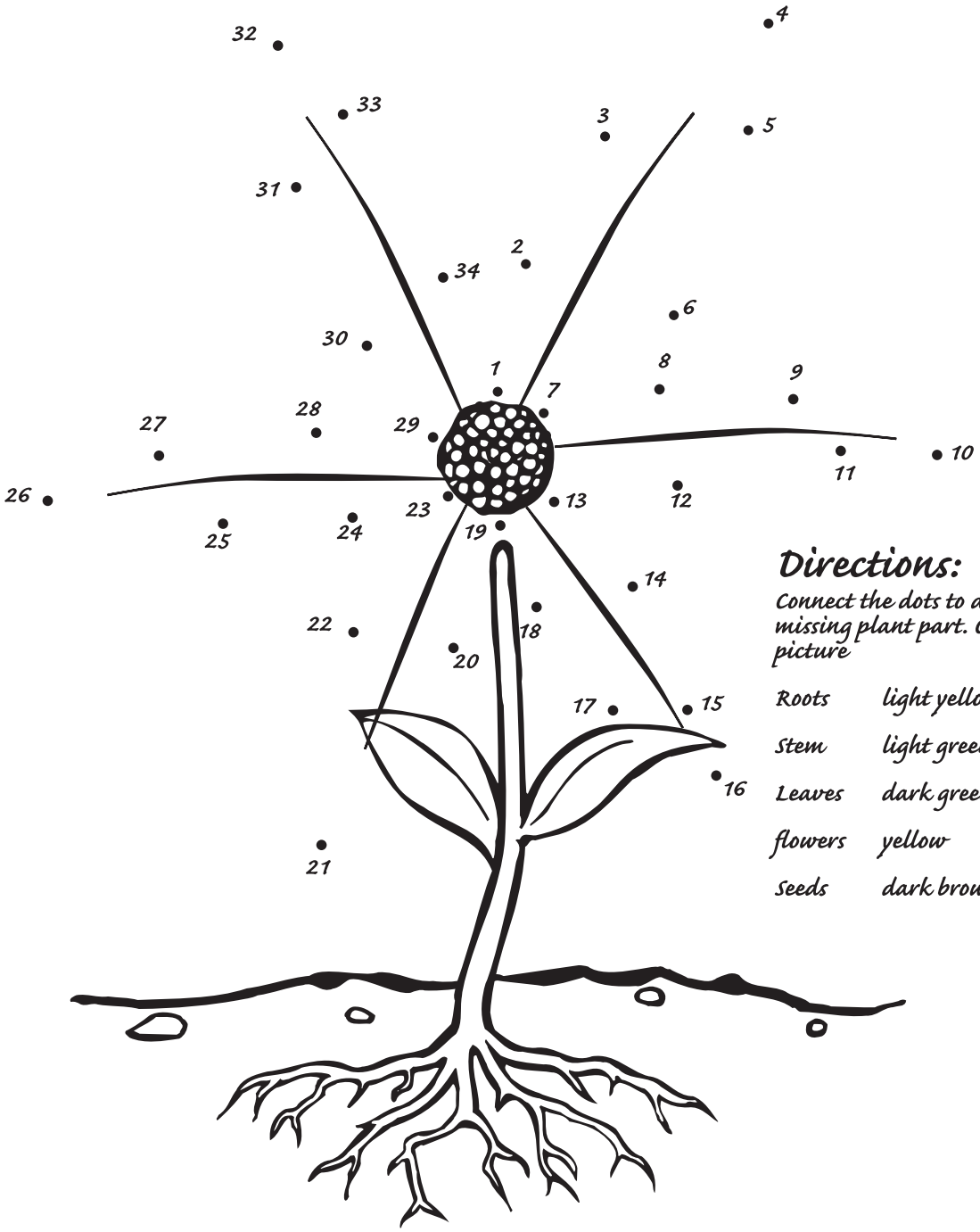


*18 U.S.C. 707

My Name is:

*18 U.S.C. 707

# The Missing Plant




## Directions:

Connect the dots to discover the missing plant part. Color your picture

| | |
|---|---|
| Roots | light yellow |
| Stem | light green |
| Leaves | dark green |
| flowers | yellow |
| Seeds | dark brown |

Activity Sheet 1C

Virginia Cooperative Extension

# Living with Plants

## Chapter Background

"The alarm goes off in the dark morning hours. You stretch, rub your eyes, and peer out into the stillness. Time to get up! Swinging your legs out of the bed, you toss off the blankets, and put on your clothes for the day. Heading to the kitchen, you smell breakfast cooking and your stomach begins to rumble. After a nice breakfast, you pack up your backpack with your books and homework, grab your lunch, and head out to the bus stop. Good thing your coat is warm, as the morning chill is still in the air. Here comes the bus! Time to go to school!"

Young children have a good sense of this morning routine. Most children experience some form of this scenario on a typical school morning. However, what they often do not recognize is how plants play an important role in even this small part of their day.

Let's take a look. Most homes are framed and constructed with wood or wood products, painted with paint containing plant oils, and decorated with fabrics made from plant fibers. Clothes are often made from plant fibers, as are our blankets, backpacks, and coats. Homework papers and schoolbooks are composed of paper made from plant and wood fibers. The nice breakfast is made from plants...cereal, toast, jelly, margarine, juice, waffles, and pancakes. Even the eggs, bacon, and sausage come from animals that rely on plants for their food. The fuel for the bus is made from oil composed of plants compressed for millions of years. And the school day starts with pencils, books, paper, and desks made from the wood and wood fibers from trees.

People use plants every day for food, clothing, and shelter. Although we often do not think about it, we also breathe oxygen supplied by plants! In addition, we get many of our luxuries such as oils, paints, perfumes, spices, and medicines from plants. Then, to top it off, plants supply us with many happy times and memories. Remember how you felt sitting in the cool shade of a tree, sending a red rose to your sweetheart, or carving a scary Halloween pumpkin?

The activities in this chapter will introduce the children to some of the many ways that plants impact our everyday lives. The children will take a close look at the different ways that we use plants, our special relationship with plants and the foods we eat, and the unique ways that plants make us happy.

# Activity 2A: Plants! Plants! Everywhere!

## Life Skills:

Thinking Creatively-Recognizes relationships.

## Location: indoors

## Time Needed:

**Introduction:** 20 minutes

**Activity:** 30 minutes

## Best Time of Year: any time

## Materials:

**Introduction:** examples or pictures of plant-based items (found under *Doing the Activity*)

**Activity:** candy Bingo Markers, crayons or markers, rulers, student scissors, plain paper, copies of Activity Sheets 2A, glue or tape

## Objective

To identify the many ways that we use plants in our daily lives.

## Activity Summary

Children describe the things they know people use that come from plants. The adult leader expands their list to include the items discussed in this activity. The children play "Plants We Use" Bingo to encourage recognition of the many things we use that come from plants.

## Doing the Activity


### Introduction

Ask the children to help you make a list of the things they use that come from plants. Make sure that several children have the opportunity to respond. They should be able to list many foods, possibly some clothing, and some wood products. To encourage discussion, have a collection of examples or pictures of plant-based products. Ask the children to identify what plants or plant parts were used to make these items.

Challenge them to think about different kinds of plants and what we might get from them. Ask them about the wood from trees (houses, furniture, musical instruments, paper, pencils, etc.), the fibers from cotton, hemp, and flax (clothes, tents, rope, upholstery), and things such as perfumes, beverages (tea, coffee, cola, cocoa, and fruit juices), and medicines.

Here are some interesting plants and plant products to discuss:

| Item | Plant | Plant Part |
|---|---|---|
| Eraser/Tires | Rubber tree | Sap |
| Corn Flakes | Corn | Seeds |
| T-shirt | Cotton | Seed pod |
| Aspirin | Willow Tree | Bark |
| Soap | Castor Bean | Seeds |
| Pencil/paper | Pine Tree | Stem |
| Candy | Sugar Cane | Stem |
| Tea | Tea plant | Leaves |
| Chocolate bar | Cacao Tree | Seed pod |

Ask these questions to encourage thinking about plants and their uses: Are people the only creatures that use plants in their lives? How do birds use plants (ex. eat seeds and flower nectar, build nests from twigs, protection from predators)? How do animals use plants (ex. food, shelter, water source, protection, scratching posts)? How do insects, reptiles, fish, or amphibians use plants? What would the lives of people and animals be like if all of the plants disappeared? The children should see that most living creatures are dependent on plants for many different things in their lives.

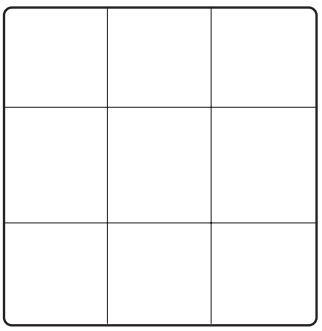
Activity

## Activity: "Plants We Use" Bingo

This is a variation of a Bingo game. Give each child a copy of Activity Sheet 2A and a plain piece of paper. Using a ruler, mark the plain sheet of paper as shown:

Ask the children to cut out the *Plants We Use* pictures on Activity Sheet 2A. Select nine of the pictures and glue them in any order in the nine drawn squares. Every bingo card should have different pictures in a different order to make the game fun! Younger children may need their cards made for them prior to this activity. Older children should be able to make their own cards. If you have time, ask the children to color the pictures on their bingo cards.

To play the game, the "caller" will mix up a complete set of the *Plants We Use* pictures that are upside down or in a hat. Distribute candy markers to each child. The caller pulls out a picture and calls it out. The children will place a candy marker on that picture if it is on their own card. The first person that gets three candies in a row yells out "Plants! Plants! Everywhere!"



After a few rounds of *Plants We Use* Bingo, let the children eat some of the candies.

## Evaluation

To determine if the children have learned how many things we use come from plants, take a walk through the meeting room and ask the children to point out things they now know come from plants. Make it a game to see who can point out a plant product first. Ask them to describe what our lives would be like without plants.

## This is What You Can Do!

Plants provide us with many different things that we use in our lives such as food, clothing, shelter, paper, and luxuries. Since plants are so important to us, we must remember to take care of the plants around us.

# Activity 2B: Eating Out

## Life Skills:

Learning to Learn-Draws upon experiences and prior knowledge.

## Size of Group: 10 to 12 children

## Location: indoors

## Time Needed:

**Introduction:** 20 minutes

**Activity 1:** 15 minutes

**Activity 2:** 30 minutes

## Best Time of Year: any time

## Materials:

**Introduction:** lunch box or bag (packed with a piece of fruit, peanut butter and jelly sandwich, cookies, and potato chips)

**Activity 1:** copies of Activity Sheet 2B

**Activity 2:** poster board, garden catalogs and magazines, student scissors, glue sticks, markers or crayons

## Objective

To distinguish and demonstrate the different plants and plant parts that we eat.

## Activity Summary

Children explore the origins of some of the foods that they eat. They discover that we eat a variety of plants and plant parts. They think about the different plant parts we eat by constructing a collage of plant food pictures.

## Doing the Activity

To discover where the foods we eat come from, start by asking the children to describe their favorite foods. They will probably say that French fries, cookies, and pizza are tops on their list! Let every child have an opportunity to tell you about his or her favorite food.

Using their examples, discuss where the different foods they enjoy come from. For example:

- French fries are made from the underground stems of the potato plant.
- Pizza is made with crust made from wheat seeds (flour), pizza sauce made from tomato fruit, spices from the leaves of basil and oregano plants, and garlic from the underground stem of the garlic plant. The cheese on the pizza may be made with cows' milk, but the cows depend on grasses and other plants for their food.
- Cookies are made with flour made from wheat seeds, sugar from a sugar cane's stem, chocolate from the seeds of a cocoa tree, and margarine from corn seeds.

The children will be surprised to learn that all their favorite foods come from, or rely on, plants!

Bring out the lunch box. Ask a child to open it up and lay the contents in front of the group. Talk about the plants and plant parts that were used to make this lunch. Did the plants store sugars in the different parts that were used to make this lunch? (Note: Remind the children about what they learned in Activity 1B about plants making and storing sugars.)

| Item | Plant | Plant Part |
|---|---|---|
| Bread | wheat plant (flour) | seed |
| Grape jelly | grape vine | fruit |
| Peanut butter | peanut plant | seed |
| Potato chips | potato plant | stem |
| Cookies | wheat plant (flour) | seed |
| | sugar cane (sugar) | stem |
| | cocoa tree (chocolate chips) | seeds |
| Fruit | apple tree | fruit |
| | grape vine | fruit |
| | banana tree | fruit |

Use these questions to encourage further discussion: Which parts of the lunch do the children like the best? Which part of the lunch is the sweetest? Are some of the foods not sweet? Do we still get nourishment and energy from the plants that we eat that are not sweet? Explain to the children that even the non-sweet plants have stored sugar. These plants have just changed their sugars into starches. A starch is just a more complicated form of sugar that is not sweet tasting, but just as nutritious. The plants used in this lunch that changed their sugars into starches are the wheat, peanut, and potato plants. Can they think of other plants that we eat which are not sweet?

Activity

## Activity 1: The Food Search

Provide each child with a copy of Activity Sheet 2B. Ask them to find the 14 hidden plants that we like to eat!

Activity

## Activity 2: Delicious Dining

Divide the children into groups of four. Ask each group to draw a large, imaginary plant on a piece of poster board or large piece of paper. Their "plant" should include a flower, leaves, stems, roots, seeds, and some fruit. Provide the children with old garden magazines or seed catalogues. Ask them to cut out pictures of 10 vegetables and/or fruit that they enjoy eating.

Ask them to look at the pictures carefully and decide what part of the plant each food comes from. Next, glue all the foods from plant leaves, like lettuce and spinach, on the leaves of the plant drawing. Glue all the stem foods on the stem of the drawing, all the root foods on the roots, all the fruit foods on the fruits, the flower foods on the flowers, and the seed foods on the seeds. Their posters will demonstrate how people depend on different plants and plant parts for our food. Have each group present their poster to the group.

## Evaluation

Bring out the different foods used in the demonstration lunch. Ask the children to identify the different foods. Ask these questions: What plants and plant parts did the foods come from? Did the plants store sugars and starches in these plant parts? How do people get the sugars and starches from plants to use for their own healthy living? (The answer? We eat them!)

## This is What You Can Do!

The foods we eat come from, or rely on, plants. We also eat many different plant parts. Aren't we glad that plants can make and store sugars for us to use for our own nourishment?

## Enrichment Activities

Ask the children to do the following: When you go home tonight try to figure out what plants were used to make your dinner. Can you tell which plant part you are eating? Can you taste the sugars that the plants were storing? Can you tell when the plant has changed sugar into starch? If you are having some meat, talk about the plants that the meat producing animals eat to live and grow. Are plants important to animals too?

# Activity 2C: Put on a Happy Face!

## Life Skills:

Thinking Creatively- Actively pursues creative expression.

## Location:

**Activity 1:** indoors

**Activity 2:** indoors and outdoors

## Time Needed:

**Introduction:** 15 minutes

**Activity 1:** 20 minute; Growing Time: up to 4 weeks

**Activity 2:** 30 minute, and up to 3 weeks for flower pressing

## Best Time of Year:

**Activity 1:** any time

**Activity 2:** seasons when flowers are available for collecting

## Materials:

**Activity 1:** 2-litre soda bottles, student scissors, gravel, potting mix, houseplants for cuttings (suggestion: use plants, such as coleus and Swedish ivy, which can provide multiple cuttings), rooting hormone, 1 gallon plastic bags, watering can, construction paper, glue or tape

**Activity 2:** telephone books, heavy books, heavy white paper, flowers, clear contact paper

## Objective

To identify how plants improve the quality of our lives.

## Activity Summary

Children discuss the ways they have experienced using plants during celebrations and holidays. They also discuss how they feel when they are around plants. They explore how we use plants to make ourselves and others feel good. The children discover how people use plants to convey such feelings as love, sympathy, caring, peacefulness, and happiness. They make and share a Friendship Garden or pressed flower cards and bookmarks with a friend.

Activity

## Doing the Activity

### Introduction

Tell the children that they will be exploring the many ways that people use plants during holidays and celebrations, and to share good feelings with others. Ask the children to fill in the blanks as you say the following statements:

On Valentines Day you send your sweetheart a _____. *(rose)*

At Christmas we decorate an _____. *(evergreen tree)*

For Halloween we carve a _____. *(pumpkin)*

At a wedding the bride carries a _____. *(bouquet of flowers)*

When a friend is sick we show them we care by sending _____. *(flowers or a plant)*

Let the children describe other ways that people use plants to celebrate an occasion or to send best wishes or love to another person. Make sure several children have a opportunity to respond.

Next, lead them in a discussion about how they feel when they are around plants. Let them describe how they feel when they:

- walk barefoot through cool wet grass, or sit under a shade tree on a hot summer day
- play soccer or football on a big open field of grass
- collect colored leaves in the fall or plant flowers in the spring
- gather clover to make a clover necklace or pick buttercups for their teacher
- look at a bouquet of flowers on the kitchen table

There is something special about plants that makes most people feel good. Maybe we enjoy the bright colored flowers or the fresh, cool green color and pleasant aromas of plants. Ask the children why they think plants make us feel good. Whatever it is, we often like to share the good feelings that plants provide with others. These activities are designed for children to share this happiness with a friend.

Activity

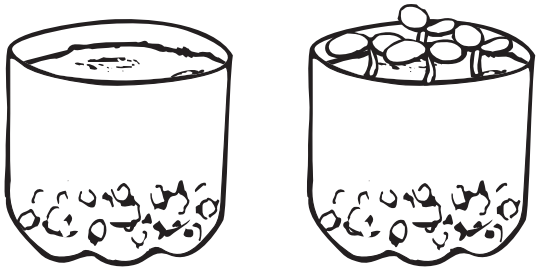
## Activity 1: A Giving Garden

This is a fun activity that not only provides the children with a beautiful plant to share with someone special, but it also introduces them to the form of plant **reproduction** called rooting **cuttings**. If possible, let every child make two "Giving Gardens" so they have one to share and one to keep for themselves.

The process of rooting cuttings involves cutting a piece of a plant stem from a plant and encouraging it to grow its own root system. The stem piece, called a cutting, should always have leaves attached, but should not have flowers. The leaves help the cutting produce the food it needs to grow roots. Gardeners often use this form of propagation to obtain new plants from one of their favorite plants.

**Demonstrate how to take cuttings before you let the children begin this activity.**

Each child will need a 2-litre soda bottle with the top removed. The bottom of the soda bottle should be about 5 inches deep.



To take plant cuttings ask each child to:

- Fill the bottom of the soda bottle with 2 inches of small gravel to assist with bottle stability (Important: an adult should make 4 to 5 holes in the bottom of the container prior to this activity).
- Fill the container with moist potting soil up to 1-inch from the top.
- Cut four cuttings, about 4-inches in length, from the plants provided using scissors.
- Remove the bottom leaves from each cutting.
- Dip the cut end of each cutting into rooting hormone.

- Stick the cut end of the cutting into the moist potting soil.
- Water the soil thoroughly until water is seen draining into the stones.
- Gently cover the cuttings with a plastic bag.
- Place the container in indirect light (bright light will cause the cuttings to rot).

In about four to five weeks the cuttings should begin to develop their own root system and start to grow. Until the roots begin to grow, occasionally spritz the cuttings with water to keep the humidity high inside the plastic bag.

Remove the plastic bag after the cuttings have formed roots. Use construction paper, scissors, and glue to decorate the container. Each child will share his or her "Giving Garden" with someone special.

Activity

### Activity 2: The Beauty of Flowers

Take the children outside to collect flowers from a garden or an open field.

**Warning:** If necessary, show the children an example of poison ivy or poison oak. Warn them not to touch these plants.

Ask the children to collect thin flowers such as buttercups, geraniums, pansies, Queen Anne's Lace, or violets. Thin flowers work best for this activity. Gently lay the flowers between the pages of the telephone books. Lay heavy books, such as encyclopedias or dictionaries, on top of the closed telephone books to press the flowers flat. After two to three weeks remove the heavy books and gently open the pages of the telephone books. The flowers should be nicely dried and pressed.

Ask each child to:

- Cut bookmarks or cards out of heavy paper (white paper is suggested to show off the colors of the flowers).
- Arrange the flowers on the paper.
- Cover the entire card or bookmark with clear contact paper and seal it on the back.
- Share his or her creations with someone special.

## Evaluation

Pick a bouquet of flowers and place them where all the children can see. The flowers can even be "weed" flowers from a roadside or field. If it is not possible to bring fresh flowers, provide pictures of flowers or plants from magazines. Ask the children: How do the flowers and plants make you feel ? What are some ways that we use plants to share happiness or compassion? Can you describe a time when plants made you feel good or calm? What would the world look like if there were no plants around?

## This is What You Can Do!

Plants can brighten our lives through their beauty or calm us with their presence. We can share good feelings with others by sharing plants.

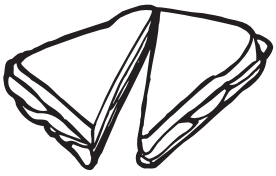
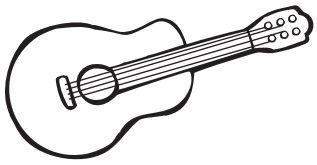
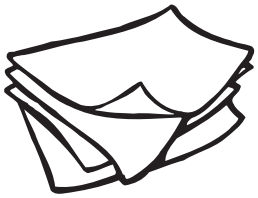
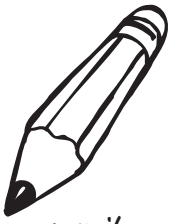
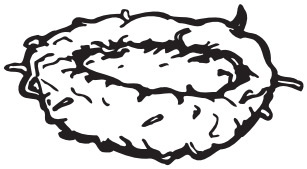
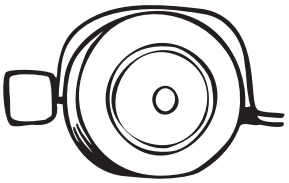
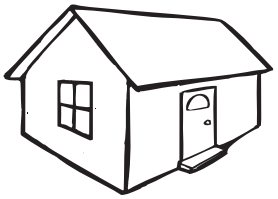
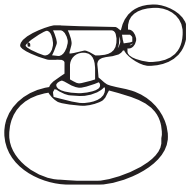
## Enrichment Activities

Gather a bundle of dandelions or buttercups today and share them with someone. Watch them smile!

My Name is:

*18 U.S.C. 707

# Plants We Use

| | | | |
|---|---|---|---|
|  clothes |  food |  musical instruments |  paper |
|  pencils |  homes for animals |  beverages |  sports equipment |
|  candy |  rubber tires |   soap |  decorations |
|  happiness |   medicine |  shelter |  protection |
|   fuel |  fiber |  furniture |  perfume |

Activity Sheet 2A

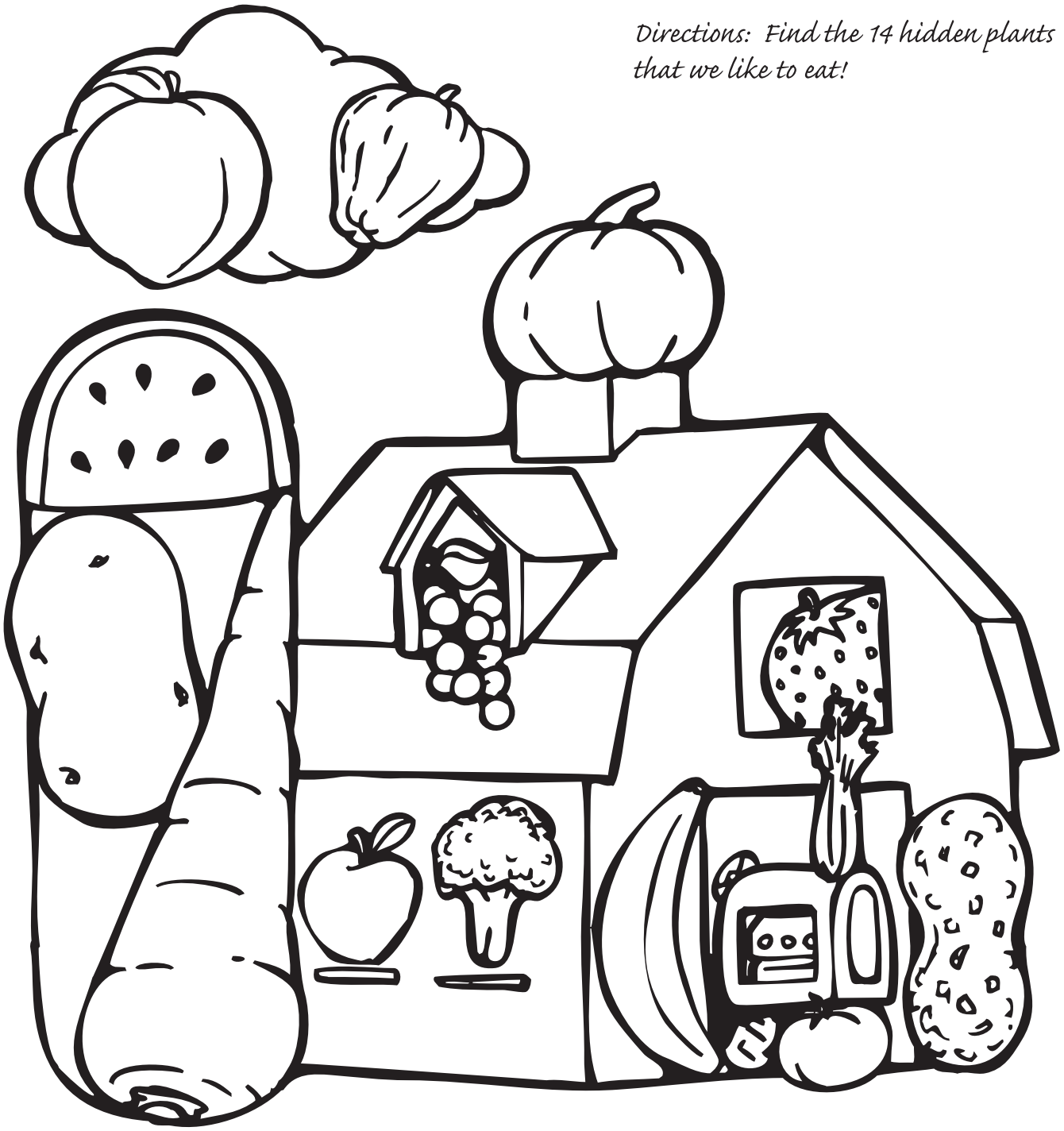
Virginia Cooperative Extension

My Name is:

*18 U.S.C. 707

# Eating Out

Directions: Find the 14 hidden plants that we like to eat!



Activity Sheet 2B

Virginia Cooperative Extension



*18 U.S.C. 707

# Growing Up Green

## Chapter Background

As a little seedling pushes its way slowly through the surface of the soil, a child can witness the first signs of plant growth. Unfortunately plants grow so slowly that it is sometimes hard for a child to imagine that this little seedling will eventually turn into a big tomato plant or a gigantic oak tree! The slow growth of a plant from seedling to full-grown plant may take days, weeks, months, or even years.

So, how can a child see and understand that plants grow? The answers to that question are: time, patience, and observation. Yes, time is needed to check a plant's growth every day or every week. Patience is needed to watch a plant slowly grow from a seed into a plant, and observation is needed to see all the fascinating changes in a plant's life.

The daily observation of plant growth is one of the pleasures of gardening. There is enjoyment in the daily visit to the garden to check on the bean and squash plants, or in watching a rose plant produce flower buds that ultimately open into beautiful, vibrant blooms. The patient, hopeful vigil over the unhurried growth of plants is part of the satisfying interaction between the garden, plants, and the gardener! Take advantage of a young child's power of observation and imagination to encourage patience and personal investment - qualities often overlooked in their busy lives.

The activities in this section discuss the things that plants need to live and grow. The children will compare the things that people need to grow with those of a plant. They will be surprised by the similarities! The children will discuss, observe, and experiment with the factors plants need for growth: light (food), water, air, and soil (nutrients and support). Plants are grown over several weeks in each of these activities. The children will need to use their patience and powers of observation to find out more about plants.

The following is basic information you will need for these activities:

### Light

An important element in the life of a plant is light energy. In nature, plants use the energy from sunlight to make their own food - sugar and starches. A pigment, or coloring, called chlorophyll gives leaves their green color and is used by the plant to collect light energy. Plants then use this light energy to change carbon dioxide (from the air) and water (from the soil) into sugars. This process is called photosynthesis.

The sugar made by photosynthesis is the food the plant uses for living and growing. The sugar, sometimes changed into a more complex form called starch, is stored in different parts of the plant for later use. For example, starch is stored in potato tubers and sugars are stored in apples and pears. Animals and humans eat plants to obtain this stored sugar and starch for their own nourishment.

Plants need plenty of light energy in order to perform photosynthesis. If they do not get enough, they will become weak and spindly, and produce small leaves. Too much light, however, can burn or scorch leaves and fruit. Light energy is so important to plants that they will grow toward any light source to maximize their light exposure. This movement toward a light source is called phototropism.

## Water

Water is important to a plant because it transports food and nutrients to all parts of the plant, it keeps the plant rigid, and it is used in photosynthesis. The plant's roots take up water from the soil. The water then moves through the plants' "plumbing system" from the roots, through the stem, to the leaves, buds, and flowers. Water constitutes about 90% of a plant's weight. Think about what happens to a plant when it does not have enough water...it wilts!

## Air

Some of the gases found in the atmosphere are required for plant growth. Atmospheric oxygen is a basic component of plant cells, carbon dioxide is a crucial ingredient in the photosynthetic process, and nitrogen is used in making plant proteins. Plants obtain some of these elements from the air through openings in the underside of the leaves called stomata.

## Nutrients

Just as children need vitamins and nutrients to grow, plants also need special elements (called soil nutrients) for healthy growth. The topsoil is the soil layer that provides most of the nutrients plants need. These nutrients are used as the building blocks for plant cells and the plant's living processes such as developing seed, photosynthesis, or growing new leaves and flowers.

The soil itself is a storehouse of decaying plant and animal matter, water, air, and plant nutrients. The soil is also the dwelling place for insects, microorganisms, and other animals and plants. Bacteria, fungi, and molds are some of the plants and animals living in the soil. They help decompose dead plants and animals into small particles, which become part of the nutrient reservoir in the soil. Plant roots take in dissolved soil nutrients at the same time as they actively take up the soil water.

# Activity 3A: Light up the Way!

## Life Skills:

Reasoning- Applies principles to a procedure; interprets information; predicts outcomes.

## Location:

**Activity 1:** indoors

**Activity 2:** outdoors

## Time Needed:

**Introduction:** 20 minutes

**Activity 1:** 20 minutes; Growing Time: about 2 weeks

**Activity 2:** 20 minutes

## Best Time of Year:

**Activity 1:** any

**Activity 2:** seasons when plants are growing

## Materials:

**Introduction:** Bean plants from Activity 1A

**Activity 1:** large box, scissors, two pots with two bush bean plants growing in each pot, a sunny window, watering can

## Objective

To demonstrate that plants need light energy to make their food.

## Activity Summary

By observing how plants move toward light, children come to understand a plant's natural need for light energy. The children appreciate that plants use light energy to make sugars for food to use for healthy growth.

## Doing the Activity

Complete Activity 1B prior to this activity.

### Introduction

Ask the children to help you make a list of the things that people need to live and grow. Write their list down on a piece of poster board. Let them tell you why these things are important. The list should include:

- Food - to keep us from getting hungry; for energy and vitamins
- Water - to keep us from getting thirsty; for our bodies to use
- Air - to breathe; for our bodies to use

- Clothes - to stay warm
- Shelter - to protect us from bad weather
- Care - to have someone to care for us

They may also include in their list such items as toys, books, and video games.

Next, ask them to use this question to determine if something really is necessary for people to live and grow.

Can I live without (the item)?

Some examples are:

Can I live without food? Can I live without shelter? Can I live without video games? Can I live without TV? Can I live without air?

Let all the children give an example using this question. They will enjoy identifying the things that they really need to live and grow with things that are fun but not necessary for life.

Now, bring out the young bean seedlings growing in the pots. Ask the children to tell you what these plants need to live and grow.

- Food - plants make their own food, but they get their nutrients from the soil
- Water - plants will wilt and die without water
- Air - plants need air to breathe; air is used to help make the plant's food
- Clothes - plants have special bark or waxes on their outside (plant clothes?) to protect them from bad weather
- Shelter - most plants have adapted to the outdoors and do not need shelter for protection
- Care - plants act in response to our stewardship

Ask the children to explain why plants need some of the same things people need to live and grow. Explain that all living things have the same basic needs to live and grow.

One of the most important things that living things need to live and grow is food. In Activity 1B the children looked at how plants make their own food (sugar) by a process called photosynthesis. The children learned that one of the "ingredients" that plants need to make sugar is light energy. In this activity we will be looking at how plants grow toward the light to improve their exposure to the light for making food.

Activity

## Activity 1: Looking for Light

In this activity we will be looking at a plant **tropism**. A plant tropism is a plant's response to an outside influence such as gravity, light, oxygen, wind, or temperature. Chemical changes occur in the plant as a response to these outside influences. These chemical changes then result in changes in plant growth, which usually improves plant survival.

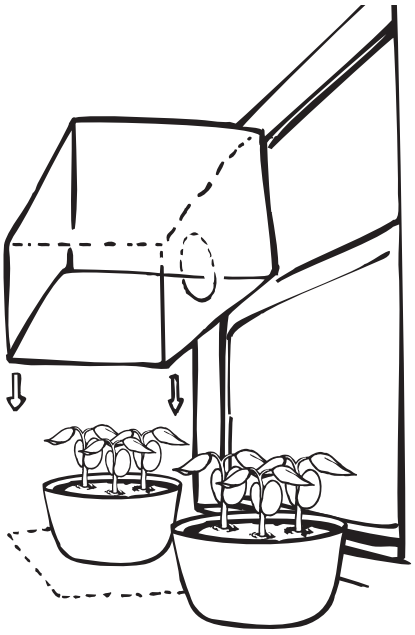
To see how plants respond to light, the children will be exploring **phototropism**. Phototropism is a plant's ability to move or turn toward the light source (usually the sun) to improve its exposure to light. As the children have learned, light is needed for a plant to make its own food, so growing toward light would help the plant feed itself.

To watch a plant's response to light:

- First, cut a hole (a circle 2 inches in diameter) in one side of the large box.

- Place one container with two bean seedlings into the box.
- Cover the box with the lid so that light enters only through the hole.
- Place the box by a sunny window. Make sure the hole in the box faces the window. Open the box only to water the seedlings. Make sure you put the lid back on each time!
- At the same time, place the other container of two bean seedlings in the window to be used for comparison.

Ask the children to predict what they think will happen to the plant in the box. How will the plant get the light energy that it needs to make food?



After two weeks, open the box and observe the seedlings. Ask the children to describe how the plants grew. Ask them: Why would they be growing toward the light? Compare these seedlings to the other ones growing in full sun on the windowsill. Did the plants in the windowsill grow toward the light also? Are there differences in leaf color? Plant size? Stem length? Leaf size? Ask the children why they think these differences occurred.

Activity

### Activity 2: Looking for Light in the Garden

Take the children out into a garden, field, or forest. See if they can find plants growing under shady trees. Are the plants found under the trees growing in the direction of the sun to improve their exposure to the sun's light?

Have the children stand under a tree or large shrub. Ask them to describe how much light they can see under the leaves and branches. Do they think there is enough light for the plants living under the tree? Explain that in nature many plants have learned to make sugars using small amounts of light. The plants that are normally found living under trees or bushes have learned to make sugar using small amounts of light.

Look at a tree. Ask each child to pick a leaf from the bottom of the tree. Now ask an adult to pick some leaves from as high up in the tree as he or she can reach. Compare the two sets of leaves. Ask the children to describe the differences in size and color between the leaves from the bottom of the tree and the leaves from the top of the tree. What might explain why these leaves are different? Explain that the bottom leaves have to be bigger than the top leaves to catch the light that filters through the tree branches. This is also why they are a lighter shade of green (remember what happened to the grass and the leaves in Activity 1B?).

## Evaluation

This activity took a close look at a plant's need for light energy. Ask the children to tell you why a plant will grow toward the light. Why is light energy important to the life of a plant? Do they remember the name of the plant process that uses light energy to help make sugar (food)?

How do we know that light has energy in it? Let them describe what they feel when they are out in the sun. Is the heat they feel the same light energy that the plant uses to make food?

## This is What You Can Do!

You can understand that plants need light to help make their food. A plant will grow toward a light to increase its ability to make food. Understanding what plants need to live and grow helps us to be better earth stewards.

# Activity 3B: Sun, Soil, Water, and Air

## Life Skills:

Reasoning- Applies principles to a procedure; interprets information; predicts outcomes.

## Location: inside

## Time Needed:

**Introduction:** 20 minutes

**Activity 1:** 10 minutes; Growing Time: 1 to 2 hours

**Activity 2:** 10 minutes; Growing Time: about 2 weeks

**Activity 3**: 10 minutes; Growing Time: about 2 weeks

## Best Time of Year: any time

## Materials:

**Introduction:** Cookies, juice, cups, napkins, copies of Activity Sheet 3B

**Activity 1:** one pot of growing bush beans (about 2 weeks old), clear plastic bags that cover the plant, twist-ties

**Activity 2:** a potted plant with many leaves (a leaf for every child - you may need more than one plant), petroleum jelly, twist-ties, pencils, tags

**Activity 3:** 2 pots of growing bush bean seedlings (about one week old)

## Objective

To demonstrate that plants need light energy, air, and water to live and grow.

## Activity Summary

The children look at the factors (food, air, and water) that are needed by every living thing to live and grow. They discuss how people and animals acquire and use these factors. They set up three activities to demonstrate how living plants also need water, air, and food.

Activity

## Doing the Activity

It is recommended that you have completed Activity 1-B and 3-A before doing this activity. Also, have all of your discussion, activity, and demonstration supplies prepared and set up ahead of time.

### Introduction

Give half of the children in the group a cookie and a cup of juice and ask them to go ahead and enjoy eating and drinking while the rest of the group is watching. Ask the children who did not have cookies and juice to describe how they feel. Are their stomachs rumbling? Are their mouths watering? Does it make them hungry and thirsty watching the others eat and drink? Are they very happy when they are hungry and thirsty?

Now give the rest of the children a cookie and juice and let them all eat and drink. Ask them to describe how they feel now. Have their stomachs stopped rumbling? Are they still thirsty? Ask

them to explain why it is important that we have something to eat and drink. Discuss what would happen if we did not have any more food to eat or water to drink.

Now tell half of the group that they may continue breathing, but tell the other half that they must hold their breaths for five minutes. Time them. Can they do it? Of course they can't! Ask the children what would happen if they were not allowed to breathe. Ask them if it is important that we have air to breathe.

What other creatures need air to breathe, food to eat, and water to drink? The children should be able to give you a very long list of animals, reptiles, amphibians, fish, and insects that require these items for living.

Now, bring out a plant. Ask the children what they think this plant needs to stay alive. Would it be the same things that people and animals need? Food? Water? Air? Explain that all living things need food, water, and air to live.

This series of activities will demonstrate how plants need food, water, and air to live and grow. You may do these activities all together, or individually depending on your time limitations. As you do each activity, use Activity Sheet 3B to locate the different parts of the plant that are being discussed. Let the children color the picture when the activities are concluded.

## Activity 1: Plants Need Water

Activity

Plants take up water from the soil through their roots. This water is sent through the plants "plumbing system" to all parts of the plant to be used for healthy growth. Plant roots usually take up more water than the plant actually needs. The extra water is released into the air through tiny holes found on the underside of the leaves (Botanical note: These tiny openings are called **stomata**).

This activity will demonstrate that water enters through the plant's roots, moves up the stem, and leaves through the tiny openings found on the underside of the plant's leaves. When the water moves out of the leaves it is called **transpiration**.

### For this demonstration:

- Water the pot of growing bush bean seedlings thoroughly.
- Place a clear plastic bag over each of the plants. Gently secure the bottom of the bag with a large rubber band or twist-ties around the base of each plant. Make sure the plastic bags are fixed firmly so that evaporation water from the soil surface does not enter the bags.
- Place the pot in a sunny window.

In a few hours the children will see water droplets forming on the inside of the plastic bag. Ask them to think about where this water came from. How did the water get from the soil into the plastic bag? Explain that the water in the plastic bag is the extra water the plant has released into the air through the openings in the leaves.

## Activity 2: Plants Need Air

Activity

Plants absorb air from the atmosphere through the same tiny openings that release extra water from the underside of leaves. These little openings open up during the daylight hours to let air move into the plant and close during the night. Since these openings are microscopic the children can only imagine they are really there. Show the children the picture of the stomata found on Activity Sheet 3B.

Ask each child to write his or her name on a small piece of paper. Using the demonstration plant, have each child use a twist-tie to gently attach his or her nametag to a leaf. Let each child apply a thick layer of petroleum jelly to the underside of his or her marked leaf. The petroleum jelly will

fill up the leaf air holes (Note: Make sure that most of the leaves on the plant have the leaf undersides covered in petroleum jelly).

Ask the children to predict what will happen to the leaves now that they have plugged up the air holes with petroleum jelly. Do they remember what happened when they tried to hold their breaths? Is the plant holding its breath now?

At the next few meetings check the leaves of the plant. It may take several weeks, but the leaves should begin to turn brown and die. Without the ability to take in air, the plant leaves cannot continue to thrive.

### Activity 3: Plants Need Food

Activity

Lessons 1-B and 3-A discussed how plants make their own food through the process of photosynthesis. The children now know that plants need light energy to make their own food. This activity will further demonstrate a plant's need for light.

Ask the children to place a pot of young, growing bush beans in a dark closet. Place the other pot of bush beans by a sunny window to use for comparison. Tell them that they will be watching the plants grow for the next two weeks. Open the closet once a week (or more if necessary) to water the plant, and water the windowsill plant when needed.

Ask the children to predict what will happen to the plant in the closet. Ask these questions: Will the plant grow without light? Will the plant thrive without light? How do they think the plants in the window will be different from the plants in the closet in two weeks?

After two weeks bring the plant out of the closet. Compare the plant from the closet to the plant that has been in the sunny window. Ask the children to describe how the plants are different and how they are the same. The plant from the closet should be a lighter shade of green (decrease in the amount of chlorophyll in the leaf), have longer stems than the plant in the window (phototropism: the plant stems lengthen to search for light), and have thinner stems (lack of sugars to build strong stems) than the plant in the window.

## Evaluation

In this activity the children looked at several things that plants need to live and grow. Ask the children to discuss these questions and comparisons: Do all living things need food, air, and water to live and grow? Compare how a dog and a tree get their food. Then compare how they both obtain water and air. What would happen to both the dog and the tree if they could not get food? water? air?

## This is What You Can Do!

You now understand that all living things need food, water, and air to live. Keeping the earth's air and water clean is a good way to help all living things. An easy way for us all to help is to "reduce, reuse, and recycle" the things we use. Every time we reduce, reuse, or recycle an item it decreases the amount of pollution that goes into the air and water. Remember that "caring' is something that all living things need. This is your way to care for plants!

# Activity 3C: Adventures in Soil

## Life Skills:

Learning to Learn-Interprets and applies new knowledge and experiences; draws upon experiences and prior knowledge.

## Location: indoors or outdoors

## Time Needed:

**Introduction:** 15 minutes

**Activity:** 30 minutes

## Best Time of Year: any

## Materials:

**Introduction:** 4-5 cup soil sample

**Activity:** 4-5 cup soil samples from four locations such as a schoolyard, home garden, forest, or roadside (make sure to label each soil sample location), a trowel, a bucket or container, a small container to hold insects and worms, a hand-lens for each group, newspaper, measuring cups, water, copies of Activity Sheet 3C

## Objective

To demonstrate that soil is made up of living and non-living components, and to correlate that plants use their roots to absorb nutrients and water from the soil.

## Activity Summary

This project introduces the children to the many things that make up the soil and the idea that plants get their nutrients and water from the soil. The children compare soil samples collected from different places to learn that soils have different compositions. They also describe the different components that make up a soil.

## Doing the Activity

### Introduction

The soil is a storehouse of **minerals**, rotting dead plant and animal matter, water, and air. The soil is also the dwelling place for insects, fungi, bacteria, and other animals and plants. A typical soil consists of:

- Minerals: sand, silt, and clay particles
- Rotting plant and animal matter
- Water
- Air
- Fungi (such as mushrooms) and bacteria
- Animals: snails, worms, insects, moles, etc.

To assist with your discussion on soil, spread a 4-5 cup sample of soil upon a piece of newspaper. Gather the children around the soil sample and ask them what they think makes up a soil. They will probably have very little idea! Soil is something we rarely think about or talk about. Isn't it just dirt?

Explain to the children how the soil is made up of many different things. Use the soil sample to show them the different components as you speak about them. Next, ask them why they think soil is important to plants. They might know that plants use their roots to get water from soil, but they may not know that plants get their **nutrients** from soil too.

Use this analogy to help the children understand why plants need nutrients:

Ask if any of them take a daily vitamin. Ask if their parents ever say, "Eat your vegetables! You need to get those vitamins to grow up big and strong!"? Do they know what those vitamins are for? Explain how vitamins are elements that their bodies use to build bones, muscles, nerves, and other body parts.

We get many of our vitamins and nutrients by eating plants or by taking a vitamin pill, but how do the plants get theirs? Do plants also take a vitamin pill or eat other fruits and vegetables to get their nutrients? Where do the "vitamins" that plants need (called nutrients) come from? What plant "body parts" need nutrients to "grow up big and strong!"?

Explain that the nutrients that plants need to grow healthy stems, leaves, roots, and flowers are found in the soil. Describe how the nutrients from minerals and rotten plant and animal matter dissolve into the soil water. When a plant root system absorbs the soil water, it also takes up the dissolved nutrients at the same time.

Activity

## Activity: Soil Hunt

Divide the children into groups of 3 or 4. Each group should have an adult leader. Have each group go on a soil hunt to search out a soil from a designated place such as a forest, a field, a roadside, and a garden. Each group should go to a different place so that the soil sample they return with is different from the others. Collect 4 to 5 cups of soil from each area. Make sure to label each soil sample with its location. Use previously collected soil samples for this activity if time is limited.

Dump each soil sample on a large sheet of newspaper. Spread the soil out over the paper.

Ask each group of children to describe their soil sample: What color is it? How does it smell? How does it feel (Roll some in your fingers)? What do the largest soil pieces look like? What do the smallest pieces look like? Provide each group with a hand lens. Ask them to use the hand lens to explore the soil samples. Let them remove any living organisms that are found in the soil samples, and have them place the living creatures in a container for observation. Describe the organisms and see if the children can identify them.

Next, help the children mix 1/2 cup water and 1/2 cup soil from each sample. Ask them to observe the soil and water mixes using a hand lens. Let them describe any tiny soil organisms found in these samples. Using Activity sheet 3C, ask the children to draw pictures of the different things they found in their soil sample.

Bring all of the groups together and ask them to share what they discovered about their soil sample. Did every sample contain insect or worm life? Did every soil have dead plant pieces in it? Was every soil the same color? The children should recognize that there are many different kinds of soil, and that soil is made up of many different things.

## Evaluation

Using your original soil sample, ask a representative from each group to come up and identify a different thing that makes up the soil. Ask the children to discuss the different parts of the soil, and why these different parts are important to plant growth.

Older children may like to find out what would happen to plants if they were grown in pure water without nutrients. What would happen to our bodies if we only drank water and did not eat food for energy and nutrients? Why are these nutrients important to the healthy growth of both plants and people?

## This is What You Can Do!

You can understand that the soil is important to the growth of plants. Plants get their nutrients from soil, just as we get our nutrients from the foods that we eat.

## Enrichment Activities:

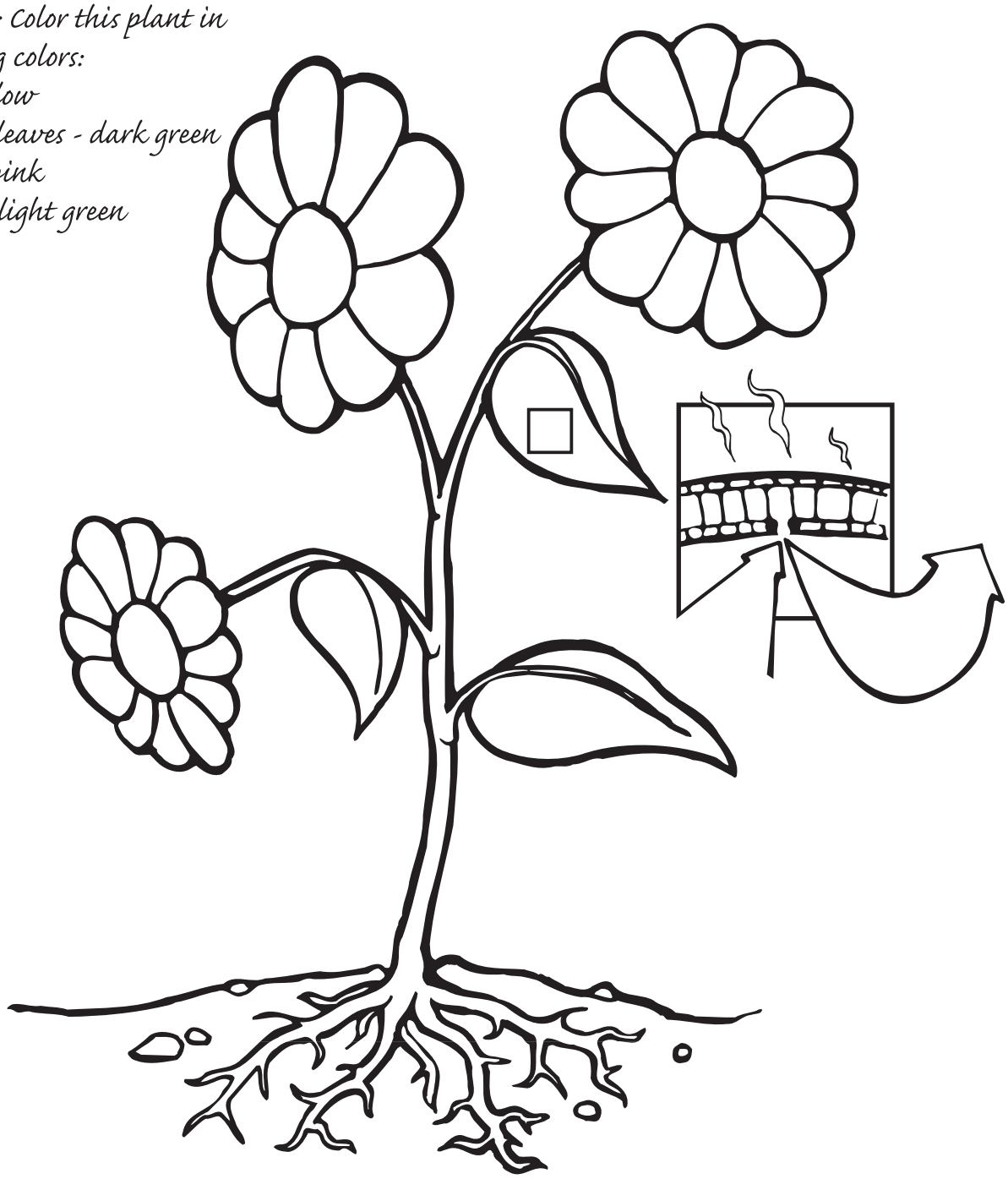
List 5 ways in which soil is important to us. Consider such things as how we use soils to grow lawns and shade trees for our homes; to grow food for animals and people; or how soils support houses and roadbeds.

My Name is:

*18 U.S.C. 707

# Sun, Soil, Water & Air

Instructions: Color this plant in the following colors:
- Roots - yellow
- Stem and leaves - dark green
- Flowers - pink
- Stomata - light green



Activity Sheet 3B

Virginia Cooperative Extension



*18 U.S.C. 707

My Name is:

*18 U.S.C. 707

# Soil Hunt

Directions: Draw and color pictures of the different things you found in your soil sample.

## PLANTS

## INSECTS or ANIMALS

## MINERALS

## OTHER

Activity Sheet 3C

Virginia Cooperative Extension

# What's Happening?

## Background Information

From the window of a traveling car, a child sees a whirl of passing green. Like most people, the child doesn't acknowledge the green but rather focuses on the antics of a dog barking at a hissing cat, or the kids playing ball in front of a house. So common is this background of green that we rarely take notice of the plants comprising that "green blur."

If we would just stop the car for a moment and take a look at that green community, we would see all sorts of interesting things taking place. We would see flowers blooming, vines creeping, leaves blowing in the wind, and grass rustling. If we would check these plants out over a longer time period we would see plants growing, seeds developing, shoots sprouting, and leaves changing colors!

So many things are happening in a plant community. When given the time, children ages five to eight instinctively explore the living things around them. They poke and prod with sticks, pick flowers, turn over rocks, and collect leaves. However, to see actual changes occur in plant growth takes more time than a single experience provides. Changes in a plant or plant community take place slowly. Many of these changes are also cyclical. The children will be surprised by how many cycles are found in nature.

In this chapter, the children will be taking the time to stop and look at the changes that plants make during their lives. They will first look at a plant's life cycle and compare it with the life cycles of different animals. They will investigate how a plant grows from a seed into a plant that produces flowers and new seeds.

The children will then look at seasonal changes and how plants change throughout the year. They will compare the changes in their own lives throughout the seasons to the changes that occur in a plant's life.

They will also look at the special changes that groups of plants have made in order to live in different places around the world. They will recognize that plants have adapted to many different climates and living conditions. They will discover the wide variation that exists in the plant world and that the "green blur" is a fascinating hodgepodge of unique and interesting individuals.

# Activity 4A: From Seed to Shining Seed

## Life Skills:

Acquiring and Evaluating Information-Obtains information; interprets information; predicts outcomes.

## Location: inside

## Time Needed:

**Introduction:** 15 minutes

**Activity:** 20 minutes

## Best Time of Year: any time

## Materials:

**Activity:** copies of Activity Sheet 4A, a selection of common flower seeds, student scissors, gardening catalogs and gardening magazines, glue or paste, crayons or markers.

## Objective

To describe the life cycle of a plant.

## Activity Summary

The children discuss animal life cycles, and compare them to a plant's life cycle. From a seed a young plant grows and matures until it produces flowers. Reproduction occurs in the flower, and new seeds are formed. From this point the plant's life cycle starts all over again. Using Activity Sheet 4A, the children illustrate a plant's complete life cycle.

## Doing the Activity

Activity

### Introduction

Explain to the children that in this next set of activities they will be exploring the different ways that plants change. In this first activity, they will be looking at a plant's **life cycle**. A life cycle is a series of stages through which a living thing passes during the course of its life, eventually arriving back again at the starting point.

Surprisingly, most children this age already know quite a bit about life cycles. They can probably tell you that their dog had puppies and when those puppies grow up into dogs, they too will be able to have their own puppies. Ask them to tell you about the life cycles of other pets. Let all the children have a turn.

Compare the life cycles of their pet dogs and cats to those of birds, fish, and turtles (they may not know that these latter animals lay eggs to have babies). If you would like, show the children some pictures of more unusual animals such as giraffes, whales, turkeys, or elephants, and talk about their life cycles too. The children will understand that all living things have life cycles.

It is important to point out that dogs always have puppies and cats always have kittens and not the other way around. Children this age are often unaware that the offspring of living creatures will mature to look like their parents. Explain that when dogs have puppies and cows have calves it is called reproduction.

Now ask the children about plants. Since plants are alive they must also have a life cycle. Walk them through the cycle of a plant's life from seed to seed. Do all plants have the same type of life cycle? Apple trees? Marigolds? Roses? Bean plants? Giant Redwood Trees? (Botanical Note: many of the lower plants such as ferns, mosses, and horsetails reproduce by spores and some plants are sterile, but for this introduction it is safe to say that most plants have the same basic life cycle and reproduce by making seed.)

As with animals, plant offspring are always similar to their parents. You can't plant carrot seeds and grow cucumbers. Carrot seeds grow carrot plants, and cucumber seeds grow cucumber plants.


## Activity: The Circle of Life

In this activity the children will put together a plant's life cycle using the materials you provide. Supply a selection of labeled flower seeds. Ask each child to choose 8 to 10 seeds from one flower type. Flower seeds that are often easy to obtain in large quantities are sunflower, marigold, and zinnia seeds. The children will see that seeds from different plants look different.

Ask the children to hunt through the garden catalogs or magazines. Find the exact picture of the flowers that grow from the seeds they have selected. An adult may need to assist non-readers. Provide each child with a copy of Activity Sheet 4A. Ask them to:

- Glue 4 to 5 seeds on the area marked "seeds are planted."
- Draw a plant in the area marked "plants grow from seeds."
- Glue the cut out pictures of the flowers from the gardening catalogs and magazines on the area marked "plants produce flowers."
- Glue another flower picture and 4 to 5 seeds on the area marked "flowers make seeds."

...and then the life cycle starts all over again. If time permits, ask each child to share their life cycle with the group.

## Evaluation

Ask the children to describe the life cycle of a pet dog, cat, rabbit, or fish. Let them tell you how these life cycles are similar to a plant's life cycle? How are they different? Ask the children to think about a plant going through its life cycle in a garden. What would happen to the plant if it rained too much? Did not rain enough? A deer slept on top of it? A bird carried the seeds to its nest? How would these things affect the plant's life cycle?

## This is What You Can Do!

You can recognize that all living things have a life cycle.

## Enrichment Activities

Plant some marigold or zinnia seeds in a garden or in an outdoor pot in the spring. Watch the seeds grow into plants with flowers. The flowers will make new seeds that can be collected and used to plant a garden in the following year. You will make the world beautiful, and help a plant complete its life cycle at the same time!

# Activity 4B: A Plant for all Seasons

## Life Skills:

Learning to Learn- Draws upon experiences and prior knowledge; interprets and applies new knowledge and experiences.

## Location: inside-

## Time Needed:

**Introduction:** 20 minutes

**Activity 1:** 15 minutes

**Activity 2:** 30 minutes

## Best Time of Year: any time

## Materials:

**Introduction:** poster board or chalkboard with markers or chalk respectively

**Activity 1:** copies of Activity Sheet 4B-1, crayons or color markers

**Activity 2:** example of completed calendar, copies of Activity Sheet 4B-2 (12 copies per child), stapler, construction paper, art supplies such as crayons, markers, paint, colored paper, stickers, yarn, etc...

## Objective

To differentiate between the seasonal changes made by plants during the course of a year.

## Activity Summary

Just as people change their activities with the changing seasons, plants also change as seasonal temperatures and day length vary during the course of a year. The children look at plants and their seasonal changes as related to the life cycle of the plant. They understand that seasonal changes continue year after year for plants as well as for people. The children draw and color the seasonal changes exhibited by an apple tree. They also construct a tree calendar to show seasonal changes in a plant throughout an entire year.

Note: These two activities are based on plants that grow in areas where there are four distinct seasons: spring, summer, autumn, and winter. In places where the seasons are not as distinct, such as in tropical zones, there are still distinctive, cyclical seasonal changes in the local flora. Adjust the following activities accordingly as they relate to your local seasons.

## Doing the Activity

### Introduction

This activity will explore how people and plants change with the seasons. First see if the children can tell you the seasons of the year. Ask them to describe how the seasons are different. Now, let them think about the different things that people do in the different seasons. Ask these questions to help

them think about seasonal changes: Do they wear shorts, eat cool foods such as ice cream and sno-cones, and go swimming to cool off in the summer? Do they put on jackets, rake leaves, and start school in the autumn? Do they wear heavy coats, eat hot foods, and stay indoors to keep warm in the winter? And, do they pull out light jackets again and go outside to fly kites in the spring?

Make an enlarged version of this chart on a chalkboard or piece of poster board and ask the children to fill it with their own answers (leave space at the bottom to discuss seasonal plant changes).

| | SUMMER | AUTUMN | WINTER | SPRING |
|---|---|---|---|---|
| Clothes | | | | |
| Foods | | | | |
| Activities | | | | |

Now, under the word *Activities* write the words *Plant Changes*. Just like people, plants change with the seasons. Ask the children to describe the changes they have seen in plants in the different seasons of the year. Plants grow, reproduce (have flowers and make seeds), rest, and even die during different seasons of the year.

First let the children provide their own observations. If needed, use the following to assist the discussion:

**WINTER:** When the temperatures are cold and the days are short, most plants will rest (called **dormancy**). During this time plants live on the stored food that they made previously during the warm months ...just like squirrels storing acorns for the winter!

**SPRING:** In the spring the days start getting longer and warmer. Plants start growing new shoots and leaves. Many plants and trees flower during the spring. Seeds in the ground sprout as the soil warms and new plants grow from the seeds.

**SUMMER:** Summer days are long and warm. Different plants grow, flower, and reproduce by making seeds during these warm days. During these sunny months plants have all of their leaves. This is the season when plants actively make sugars for growth or to store for later use.

**AUTUMN:** These days are starting to get shorter and cooler. Some types of trees (**deciduous**) have leaves that change color and then fall off before the tree goes dormant. Some plants (most **perennials**) look like they have died and withered to the ground. Where have they gone? They are just resting under the soil until the spring.

Explain to the children that it is the changes in day length and temperatures that signal the plants to make seasonal changes.

Activity

### Activity 1: Apple Antics

In this activity the children will color the seasonal cycle of an apple tree. Provide a copy of Activity Sheet 4B-1 for each child. Ask them to color each tree to show how the tree changes during each season of the year.

Activity

### Activity 2: Seasons in the Sun

Following an apple tree through the months of the year will not only show how plants change through the seasons, but also provide a beautiful calendar for the children to use throughout the next year! This activity will also reinforce a younger child's understanding that different months of the year are found in different seasons.

Provide each child with 12 copies of Activity Sheet 4B-2. Label each sheet with a month. Color and decorate the apple tree appropriately for each month. Using a current calendar, write in the days for each month (in the interest of time, this can be done at home with a parent). This project may take more than one meeting to finish.

| Month | Tree | Decorations |
|---|---|---|
| January | bare tree/no leaves | snow lying on the branches and ground |
| February | bare tree/no leaves | Valentine hearts |
| March | bare tree/no leaves | a kite caught in the branches |
| April | light green leaves | white or pink flowers on branches |
| May | light green leaves | baby bunnies and daisies |
| June | dark green leaves | children playing - School's out! |
| July | dark green leaves | 4th of July fireworks display |
| August | dark green leaves, small green apples | Write: My favorite thing to do in the summer is _____ |
| September | dark green leaves and big red apples | footballs! |
| October | orange, red, and yellow leaves | Halloween pumpkins |
| November | colored leaves falling to the ground | Thanksgiving turkeys |
| December | bare tree/no leaves | strings of colored lights through the branches |

Use two pieces of construction paper for back and front covers. Staple the pages together to make a beautiful new calendar!

## Evaluation

Hold up a finished copy of Activity Sheet 4B-1 showing the apple tree during the different seasons of the year. Ask the children to describe how the tree has changed throughout the seasons. Once the tree has gone through all four seasons does it start all over again? Why is this called a "cycle"? What other cycles are found in nature? The calendar that they made is a cycle...once a year is finished, it starts all over again! A day is a cycle! The seasons are a cycle! A seed growing into a plant which then flowers and makes its own seed is a cycle!

For older children, ask what signals the plants to change during the year. They should remember that it is the temperature and the length of the day that signals plants to change during the different seasons.

## This is What You Can Do!

You can understand that plants change during different seasons of the year. These changes are all part of a plant's life cycle.

## Enrichment Activities

Make up a poem or rhyme about your favorite season!

# Activity 4C: Wonderful World of Plants

## Life Skills:

Acquiring and Evaluating Information-Obtains information; integrates multiple items of data; researches additional information sources.

## Location:

**Activity 1:** at a local greenhouse or florist

**Activity 2:** indoors

## Time Needed:

**Introduction:** 20 minutes

**Activity 1:** 30 minutes

**Activity 2:** 20 minutes

## Best Time of Year: any time

## Materials:

**Introduction:** pictures of different plants (listed under *Doing the Activity*)

**Activity 1:** If you are not able to visit a greenhouse or florist, you will need a selection of greenhouse plants (listed under *Activity 1*)

**Activity 2:** copies of Activity Sheet 4C (laminate, if desired), student scissors, crayons or markers

## Objective

To show that plants have adapted to grow in many different places around the world.

## Activity Summary

Children explore variation in plants by linking unusual plants with the different places in the world where they naturally grow. Plants have adapted to growing in climactic extremes of light, humidity, soil, water availability, wind, and temperature. Plants are found growing anywhere from the hot, dry desert to the cold tundra or the hot, humid rain forest. This activity introduces the children to some plants that have adapted to living in different places around the world.

Activity

## Doing the Activity

### Introduction

Start this discussion by asking the children to describe the plants growing in their hometown. They can take turns talking about the trees, shrubs, flowers, and grass that they have seen in their yards or by their school. Ask them to also describe the weather by their homes. Is it usually hot and dry? Do they have a change in seasons? Do they have cold or warm winters? Do they have hot or cold summers? Ask them how they think the plants by their homes have learned to live in their neighborhood. They should be able to tell you some of the things they learned from Activity 4B such as:

- Some trees drop their leaves and go to sleep (dormant) for the winter.

- The tulips and daffodils live underground during the winter and only come up once it becomes warm in the spring.
- The roses bloom in the warm summer and not in the cold winter.
- The grass in the lawn stops growing in the winter (doesn't need to be mowed!), but really gets going in the spring when the temperatures start to warm up!

Next ask the children to think of other types of plants that do not grow outside in their hometown. Using pictures of different plant types, talk about how these plants have changed so they can live in different places and climates around the world. This discussion should include:

- cacti from the desert
- ferns and evergreen trees from the cold, northern forests (taiga )
- maples and oaks from the deciduous forest
- grasses from the prairies or savanna
- orchids, most leafy houseplants, and bromeliads from the rain forest
- heaths and mosses from the arctic regions.

Using their imaginations and what they already know, ask the children:

- Why can't a cactus that comes from the dry desert live in a place where it rains a lot?
- Why can't a pine tree that comes from the cool mountains live in the desert?
- Why can't a leafy houseplant from the warm rainforest live in the cool forest?
- Why can't a maple tree that lives where there is winter, spring, summer, and fall live in the cold arctic tundra where it is cold all year long?

The children should recognize that different plants have learned to live in different places. You can tell them that this is called **adaptation**. The plants have adapted to the different climates found around the world.

## Activity 1: Greenhouse Explorers


A great way to observe how plants have adapted to different places and climates is to visit a local greenhouse or florist. Walk through the greenhouse and locate a variety of different types of plants. Use the information provided to explain how these plants have adapted to different living conditions found around the world. If you cannot take the children to a greenhouse, try to borrow sample plants to use in this activity.

Ask the children to point out and describe three leafy houseplants.

- Many green houseplants originally came from the shady floor of the rain forest where there are low light and water levels. The children will see that many of these plants have very large leaves that can catch the little bit of light that makes it through the thick forest canopy. This is why they make such great houseplants. Most homes have very little light, and people often forget to water them!

Ask the children to point out and describe three cactus plants.

- Most cacti originated in a desert environment and have learned to live with high light and low water levels. Most cacti do not have leaves (which lose too much water - refer to Activity 3B) and have a waxy coat, which allows them to conserve water. Also, cacti have green stems that can act like leaves and make sugars through photosynthesis.

Show the children a bromeliad.

- Describe how these plants live in the branches of trees in the rain forest where they have adapted to live without soil. These plants have also adapted to live in the shade of the trees where they get very little light, but lots of rainwater. Bromeliads have leaves that form a cup shape into which rainwater falls and is captured for the plant to use. These plants get their nutrients from the insects that fall into these water-filled leaf cups, drown, rot, and release nutrients into the water.

Ask the children to find an African Violet.

- These plants were originally found on rocky mountain slopes in Africa. They have learned to live where there is a lot of light, but very little soil and water. Due to these adaptations, African violets grow best in a sunny window but have small root systems, so be careful not to water them too much!

What other types of plants can they find in the greenhouse? How are they the same? How are they different?

### Activity 2: "Plants Around the World" Memory Game

Activity

Provide each child with a copy of Activity Sheet 4C. Ask the children to color the pictures of the different plants and the places where they are found growing around the world. Discuss the different plants shown and how they have adapted to grow in different places. Ask the children to cut out the individual squares.

To play this memory game, set up each child with a partner. Each set of children will shuffle one set of the cards and lay them out, one by one, face down on a hard surface. Take turns turning up two cards. If a plant-place match is made, keep the cards and take another turn. If the cards don't match, turn the cards back over and let the next person take a turn. To make it easier, put the plant cards in one area and the place cards in another.

## Evaluation

Using one set of cards from Activity Sheet 4C, ask the children to name the types of places shown in the pictures. Then ask them to describe what kinds of plants are found growing in those places, and how the plants have adapted to live and survive in each place.

## This is What You Can Do!

You can understand that plants have adapted to live in many different kinds of places around the world, and appreciate the wonderful variety of plants found in nature.

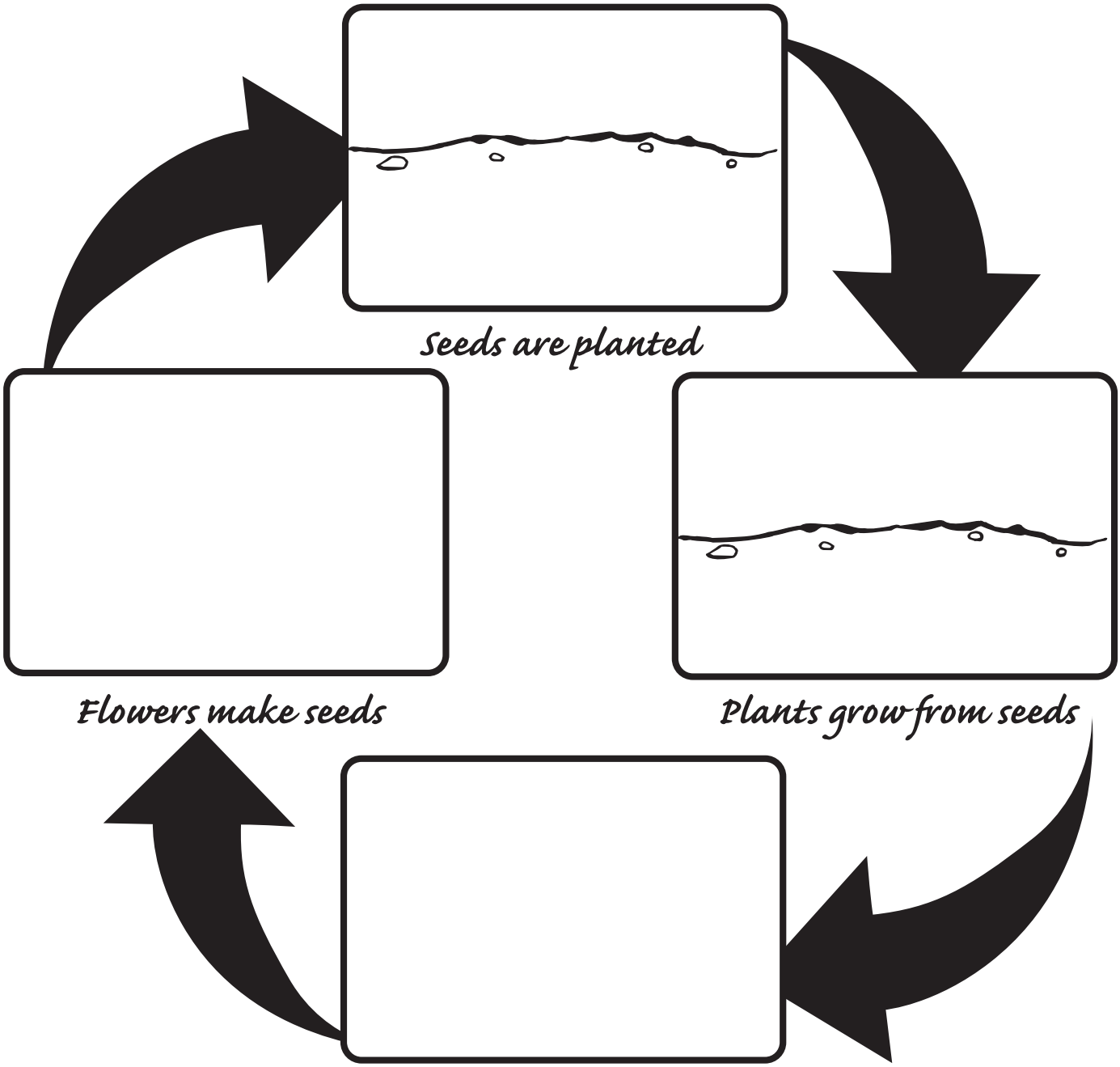
## Enrichment Activities

Provide each child with a houseplant to care for. If they are readers, ask them to read a book about houseplants to learn more about their plant and what it needs. Remind them that they will need to water the plant, and make sure that it gets the proper amount of sunlight.

My Name is:

*18 U.S.C. 707

# The Circle of Life




Activity Sheet 4A

Virginia Cooperative Extension

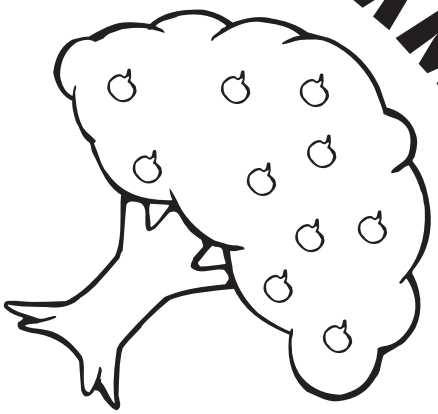
My Name is:

*18 U.S.C. 707

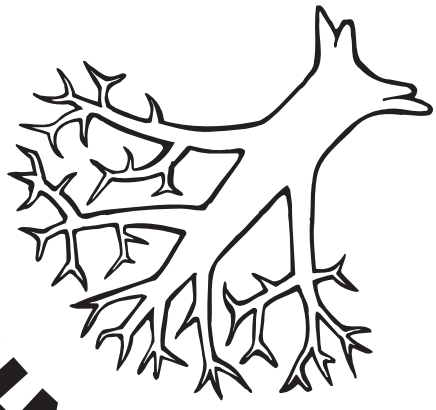
# Apple Antics

SPRING

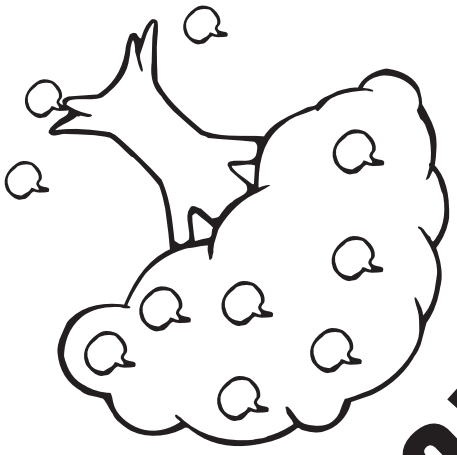
SUMMER



WINTER



AUTUMN

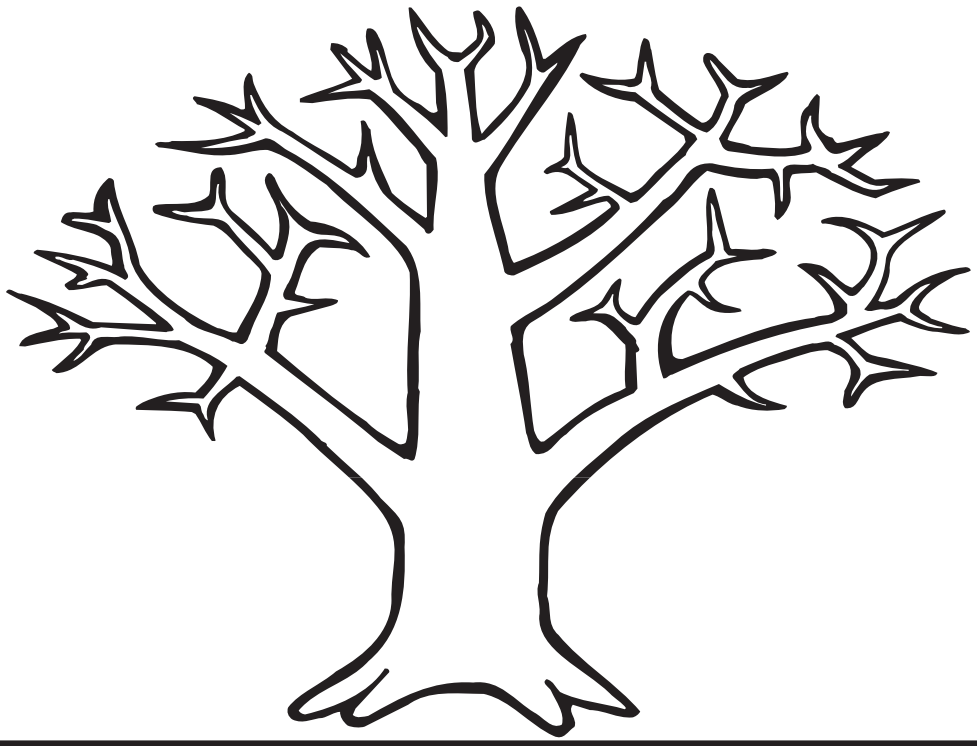


Activity Sheet 4B-1

Virginia Cooperative Extension

## Month:

*18 U.S.C. 707



| Sun | Mon | Tue | Wed | Thur | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

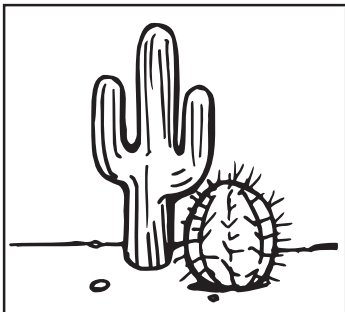
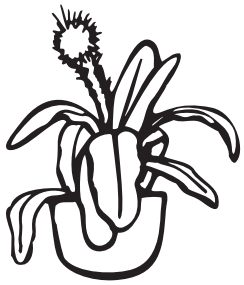
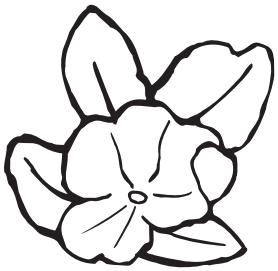
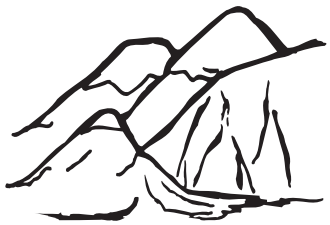
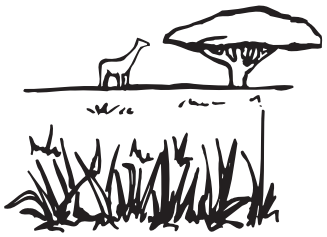
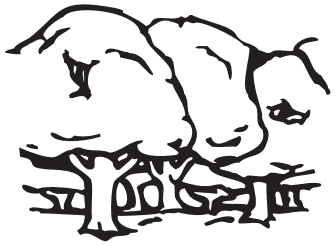
Activity Sheet 4B-2

Virginia Cooperative Extension

My Name is:

*18 U.S.C. 707

# Plants Around the World

| | | | |
|---|---|---|---|
|  cactus |  desert |  bromeliad |  rain forest canopy |
|  african violet |  mountains |  grass |  grasslands (savanna) |
|  maple tree |  deciduous forest |  pine tree |  pine forest (taiga) |
|  leafy houseplant |  rain forest floor |  heath plants |  artic region |

Activity Sheet 4C

Virginia Cooperative Extension



*18 U.S.C. 707

# Gardens of Gladness

## Chapter Background

After planting a garden, the gardener often eagerly waits for the first signs of plant growth. In our world of "instant" everything, many gardeners enjoy the patient, vigilant wait for a young seedling to push through the soil. Ask any seasoned gardener about their favorite part of gardening and they will often tell you that it is the "anticipation" of the garden. Witness the number of garden catalogs that flood the postal system every winter, as people plot and plan their spring gardens! We love the expectancy of the garden's beauty or harvest almost as much as the plants themselves.

On this note, let's introduce children to the many ways that they can anticipate and grow new plants. Young children view themselves as passive participants in nature. They perceive that they can do things in nature, but they often do not understand the consequences of their actions. In these activities they will see themselves having a role in changing nature by growing plants of their own.

The children will first look at growing new plants from seeds. The children will recognize that seeds come from the fruit of plants, that new plants grow from seeds, and that seeds will only grow similar plants. They will hunt through fruit to find the seeds, plant them, tend them, anticipate them, and then celebrate their growth.

A wonderful thing about plants is that many of them can be grown from plant parts other than seeds. Gardeners can grow new plants from stem pieces (**cuttings**), leaves, runners, bulbs, tubers, and other plant parts. It is fun to watch these various plant parts grow roots, and it is fun for children to grow new plants that they can call their own.

The children will explore growing new plants from bulbs and from tubers. Additional activities will encourage them to root stem pieces to produce new plants. For all of these activities the children will need to use their patience and their powers of observation. Growing new plants from seeds or from plant parts can take several weeks to several months, but it is worth the wait when a new plant begins growing.

# Activity 5A: Sowing Seeds

## Life Skills:

Learning to Learn- Draws upon experiences and prior knowledge; interprets and applies new knowledge and experiences.

## Location: inside

## Time Needed:

**Introduction:** 20 minutes

**Activity:** 20 minutes; Growing Time: about 1 to 2 weeks

## Best Time of Year: any time

## Materials:

**Introduction:** newspaper, plastic knives, a selection of fruits and vegetables (those that contain mature seeds), plastic sandwich bags

**Activity:** 4 to 6-inch plastic pots, potting soil, watering can, pencils, crayons, copies of Activity Sheet 5A, clear contact paper, craft sticks, lima bean seeds that have been soaked overnight

## Objective

To demonstrate that seeds are found in a plant's "fruit" and that a new plant can grow from a seed.

## Activity Summary

The children find out that seeds are located inside of a plant's fruit and that these seeds can grow into new plants. The children "dissect" the fruit of plants and compare the seeds that they find inside. They plant these seeds to watch them grow.

Activity

## Doing the Activity

### Introduction

Prior to this activity prepare plastic sandwich bags with labels. Bring a selection of ripe fruit and vegetables that the children can cut open to find seeds.

The following fruit are recommended, as their seeds are easily grown:

| | | |
|---|---|---|
| apricot | tomato* | pepper* |
| cherry | orange | pumpkin |
| plum | lime | watermelon |
| peach | lemon | cantaloupe |
| grapefruit | grape | summer squash |
| avocado | | |

** typically may not have mature enough seed for reliable germination if purchased from the grocery store*

Ask the children to tell you the name of each fruit or vegetable. Explain to them that we use the word "fruit" in two different ways:

- The first way we use this word is when we describe the botanical role of a specific part of the plant. The seeds of a plant are usually found in the "fruit" of a plant. Some foods that we think are "vegetables," such as tomatoes and cucumbers, are really the fruit of the plant because they contain seeds. Ask the children to name some vegetables that are not the fruit of the plant.
- The second way we use this word is when we describe the way we eat a specific plant part. We say "fruit" when it is a plant part that we eat as a dessert or a sweet snack. We say "vegetable" when it is a plant part that is not very sweet and that we eat with lunch or dinner.

Open up some sample fruit on a sheet of newspaper using a plastic knife. This will demonstrate to the children that the fruit of a plant contains the seeds. Ask the children for different "volunteers" to help you cut open each fruit to look for seeds.

Pick out the seeds from each fruit and place each type in the appropriately labeled sandwich bag. The children will see that some fruit have one seed and some have many seeds. They will also see that seeds come in various colors, shapes, textures, and sizes. Place the seeds the children find in the fruit immediately in the appropriately labeled sandwich bag to prevent mixing the seeds.

Activity

### Activity: Plants from Seeds

To plant the seeds:

- Ask each child to fill a pot with potting soil (up to 1 inch from the top).
- Place three small seeds on the soil at least 1 inch apart (recommended: watermelon, cantaloupe, tomato, pumpkin, squash, or green peppers as they usually start growing in 1 to 2 weeks). If possible, have different children plant different types of seeds so that comparisons can be made between the growing seedlings.
- Cover the larger seeds with 1/2 inch soil and the smaller seeds with 1/4 inch soil
- Water the soil thoroughly.
- Place the pot in a warm, sunny window.

Use Activity Sheet 5A to make labels for the pots. The label picture does NOT have to match the seed types that are planted. Use creativity! Write the child's name, date planted, and the name of the seed planted using a pencil. Color the label with crayons. Cover both sides of the label with clear contact paper. Tape or staple the label to a craft stick and place it in the pot.

Watch the pots for several weeks and water when necessary. Ask the children these questions:

Which type of seeds started to grow first? Do the seedlings of different plant types look the same? How are they different? Will each seedling grow into the plant from which it was collected? Will the cantaloupe seeds grow into watermelon plants? Or, will the watermelon seeds grow into watermelon plants?

## Evaluation

To evaluate the children's understanding of seeds and fruit, provide each child with 2-3 lima bean seeds that have been soaked overnight. Ask them to split the seeds in half along the line seen from the outside of the seeds, and to examine the inside of the seeds. Ask the children if they can see the young plant inside the seed. Is this the baby plant waiting to grow? If they planted a lima bean seed, would a new plant grow from the seed? Will the lima bean seed grow into lima bean plants or into peanut plants?

In which part of a plant are seeds formed? Are seeds formed in a plant's roots? Fruit? Stem? Leaves?

## This is What You Can Do!

You can understand that seeds are usually formed in a plant's fruit, and that new plants can grow from seeds. We can help seeds grow by planting them in the soil and providing them with water, light, and warmth.

## Enrichment Activities

Obtain some vegetable seeds for each child. Help them plant these seeds in a garden or in a container, and care for them over the summer. The children can enjoy watching these seeds grow into plants, and prepare for a bountiful harvest.

# Activity 5B: Rooting Out the Answers

## Life Skills:

Reasoning-Applies principles to a procedure.

## Location: inside

## Time Needed:

**Introduction:** 20 minutes

**Activity:** 20 minutes; Growing Time: about two weeks

## Best Time of Year: any time

## Materials:

**Introduction:** a sample garlic clove that has been growing for two to three weeks in potting soil

**Activity:** garlic bulbs, 4 to 6-inch pots, potting soil, labels, markers, watering can,

## Objective

To demonstrate that new plants can be grown from different plant parts.

## Activity Summary

Children are introduced to the idea that some types of plants can be grown from plant parts other than seeds. They talk about the different plant parts that can be used to grow new plants. They grow new plants using bulbs.

## Doing the Activity

### Introduction

Some types of plants can be grown from various plant parts other than seeds. Here are some examples:

- A new African violet plant can be grown from a single leaf.
- A new colorful coleus plant can be grown from a piece of the plant's stem.
- A new strawberry plant can be grown from special strawberry stems called runners.
- An entire potato plant can be grown from a piece of the underground potato stem.

Many types of plants have the ability to make new plants by growing roots and shoots from different plant parts (Botanical Note: When a new plant is grown from a plant part other than a seed it is called **asexual reproduction**). Plants that grow from **bulbs** have this peculiar ability. Bulbs are small plant stems surrounded by big, fleshy leaves. The bulbs are found under the ground and produce new, young bulblets every year. Some plants that make bulbs are garlic, tulips, daffodils, and lilies.

Activity

### Activity: Growing Garlic

Take a garlic bulb and split it into individual bulb leaves (often called cloves). Tell the children that new plants can be grown from each clove. Count how many cloves are in a single garlic bulb. How many new plants can be made from one garlic bulb?

Activity

Show the children the sample garlic plant growing from the clove. Remove the plant from the pot and brush off the soil from the root system. Can the children still see the remains of the original garlic bulb leaf? Can they see how the roots grow from the bottom of the garlic bulb leaf and the green leaves from the top? This is how a plant grows from a plant part other than a seed.

In this activity the children will grow new plants from garlic bulbs.

Ask each child to:

- Choose three or four of the thickest cloves.
- Fill a container 2/3 full with moist potting soil.
- Measure and mark spots 3-inches apart in the potting soil.
- Place a clove, pointed end up, at each marked spot.
- Cover the cloves with potting soil. -
- Make a label that includes his or her name and the date and place it in the pot.
- Water the soil and place the container in a very sunny spot.
- Watch and describe what happens to the cloves over the next two weeks.

Ask the children to predict what they think would happen if they planted a garlic clove outside in the garden. After a summer of growing outside, would they harvest a big garlic bulb like the one from which they took the clove? Explain that this is how farmers grow a new crop of garlic bulbs every year.

## Evaluation

Using a garlic plant growing from a clove as an example, ask the children to explain how plants can grow from plant parts other than seeds. What other plant parts can be used to grow new plants? Will a new plant grown from a bulb make new bulbs?

## This is What You Can Do!

You can understand that new plants can be grow from plant parts other than seeds.

## Enrichment Activities

Fill a clear container with water. Use scissors to cut a few 4 to 5-inch stems off a houseplant. Remove any lower leaves that might go under the water once the stem pieces have been placed in the container. Place the stem pieces in the container and watch what happens. In a few weeks the stems should start growing roots. After some roots have grown, plant the rooted stem pieces in a pot filled with potting soil.

# Activity 5C: Taters from Tubers!

## Life Skills:

Reasoning- Applies principles to a procedure.

## Location: inside

## Time Needed:

**Introduction:** 15 minutes

**Activity:** 20 minutes; Growing Time: 3 to 4 weeks for plant growth

## Best Time of Year: any time; late spring if planting the potatoes outside

## Materials:

**Introduction:** a potato tuber with actively growing buds, a tree branch with actively growing buds, a potato plant growing in soil, newspaper

**Activity:** 4 to 6-inch pots, potato tubers with actively growing buds, potting soil, labels, markers, copies of Activity Sheet 5C, crayons

## Objective

To demonstrate that new plants can be grown from different plant parts, and that plant buds are found on a plant's stem.

## Activity Summary

In this lesson, the children look at how potato plants are grown from potato tubers. They discuss how the potato tuber is actually a plant stem because it has "buds." Buds are a plant part found only on stems. These specialized plant parts have the ability to grow into new stems, leaves, or flowers. Children compare a potato tuber with growing buds (often called the "eyes" of the potato) to a tree branch with prominent buds to understand the concept of a bud. The children grow a new potato plant from a piece of potato tuber with a growing bud.

Activity

## Doing the Activity

### Introduction

Hold up a sprouting potato tuber. Ask the children to think about potatoes by answering these questions: Do you know where a potato grows on a plant? Does it grow on the branches or does it grow under the ground? Do you know that the farmer has to dig under the ground to find the potatoes that we eat? If the potato grows under the ground does that mean that the potato is a root?

Ask the children to take a good look at the sprouting potato. What do they see? Ask several children to describe what they see. What is the potato's shape? Color? Texture? Is it smooth or bumpy? Already growing? Does it look like a root? Does it look like any other plant part? They will probably decide that they really don't know what a potato is!

Explain to the children that a number of plants have some very unusual leaves, stems, roots, or flowers. In this activity they will be looking at a very unusual stem called a **tuber**. A tuber is an underground stem.

A plant's stem usually has "buds" growing on it. A **bud** is a special bump on a stem that has the ability to grow into new leaves, flowers, or stems. Show the children the sample branch. Have them point out the buds on the branch. If the buds are swelling or growing, show them how the buds can grow into new plant parts.

Now look at the potato tuber. Can they see the buds beginning to grow? Explain that the tuber is a special stem storage organ used by the potato plant to store food (in the form of starch) to be used at a later time for plant growth.

Place the sample potato plant that has been growing in potting soil on the newspaper. Shake off the potting mix. The children should be able to see how both stems and roots grow from a piece of potato tuber.

Activity

### Activity: Growing Potatoes

Now it is time to grow a new potato plant from a potato tuber. Ask each child to:

- Fill a pot half full with potting soil.
- An adult will cut a potato tuber that is already showing signs of growth in half (the potato "eyes" should be swelling).
- Plant a potato piece with the cut side down into the pot.
- Cover the potato piece with just enough potting mix to cover it up.
- Water the soil until water drains from the bottom of the pot.
- Make a label that includes his or her name and the date and place it in the pot.
- Place the pot in a warm, sunny location.

In two to three weeks the potato piece will have grown some new stems and roots. Tell the children that the potato they have grown can be planted outdoors in a garden if the weather and soil are warm. In a few months new potato tubers should be ready for harvest.

Using Activity Sheet 5C, ask the children to color the picture of the potato plant. Do they think their plant will grow new potato tubers too?

## Evaluation

Plants are made up of many plant parts - roots, stems, leaves, flowers, and seeds. Ask the children to discuss these questions: What new plant part did you learn about in this activity? Why is a potato tuber a stem? Where do you find buds on a plant? What is a bud? What new plant parts grow from buds on a stem? Since a potato tuber has buds, is it a stem?

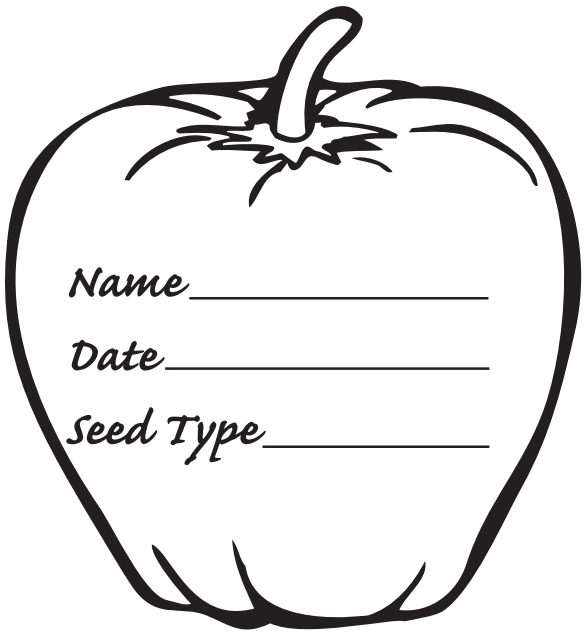
## This is What You Can Do!

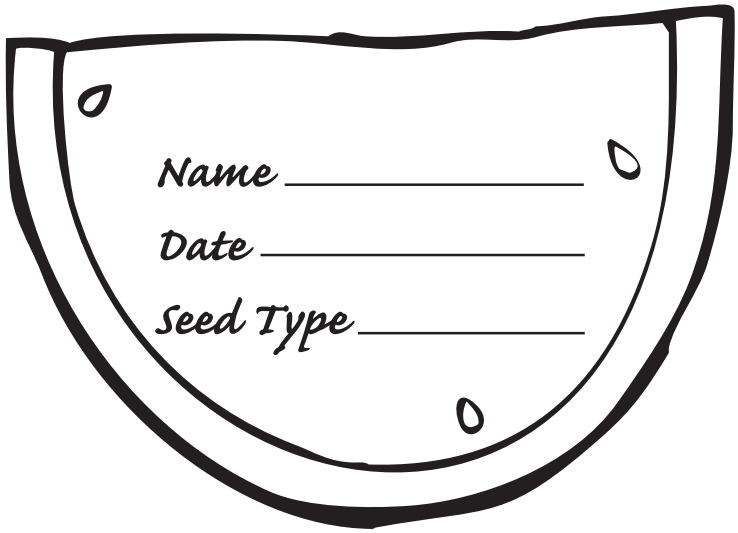
You can understand that some plants have parts that do not look like typical roots, stems, leaves, or flowers. See if you can find out about other plants that have unusual parts.

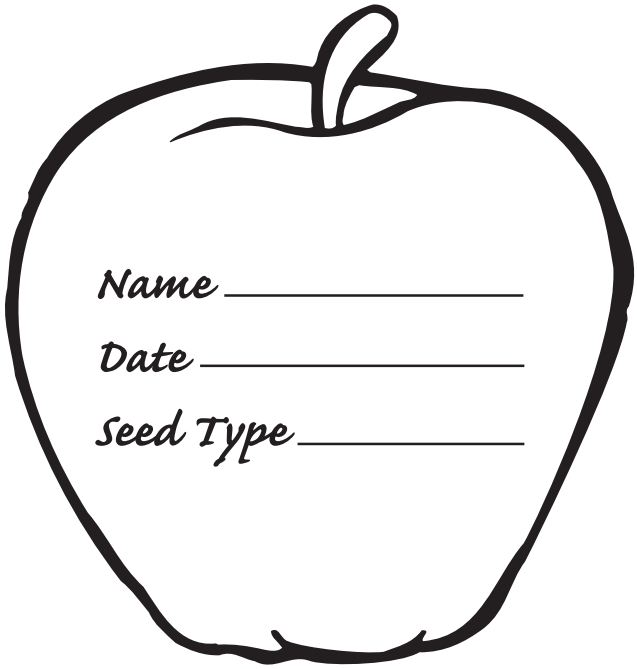
My Name is:

*18 U.S.C. 707

# Sowing Seeds





Activity Sheet 5A

Virginia Cooperative Extension

My Name is:

*18 U.S.C. 707

# Potato

Activity Sheet 5C

Virginia Cooperative Extension



*18 U.S.C. 707

# Plants in the Past

## Chapter Background

Plants! Plants! Everywhere! There are so many different kinds of plants and so many different ways to use plants. This series of activities will look at three special groups of plants that have been used by people for hundreds of years in some very interesting ways. The children will laugh when they hear the stories of how people have used plants through the ages.

It is sometimes difficult for children in this age group to understand the concept of times past. Their understanding of the world is solely in the present tense. An exploration of plants and their historical uses will introduce and connect the past with the present through something from a child's real-life world - plants!

First the children will explore herbs. Some herbs you might recognize are oregano, chives, parsley, and rosemary. People have used herbs for thousands of years in a variety of ways. For example:

- Long ago people rarely bathed or brushed their teeth. To cover up bodily odors they wore herbs in their hair or pinned them to their clothes. They chewed herbs to cover up the smell of bad breath and rotting teeth.
- Herbs were strewn upon the floors of homes. When people walked upon the herbs and crushed the leaves, the scents released would cover up the smells of the home.
- Long ago there were no refrigerators or freezers in which to store food. Without refrigeration foods would quickly go bad. Herbs were used to mask the smell of rotting food.
- Due to their strong odors, herbs were considered to have special healing properties. Herbs were often used to cure diseases, frighten away evil spirits, bring good luck, and many other things that we would consider "unscientific" today

Next the children will look at plants used for dyes. Fabric made from sheep's wool, linens, and cotton has been colored by plant dyes for thousands of years. Exploring plant dyes introduces the children to another way that people use plants.

Finally, we will explore how plants have been used in communication. Plants have played a prominent role in human interaction, particularly since the invention of paper from plant fibers. Interestingly, flowers cut from the garden once played a role in communication. Long ago, a proper, young woman was not allowed to speak to a young man that she fancied. To convey a message to a special fellow, she would use the "language of flowers." Wearing a small corsage of carefully selected flowers pinned to her dress, she would convey a secret message just for him!

# Activity 6A: Amazing Herbs

## Life Skills:

Thinking Creatively-Makes connections between old and new; actively pursues creative expression.

## Location: inside

## Time Needed:

**Introduction:** 20 minutes

**Activity:** 15 minutes

## Best Time of Year: any season that allows for the collection of fresh herbs

## Materials:

**Introduction:** samples of different herbs (listed under *Doing the Activity*), a house plant, newspaper

**Activity:** herb sample labels, crayons, student scissors, copies of Activity Sheet 6A

## Objective

To look at a special group of plants that share common characteristics. In addition, children learn that people have used plants in some very unusual ways.

## Activity Summary

The children use their senses to discover a very common characteristic of herb plants - a distinctive smell! They compare the herbs to some other plants to recognize that not all plants have a strong odor. Then the children listen to stories about how herbs were used in times past. They learn that people have used plants in some very interesting ways.

Activity

## Doing the Activity

### Introduction

Place the herb samples and their labels on a newspaper in front of the children. Explain that they are going to be detectives who must find out what these plants have in common by using their senses of sight, touch, and smell.

First, start by looking at the plants (using the sense of "sight") and describe their differences and similarities. Look at:

- The color of the leaves
- The size of the leaves
- The texture of the leaves
- The presence of flowers
- The color and shape of the flower

What other comparisons can be made? Did the children find a common characteristic? (Botanical Note: Plants we call "herbs" come from many different plant families. They share no common physical characteristics).

Next, the children will use their senses of smell and touch. Demonstrate how they are to gently rub the leaves of these plants between their fingers before they smell them (this rubbing releases the oils in the leaves, and allows for a better whiff of the herb's aroma). One by one, pick up an herb, state its name, and pass it around for the children to feel and smell. Ask the children to:

- Describe how the leaves feel. Are they soft? Rough? Smooth? Slippery? Bumpy?
- Describe how the leaves smell. Do they have a strong smell? Sweet smell? Bad smell?

The common feature of most herb plants is that they have a strong smell! Congratulations on being great plant detectives!

Now, pass around the houseplant and have them rub and smell this plant. Most common houseplants will have a very weak smell. The children will see that not all plants have a strong smell. The plants we call herbs usually have a rather strong odor.

## Activity: Historical Herbs

Activity

Ask the children what they think herbs are used for. Ask them to point out plants from the samples that they have seen used in their homes. Let as many children as possible respond. Explain that today we use herbs primarily for cooking, decorating, and as a source for medicines, fragrances, and some vitamins.

Now ask them these funny questions about how they might use herbs. Do they use herbs to:

- Make themselves strong?
- Make bandages?
- Help them fall in love?
- Help them see the fairies?
- Help them do well on a test?
- Cure snakebites?
- Scare away their neighbors?
- Keep their hair from falling out?
- Keep out ghosts?

Explain that a long time ago people did not have the things that we have today. They did not have stores where they could buy medicines, clothes, or food. Most of the time they had to make these things themselves. Since herbs had such strong odors, the people thought that they had special powers. The following are some old ways that herbs were used. Hold up the herb as you tell its story.

*Note: After you tell the stories ask the above questions again. Do the children think the herbs really did these things?*

- **Parsley** is one of the world's oldest herbs used by people and it was thought to bring bad luck. Once an entire Greek army panicked and ran away because an enemy sent a donkey covered with parsley into their midst!
- **Chives and onions** were fed to racehorses, wrestlers, and workers to make them strong. It was thought that the plants' strong odor would increase the strength of animals and people.

- **Dill** comes from the Norse word "dilla" which means "to lull" or "help put to sleep." Dill tea was used as a sleeping aid, thus the lullaby:

  Lavender blue, dilly dilly
  Lavender green
  When you are king, dilly dilly
  I shall be queen

- **Fennel** was hung from house rafters to keep away bad happenings and bring good luck. Fennel seeds were placed in keyholes to keep ghosts from sneaking in. Fennel was also placed on floors to cover odors. Fennel bandages were used to cure snake and dog bites, toothaches, and earaches.
- It was believed that the Greek goddess of love, Venus, created **marjoram**. Wreaths of marjoram were placed on the heads of both the bride and the groom in ancient Rome and Greece to enhance their love.
- **Mint** has a funny story connected with it. It seems that the Greek god Pluto fell in love with a beautiful nymph named Minthe. Another Greek goddess, Persephone, became jealous and changed Minthe into a lowly herb so she could step on her!

  Early American colonists brought mint to America to treat watery eyes, bad memory, headaches, sore gums, stomachaches, bad breath, bee stings, bad dreams, and dandruff.
- **Rosemary** was considered by the Romans to be a sacred herb that brought happiness and improved a person's memory. As a result, Greek students would braid rosemary into their hair everyday to guarantee a good day at school and to help them remember the facts on a test!
- **Sage** comes from a Latin word which means, "to save." Ancient Romans thought sage brought good luck so before they could pick it they would change into a clean, white outfit, take off their shoes, and offer bread and wine to the plant.
- **Thyme** was used to cure bad moods, flu, and hair loss. It was thought that the wee folk (elves and fairies) made their home in thyme. If you drank thyme tea you could see the fairies!

Provide each child with a copy of Activity Sheet 6A. Ask them to color and cut out the wreath of rosemary. Place the rosemary wreaths on their heads. Now ask the children: Do you feel smarter? Do they think that these stories about herbs are true?

## Evaluation

As the children are wearing their wreaths of rosemary, ask them why people would think that herbs had special powers. Ask them to describe some ways that people long ago used herbs. What are some of the ways that we use herbs today?

## This is What You Can Do!

You can understand that some plants have special qualities that people have used for many different things.

## Enrichment Activities

Ask the children to go to the kitchen in their home to see if they can find some cooking herbs. Encourage them to find some of the same herbs that have been explored in this activity.

# Activity 6B: In-dye-scribable!

## Life Skills:

Thinking Creatively - Makes connections between old and new; actively pursues creative expression.

## Location: inside

## Time Needed:

**Introduction:** 20 minutes

**Activity 1:** 15 minutes

**Activity2:** 30 minutes

## Best Time of Year: any season that allows for the collection of plant materials for dyeing

## Materials:

**Introduction:** pictures of flowering plants

**Activity 1:** copies of Activity Sheet 6B, crayons

**Activity 2:** hot pot, spoons, hard-boiled eggs, samples of 5 to 6 plants used for dyes (listed under *Doing the Activity*), vinegar, colander, newspaper, wax pencils, timer

## Objective

To demonstrate how the colors found in plants are used for coloring (dyeing) other things.

## Activity Summary

Using the familiar activity of coloring eggs, the children explore how different plant parts release colors (pigments) that can change the color of other things. They discuss how people have used plant dyes to color such things as clothes, flags, banners, hair, skin, and to produce artwork.

Activity

## Doing the Activity

### Introduction

Holding up a picture of a flowering plant, ask the children to describe the colors they see. The most obvious colors are the green found in the plant's leaves and stems, and the flower colors. Ask them to think about why a plant would have these different colors. From activities 1B and 3A they should remember that the green color in plants helps them make their food. Explain that the colors found in flowers are often used to attract insects that help the plant reproduce (make seeds).

Show them a picture of a deciduous forest showing its autumn colors. Explain to the children that many times there are colors in plants that we cannot see until certain times of the year. The reds, orange, and yellow colors we see in the autumn are always in the leaves...we just can't see them until the green fades away! There are also plant colors in berries, nuts, fruit, and some roots! The colors found in plants are called **pigments**.

Using their imaginations, ask the children to tell a story about how people long ago figured out that a plant contained pigments. Ask these questions to encourage creative thinking: Did an ancient person bite into a berry, only to have berry juice dribble down his chin and stain his skin? Did a young girl walk across some black walnuts and wind up with a pair of black moccasins? What other things could have happened? Why would people want to color their clothes, paint their skin, or draw pictures? Why do people today like to use different colors?

Activity

## Activity 1: Living With Color

Ask the children to look at the clothes they are wearing. Let each child tell you about the colors in his or her clothes. Ask them to describe how they feel about the colors. How would they feel if everything were just one color?

Provide each child with a copy of Activity Sheet 6B. Ask them to color the picture according to the directions. They will color the first picture in just one color, and the second picture in many colors. Let them share how they feel about the two different pictures. Do colors make a difference?

Activity

## Activity 2: Eggs Galore!

Introduce the children to the dye plants selected for this project. Explain which part of the plant carries the pigments they will be using. Describe the colors that will result.

**Suggested plants to use for dyeing-**

Growing Ideas, National Gardening Association, April 1995

| | |
|---|---|
| birch leaves (yellow/tan) | black walnut hulls (black) |
| red cabbage (pinkish) | carrot tops (green) |
| coffee grounds (tan) | mint leaves (yellow) |
| parsley leaves (yellow) | spinach plants (green) |
| tomato plants (pink/blue) | wild grapes (purple) |
| wild mustard (yellow) | aster (yellow) |
| black-eyed Susans (yellow) | chamomile (yellow) |
| coreopsis (orangish) | marigolds (yellow) |
| sunflowers and seeds (gold) | zinnias (yellow) |
| dandelions (magenta) | giant ragweed (brass/gold) |
| goldenrod (brass) | mullein (yellow) |
| redroot pigweed (brass/gold) | |

In this activity the children will be exploring plant dyes by coloring eggs. Explain that boiling plant parts in water releases the pigments inside. They will be using the plant pigments released into the water to color their eggs (Note: Have some of the pigments ready for dyeing so that the children will not have to wait). Ask the children to select one of the sample plant dye materials. Have some of them shred the leaves or plant stems to release the pigments.

***CAUTION: It is important that the children recognize that the water in the hot pot is very hot. An adult will boil and strain the pigments from the plant parts.***

An adult will:

- Bring two cups of water to a boil in the hot pot.
- Place the shredded plant parts into the boiling water with one tablespoon of vinegar. Using the timer, simmer for at least ten minutes.
- Using a colander, strain out the plant materials making sure to save the colored water.

Let the children place an egg on a spoon and gently dip it into the water containing the pigments. Using the timer, keep the eggs in the water for at least ten minutes. Using the spoons, remove the eggs from the water and place them on the newspaper until they have dried. Ask the children to describe the colors of the eggs. Do they like the colors? (Note: most plant dyes are dull earth tones. These are the natural colors found in nature) Why, or why not?

For a more interesting effect, use a wax pencil to draw designs on the eggs prior to dyeing. The wax will resist the dye and creative patterns will appear. Also, try leaving some of the eggs in longer than others to create different shades.

## Evaluation

People have been using plant dyes for thousands of years. Ask the children to tell you how colors make their lives more enjoyable. What are some of the different ways that people use dyes? Can they remember what the colors found in plants are called?

## This is What You Can Do!

You can understand that plants contain pigments, which can be used to add color to our lives.

## Enrichment Activities

Paint a "Plant Pigment Picture" by rubbing and releasing pigments from different plant parts onto paper. Rub leaves, flower petals, stems, softwood and other plant-based materials onto drawing paper using your fingers.

# -Activity 6C: The Language of Flowers

## Life Skills:

Thinking Creatively-Makes connections between old and new; actively pursues creative expression.

## Location: indoors

## Time needed:

**Introduction:** 20 minutes

**Activity:** 20 minutes

## Best Time of Year: any time

## Materials:

**Activity:** fresh flowers or artificial flowers, student scissors, ribbon, doilies, large safety pins

## Objective

To identify different ways that people have used plants in communication.

## Activity Summary

The children look at some ways that plants have been used in communication. They discuss the many ways that paper is used in communication. They discover how people have used flowers to communicate using the "language of flowers."

## Doing the Activity

Activity

### Introduction

"Communication" is how we send messages to one another. Ask the children to name different ways that we communicate with each other. They will probably mention such things as talking, telephones, letters, sign language, or e-mail. People are not the only creatures who communicate. Ask the children to think of different ways that animals communicate. Can they tell you what it means when a dog wags his tail, shows his teeth and growls, or puts his tail between his legs? Do we know what the dog is trying to tell us? Let all of the children respond to these questions.

In this activity the children will be looking at how plants have been used for communication. Explain that the most important way that plants have helped in communication is through the production of paper. Paper is made from plant fibers. The first paper was made from the river plant, papyrus. Today we make paper out of wood fibers from trees. We communicate with each other by writing such things as letters, books, pictures, pamphlets, and brochures on paper. Ask the children to tell you about ways that they have used paper to send a message to someone.

### Activity: Flowers Tell the Story

Another way that people have used plants to communicate is by using the "language of flowers." A long time ago, it was considered poor manners for a young woman to speak to a young man that she fancied. Since she could not speak to him, she would use flowers to relay her

message to him. Each flower type had a special meaning. The young man would "read" the flowers that he saw pinned to the young lady's dress. These are some of the messages that he may have seen:

| | |
|---|---|
| Apple blossom | I like you |
| Rose | happy love |
| Butterfly weed | let me go |
| Buttercup | I am too young |
| Jasmine | I'm too happy |
| Red carnation | Alas! For my poor heart |
| Striped carnation | I can't |
| Yellow carnation | I don't like you |
| Cedar leaf | I live for you |
| Clover | Be mine |
| Ivy | Marriage |

Ask these questions to encourage thinking about flower communication:

Do these messages sound like those on a valentine heart? Since there are hundreds of flowers, and each flower had its own meaning, do you think this was a very easy way to send someone a message? What do you think happened when the fellow forgot or mixed-up the meanings of the flowers?

Hold up the flowers that were brought in for this activity. Ask the children to decide on the message of each flower. Write down the meanings of each flower as the children decide. Remind them that it is always nice to receive a pleasant message.

To put together a flower message, each child will:---

- Choose the flowers needed for the message using the group's list of "flower meanings."
- Group the flowers into a little bouquet.
- Cut off any long stems for a 4 to 6 inch long bouquet.
- Cut a hole in the center of a doily.
- Push the flower stems through the hole in the doily.
- Wrap the doily around the stems.
- Tie the flowers and the doily together with a piece of ribbon.
- Ask an adult to help put a safety pin through the ribbon and pin it to his or her shirt.

Ask each child to tell the group their flower message using the "language of flowers!"

## Evaluation

People often communicate with each other with the help of plants. Ask the children to tell you ways that plants have helped people send messages. Do they think that sending a flower message was a very good form of communication? Why, or why not?

## This is What You Can Do!

You can understand that plants have been used in many different ways to help people communicate.

## Enrichment Activities

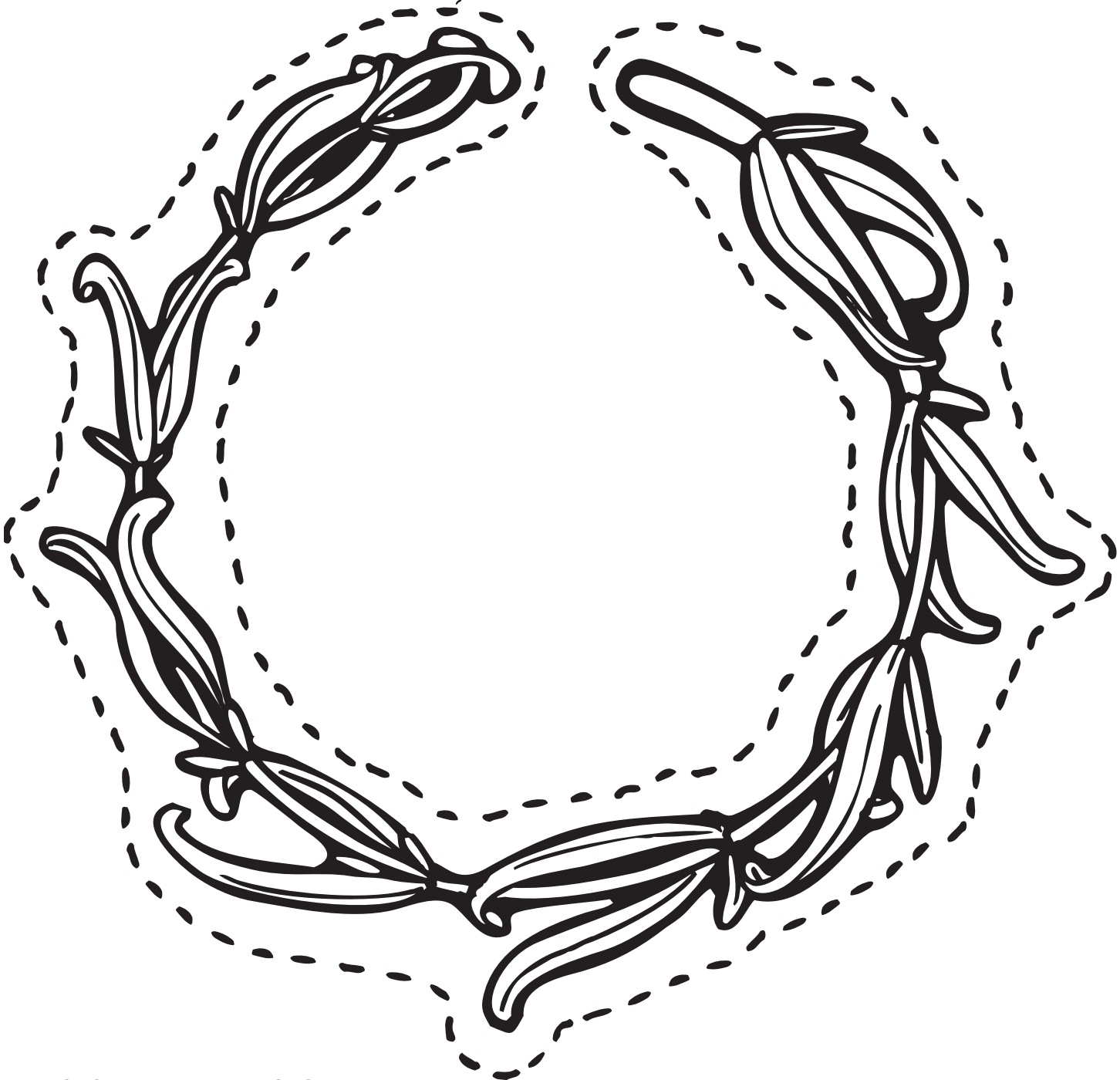
Take a piece of paper (made from plant fibers) and write a special message on it. Make sure that person gets your message to brighten their day!

My Name is:

*18 U.S.C. 707

# Amazing Herbs

Directions: Color and cut out this rosemary wreath.



Activity Sheet 6A

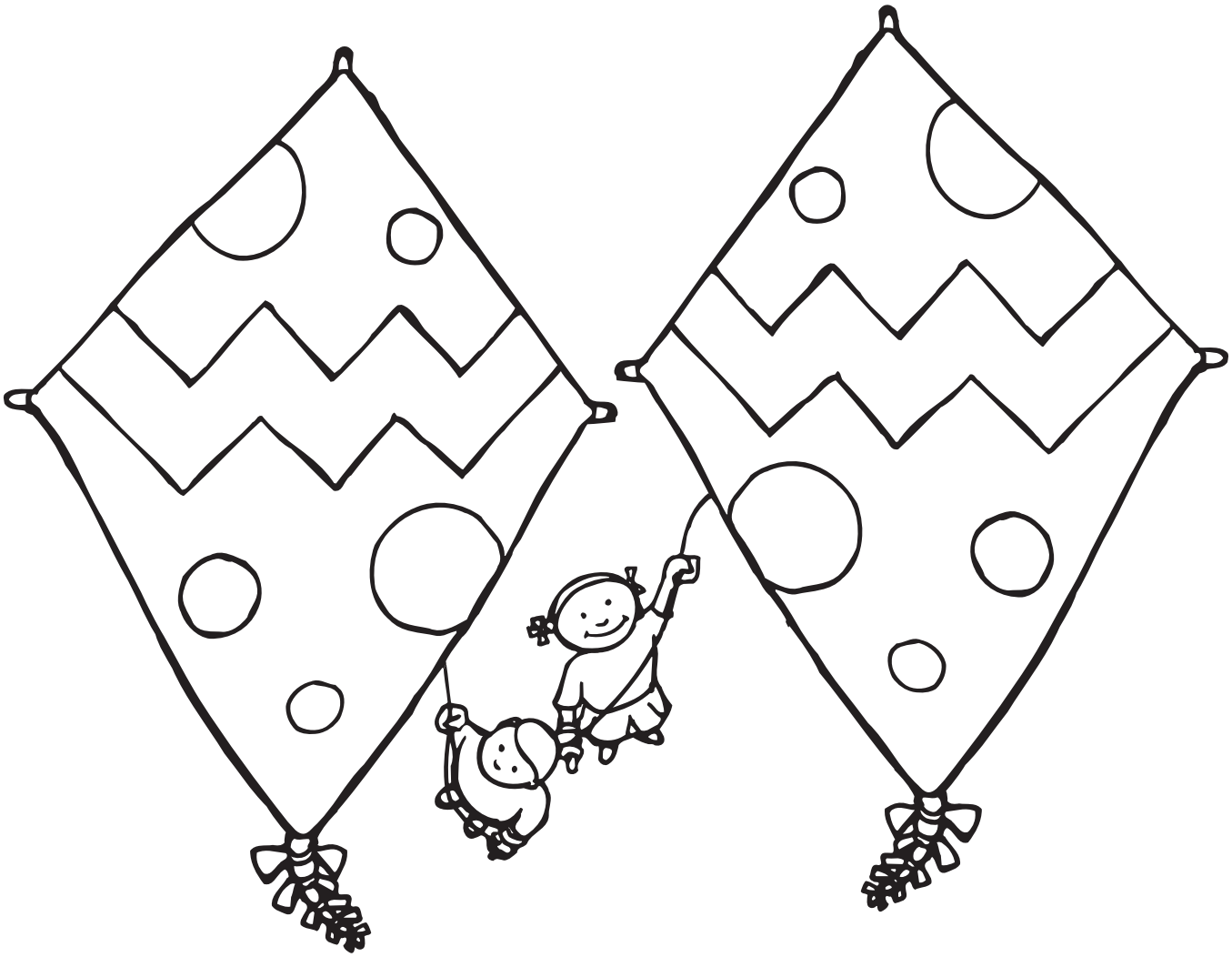
Virginia Cooperative Extension

My Name is:

*18 U.S.C. 707

# Let's Color

Color picture #1 in a single color. Color picture #2 in many colors.
Which do you like better?



# Doing Our Part

## Chapter Background

Imagine running barefoot through a field of grass and feeling the coolness under your toes. You lie back into a patch of clover to look up at the sky to see dinosaur or bunny shapes in the clouds. The gentle breeze brushes past your cheek. Then, sitting up you peacefully pick pretty white, clover flowers to weave into a clover crown for a friend. What beautiful, peaceful feelings nature can provide, and what memories it can inspire. The natural world is here for us to enjoy, but can we be sure that this same scene can be replayed in ten years? 20 years? 100 years? How can we keep our world healthy for the children of the future?

The world is so large. Children this age may not be able to imagine that they personally can make a difference in caring for the Earth. Young children may have a sense that they exist in nature, but it is hard for them to understand that they can have an effect on nature. In these activities the children will explore how the little things they do every day can impact their small piece of the world. They will practice good earth stewardship. They will recognize that every person has a part in assuring those clover fields for future generations.

All people need to work together to keep the natural world healthy. Each individual can start by doing such things as planting new plants as a method to prevent the erosion of the earth's precious topsoil. In the first activity, the children will learn about the care of the soil by planting a garden.

Next, the children will discover that composting kitchen and garden waste is an effective method of returning plant nutrients to the soil. They will learn that growing plants will use the nutrients from the compost for healthy growth. In this activity, the children will learn about recycling soil nutrients by learning how to compost.

Lastly, the children will discuss how plants make the world a more beautiful place for everyone to enjoy. They will listen to stories about how others have used plants to enhance the world and peoples' lives. In this last activity, the children will learn that anyone can help beautify the world.

# Activity 7A: Growing Gifts

## Life Skills:

Reasoning - Applies principles to a procedure examines information for relevancy.

**Location:** Outside; flowers will be planted in a prepared garden either at home or at a community building

## Time Needed:

**Introduction:** 20 minutes

**Activity:** 30 minutes

**Best Time of Year:** any season except winter

## Materials:

Introduction: a greenhouse flat with grass growing in it (note: start growing the grass seed in the flat at least two weeks prior to this activity), a greenhouse flat filled with potting soil, newspaper, watering can

Activity: garden trowels, plastic 4 to 6-inch pots, potting soil, flower packs (suggestions: marigolds, petunias, impatiens, or ageratum).

## Objective

To demonstrate good earth stewardship by growing plants to prevent soil erosion, and ensure future generations of plants.

## Activity Summary

The children demonstrate how plant roots prevent the erosion of the earth's soil. They recognize that we should not remove plants from the earth without replacing them. Replanting protects the soil by reducing soil erosion.

Activity

## Doing the Activity

### Introduction

Bring out the two flats that were prepared prior to this lesson. Ask the children to describe the differences that they see. They should tell you that one flat has grass growing in it and the other does not.

Follow these steps to observe how plants reduce erosion:

- Spread the newspaper out on a table.
- Ask two children to assist you with your demonstration.
- Ask each child to hold a flat at a 45˚ angle with the base of the flat on the newspaper. Ask two more children to help you pour water from the watering can down the length of each flat, starting at the top of each flat.
- Ask the children to describe what happens. Did the flat without grass lose its soil onto the newspaper? Did the flat with the grass stay intact? Ask the children to think about why this happened.

Explain to the children that the grass plants' roots were holding the soil in place so that it would not wash away. When soil washes away it is called **erosion**. Ask the children to imagine what would happen if all of the plants were removed from a forest and then it started to rain. Ask these questions to encourage thinking about soil erosion: What would happen to the soil in the forest? Where would the soil go? Why would it be bad if the earth's soil washed away? Where would new plants grow if all of the soil were gone? Why would we be sad if we could not grow plants (remind the children of the activities they have done that discuss the things that we get from plants)?

People often remove plants from the earth. Foresters remove trees from a forest for wood to make paper, furniture, homes, and violins. Farmers will remove a crop of corn or tomatoes from their fields to take to the market to sell. If we remove all the plants, how can we stop the soil from washing away? One way is not to remove all of the plants at one time, but another way is to plant new plants into the soil. The new plants will grow roots to help hold the soil in place.

Activity

## Activity: Planting A Garden

Prepare an outdoor flower bed prior to starting this activity.

To help reduce erosion, each child will plant a flower at his/her school, a community building, or home. If you are planting at your school or at a community building (suggestions: senior citizens center, recreation center, library, or fire station), take the children outside to the prepared garden. More than one flower per child can be planted depending on the size of the garden and the number of children participating.

To plant the garden, let each child:

- Use a hand trowel to dig small holes for their flowers.
- Plant a flower into the garden by placing the roots into the hole, covering the roots with soil, and then pressing the soil down around the roots.
- Water the flower to give it a good start in the garden.

If you are sending the flowers home with the children, have them:

- Fill a flower pot 1/2 full with potting soil.
- Place a rooted flower into the pot.
- Fill the remainder of the pot with potting soil, pressing the soil down gently around the flower to hold it in place.
- Water the pot until water drains from the bottom of the pot.

Remind the children that the plants should be placed in an outdoor garden or in an outdoor window box or container soon after they get home. Thank the children for helping prevent soil erosion by planting new plants.

## Evaluation

Take the flat with grass growing in it and ask each child to come up and gently pull out some grass from the soil. They will find that it is difficult to pull up the grass as the grass roots are firmly holding the soil. Ask these questions: Can they see why plant roots prevent erosion? Why do we need to replace plants that are removed from a garden? Why does this keep the earth healthy?

## This is What You Can Do!

You can understand that we all have a responsibility to help take care of the earth by reducing soil erosion. Planting a garden is a way to protect the earth.

# Activity 7B: Compost Creations

## Life Skills:

Reasoning - Applies principles to a procedure; examines information for relevancy.

## Location: indoors or outdoors

## Time Needed:

**Introduction:** 20 minutes

**Activity:** 25 minutes

## Best Time of Year: any time

## Materials:

**Introduction:** piece of moldy bread (Note: place a moistened piece of bread in a half-zipped plastic bag for two weeks prior to doing this lesson)

**Activity:** 1 pint zippered plastic bags, garden soil, grass clippings (without lawn chemicals), chopped up fruit and vegetables (small pieces), water, measuring cups, craft sticks

## Objective

To demonstrate that composting old plants and food and returning them to the soil is a way to provide nutrients to growing plants and to reduce waste.

## Activity Summary

The children discuss the role of decomposers in breaking down old plants and food into compost. Watching table scraps decompose over a period of weeks will demonstrate the process of decomposition and the production of compost. They discuss how the roots of growing plants absorb the nutrients released by compost.

Activity

## Doing the Activity

### Introduction

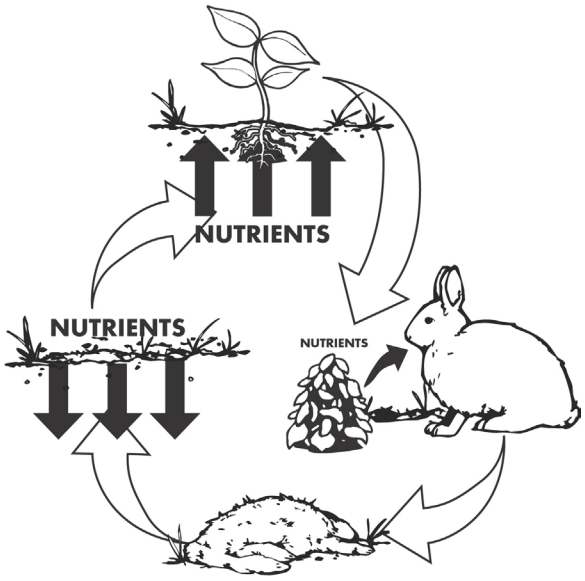
Show the children the moldy piece of bread. **CAUTION:** Do not open the bag or let the children touch the bread since some children may have allergies to bread mold. Ask the children what they think is happening to the bread. What is the green and black fuzzy stuff that covers the bread?

Explain to the children that this fuzzy stuff is a **decomposer** called "mold." Mold is a plant-like organism that cannot make its own food. Ask the children why the mold might not be able to make its own food. Explain that mold has no chlorophyll so it cannot perform photosynthesis to make its own food. Molds, and other decomposers, break up dead plants into small pieces, which they then absorb, for their food. This is called **decomposition**. Ask the children to predict what they think will happen to the piece of bread in two to three more weeks. Will the bread still be on the plate or will it be a small pile of mush?

Tell the children that the broken down pieces of the bread turn into **compost**. In nature, dead plants are broken down into compost by decomposers. The compost gets mixed back into the soil

and releases nutrients into the soil water. The roots of growing plants absorb the nutrients when they take up water from the soil. This is the cycle of nutrients that is found in nature.

To provide nutrients for growing plants, farmers and gardeners often mix compost into the soil. The new plants grow roots that absorb the nutrients released by the compost. The plants use the nutrients for healthy growth.




*Decomposition*

## Activity: Making Compost

In this activity the children will make their own compost. They will add this compost to a garden to provide nutrients to growing plants. To watch the decomposition of dead plants (composting) each child will mix together the following items and place them in a 1 pint zipper-sealed plastic bag. Make sure to label each bag with the child's name and the date of the activity.

| | |
|---|---|
| 1/2 cup | garden soil (contains the decomposers - bacteria and fungi) |
| 1/2 cup | grass clippings (free of lawn chemicals) |
| 1/2 cup | chopped up fruit and vegetables (the smaller the pieces are, the faster the decomposition process will occur) |
| 1/2 cup | water |

Seal the bag and have the children shake their bags until everything is mixed thoroughly. Ask them to predict what they think will happen to the fruits and vegetables. Do they think the food will disappear? What will break down the fruits and vegetables into tiny pieces? Do they see any decomposers? Explain that some decomposers (bacteria and fungi) are so small that we cannot see them. They live in the topsoil that was mixed in the bag.

Ask the children to take their bags home and watch what happens. Tell them to open the bags every few days to let air into the bag. Ask these questions to help the children think about living decomposers: Why do the decomposers need air? Are the decomposers alive? Do all living things need air? Do they need water? Ask the children to bring their bags back in a month. Let them share what happened to the fruits and vegetables in their bags.

## Evaluation

Using the composting project sample, spread the contents of the bag onto a piece of newspaper. Ask the children to find the pieces of fruits and vegetables. Provide them with craft sticks to push the compost around to find these pieces. Ask them to explain what happened to the pieces of fruit and vegetables, and what broke the food down into tiny pieces.

## This is What You Can Do!

You can understand that decomposers break down dead plants to use for their food. Nutrients from decomposed plants and animals are returned to the soil to be used by growing plants. We can help growing plants by composting old garden plants and lawn clippings and returning the nutrients back into our garden soil.

# Activity 7C: Blooming Beauties

## Life Skills:

Thinking Creatively - Paraphrases existing ideas; recognizes relationships; actively pursues creative expression.

## Location: inside

## Time Needed:

**Introduction:** 30 minutes

**Activity:** 30 minutes

## Best Time of Year: any

## Materials:

**Introduction:** one of the following storybooks (or a similar book of your choosing):

*Miss Rumphius* by Barbara Cooney

*Wanda's Roses* by Pat Brisson

*The Gardener* by Sarah Stewart and David Small

*City Green* by DyAnne DiSlvo-Ryan.

**Activity:** craft sticks, drawing paper, crayons, student scissors, copies of Activity Sheet 7C

## Objective

To describe how plants bring people together and beautify the world.

## Activity Summary

The children listen to stories about people using plants to make the earth a more beautiful place. They discuss how the beauty of plants improves peoples' lives. They make stick puppets and re-create a story about people and plants.

Activity

## Doing the Activity

### Introduction

There are so many wonderful books that tell the story of people living with and enjoying plants. Select one of the suggested books (or use a book that you are familiar with that tells the story of plants and people). Read the story to the children and discuss how growing the plants made the people in the story feel. Talk about how the plants brought people together and made the earth a more beautiful place.

Making a list on the poster board, ask the children to identify the characters in the story. Now ask them to identify the plants in the story.

### Activity: Plant Puppet Show

Activity

Provide each child with a copy of Activity Sheet 7C. Using the list, assign each child a character or plant from the book. Ask them to make a stick puppet of their character or plant. Color the puppets in bright colors.

Ask the children to re-tell the story using their puppets. They will enjoy telling the story of how plants make our world a more beautiful place!

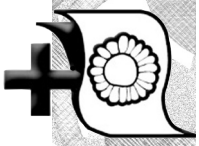
## Evaluation

After the puppet show, ask the children to tell you what was the most fun about putting on the show. Was it making the puppets? Was it telling the story? Now, ask them to tell you why plants were important to the story. Did the plants make the earth a more beautiful place? Did the plants make the people happy?

## This is What You Can Do!

You can understand that plants help beautify our world.

## Enrichment Activities



Take the children outside to collect a bouquet of dandelions, buttercups, or other flowers from a garden, a field, or a lawn. Ask them to share their bouquet with a special person.

My Name is:

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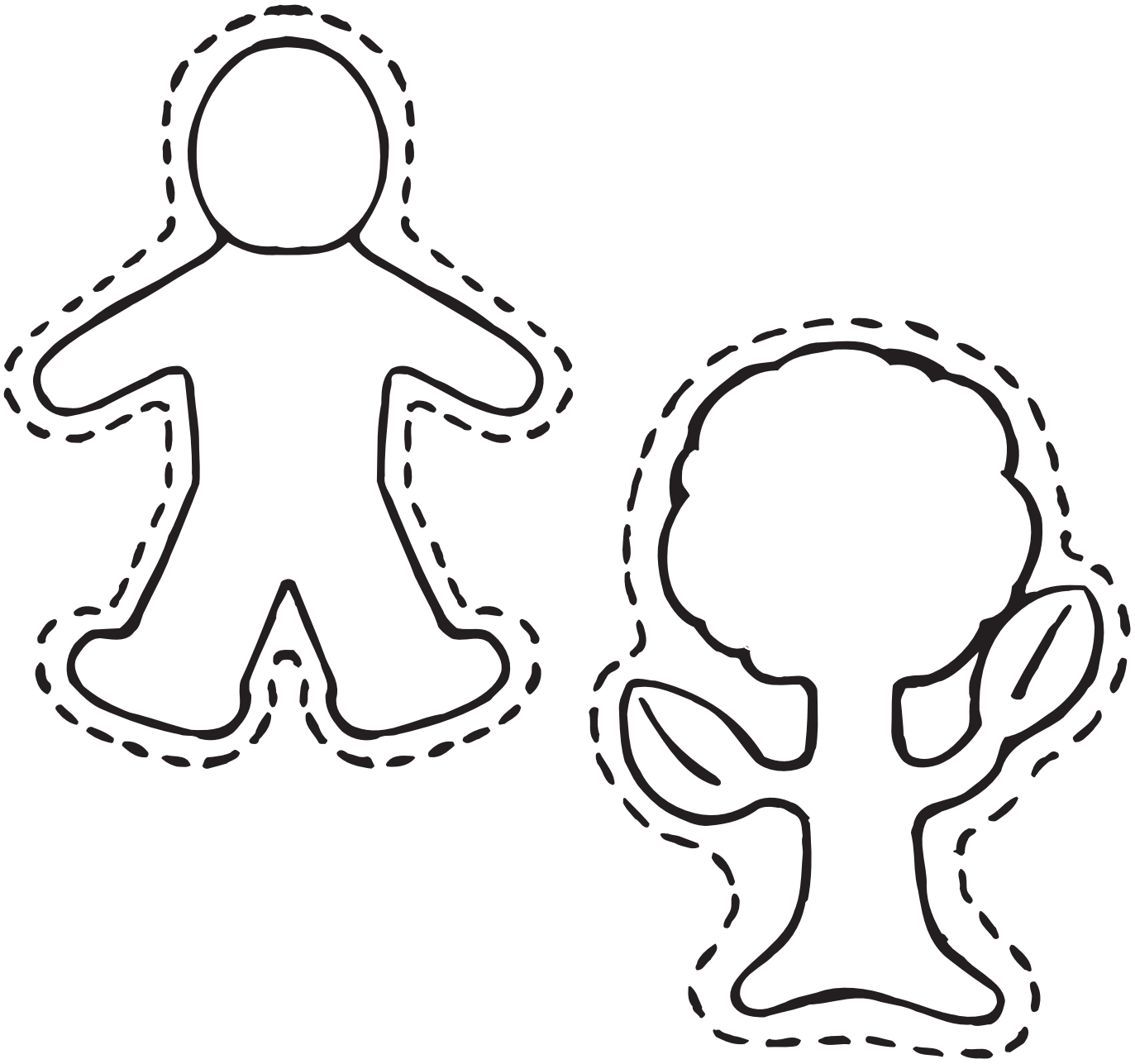
# Puppets



Activity Sheet 7

Virginia Cooperative Extension



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# Glossary

**adaptation** an act of changing so as to fit or to become suitable; to change oneself so as to adjust to a new condition

**asexual reproduction** any form of plant reproduction that does not involve seeds reproduction

**bud** a small swelling on a plant stem from which a shoot, cluster of leaves, or flower develops

**bulb** An underground food-storage organ that is essentially a modified bud consisting of fleshy leaves that surround and are attached to a small stem

**chlorophyll** green pigments that are essential to photosynthesis

**compost** a fertilizing mixture that consists of decomposed vegetable matter

**cutting** a piece of a plant that is encouraged to grow roots to produce a new plant

**deciduous** shedding leaves annually

**decomposer** organism that breaks down organic material to forms capable of being recycled

**decomposition** to decay; to break up into constituent parts

**dormancy** a state of reduced activity in which no, or very little, growth takes place

**erosion** the state or process of being gradually worn away by constant friction

**life cycle** is a series of stages through which a living thing passes before arriving again at the starting point

**minerals** a solid inorganic substance that is taken from the earth

**nutrients** a substance that nourishes

**perennial** a plant that grows from the same root system for three or more years

**photosynthesis** the conversion of light energy, water, and carbon dioxide in the presence of chlorophyll to carbohydrate (sugar) with oxygen being released as a by product

**phototropism** the movement of a plant toward the light

**pigments** any substance which imparts color to vegetable tissue or animals

**reproduction** the development of new individual organisms

**stomata** tiny openings, found on the underside of a leaf, that open and close to regulate the exchange of gases and water

**transpiration** loss of water in vapor form; most transpiration takes place through the leaf stomata

**tropism** response of a plant organ or part to an external stimulus, usually in the direction of the stimulus

**tuber** a swollen, fleshy underground stem

# Digging Down and Growing Up

## A Plant and Soil Curriculum for Five to Eight Year Olds
## Virginia Standards of Learning Correlations

## Chapter 1 What is a Plant?

**Science:** K.1 The student will conduct investigations; K.6 The student will investigate and understand basic needs and life processes of plants and animals; K.8 The student will investigate and understand simple patterns in his/her daily life; K.9 The student will investigate and understand that change occurs over time, and rates may be fast or slow; K.10 The student will investigate and understand that materials can bereused, recycled, and conserved; 1.1 The student will plan and conduct investigations; 1.4 The student will investigate and understand that plants have life needs and functional parts can be classified according to certain characteristics; 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics; 2.1 The student will plan and conduct investigations; 2.4 The student will investigate and understand that plants and animals go through a series of orderly changes in their life cycles; 2.5 The student will investigate and understand that living things are part of a system; 3.1 The student will plan and conduct investigations; 3.8 The student will investigate and understand basic patterns and cycles occurring in nature; 2.4 The student will investigate and understand that plants and animals go through a series of orderly changes in their life cycles; 2.5 The student will investigate and understand that living things are part of a system; 3.1 The student will plan and conduct investigations; 3.8 The student will investigate and understand basic patterns and cycles occurring in nature.

**English:** K.2 The student will use listening and speaking vocabularies; K.3 The student will build oral communication skills; K.11 The student will write to communicate ideas; 1.1 The student will continue to demonstrate growth in the use of oral language; 1.2 The student will continue to expand and use listening and speaking vocabularies; 1.3 The student will adapt or change oral language to fit the situation; 2.2 The student will continue to expand listening and speaking vocabularies; 2.3 The student will use oral communication skills; 3.1 The student will use effective communication skills in group activities.

**Math:** K.8 The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer); 1.18 The student will investigate, identify, and describe various forms of data collection in his/her world (e.g., recording daily temperature, lunch count, attendance, and favorite ice cream), using tables, picture graphs, and object graphs; 2.18 The student will: Use calendar language appropriately (e.g., months, today, yesterday, next week, last week); Determine past and future days of the week; and Identify specific dates on a given calendar; 3.14 The student will estimate and then use actual measuring devices with metric and U.S. Customary units to measure.

## Chapter 2 Living With Plants

**Science:** K.6 The student will investigate and understand basic needs and life processes of plants and animals; K.8 The student will investigate and understand simple patterns in his/her daily life; K.10 The student will investigate and understand that materials can be reused, recycled, and conserved; 1.1 The student will plan and conduct investigations; 1.4 The student will investigate and understand that plants have life needs and functional parts can be classified according to certain characteristics; 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics; 1.8 The student will investigate and understand that natural resources are limited; 2.1 The student will plan and conduct investigations; 2.4 The student will investigate and understand that plants and animals go through a series of orderly changes in their life cycles.; 2.5 The student will investigate and understand that living things are part of a system; 2.8 The student will investigate and understand that plants pro-

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duce oxygen and food, are a source of useful products, and provide benefits in nature; 3.1 The student will plan and conduct investigations; 3.8 The student will investigate and understand basic patterns and cycles occurring in nature; 3.1 The student will use effective communication skills in group activities.

**English:** K.2 The student will use listening and speaking vocabularies; K.3 The student will build oral communication skills; K.11 The student will write to communicate ideas; 1.1 The student will continue to demonstrate growth in the use of oral language; 1.2 The student will continue to expand and use listening and speaking vocabularies; 1.3 The student will adapt or change oral language to fit the situation; 2.2 The student will continue to expand listening and speaking vocabularies; 2.3 The student will use oral communication skills.

**Math:** K.8 The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer).; 1.12 The student will use nonstandard units to measure length and weight; 2.12 The student will estimate and then use a ruler to make linear measurements to the nearest centimeter and inch, including measuring the distance around a polygon in order to determine perimeter; 3.14 The student will estimate and then use actual measuring devices with metric and U.S. Customary units.

## Chapter 3 Growing Up Green

**Science:** K.1 The student will conduct investigations; K.6 The student will investigate and understand basic needs and lifeprocesses of plants and animals; K.8 The student will investigate and understand simple patterns in his/her daily life; K.9 The student will investigate and understand that change occurs over time, and rates may be fast or slow; K.10 The student will investigate and understand that materials can be reused, recycled, and conserved; 1.1 The student will plan and conduct investigations; 1.4 The student will investigate and understand that plants have life needs and functional parts can be classified according to certain characteristics; 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics; 1.8 The student will investigate and understand that natural resources are limited; 2.1 The student will plan and conduct investigations; 2.4 The student will investigate and understand that plants and animals go through a series of orderly changes in their life cycles; 2.5 The student will investigate and understand that living things are part of a system; 2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings; 2.8 The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature; 3.1 The student will plan and conduct investigations; 3.6 The student will investigate and understand that environments support a diversity of plants and animals that share limited resources; 3.8 The student will investigate and understand basic patterns and cycles occurring in nature.

**English:** K.2 The student will use listening and speaking vocabularies; K.3 The student will build oral communication skills; K.11 The student will write to communicate ideas; 1.1 The student will continue to demonstrate growth in the use of oral language; 1.2 The student will continue to expand and use listening and speaking vocabularies; 1.3 The student will adapt or change oral language to fit the situation; 2.2 The student will continue to expand listening and speaking vocabularies; 2.3 The student will use oral communication skills; 3.1 The student will use effective communication skills in group activities.

**Math:** K.8 The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer); 1.18 The student will investigate, identify, and describe various forms of data collection in his/her world (e.g., recording daily temperature, lunch count, attendance, and favorite ice cream), using tables, picture graphs, and object graphs; 2.18 The student will: Use calendar language appropriately (e.g., months, *today, yesterday, next week, last week*); Determine past and future days of the week; and Identify specific dates on a given calendar; 3.14 The student will estimate and then use actual measuring devices with metric and U.S. Customary units.


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## Chapter 4 What's Happening?

**Science:** K.1 The student will conduct investigations; K.6 The student will investigate and understand basic needs and life processes of plants and animals; K.8 The student will investigate and understand simple patterns in his/her daily life; K.9 The student will investigate and understand that change occursover time, and rates may be fast or slow; K.10 The student will investigate and understand that materials can be reused, recycled, and conserved; 1.1 The student will plan and conduct investigations; 1.4 The student will investigate and understand that plants have life needs and functional parts can be classified according to certain characteristics; 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics; 1.7 The student will investigate and understand the relationship of seasonal change and weather to the activities and life processes of plants and animals; 1.8 The student will investigate and understand that natural resources are limited; 2.1 The student will plan and conduct investigations; 2.4 The student will investigate and understand that plants and animals go through a series of orderly changes in their life cycles; 2.5 The student will investigate and understand that living things are part of a system.

**English:** K.2 The student will use listening and speaking vocabularies; K.3 The student will build oral communication skills; K.11 The student will write to communicate ideas; 1.1 The student will continue to demonstrate growth in the use of oral language; 1.2 The student will continue to expand and use listening and speaking vocabularies; 1.3 The student will adapt or change oral language to fit the situation; 2.2 The student will continue to expand listening and speaking vocabularies; 2.3 The student will use oral communication skills; 3.1 The student will use effective communication skills in group activities.

**Math:** K.8 The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer); 1.18 The student will investigate, identify, and describe various forms of data collection in his/her world (e.g., recording daily temperature, lunch count, attendance, and favorite ice cream), using tables, picture graphs, and object graphs; 2.2 The student will continue to expand listening and speaking vocabularies; 2.18 The student will: Use calendar language appropriately (e.g., months, today, yesterday, next week, last week); Determine past and future days of the week; and Identify specific dates on a given calendar; 3.14 The student will estimate and then use actual measuring devices with metric and U.S. Customary units.

## Chapter 5 Gardens of Gladness

Science: K.1 The student will conduct investigations; K.6 The student will investigate and understand basic needs and life processes of plants and animals; K.8 The student will investigate and understand simple patterns inhis/her daily life; K.9 The student will investigate and understand that change occurs over time, and rates may be fast or slow; K.10 The student will investigate and understand that materials can be reused, recycled, and conserved; 1.1 The student will plan and conduct investigations; 1.4 The student will investigate and understand that plants have life needs and functional parts can be classified according to certain characteristics; 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics; 1.8 The student will investigate and understand that natural resources are limited; 2.1 The student will plan and conduct investigations; 2.4 The student will investigate and understand that plants and animals go through a series of orderly changes in their life cycles; 2.5 The student will investigate and understand that living things are part of a system; 3.1 The student will plan and conduct investigations; 3.8 The student will investigate and understand basic patterns and cycles occurring in nature; 3.9 The student will investigate and understand the water cycle and its relationship to life on Earth.

**English:** K.2 The student will use listening and speaking vocabularies; K.3 The student will build oral communication skills; K.11 The student will write to communicate ideas; 1.1 The student will continue to demonstrate growth in the use of oral language; 1.2 The student will continue to expand and use listening and speaking vocabularies; 1.3 The student will adapt or change oral language to fit the situation; 2.2 The student will continue to expand listening and speaking vocabularies; 2.3 The student will use oral communication skills; 3.1 The student will use effective communication skills in group activities.

**Math:** K.8 The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer); 1.18 The student will investigate, identify, and describe various forms of data collection in his/her world (e.g., recording daily temperature, lunch count, attendance, and favorite ice cream), using tables, picture graphs, and object graphs; 2.18 The student will: Use calendar language appropriately (e.g., months, today, yesterday, next week, last week); Determine past and future days of the week; and Identify specific dates on a given calendar; 3.14 The student will estimate and then use actual measuring devices with metric and U.S. Customary units.

## Chapter 6 Plants in the Past

**Science:** K.1 The student will conduct investigations; K.2 Students will investigate and understand that humans have senses that allow one to seek, find, take in, and react or respond to information in order to learn about one's surroundings; K.6 The student will investigate and understand basic needs and life processes of plants and animals; K.8 The student will investigate and understand simple patterns in his/her daily life; K.10 The student will investigate and understand that materials can be reused, recycled, and conserved; 1.1 The student will plan and conduct investigations; 1.4 The student will investigate and understand that plants have life needs and functional parts can be classified according to certain characteristics; 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics; 1.8 The student will investigate and understand that natural resources are limited; 2.1 The student will plan and conduct investigations; 2.4 The student will investigate and understand that plants and animals go through a series of orderly changes in their life cycles; 2.5 The student will investigate and understand that living things are part of a system; 2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings; 2.8 The student will investigate and understand that plants produceoxygen and food, are a source of useful products, and provide benefits in nature; 3.1 The student will plan and conduct investigations; 3.7 The student will investigate and understand the major components of soil, its origin, and importance to plants and animals includinghumans; 3.8 The student will investigate and understand basic patterns and cycles occurring in nature.

**English:** K.9 The student will investigate and understand that change occurs over time, and rates may be fast or slow; K.2 The student will use listening and speaking vocabularies; K.3 The student will build oral communication skills; K.11 The student will write to communicate ideas; 1.1 The student will continue to demonstrate growth in the use of orallanguage; 1.2 The student will continue to expand and use listening and speaking vocabularies; 1.3 The student will adapt or change oral language to fit the situation; 2.1 The student will demonstrate an understanding of oral language structure; 2.2 The student will continue to expand listening and speaking vocabularies; 2.3 The student will use oral communication skills; 3.1 The student will use effective communication skills in group activities; 3.6 The student will continue to read and demonstrate comprehension of nonfiction.

**Math:** K.8 The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer); 1.18 The student will investigate, identify, and describe various forms of data collection in his/her world (e.g., recording daily temperature, lunch count, attendance, and favorite ice cream), using


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tables, picture graphs, and object graphs; 2.18 The student will: Use calendar language appropriately (e.g., months, *today, yesterday, next week, last week*); Determine past and future days of the week; and Identify specific dates on a given calendar; 3.14 The student will estimate and then use actual measuring devices with metric and U.S. Customary units.

## Chapter 7 Doing our Part

**Science:** K.1 The student will conduct investigations; K.6 The student will investigate and understand basic needs and life processes of plants and animals; K.8 The student will investigate and understand simple patterns in his/her daily life; K.9 The student will investigate and understand that change occurs over time, and rates may be fast or slow; K.10 The student will investigate and understand that materials can be reused, recycled, and conserved; 1.1 The student will plan and conduct investigations; 1.4 The student will investigate and understand that plants have life needs and functional parts can be classified according to certain characteristics; 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics; 1.8 The student will investigate and understand that natural resources are limited; 2.1 The student will plan and conduct investigations; 2.4 The student will investigate and understand that plants and animals go through a series of orderly changes in their life cycles; 2.5 The student will investigate and understand that living things are part of a system; 2.8 The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature; 3.1 The student will plan and conduct investigations; 3.7 The student will investigate and understand the major components of soil, its origin, and importance to plants and animals including humans; 3.8 The student will investigate and understand basic patterns and cycles occurring in nature.

**English:** K.1 The student will demonstrate growth in the use of oral language; K.2 The student will use listening and speaking vocabularies; K.3 The student will build oral communication skills; K.8 The student will demonstrate comprehension of fiction and nonfiction; K.11 The student will write to communicate ideas; 1.1 The student will continue to demonstrate growth in the use of oral language; 1.2 The student will continue to expand and use listening and speaking; 1.3 The student will adapt or change oral language to fit the situation; 2.1 The student will demonstrate an understanding of oral language structure; 2.2 The student will continue to expand listening and speaking vocabularies; 2.3 The student will use oral communication skills; 3.1 The student will use effective communication skills in group activities; 3.6 The student will continue to read and demonstrate comprehension of nonfiction.

**Math:** K.8 The student will identify the instruments used to measure length (ruler), weight (scale), time (clock: digital and analog; calendar: day, month, and season), and temperature (thermometer); 1.18 The student will investigate, identify, and describe various forms of data collection in his/her world (e.g., recording daily temperature, lunch count, attendance, and favorite ice cream), using tables, picture graphs, and object graphs; 2.18 The student will: Use calendar language appropriately (e.g., months, *today, yesterday, next week, last week*); Determine past and future days of the week; and Identify specific dates on a given calendar; 3.14 The student will estimate and then use actual measuring devices with metric and U.S. Customary units.

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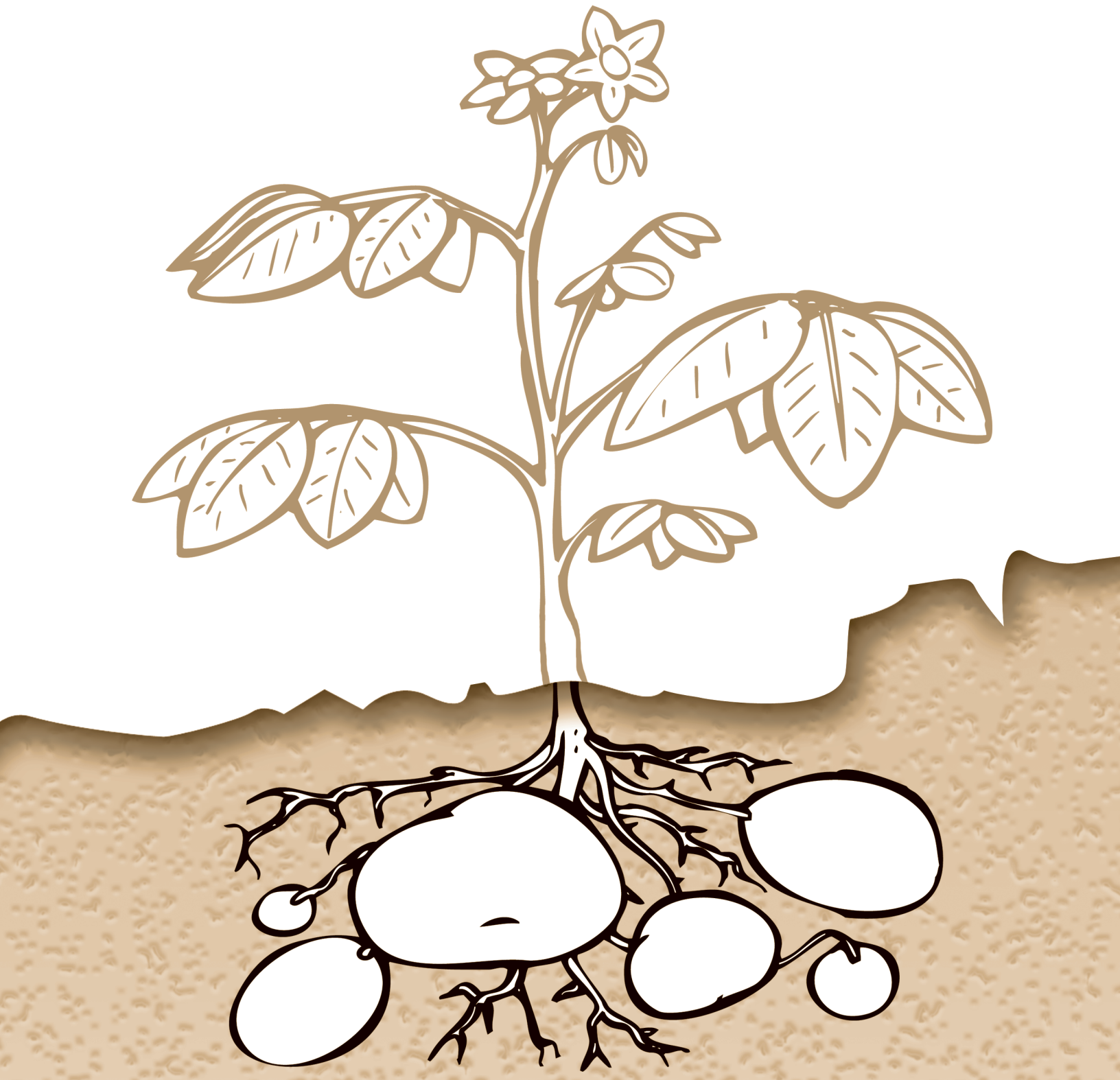

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