Planting Seeds, Growing Minds

A Horticultural K-6 Curriculum

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Curriculum Designer
PLANTING SEEDS,
GROWING MINDS
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"Science is a limitless voyage of joyous exploration."
—Walt Whitman

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INTRODUCTION

SUMMARY OF THE CURRICULUM

By participating in first-hand experiences and hands-on experiments as scientists, children will discover the basic needs and concepts of seeds, plants, flowers, and trees. Students will apply this knowledge as they create flip books, poetry, and crafts, play games that teach, adopt a tree, design a container garden and hold a tree-planting ceremony.

It is our goal that your students will achieve the objectives listed below, enjoy science through the study of plants and trees, gain respect for the role of plants in nature and in their lives, work in cooperation with others and become empowered as joyful thinkers and learners.

CURRICULUM OBJECTIVES

By using this curriculum, your class will:

• Acquire facts and information related to plants by using the scientific processes of observing, gathering data, categorizing and sequencing;
• Gain deeper understanding and reasoning skills by comparing, contrasting, classifying, summarizing, verifying and analyzing;
• Synthesize information by reorganizing data, hypothesizing, imagining, inventing and creating;
• Examine the impact of this new knowledge by describing feelings, discussing values and reviewing possible courses of action and the decision-making process.

ORGANIZATION AND TIMING

Although the curriculum was designed to be taught on and around California Arbor Day, March 7, and National Gardening Month in April, it can easily be taught at any time of year and extended for many weeks.

In the first lesson, children will discover that many of the processes scientists use to learn about the world are the same processes they themselves have always used. Students will use these processes in the first guessing game and throughout the curriculum.

In the following lessons, children will grow and observe seeds under different conditions to determine the basic needs of plants and seeds. Students record their data on a sheet that will become a flip book. Activities that include dissecting a seed, making a paper flower and acting out plant parts all focus on the structure and function of seeds, plants, and flowers.

In the Where In Earth? lesson, students will play a cooperative logic game that expands their knowledge of plant needs and challenges students to use this information to design a garden plot. This is followed by a lesson where students will plan and plant a container garden.

The tree section of the unit begins with the students' careful observation of a school or neighborhood tree. In Build A Tree, the class will learn about the structure and function of tree parts by role playing.

The next two lessons focus on how to choose and plant a tree. The class will design and carry out a meaningful tree-planting ceremony as an expression of their understanding and appreciation of the important role of plants and trees in their lives.

If teachers choose to plant a tree in March and do the container gardening at a later date, it is recommended that they begin with the first two lessons where students discover the basic needs of seeds and plants. The knowledge acquired in the early lessons will help children make decisions about the trees they will plant and care for.

CALIFORNIA SCIENCE FRAMEWORK GUIDELINES

This curriculum is designed to follow guidelines in the 1990 Science Framework for California Public Schools K-12. It includes experiences where children become scientists by practicing the process skills identified in the objectives. In the Science Framework it says:

Scientists study the world around us and try to explain natural objects and events.1

The scientist, as observer, systematically gathers information of the world through direct and creative indirect use of the human senses.2

Continued on next page

Footnotes

1Science Framework for California Public Schools (Sacramento: California Department of Education, 1990), p. 3.
2Ibid., p. 146.
California Science Framework Themes

Following a thematic approach enables children to apply their understanding about plant concepts to other organisms and ecosystems they may study. Various unifying themes could be stressed: Scale and Structure, Systems and Interactions, Patterns of Change or Energy. The following statements from the Science Framework are examples of how to tie together the subdisciplines of science using the suggested themes.

Living things have structures that do specific things to help the organisms live and grow and meet their needs as they interact with their environments. All living things need certain resources to grow, such as food, water and gases to breathe. If any of these things are lacking, the organism will die.3

Plants are able to make food out of air and water, using the energy from sunlight and nutrients from sun or water. Living things depend on other living things in many ways.4

Related California Science Framework Concepts
modified to Summary Statements

**Plants**
- Growth and reproduction of plants are affected by temperature.
- Stems support plants and transport their fluids.
- Soils provide the water and minerals that plants need.
- Seeds require certain conditions, such as proper temperature and moisture, in order to germinate.
- Roots anchor plants and absorb minerals and water from soil.
- Plants can be grown for use and enjoyment.

**Humans**
- Humans are part of the biosphere and are dependent on it.
- Humans rely on a great variety of living things for many reasons. They need to exercise judgement, care and planning in their use of natural resources including plants, animals, soil and water.

Footnotes

3Science Framework for California Public Schools (Sacramento: California Department of Education, 1990), p. 117.
4Ibid., p. 118.

ASSESSMENT

It is recommended that students keep a portfolio of their best work during the unit. This will give teachers and students an opportunity to assess the children's progress and understanding of the concepts and main themes of the unit. At the end of the unit, students can review and critique their work alone, with another student or with their teacher. They can summarize their new understandings and discuss how they can apply this information in their own lives.
BEING A SCIENTIST

SUMMARY
Students share their understanding of science and their perceptions about scientists. Through a guessing game, students practice using some of the same learning processes as scientists do to discover and learn about the world. This lesson will culminate with students identifying a mystery plant in the guessing game. This will lead into the next series of lessons which cover the study of plants and continue to involve the children as scientists.

BACKGROUND
It is important to hear and respect the students' diverse impressions of the world. This provides you with the information you need to design experiences that test their misconceptions. Through this process, students will come to new understandings about the world around us.

PREPARATION
Have a baby doll already in a bag for the science discussion. Keep the cut washed mint hidden during the guessing game and have two bags with a sprig of mint in each.

PROCEDURE
Part One: Discussion About Science and Scientists
1. Ask the students to tell you what they believe science is. They will probably mention the many different things that are traditionally studied in science (plants, animals, etc.). Summarize the discussion by telling them, “Science is the study of all living things and all objects in the world.”

2. Ask the students how scientists discover things about the world. (Common answers include “reading” and “using their brains.”) Ask them how their brains receive information about the world. Use the example of a hot stove burner and ask the class what messages do their brains receive about the burner from their eyes, their nose or their fingers. Conclude that our brains receive messages through our senses: touch, sight, smell, hearing and taste. These senses help us find out about the world. Another name for this process is observing. This is what scientists do too.

3. Hold up the closed bag with the baby inside to show the class. Announce to the students, “In this bag, I have the first human scientist.” (Pause for the class to think about this.) Let the students guess what’s in the bag. Pull the baby doll out of the bag and after they react, ask the students why you called this baby a scientist. If they cannot guess, ask them how a baby finds out about the world.

Ask the class what babies do with objects when they pick them up with their hands. (Babies usually put objects in their mouths.) Ask what babies discover when they do this. (Textures, tastes, smell, temperature, etc.) Remind the class that babies often bang objects; ask why babies might do this. Explain that babies are using their sense of hearing and doing experiments to see and hear what happens when they hit different things. Ask what other senses a baby uses—until all five senses are named.

4. Conclude that babies use senses, guesses and experiments to find out all about the world. Remind the class that scientists use senses and experiments to find out things about the world.

Ask students if this means that babies are scientists too. Say to the class, “Raise your hand if you have ever been a baby. Now raise your other hand if you find out about the world the way a scientist does.” Continued on next page
Part Two: Guessing Game With Two Bags of Mint

1. Hold up two closed bags containing mint.

2. Announce to the class, “We are going to practice being scientists and use all our senses to make guesses about what I have in these two bags. Which senses are you using now?”

When they answer “seeing,” ask the class what their eyes tell them about the bags. Ask them what their eyes tell them is not inside the bag.

Ask the students what other senses they can use from where they sit.

When they answer “hearing,” walk around the room shaking the bags for the students to hear. Ask them what information their ears give them about the contents of the bags. Ask them to tell you what the contents could not be. Ask how they know. Ask them if they wonder what it is in the bag. Tell them that without the sense of wonder, we wouldn’t be inspired to use our other senses.

3. Tell the class that scientists take information from their senses and make guesses. Ask students to whisper their guesses to the person next to them.

4. Ask for a volunteer to demonstrate and help with the touch and smell process. Choose a helper and tell the child and the class the rules of the game.

“Here are the three rules:

I. No one will peek or say what’s in the bag until the end of the game when we all say what it is aloud together.

II. If students figure out what’s inside the bag, they are to pat themselves on the back.

III. Those students who are waiting their turns to participate should watch the faces of the people with their hands in the bag to see if they have guessed the bag’s contents by touching them.”

5. Have your assistant put his hand in the bag. Hold the bag snugly on his arm to prevent peaking and repeat the rules. Ask the child to smell his fingers. Tell him to take the bag around the room in one direction for touching and smelling while you take the other bag around in the opposite direction.

6. Offer students a chance to taste the bag’s contents. Pass out the cut washed mint. The students must have their eyes closed as they taste the mystery plant. When the whole class has had the chance to taste it, ask if anyone can give clues about what it is by suggesting foods they’ve tasted before that contained this flavor in them without saying the name.

7. Before the children reveal their guesses, discuss the process of guessing with them. We all change our guesses as we learn more information. All guesses are important—even those that are “not right.” Scientists don’t always guess “right” every time.

Have everyone say what they guess is in the bag at the count of three. Review what the students learned about the object from their sensory exploration. What did their fingers tell them? Ask for temperatures, shapes, textures. Ask how the students knew the object was a plant.

8. Explain to the students that in the next few weeks they will discover many new things about plants and trees using their senses, making guesses, observing and experimenting as scientists.

EXTENSION IDEAS

• Have mint candy or mint tea together.
• This activity can be done over and over with oranges, lemons, etc.
SUMMARY OF NEXT TWO LESSONS

Students predict whether alfalfa seeds will grow in 10 different conditions created for class demonstration experiments. They also will grow their own seeds and decide where to hang them. After observing and drawing their seeds every day for a week, students make a flip book from their drawings to “see” the seed grow into a plant.

Through observing and comparing the results of these experiments, students will discover and identify different basic plant needs and conditions that affect plant growth. They also will identify any additional questions they have about plants.

PREPARATION

Draw the following diagram on the blackboard or copy it for each group of students from the Copycat Page: Directions.

For Hands-On Activity:
Decide the size of your groups.
Each group will need:
- Dish pan or tray to hold materials
- Roll of masking tape
- Ballpoint pen or marker
- One pair of scissors
- A few hand lenses (optional)
- Margarine tub or small container filled with water to dip paper towel pieces
- Sponge or paper towels for spills
- Small container of alfalfa seeds
- Copycat Page: Directions (optional)

Each child in the group will need:
- Cut-up paper towel about 2” x 3” (Prepare pieces in advance.)
- Plastic ziplock sandwich bag
- Pencil
- Copycat Page: Flip Book (duplicated on white construction paper)

Time: 50 minutes
Setting: Classroom
Materials:
For Introduction (choose one):
- Either poster of a redwood tree or other large tree
- And cone or cones from the tree in poster
- Or selection of potted plants
- Or seed packets with pictures of mature plants

For Teacher Demonstration Experiment for Class:
- The chart (described in Preparation)
- Small bag of potting soil
- A trowel or big spoon
- Three margarine tub-sized containers, one for each of the following water mixtures:
  1) 2 tablespoons of salt mixed in water
  2) biodegradable soap mixed in water
  3) scouring powder mixed in water
- A pitcher of water
- 10 (2” x 3”) pieces of paper towel
- 10 ziplock bags
- A small bowl of alfalfa seeds (health food store)
- Scotch tape

Continued on page 7
1. Pass out baggies and paper towels.

2. Dip towel in water and place in baggie.

3. Drop in a small pinch of seeds (10-12 seeds).

4. Write your name on the bag.

5. Cut off the excess tape with scissors.

6. Zip the bag and hang it.
Tape nine plastic bags to an 18" x 24" piece of construction paper and label as shown in the diagram above. Place the paper on an easel or tape it to the blackboard. Keep demonstration supplies close by.

PROCEDURE

Day One

Introduction

1. Begin by showing the students a picture of a redwood. Explain how it is impossible to see the top of the tree because of its enormous size. Hold a tiny redwood cone in your hand and explain that the seeds for the redwood are very small and are contained within the cone.

Seeds are amazing because they contain all the food they need to start a plant or tree growing and sustain it until it is capable of producing its own food. Show different potted plants explaining that each has its own seeds. You also can pass around seed packets with photos and illustrations of the plants on the package that show what type of plant the seeds will become.

2. Explain to the students that they will practice using the same processes that scientists use: observing, guessing and experimenting to discover what seeds need and do not need to grow into plants. The first experiments will be done for the whole class; the students will then do their own experiments.

As the teacher undertakes each experiment, the students will guess or predict whether the seeds will grow. The teacher will record the students' predictions. Observation of the seeds will take place throughout the week to determine how the seeds have grown.

Teacher Demonstration

(Instructions for each experiment are contained in the following teacher narrative. Each number identifies a new experiment.)

1. "I am putting a piece of paper towel and a pinch of alfalfa seeds into the first bag and nothing else. Raise your hand if you think the seeds will grow. (Count and record the numbers on the chart.) How many think the seeds will grow? Does anyone think otherwise? Why?"

2. "In the second bag, I will put the towel, seeds, and lots and lots of water." (Complete this process and record the students' predictions.)

3. "The third bag will contain a towel soaked in salt water and seeds. What do you predict?" (Record.)

4. "The fourth bag will have one kind of soapy water—scouring powder." (Record.)

5. "The fifth will have a biodegradable soapy water." (Record.)

6. "The sixth will have dirt and no water." (Record.)

7. "The seventh will have dirt and some water." (Record.)

8. "The eighth, not yet taped to the paper, will have a towel dipped in water and seeds but will be twisted up into a tight little wad allowing no air or space." (Tape up the twisted bag and record the students' predictions.)

9. "The ninth bag will have seeds and a towel dipped in water. We will put this bag in the refrigerator." (Record again.)

Continued on page 9
Plants Change
by
**Student Experiment**

10. Tell the students they will conduct the last experiment. This includes dipping a paper towel in water, adding seeds, putting the towel and seeds in a plastic bag and selecting a spot in the classroom to hang the experiment.

Students will draw the seed each day and record any changes on a special paper (data sheet) that will become their own flip book. Tell them to write their predictions on the back of the paper. Younger children can write “yes” or “no” as to whether they think their seeds will grow.

11. Give the students the Copycat Page: Flip Book data sheet and have them write their names on it. Distribute a couple of seeds to each student and 2-3 hand lenses (optional) for each group of students. Ask them to take turns looking at their seeds through the hand lens.

The students should look carefully to be able to draw the right shape. It may be a new experience to draw what they see. Explain that scientists draw what they see too.

12. Ask the students to draw the seed on the Copycat Page: Flip Book data sheet. Tell them they will draw the seed each day for a week. Ask them to draw it on the dot provided on the data sheet and to make it larger than the dot. Demonstrate how to do it. Have the students write the number of the day (Day 1, Day 2, etc.) on their drawing for each day they record the seed’s growth. Collect the students’ papers. Invite the students to taste the seed if they wish.

13. Have the students “read” the directions for their “planting” on the blackboard or in a hand-out. Be sure to tell them to place the tape at an angle so the bag is hung securely. Suggest that they separate one or two of the seeds from the rest so they can observe these more easily.

14. When the seeds are all in labeled bags, allow the students to place them wherever they want in the classroom. (If no one chooses a very dark place, put your experiment in that location. Please, no clues about light.)

**Each Day During the Week**

*Follow-up to Teacher Demonstration and Student Experiment*

Each day at the same time, return the data sheets and hand lenses to the students. Ask them to take five minutes to draw the seeds; show the students what the class chart results are so far. They may need to add a tiny bit of water to their bags if dry. The students will have to guess what happened to their experiments over the weekend to complete their drawings. Remind them to observe very carefully as they complete their drawings.

Check the students’ drawings to see whether they have drawn the roots, leaves and stem.

**One Week Later**

*Reviewing What Happened to the Seeds and Making Flip Books*

Ask the students to look at their sprout drawings on their data sheets and their experimental bag of seeds.

**DISCUSSION QUESTIONS**

- Which part of the plant grew first?
- Which day did the brown seed coat come off?
- Look closely at the coat. Does it still have food for the seed inside it? Why not?
- When could you see the leaves?
- Can you tell where the stem meets the root? (On some of the sprouts, the root begins where the bend is.)
- Tell me about the differences between the root and the stem.
- Does anyone’s plant have little tiny root hairs growing yet?
- What surprised you? Why?

**MAKING THE FLIP BOOK**

Provide students with directions to make a flip book:

1. Cut the rectangles on the data sheet apart on the dotted lines.

2. Stack them in order from Day One to the last day, and put the title page on top. The rectangles can be slightly staggered with the edge of rectangle two peeking out behind the first one, and so on, for easier flipping.

3. Staple the rectangles on the solid line with three staples.

4. Flip the pages with your thumb to see your seed grow.

**EXTENSION IDEAS**

- Take a piece of celery and cut two inches up the stalk to make two legs. Put one leg in red-colored water (use a few drops of red food dye) and another leg in plain or other colored water. Observe the celery throughout the week. This will show how a plant consumes and transports water and possible pollutants.

- Put one piece of celery in the refrigerator and the other out to dry for several weeks. Ask the children to observe the celery and notice the differences between the two. The celery that is allowed to dry out will dehydrate. The contrast between the two plants will demonstrate how much of a plant consists of water.
A SEED BECOMES A PLANT

SUMMARY

Part Two of A Seed Is A Beginning

One week later, students will examine the results of the experiments with seeds and sprouts to make conclusions about the needs of plants.

PREPARATION

Post the chart with the plastic bags. Take out the bags from the dark closet and the experimental seeds, grocery store sprouts and celery from the refrigerator. Place the glass with the split stalk of celery on the table.

Ask the students to prepare last week’s experimental bag of seeds (now sprouts) and the data sheets for review and observation.

Prepare and post a large piece of butcher paper as shown below.

PROCEDURE

1. Tell the students that they will look at all the sprouts to see what has happened to them in a week. Ask the students to tell you what they have discovered from the experiments, what they now know, and what they think they know about the needs of sprouts and plants so you can record it on the chart. You also will record things the students think they know, but are not sure, and what they still want to know about seeds and plants.

2. First, ask the class if anyone has seeds or sprouts that have died. Reassure the student(s) that you have more seeds for them. Ask them if they have any idea why their seeds died. Typically, some will have dried out or drowned. If this is so, have the student(s) show the others.

Ask them to tell you what to record on the butcher paper. Ask the class if anyone placed their seeds in the dark.

Compare the sprouts that spent the week in the dark with those that were located in the sun. Record the students’ conclusions about how light affects the leaves and length of stems.

3. Lead the students into their responses by saying: “Seeds and plants need...” Pause to let the children tell you an answer. (For example, water.) Write their responses on the butcher paper.

Recommendation: with students who are E.S.L., L.E.P. or learning to read, write “water” and make a symbol for water that everyone agrees upon. Do the same for other chart information.

4. Ask the students to review the class experiments. Look at the bags on the chart and ask what they learned about the seeds in the bag that had no water.

Next, look at the bag that had the most water and discuss and record the results. Look at the bag that had salt water and record the students’ observations on the butcher paper.

5. Look at the bags with the soapy water to see the results. (It’s surprising to many that sprouts can grow in biodegradable soapy water that usually carries toxic warnings for humans.)

Ask the students whether they think it would be safe to eat sprouts from either of the soapy water bags. List any questions you or the children want to know in the appropriate column.

6. Look at the bag that has dirt and no water, and the bag that has water, but was twisted up too tightly to allow for space or air. Look at the seeds from the refrigerator. Write down the students’ conclusions about why these seeds did or did not grow.

The completed list of plants’ and seeds’ needs should include air, sun (light), space, water, warmth and nutrients. Seeds do not need light in the beginning, but do require light as they turn to sprouts so that they can become green.

DISCUSSION QUESTIONS

• What results surprised you the most?
• Look at our list of plant needs. If you plant seeds or take care of plants, what should you remember to do?
• What questions do you have about plants or seeds? (Record questions in the correct column. Below each question leave space to record an answer.)
• Using the chart as a guide, help each student figure out how to find the answer to the questions. Encourage the class to research the answers and report back.

This discussion will lead to other experiments the class may wish to do. It also will help stimulate additional reading of texts or reference books. For younger children, help set up experiments and bring in books for them to read and share.

EXTENSION IDEAS

A Closer Look at Seeds and Sprouts

• Let the students each dissect a big bean that has been soaked overnight. Direct students to look for the plant embryo with its small pair of leaves and root. Ask them to find the seed coat and cotyledon where the tiny plant gets its food until it can make its own.

• Give each of the students a bunch of sprouts from the grocery store to observe. Direct students to look inside the tiny brown seed coat to see if the sprouts have used up their food. Direct the class to take a closer look at the bend of the plant where the stem meets the root. Invite students to eat the sprouts, reminding them that this was the kind of seed they grew.

A Closer Look at the Stem

(Continued from page 9)

• Show celery in two different colors to demonstrate the way a stem consumes water and (possible) pollutants. Show the celery from the refrigerator and compare it to the celery drying out to demonstrate how much of a plant is water.

1. Six groups of approximately four students are given a secret food to act out.

2. The rest of the class tries to guess what the group is. As you pass out the bags, tell the groups that they must become that object from the refrigerator together cooperatively.

3. When the students are finished, ask each group what part of a plant it played.

4. At the conclusion, the class will count how many parts of the plant were represented and name them altogether out loud.

EXTENSION IDEAS

• The Banana Slug String Band has a song called “Six Plant Parts” on a tape called Dirt Made My Lunch. To obtain a copy of this tape and other BSSB tapes, contact BSSB, P.O. Box 717, Pescadero, CA 94060; phone 408/429-9806. Tapes are $9.00. Songbooks are $3.00. Note: if you play this fun tape for the class, each group stands up when its plant part is mentioned.

• Have children bring vegetables and bean seeds and make a soup to share.
SEEDS TO FLOWERS
TO SEEDS

SUMMARY
Students will learn how a flower makes seeds. They
will apply this information by making a simple craft
using one piece of paper folded twice and cut three
times. It will become a seed that turns into a plant
with root, stem, leaves and flower. The students will
add the stamen and pistil.

BACKGROUND AND PREPARATION
Try the craft activity yourself first so you can show the
students how to do it. It’s easier than it looks.
The following diagram can be drawn on the black-
board. Memorizing the parts of the flower need not be
the focus of the activity. Learning about the structure
and the function of the flower together will make the
lesson more meaningful. Older children are more
interested in drawing and labeling the parts.

INTRODUCTION
Tell the students they will learn how seeds begin to
grow by making a plant and flower from a paper seed.
Show the class a real flower pointing out the male and
female parts. Explain how the flower is fertilized. Tell
the students they will put the male and female parts
on their flower. Older students can draw the flower
and label the parts.

PROCEDURE
Demonstrate each step for your students. Let them
watch you first and then let the class complete the step
before you proceed to the next one.
Steps
1. Hold the paper up and fold the blank side in the long way.

2. Fold the long drawing inside, the short way, so you cannot see it. Hold it on the fold.

3. With the point up, cut the seed out only on the line. Cut all the way around, but do not cut across the fold at the bottom. You will have two parts.

4. Put the blank seed part aside and write your name on it. Hold the long picture with the point down. Starting at the point, cut up to the end of the line and stop. Return to the point and cut to the top of the line again and stop.

5. Place the cut shape exactly on top of the plain seed shape and stick the brad through both of them at the dot. Open the back of the brad.

6. Twist the inside piece of paper sideways so the root comes down and the leaves are at the root's sides. Take the two long flaps and twist them up to make any kind of flower you wish. It can be taped or glued and colored. Each flower plant will be unique. Add several stamens and the pistil by drawing or gluing them on. When closed, the paper looks like a seed.
Problem: Which crop is planted in each of the sections of the garden?

Clue: • The melons are to the right of the beans.

Problem: Which crop is planted in each of the sections of the garden?

Clues: • The beans are planted in front of the corn.
• The peas are next to the tomatoes.

Problem: Which crop is planted in each of the sections of the garden?

Clues: • The peas are next to the corn.
• The melons are to the right of the carrots.

Problem: Which crop is planted in each of the sections of the garden?

Clue: • The tomatoes are in back of the melons.

Problem: Which crop is planted in each of the sections of the garden?

Clue: • The carrots are in front of the peas.

Problem: Which crop is planted in each of the sections of the garden?

Clue: • The carrots are next to the beans.
WHERE IN EARTH?

SUMMARY OF ACTIVITY
The class cooperatively solves a group logic problem to figure out where plants are located in a garden. This game will introduce students to the decisions they will face as they plan their individual or class container gardens.

Time: 30 minutes
Setting: Classroom
Materials:

- Copycat Page: Garden and envelope for each group of 4-6 students
- A seed package for each pair of students
- Garden Books (see Resources on page 19) for older students

PREPARATION AND INTRODUCTION
Make one copy of the Copycat Page: Garden for each group of four to six students. Cut out the complete garden plot and cut up the six clue cards and the vegetables into separate pieces. Place the plot, clue cards and the vegetable pieces into each group’s envelope.

When distributing the envelopes to the groups, show the students where the front, right and left sides of the garden plot are or draw the diagram of the plot on the blackboard.

For older students: if there are more than four students in a group, use the extra clues that are starred (*). The problems can be solved with the first four clues.

DISCUSSION QUESTIONS
1. What technique did you use to solve the problem?
2. Look at the garden. Which plants are the tallest? Which are the shortest?
3. If the sun shines on the right front of the garden and moves to the left front during the day, what will happen if the tall plants are right in front of the short plants? Move a short plant behind a tall plant.

THE GAME
Tell students that they have different clues and need each other to solve the problem just as scientists need to share information to solve scientific problems. Students may read the clues aloud, but cannot show them to each other.

THE PROCESS
If a few groups figure out the answer and the rest are struggling, have the class stop. All students with the first clue can read it in unison and move the vegetable. Repeat this step with each clue until everyone figures out the answer.

THE ANSWER
Corn Peas Tomatoes
Beans Carrots Melons

For younger children: students can work in pairs or alone; the clues can be read aloud.

Decrease the size of the garden to make it easier for them to solve the problem. Cut off the two sections on the right of the garden plot. Eliminate the melons and tomatoes.

On the second and third clue cards cross off the bottom clues. Use only clue cards 2, 3, 5 and 6 for groups of four students. Simplify more as needed.

Directions for all students: remind the students that in previous lessons, they discovered the basic needs of seeds and sprouts. Ask if they can name those needs.

Tell the students that they will play a game that will help them think about the seeds’ and sprouts’ needs as they grow to be larger plants. Later the students will plan how to plant their own gardens.
4. Look at the garden to see if there are any problems. Are the beans blocking the sun from the corn? Are the melons blocking the tomatoes?

5. Can your group figure out a different way to plant the vegetables where short plants are still in front. What would your clues be? Write them down and trade with another group.

EXTENSION IDEAS

- **For younger children**: give all children the garden plots and vegetables and have them create and color their own garden anyway they wish. Keep the gardens in the students’ portfolios.

- **For older children**: ask groups of four to six students to create more container garden logic problems using information they get from seed packages and research on how to select compatible plants. They can use the books listed at the end of the Container Garden lesson to create clues. These contain charts on compatible and companion plants and recommendations for plants’ space requirements that can be copied for the students’ use.

- Identify different types of plants to research and ask the students to create a logic problem for these plants. Examples include: vegetables, plants that need sunlight, plants that prefer shade, water thirsty plants and Water Wise plants such as California natives.

- Have the students identify several varieties of plants in a specific category and sketch those plants in the garden plot. Tell the students to group the plants according to their water and sunlight needs, and future height.

- Instruct the students to make clues about the location, needs and characteristics of each plant similar to the clues that were provided in the game that they played.

- After you copy the students’ logic problems, have them cut the clues up and put them in envelopes for other groups to try the problems.

**To summarize**: groups can share information about the plants they researched so the class can decide what kind of garden it would like to plant. If resources are available, each group can plant the container garden it researched.

SOURCE OF ACTIVITY

“Where In Earth?” adapted from SPACES, Solving Problems of Access to Careers in Engineering and Science, 62-63, by permission of the program director. Copyright 1982 by the Regents, University of California, Berkeley.
BACKGROUND INFORMATION

Ancient Chinese believed that working in harmony with nature to increase the natural yield helped them find real satisfaction and sense more clearly the meaning of life. Much can be learned from caring for the green things of this world. A container garden can be an ideal way to expand students' understanding of life and life processes and their possible role in the care and nurturing of life on this planet.

Container gardens have many advantages over garden plots; they are flexible, portable, require less space, fewer tools and less work, and are almost instantly rewarding. They can make a rooftop or parking lot attractive and can turn a dusty asphalt corner of the playground into a pretty, green garden.

- **Location**

There are several things to consider when planning a container gardening project with your students. The location of the garden is most important.

Water is a basic requirement so the garden should be situated close enough to a water faucet to be reached by a hose.

The garden also should be in a spot that receives a minimum of six hours of sunlight (this is mandatory for most vegetables and many flowers). Smaller containers can be moved around, if necessary, to take advantage of good sunlight.

Situate the garden so it is accessible to students yet is secure. If necessary, move small containers and containers with wheels indoors at night to prevent vandalism or theft.

- **Cooperation**

As the teacher, you should decide whether the containers will be communal or individual. In a communal garden, students share the work of cultivating, planting and harvesting all the containers.

A communal garden encourages group participation and cooperation and ensures that every student receives something from the harvest.

Individual containers enable students to take responsibility for their own containers. They can be used to compare different varieties of plants or to accommodate an individual student's special interests.

- **Choice of Plants**

Annuals will provide the most dramatic results in your garden; they grow and produce quickly during a single season. However, annuals require a constant supply of moisture and nutrients to fuel their work. Check with a local nursery or the California Association of Nurserymen to find out specific varieties to plant.

Most vegetables are annuals; you might try beans, beets, broccoli, carrots, Swiss chard, cucumbers, eggplant, kale, lettuce, green onions, parsley, peas, peppers, radishes. Or try fruit such as cherry tomatoes and strawberries.

Try planting some flower seeds as well—bachelor's buttons, calendula, cosmos, snapdragons, sweet alyssum and sweet peas are easy to grow from seeds.

PREPARATION AND INTRODUCTION

Remind the students of the game they played with a garden plot. Tell them they will use the information they learned from the game to plant a garden in a container which is a very small plot. Show students the containers.

Discuss with students the benefits of container gardens. Identify the various needs of container garden plants (i.e. water, light, air, nutrients, etc.) Have students check possible sites on different days.
and at various times to determine where the sun shines the most. Help students locate a nearby water source.

Consider taking the class to visit a local garden center or nursery so that students can observe vegetables and flowers growing in containers and flats. Have the students prepare a list of questions in advance of their visit. Students can refer to the resource books listed at the end of the lesson plan to research their questions. Arrange with the nursery to have a representative on hand to field the students’ questions.

PROCEDURE

1. Students can collect containers from parents, friends and local merchants. Containers should hold at least three gallons of soil for large or deep-rooted plants like tomatoes, squash and melons. They should hold one and a half gallons of soil for smaller plants like lettuce, onions and flowers.

Containers should have drainage holes on the bottom and should be made of a material that won’t rot or deteriorate before the plants have matured. Baskets, garbage cans, plastic pails, whiskey barrels, wooden boxes, clay pots, coffee cans and water or bleach jugs all make good containers.

2. Fill the containers with soil (use commercial planter mix or a homemade mix of 70 percent organic matter—such as peat moss or compost—and 30 percent sand). Commercial or organic fertilizer should be added depending on the plant’s requirements.

3. Select seeds to use or seedlings.

4. Help students sow seeds directly into containers, following seed package directions. Thin the seedlings as recommended on the package.

5. Help students develop a system to check periodically whether the plants need water. It is better to water according to plants’ day-to-day needs rather than by a set schedule.

The soil should never become parched. Infrequent deep watering is better than shallow watering, since it prevents alkali buildup in the soil. Water only as often as is absolutely necessary to minimize water consumption and develop greater plant tolerance to dry spells, and then water thoroughly to promote deep root growth.

DISCUSSION QUESTIONS AND FOLLOW-UP

Students can predict when the seeds will sprout and compare their predictions with those on the seed package. Review Six Plant Parts and what happened to the students’ alfalfa seeds in their flip books.

After the plants have matured, cut the flowers and compare the flowers of different plants. Identify the parts of the flower (Seed To Flower To Seed lesson) and discuss the function of each part. Eat and compare the vegetables, too. Let some of the plants go to seed so that students can observe an entire life cycle from seed to seedling to plant to seed.

Ask the following questions:

• What did we have to give the plants for them to grow and produce?
• What did you like about our garden? What didn’t you like?
• Why is it important to know how plants grow? How are they important in our lives?

Have students draw pictures of a seed, a seedling and a plant. Students can make a class picture book that describes the various steps of their project or record this information in their science portfolio.

RESOURCES


For Students


SOURCE OF ACTIVITY

Introduction
To The Tree Section

This section of the unit begins with children familiarizing themselves with a tree near school by making and recording observations about it. They will become acquainted with a tree's inside structure and function by becoming parts of a tree in a game. Visualizing the life of a tree will provide students with deeper understanding, awareness and appreciation of trees. This section will culminate in a special tree-planting ceremony to celebrate Arbor Day.

LESSONS:

• Borrow A Tree Observation
• Build A Tree Role Playing
• Tree-Planting Project Planning the Planting
• Tree-Planting Ceremony Hands-on Activity

BORROW A TREE

SUMMARY

Continuing in their role as scientists, the students "borrow" a tree to observe it closely over several months. Younger children record their observations through pictures they draw in the classroom. Older children can keep a journal.

PREPARATION

Locate a nearby deciduous tree to observe or bring a small tree in a container for the class to observe if there are no trees near your school.

Time: Two 40-50 minutes periods (one outside and one inside)
Setting: Classroom and outside
Materials:
• Stethoscope (optional)

For Younger Students:

Outside:
• A chart to record their observations; paper and crayons for children to sketch or do rubbings
• A hand-out including questions in Procedure

Inside:
• Butcher paper to draw or paint the tree and put it on the wall

For Older Students:
• Journals or paper
• Pencils
• A hard surface to write on
• Copy of directions and questions in Procedure

PROCEDURE

Outside

1. Select a tree to observe. Remind the children that scientists need to use their senses to observe carefully so they will be able to tell when and if something changes when they visit the tree each month.

2. Visit the tree and record observations. Younger students can dictate to the teacher and older children can record their impressions in a journal or fill out a ditto sheet with the following directions and questions. Be sure to write the date on the paper.
3. Describe the tree as it is right now.
   • Describe the texture of its leaves and bark; do rubbings of both.
   • Identify the color and shape of the leaves, branches and bark.
   • Listen for any sounds the tree makes with or without wind. Use a stethoscope to listen to the trunk.
   • Smell the leaves and bark to see if they have any odor.
   • Do new leaves smell differently than old?

4. Can you find any evidence of other living things that may live on or under the tree and need the tree for their survival? What does this tree need to survive?

5. Draw the tree.

6. Review this information in class. Younger students can make a tree on butcher paper in the same shape and color as the tree. Encourage them to include any of the details you recorded such as the other things that live on or around the tree. The children can glue the bark rubbings on the paper.

7. Each month, visit the tree, and observe and record any changes or discoveries. Have the younger students record these changes on the class tree. Older students should continue to keep records in individual or class journals.

8. As you record and discuss information about the tree, review the following information:
   • A tree is a living thing and needs the same things little sprouts need (sun, soil, space, water, air).
   • Sometimes trees need help from people (diseases, injuries, pruning, watering, weeding).
   • Focus on the tree parts: buds, branches, leaves, needles, trunk, bark, canopy and roots. Have examples of these to touch.
   • Explore tree products and collect them in a classroom “tree museum.”
   • Discuss ways to use and reuse paper products so fewer trees will be cut down. Set up a recycling station in class. Collect used paper for recycling collection and pick-up. Use both sides of a paper.

SOURCE OF ACTIVITY
“Adopt A Tree,” adapted from Project Learning Tree Supplementary Activity Guide for Grades K-6, 4-6, by permission of the publisher. Copyright 1987 by The American Forest Council, Washington, D.C.
SUMMARY
In this fun activity, students act out the various parts of a tree: the taproot, lateral roots, heartwood, sapwood, phloem, cambium and bark. The children learn about the function of each tree part as they become a living tree together.

- The heartwood section provides strength and support for the tree.
- The roots (taproot and lateral) anchor the tree in the ground and draw up water and trace minerals.
- The sapwood or xylem (zi-lém) carries water up to the branches and leaves.
- The cambium (kam-bi-üm) is the growing part of the tree.
- The phloem (floh-ém) carries food from the leaves to the rest of the tree.
- The bark protects the tree.

INTRODUCTION
Remind the students that they have studied the outside of the tree with scientific observations. Now they will learn how the inside of a tree works by playing a game.

HEARTWOOD
Stage Direction:
To begin play, choose two or three students and ask them to play the heartwood. Have them stand with their backs to each other.

Teacher Narrative:
"This is the heartwood—the inner core, the strength of the tree. The heartwood's job is to hold the trunk and branches upright so the leaves can get their share of the sun. The heartwood has been around a long time—so long that it's dead. But it's well preserved! The heartwood used to be alive, but its thousands of little tubes that carried water up and down are now all clogged with resin and pitch. Your job is to 'stand tall and strong.'"

TAPROOT
Stage Direction:
Next, ask several students to play the taproot. Tell them to sit down at the base of the heartwood, facing outward.

Teacher Narrative:
"You are a very long root, called a taproot. Plant yourself deep in the ground—about 30 feet. The taproot enables the tree to get water from deep in the earth, and also anchors the tree firmly to the ground. When storms come, the taproot keeps the tree from being blown over by high winds. Not all trees have a taproot (a redwood doesn't), but this tree does."

LATERAL ROOTS
Stage Direction:
Choose people with long hair who look as if they won't mind lying on the ground. Ask the "lateral roots" to lie on their backs with their feet up against the trunk and bodies extending away from the tree.

Teacher Narrative:
"You are the lateral roots. There are hundreds and hundreds of you. You grow outward all around the tree, like branches but underground. You also help hold the tree upright. At your tips are tiny root hairs."

Stage Direction:
At this point, kneel beside one of the lateral roots and spread out his or her hair.

Teacher Narrative:
"Trees have thousands of miles of root hairs that cover every square inch of soil into which they grow. When they sense that there is water nearby, the cells grow toward it and suck it up. The tips of the root hairs have cells as tough as football helmets. I want the lateral roots and taproot to practice slurping up water. When I say 'Let's slurp!' you all make a loud slurping noise. Okay, let's hear you slurp!"
SAPWOOD

Stage Direction:
Ask a small group to play the sapwood. Choose several students to form a complete circle around the heartwood. Have them circle the heartwood, facing inward and holding hands, being careful not to step on any roots!

Teacher Narrative:
"You are the part of the tree called the sapwood, or xylem. You draw water up from the roots and lift it to the tree's highest branches. You are the most efficient pump in the world, with no moving parts. You're able to lift hundreds of gallons of water a day, and you do this at speeds of more than 100 miles an hour! After the roots slurp the water from the ground, your job is to bring the water up the tree.

"When I say 'Bring the water up!,' you respond: 'Wheee!' (As the students say this, they throw up their arms into the air.) Let's practice. First we'll have the roots slurp. Let's slurp! Now, bring the water up! Wheee!"

CAMBIUM/PHELLOM

Stage Direction:
Select a group of students to play the cambium/phloem. Have them form a circle around the sapwood, also facing inward and holding hands.

Teacher Narrative:
"Toward the inside of the tree is the cambium layer, the growing part of the tree. Every year it adds a new layer to the sapwood and phloem. A tree grows outward from its trunk, and also from the tips of its roots and branches. It doesn't grow like your hair does. Behind you, toward the outside of the tree, is the phloem. This is the part of the tree that carries food manufactured by the leaves and distributes it to the rest of the tree. Let's turn our hands into leaves."

Stage Direction:
Have the students stretch their arms upward and outward so that they intersect each other's arms at wrists and forearms, leaving their hands free to flutter like leaves.

Teacher Narrative:
"When I say 'Let's make food!,' raise your arms and flutter your leaves and absorb the energy from the sun and make food. And when I say 'Bring the food down,' you respond 'Wooooo!'"

Stage Direction:
Make the "Wooooo" a long descending sound while you bend at the knees and drop your arms and body toward the ground. Practice the sound and motion sequence with the students.

Go through all the sounds and motions with all the parts, in this order: "Let's slurp!" "Let's make food!" "Bring the water up!" "Bring the food down!" (Notice that the cambium/phloem ring makes food before the sapwood brings the water up. Make sure also that the students don't raise their arms and flutter their leaves until you say "Let's make food." This way their arms won't get tired.)

Ask the remaining students to play the bark. Have them circle round the tree, facing outward.

Teacher Narrative:
"You are the bark. What kind of dangers do you protect the tree from? What about fire and insects, extreme temperature changes and people with pocket knives who want to carve or cut you?"

Teacher Narrative:
"Raise your arms with both elbows out and both fists close to the chest. (Pause.) Do you hear that high-pitched sound? It's a feisty and very hungry long-snouted pine-borer. I'll go and see if I can stop it. If I don't come back, you'll have to stop the pine-borer yourselves."

Stage Direction:
Disappear behind a tree and come out as the pine-borer. Ham it up by scowling, using branches for your antennae and turning your head back and forth. Zero in with your antennae and point your long bore-snout toward the tree. Now run or walk quickly around the tree, pretending to try to penetrate the bark's protective layer. The "bark" people should try to fend you off.

While you are going around the tree, lead the rest of the tree groups in their parts. Shout the commands for all the parts in sequence. Go through the sequence three or four times. The commands for the tree parts are as follows:

Teacher Narrative:
(First time only) "Heartwood, stand tall and strong!" and "Get tough, Bark!" (1) "Roots, let's slurp!" (2) "Leaves, let's make food!" (3) "Sapwood, bring the water up!" (4) "Phloem, bring the food down!"

Stage Direction:
After the first round, shout the commands without giving the names of the tree parts. When you finish, have the students give themselves a big hand for being such a wonderful tree. And help the roots up off the ground!

SUMMARY

1. After recess, have the students who were involved in each of the tree part roles describe the function of their tree part.

2. Draw a diagram of the tree parts on the blackboard for students to copy.

Continued on next page
3. Ask the students to recall the parts of a sprout (leaves, stem, root) and compare them with the parts of a tree. Which parts are similar and which are different? Ask the class to compare the basic needs (air, space, nutrients, sun, water) of the sprout and the tree.

4. Ask if the basic needs of the sprout and tree are needs that we as human beings also share.

5. Ask the students to recall the effect of too little water on sprouts. Ask what they think happens to trees when there is not enough rain.

6. Ask students to think about and then write or share the ways a tree is like a factory in the way it works.

SOURCE OF ACTIVITY


TREES-PLANTING PROJECT

SUMMARY OF ACTIVITY

Students will apply the information they have learned about plants' and trees' needs. The class will select a tree, a location for planting and develop a plan to plant and care for the new tree.

| Time: 50 minutes for the first activity plus 15 minutes follow-up the next day. The second activity will take approximately 30 minutes. |
| Setting: Classroom and outside |
| Materials: |
| • Tree Identification Books |
| • Notepads or clipboards |
| • Pencils |
| • Chart paper and marker |

BACKGROUND INFORMATION

Choosing the Location

Identify a few possible locations (school grounds, park, or a child's home) to plant a tree before discussing this with your class. Be sure there is adequate space for a young tree to grow into its adult size. Avoid blocking important views or interfering with power lines. Remember that the tree's roots need adequate space and moisture so avoid locations that are too close to asphalt or concrete.

Water and Nutrients

Consider the following questions:

• Will the tree have to compete with other living things for basic needs such as water, soil and nutrients?
• If you plant a tree in a lawn, will frequent lawn watering promote shallow tree roots?
• Will the lawn and tree compete for nutrients?
• Is the tree close enough to a water supply for a hose to reach it?

Trees have different watering requirements. When they're first planted and taking root, they typically need frequent watering. Students should check the soil at a depth of two or three inches before watering. If it's dry, water thoroughly. Check with a nursery professional about your tree's special water, fertilizer and future pruning needs.

Choosing the Tree

Visit a nursery or garden center and ask a professional to help you select several trees that are appropriate for your climate and soil conditions. Bring a sample of the soil to aid in the decision-making process. Allow the class to make the final decision about which tree to plant.

PREPARATION AND INTRODUCTION

Preliminary Decisions

Check with the proper authorities in your school and district and find out if there are any rules governing tree locations and varieties. If so, make plans to accommodate those rules throughout this lesson plan. Evaluate whether a selected tree will need watering during the summer. If so, be sure that a nearby water supply can be turned on and that a hose can reach the tree. Find out if a district gardener can care for the tree in the class' absence. If not, ask parents and/or students to take turns caring for the tree during the summer as some schools have done before.
PROCEDURE

Activity One: Your Class Helps Select A Tree

Take a group of students or the whole class on a tree walk in your neighborhood to see which kinds of trees would be desirable and appropriate to plant at your school. Start by looking at the location(s) you have selected for a tree so the children can keep them in mind as they consider possible tree varieties. Bring several “Tree Finder” books for students to use to identify trees.

Older students can make a list of the trees you’re considering; ask students to look up information about different varieties to help them in their decision making.

Ask some of the children to record things to avoid when planting trees; have others note the questions that come up during the “tree walk;” ask another group to list the tree varieties the class prefers. For younger students, you do the recording.

Be sure to look at mature trees so the children can see their height and width and determine if they would be appropriate for your site. Point out examples of trees that are too crowded or too close to power lines, buildings, stop signs so students can see what to avoid when planting. Remind the class of the chosen site.

Suggest that students look under trees to see what needles, leaves or flowers drop and discuss whether these things would be a problem at the school location.

When you return to the classroom, ask the students to narrow their choices to three trees they like. Discuss the benefits of each (i.e. height, width, leaves (deciduous), fruit, flowers, shade, protection). Make a list of questions about the trees that will help students select one to plant.

Take a small group of students or if possible, the whole class, to a nursery or garden center and arrange to have a California Certified Nursery professional answer the students’ questions. Review the information in class and ask the students to make a final decision about which tree to plant.

Activity Two: Identify Basic Needs of the Tree and Sign Up to Help

After the students select the tree and site for planting, ask them to take two minutes to think of the things they have learned about plants and their basic needs.

Divide the class into small groups and ask them to make a list of what the new tree will need. Record the group’s impressions on the blackboard. Make sure the following needs are identified: space, air, water, nutrients/soil and light.

When the list is complete, tell the students you will read them more information about a tree’s needs (use the Background Information at the beginning of the lesson).

Ask the students to identify which of the tree’s needs they can provide. Explain that the area under the tree should be watered and possibly weeded. Arrange for each student or group of students to assume part of the responsibility for caring for the tree. Make a job chart for signing up to help.

<table>
<thead>
<tr>
<th>What needs to be done?</th>
<th>Who will do it?</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Watering</td>
<td>Clara, Nancy, Devon</td>
</tr>
<tr>
<td>2. Weeding</td>
<td>Felix, Kathy, Ricky, Hope</td>
</tr>
</tbody>
</table>

Look at the Recipe For Planting A Tree and identify what jobs need to be done to plant the tree and add them to the chart. Ask for volunteers to help with these jobs.

RECIPE FOR PLANTING A TREE

Basic Ingredients
- The right tree: kind and quality
- A shovel, rake and pickax (optional)
- Mulch (bark or leaves)
- Topsoil (for rocky soils)
- A hose that will reach the tree
- Two tree stakes and ties (optional)

Eight Easy Steps to Plant Your Tree Successfully

1. Dig the proper sized hole for your tree. Make vertical sides as shown in the diagram. Loosen the dirt on the sides of the hole to allow root penetration. If you’re transplanting your tree from a container, the hole should be one inch shallower than the container and 6 to 12 inches wider than the root ball.

2. Carefully remove the container just before the tree is put into the hole. Try to move the tree by the root ball instead of the trunk. Minimize the time the roots are exposed to air.

3. Set the root ball in the hole and adjust it until the “best” side of the tree faces the direction you want. Make sure the top surface of the root ball is one inch higher than the natural soil grade. Lay a stick or shovel handle across the hole to see if the root ball is high or low.

4. Fill the hole in and around the root ball with the soil you removed from the hole in Step One. If the soil is filled with rocks, rake out the large ones. Break up any clods and mix them with good topsoil. Firm the soil around the root ball until the hole is 2/3 full.

5. Fill the remaining space with water. Finish filling the hole with soil, but do not compact the soil. No fill soil should be put on top of the root ball.

Continued on next page
6. Mound what soil is left into a six-inch high ledge
around the planting hole. Fill the basin around the
tree with water to thoroughly wet and settle the soil.

7. Place a two- to three-inch layer of mulch such as
bark or leaves around the tree. Mulch helps to control
weeds and retains water in the soil. Keep turf/grass
18 inches away ~mth the trunk.

8. Remove any stake that is next to the tree trunk.
Restake your tree only if the tree cannot support itself.
Use two stakes and place them 12 inches away from
the trunk on either side to support the tree with ties
against the wind. This prevents the trunk or branches
from rubbing against the stakes.

RESOURCES

Tree Finder Books
Lanzara, Paola and Mariella Pizzetti. Simon &

Phillips, Roger. Trees of North America and Europe. New

SOURCE OF ACTIVITY

“Recipe For Planting A Tree” adapted from the
California Association of Nurserymen, Sacra-
mento, Calif.

TREE-PLANTING CEREMONY

SUMMARY OF ACTIVITY
Children will learn the history of Arbor Day and will
synthesize the information they have learned about
trees to create a ceremony that includes their understand-
ing of, feelings about and appreciation for trees.

Time: 40 minutes the first day and
50 minutes the second day.
Setting: Classroom and outdoors
Materials:
• Two pieces of butcher paper and marker
• The Giving Tree by Shel Silverstein
• The right tree: kind and quality
• A shovel, rake and pickax (optional)
• Mulch (bark or leaves)
• Topsoil (for rocky soils)
• A hose that will reach the tree
• Two tree stakes and ties (optional)

BACKGROUND INFORMATION

History of Arbor Day
Tree-planting festivals are probably as old as civilization.
Throughout the world, school children, men and
women plant trees, care for them and appreciate their
value. In the United States, this “festival” is celebrated
on Arbor Day. In other lands, it may be called Arbor
Week, Tree Holiday or Tree Festival. In Japan, it is
called Greening Week. In Israel, where it is changing
the entire face of the land, it is called the New Year’s
Day of the Trees. Korea has a Tree-Loving Week.
Iceland has a Student’s Afforestation Day. Yugoslavia
holds an Arbor Day in the spring and an Afforestation
Day in the fall. India celebrates a National Festival of
Tree Planting.

The First Arbor Day in the United States was
celebrated in Nebraska on April 10, 1872. Settlers in
that state had cleared the land of most trees, using
them for farming, building homes and firewood. A
Nebraska newspaperman, J. Sterling Morton, came up
with the idea of Arbor Day, which takes its name from
the Latin word “arbor” meaning tree. Morton dedi-
cated Arbor Day as an annual event where old and
young people alike would remember to plant and take
care of trees.

On the first Arbor Day in Cincinnati, Ohio in 1882,
more than 20,000 school children helped plant a grove
of trees in Eden Park. This began the tradition of
children taking a leading role in Arbor Day celebra-
tions.
Since 1909, Californians have celebrated Arbor Day on March 7, the birthday of Luther Burbank, renowned naturalist and breeder of numerous new plants, fruits and flowers. Burbank lived and worked most of his adult life in Santa Rosa, California. Today, all 50 states celebrate Arbor Day.

In 1947, California's state legislature passed a law, sponsored by the California Association of Nurserymen, officially recognizing Arbor Day as March 7. Since its beginning, the idea of Arbor Day, to remind children and adults of the need to plant and protect our trees and forests for their beauty and value, has grown to become a national tradition.

**PREPARATION AND INTRODUCTION**

All the arrangements for the actual planting were made in the previous lesson.

1. On the blackboard write: “Ingredients for a Ceremony.”

2. On one piece of butcher paper write:

   **Tree-Planting Plans**
   
   **Preparation**
   
   Date:
   Time:
   Place:
   Food?
   Agenda:

   Invitations:
   The trees:
   Digging the hole:
   Others:

3. Write on another piece of butcher paper that will be used the following day:

   **The Ways in Which Trees Enrich Our Lives**

**PROCEDURE**

**Day One**

1. Explain to the class that its study of plants and trees over the past few weeks will culminate with the students planning a special tree-planting ceremony. Planting a tree offers a perfect opportunity to reflect on the importance of trees in our lives. If possible, plan to plant the tree on or around California Arbor Day, March 7. Read the History of Arbor Day to the class so the students understand they will participate in a universal tree-planting tradition that has been taking place for thousands of years.

2. Ask the children to recall another special ceremony such as a wedding, baby christening or birthday. Ask them to think about or write down what traditions or ingredients made this memory a special occasion. Encourage the class to share their impressions with you and make a list of their ideas on the blackboard. The list might include songs, food, gifts from friends, candles and cards with poems that make people feel special.

   Have the class choose the ingredients for your tree-planting ceremony from this list. Organize your ideas and record them in the agenda section of your “Tree-Planting Plans.”

3. Show the class the “Tree-Planting Plans” sheet and identify what needs to be done to prepare for the ceremony: day, time, place, guest list. Should the students make invitations? Do they want food? What kind of food? (Idea: tree food such as apple or orange juice, fruit.) Figure out who will prepare the food. Select other members of the class to share in the responsibility for ceremony preparations.

4. When the subject of gifts comes up, post and/or read the following quote from a native American of the Pomo Tribe:

   "Plants are thought to be alive, then juice is their blood, and they grow. The same is true of trees. All things die, therefore all things have life. Because all things have life, gifts have to be given to all things.

   —William Ralganal Benson"

   Suggest to the class that each child offer the tree a gift by pouring a cup of water on its roots to help it grow. Students also will make a promise to help care for the tree or to save trees by recycling paper. They will write their promises on a slip of paper and bury them in the ground with the tree roots. They also will write poems about the importance of trees in their lives as part of this class project, and will read their poems at the tree-planting ceremony.

**Day 2**

**Part One: Inside**

5. Read The Giving Tree by Shel Silverstein to help students think about how trees enrich our lives. When you finish reading, ask the class to help you list ways trees enrich our lives.

   The list should include beauty, shelter, food and shade for many different kinds of plants, animals and people. Identify tree products such as medicines, paper, chewing gum, candy, records, camera film, bath soap, mixed nuts, table salt and color crayons. Trees also absorb carbon dioxide, a major pollutant, and produce life-giving oxygen, creating a healthier environment.

   Continued on next page
6. Help students visualize their favorite outdoor place with trees...think about the trees that are there...what their leaves look like and what insects and animals live there.

Ask the class to erase the trees from the pictures in their mind and to notice how places look and feel without trees. Tell the students to put the trees back into the pictures in their minds. If your students cannot easily do this, go outside, look at real trees, then ask them to “erase” the trees from their minds.

Discuss what the students noticed or felt when they removed trees from the pictures in their minds. Add their feelings and comments to the list of “How Trees Enrich Our Lives.” They may wish to draw their favorite place with or without trees.

Part Two: Outside

7. Take the class outside to a special tree. (Each student should bring a pencil and paper.) If there are no trees, use slides or posters of trees for this exercise. Ask the students to sit far enough from each other to be alone with their thoughts.

If possible, have children lie down on their backs outside. Tell them that while you read Joseph Cornell’s poem about trees, they should feel they’re becoming the part of the tree that each line describes.

After the first stanza, they can open their eyes and look at the base of a large tree. (Inside, have students stand apart from each other with their eyes closed.)

My long limbs stretching out for space, tips tickled by the wind, touched by the sun.

Roots anchoring deep, limbs lofty high, I abide in both worlds of earth and sky.

Roots going down, reaching through damp earth deep. Down, down, holding me here.

(Open your eyes and look at the trunk of a large tree...)

My great round trunk, massive and slender, solid yet yielding, carrier of life.

Part Three: Inside

9. Demonstrate how to write a Haiku poem with three lines: the first line has five syllables; the second has seven; and the third line has five syllables.

Ask the children to create their own poem by using words from the left side of the paper and adding others to create a poem on the right side. You can do this with younger children as a group to create a class poem. They can borrow ideas and words from the list they made about “How Trees Enrich Our Lives.” Students may want to write their poem their own way. The children can read their poems during the tree-planting ceremony as their special gift to the new tree.

10. Review the list of jobs and responsibilities for planting and taking care of the tree with the class. Ask each student to write (or dictate) his or her promise to care for the tree and all trees on a piece of paper. Ideas include watering, weeding, picking up leaves and recycling to prevent more trees from being cut down.

Keep the slips of paper in an envelope until it’s time for the ceremony. During the ceremony, invite students to place their promises in the ground with the tree’s roots.

Tree-Planting Day

11. Hold your tree-planting ceremony and follow the Recipe For Planting A Tree.

8. Tell the students they will write a poem about trees. Ask them to fold a piece of paper in half the “fat” way and on the left side, write words that describe trees and their feelings about trees. This can be done as a whole class for younger children. After the children have at least 10 words on their paper, return to the classroom.

They invite all life to shelter among them, beneath them, inside me, beneath me.

Life runs through me. I invite all life to me.

"History of Arbor Day" adapted from the California Association of Nurserymen, Sacramento, Calif.


SOURCE OF ACTIVITY
RESOURCES

Organizations
American Forest Foundation, 1250 Connecticut Ave., N.W., Washington, D.C. 20036. Brochure and poster: The Life of the Forest. ($1.50 for brochure; 16 posters for $15.00.)

California ReLeaf, c/o Trust for Public Land, 116 New Montgomery St., 4th Floor, San Francisco, CA 94105. Phone 1-800-REEF-GEO for information about becoming involved with local tree-planting groups.

Landscapes Southern California Style, 450 Alessandro Blvd., Riverside, CA 92517. Phone 714/780-4177. Contact for information about field trips to Water Wise garden, plus brochures, books and films about water conservation in the garden.


Eighteen different issues focus on subjects such as endangered species, birds, mammals and insects. ($7.95 per issue or $99 for complete set.)


Project Learning Tree (California office), California Department of Forestry and Fire Protection, P.O. Box 944246, Sacramento, CA 94244-2460. Phone 916/323-2498. Contact California coordinator for workshop schedules. PLT activity guides available only through workshops.

Project Life Lab, 1156 High Street, Santa Cruz, CA 95064. Phone 408/459-2001 to order The Growing Classroom, a science education gardening guide for grades K-6, and for in-service teacher training.

Sacramento Tree Foundation, P.O. Box 15824-A, Sacramento, CA 95882. Phone 916/924-TREE to order Seed to Seeding, a curriculum guide for grades K-6 that focuses on planting oak seedlings ($10.00).

San Francisco League of Urban Gardeners (SLUG), 2540 Newhall Street, San Francisco, CA 94124. Phone 415/468-0110. Resource for in-school presentations, slide shows and gardening reference books. (Membership donation $35-$75.)

Books for Teachers


Science and Environmental Education Resource Guide. Sacramento: California State Department of Education, 1989. This publication is a resource for organizations, books and the like on subjects ranging from aerospace to zoos.


SPACES, Solving Problems of Access to Careers in Engineering and Science. Berkeley: Regents, University of California, 1982. For information about ordering copies contact: Lawrence Hall of Science, University of California, Berkeley, CA 94720. Phone 415/642-5133. The Lawrence Hall of Science is a public science center, teacher training institution and research unit in science education at the University of California, Berkeley.


Books for Students


WHAT EDUCATORS SAY ABOUT PLANTING SEEDS, GROWING MINDS

“This curriculum is ideal for the classroom teacher who has the desire to expand their student’s horizons, but may not have the knowledge to teach about horticulture. A teacher utilizing this curriculum will change her curriculum to model exploratory learning.”

_Monica Pastor, University of Arizona Cooperative Extension Agricultural Literacy Program Coordinator_

“The students are enthusiastic about their gardens and the envy of other classrooms. This helps build their self-esteem as well as their interest. Kids having fun while learning keeps teachers and students involved.”

_Brenda Franz, San Pablo teacher_

“…a special gift…wonderfully creative, thoughtful science lessons, The curriculum provides an enthusiastic way in which children become involved in the activities.”

_Blanche Malankowski-Smith, Kensington teacher_

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