Make every day an Arbor Day.

Be one in a million!

An Activity Guide to MillionTreesNYC and Tree Planting and Care

millionTreesNYC

A PLANYC INITIATIVE WITH NYC PARKS AND NEW YORK RESTORATION PROJECT

Make Every Day an Arbor Day is a revision of PLANT A TREE FOR ARBOR DAY, a curriculum guide published in 2004 by the NYS Urban and Community Forestry Council and the NYS Department of Environmental Conservation. It includes new materials created for the MillionTreesNYC initiative, which is a movement to plant and care for one million new trees throughout New York City's five boroughs by 2017. It is designed to be useful for schools, after-school programs, youth groups and for many tree-planting groups around the City.

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New York State Learning Standards

All lessons in this guide were created with state learning standards in mind. Refer to the state learning standards located at the back of the guide.

millionTreesNYC

An Initiative of PLANYC by NYC Parks and the New York Restoration Project

About MillionTreesNYC MillionTreesNYC is a citywide, public-private initiative with an ambitious goal: to plant and care for one million new trees across the City's five boroughs by 2017. By planting one million trees, New York City can increase its urban forest—its most valuable environmental asset made up of street and park trees and trees on public, private and commercial land—by an astounding 20%, while achieving the many environmental and economic benefits that come with planting trees.

MillionTreesNYC is a public-private partnership between the New York City Department of Parks & Recreation and New York Restoration Project (NYRP).

To get to one million trees, Mayor Michael R. Bloomberg has provided funding to Parks to plant 60% of the million trees along city streets, in parks and along public rights of way. The other 40%—coordinated through NYRP—will be planted by nonprofit and community-based organizations, corporations and small businesses, landowners and developers and New York City homeowners.

MillionTreesNYC—launched by the Parks Department and NYRP—is a collaboration of many partners, including:

- Community-based and nonprofit groups
- Public and private schools, colleges and universities
- Private-property owners, including homeowners
- Building owners and managers
- Corporations and small businesses
- Developers, architects and landscape architects
- City, state and federal agencies
- All New Yorkers

Planting trees is one of the most beneficial and cost-effective ways to help our city environment! Trees help clean our air and reduce the pollutants that trigger asthma attacks and exacerbate other respiratory diseases. They cool streets, sidewalks and homes on hot summer days. Trees also increase property value and encourage neighborhood revitalization. And trees make our city an even more beautiful and comfortable place to live, work and visit.

New York City's urban forest needs to expand in all five boroughs and in all types of open space. Every New Yorker can join this movement by digging in and getting involved in MillionTreesNYC.

Introduction

A Guide to Participation in MillionTreesNYC Tree studies for young students and for interested citizens have gradually become recognized as an important part of environmental and forestry work in many parts of our country. This work has become particularly relevant in the field of urban and community forestry, which focuses on planting trees and establishing and protecting green space within our communities.

Urban dwellers are now beginning to recognize that we all live in a forest—one that is known as the urban forest. People of all ages with little or no background in arboriculture and forestry have been encouraged to learn more about the important role of trees in our urban environment. They have also learned how and why trees grow and about some of the challenges they face. They have been introduced to satisfying projects in planting and caring for trees and their associated plants in the urban and community forest.

As a result, community leaders, teachers and their students at every grade level are beginning to understand all of the ways in which their work can have a positive effect on the health of trees and other plants and the enhancement of the City's environment and economy.

Although arboricultural and horticultural work goes on all year, New York State Arbor Day on the last Friday in April has traditionally been a time of special focus, and since 2008, April is now MillionTreesNYC Month in New York City. Arbor Day was first established by J. Sterling Morton, a transplanted New Yorker, in Nebraska in 1872. Many Arbor Day activities center on school grounds and the planting of trees is connected to curricula within a variety of disciplines. However, there are also major community plantings with accompanying celebrations featuring songs, skits and public announcements.

But "every day can be an Arbor Day" if we embrace those seasonal activities that put us in touch with nature every month. Summertime, the season of expansive growth, is a time when trees and other plants need our help the most, primarily by watering during the hot and often dry months. Fall provides a season for more tree planting, as well as for activities celebrating harvest time, including the planting of bulbs for the following spring and the preparation for dormancy. Winter is an ideal time to observe twigs, branches and the overall structure of our urban environment as trees and other plants are alive and waiting for the warmer temperatures and longer hours of light to bring them back to bud, blossom and leaf.

MAKE EVERY DAY AN ARBOR DAY has been created to assist in the citywide celebration of MillionTreesNYC. The activity guide is designed to be used alone, or in conjunction with other educational materials, or as a part of an informative source for developing community events.

Lesson 1

Living in an Urban Forest

Concept: Those of us living in cities often think of forests as huge areas of trees, far away in rural, remote areas. Yet, as recent research and field work have shown, city dwellers do live in a forest—now known officially as an urban forest. Components of the urban forest include street trees, trees in parks and wildlife preserves, schoolyard trees, back and front yard trees, highway median plantings and trees in many other areas. Wherever there is enough space and soil (and sometimes when there isn't!), trees can and do grow! Their individual and combined value has been confirmed; most cities, including New York City, now have tree planting and tree care as major civic goals.

Lesson One introduces participants to the forest in which they live—both by field studies in the outdoors and by examination of important data that show specific information about the citywide urban forest. In comparing and contrasting the larger picture with new knowledge about their immediate area, participants can more truly understand what it means to be living among trees.

1 ACTIVITY ONE

A Dialogue on Trees

Objective:

To create motivation for examination of the surrounding urban forest and to determine the participants' scope of knowledge about trees on streets, in parks and playgrounds or in other open spaces.

MATERIALS:

Dialogue Worksheet

Pen or Pencil

Background:

We often don't know how much we do or don't know. A discussion brings out much useful information and prepares participants to become keener observers when they begin to examine their nearby urban forest.

Procedure:

1. Fill out answers to the Dialogue Worksheets on pages 4, 5 and 6.

2. Discuss your answers with the group.

DIALOGUE WORKSHEET
STREET TREES

1. Do you notice street trees as you walk around your neighborhood?

_____

_____

2. What things do you notice most about them?

_____

_____

3. Are the trees on your block large or small, young or old?

_____

_____

4. Do all the trees on your block have bark and leaves that look the same? Or are there many different kinds?

_____

_____

5. Who do you think planted the street trees?

_____

_____

6. What creatures do you see using the trees as part of their lives?

_____

_____

7. Why do people sit in the shade of a tree on a hot summer day?

_____

_____

8. Is there a lot of sunlight for the trees on your block?

_____

_____

9. If sunlight for trees is limited, what can trees do about it?

_____

_____

10. How do trees on your block get water? Do you ever see anyone watering them with a hose or a bucket?

_____

_____

11. In winter, salt is often used to melt the ice on the streets or sidewalks. Does any of the salty water get on the trees of your block?

_____

_____

12. Do dog-walkers on your block let their dogs use trees as bathrooms? How could this harm the tree?

_____

_____

13. Do you ever see notices nailed, tacked or stapled to the trees on your block?

_____

_____

14. What do you think the streets would be like without trees?

_____

_____

DIALOGUE WORKSHEET
TREES IN YARDS & OPEN SPACE AROUND APARTMENT BUILDINGS

1. Do you have a front yard or back yard?

_____

_____

2. If you have a yard, how many trees are planted in your front yard? How many are planted in your back yard?

_____

_____

. Do you know who planted these trees?

_____

_____

4. Who takes care of the trees in your yard?

_____

_____

5. Do you help care for them? How do you help?

_____

_____

6. Are the trees in your front yard or back yard all the same? Are they young and small? Or are they old and big? Is there a mixture of small and big trees?

_____

_____

7. Maybe you live in a tall apartment building. Is there open green space around the building?

_____

_____

8. How many trees are planted in this open space?

_____

_____

9. Do you see people caring for the trees and other plants in the open space around your building?

_____

_____

_____

10. Could you help care for them? How do you think you could help?

_____

_____

_____

11. Are there birds and small animals, such as squirrels, that live in the trees that you see around your house or apartment building?

_____

_____

12. Do the trees around your house or apartment building create shade during hot summer months?

_____

_____

13. Are there some trees that are green all year round?

_____

_____

_____

DIALOGUE WORKSHEET

Trees in Playgrounds

1. Is there a playground near your home? Do you go there to play?

2. How many trees are in the playground?

3. Do trees provide shade for the play equipment in the playground?

4. Do you or your friends ever climb the trees in the playground?

5. Who cares for the trees in the playground?

6. Where else do you see or find trees?

Trees in Parks

1. There are many parks — both large and small — in New York City. Is there one near your home?

2. If you live near a park, what is its name?

3. Do you play in the park? Where is the best place in the park to play?

4. Do you go to the park for nature walks along marked paths or explore in the woods?

5. Do you see birds, insects or small animals living in the park? Can you name any of them?

6. How do birds, insects and animals find food and water in the park?

7. Some parks have streams, ponds or lakes. How would this be helpful to wildlife that lives in the park?

1 ACTIVITY TWO

Tree Walk

Objective:

To investigate the immediate surroundings and begin to appreciate the local urban forest.

To become familiar with the nearby trees and to begin to identify them.

Background:

Field studies are the best introduction to understanding the concept of living in an urban forest. It is likely that participants have never made this connection. A Tree Walk helps to break down the disconnect between urban dwellers and the surrounding natural environment.

Procedures:

1. Take a 30-minute walk in the nearby area and surrounding blocks. Using the leaf key on page 9, identify as many trees as can be matched. (Clearly, this activity can only be done during the seasons when leaves are on the trees.) Collect some leaves to take back.

2. Each species of tree has a particular bark design, which is another important clue to identification. Using the crayons and tracing paper, choose trees for bark rubbings that will also become an art exhibit indoors. Place the tracing paper firmly against the bark, and rub it with a crayon. This will create a beautiful design. You may want to have more than one rubbing on a single piece of paper, and use different colors of crayons to add to the diversity of each design.

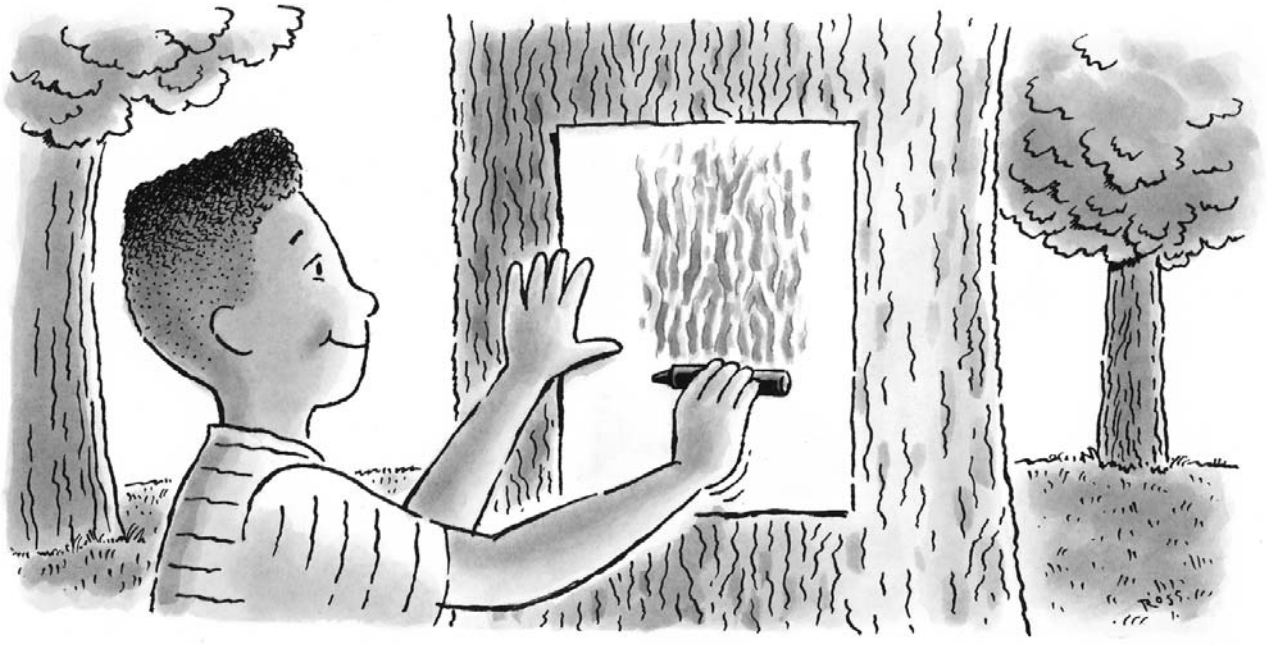
3. Compare and contrast the designs. Is there a difference in pattern between the bark of smaller and larger trees?

4. Create a display in the classroom using the rubbings. If the trees have been identified, post the names of the trees on the bark rubbings.

5. Wearing gloves, create leaf prints to display by dipping the collected leaves in bleach solution and pressing them onto colored paper.

MATERIALS:

- Clipboards
- Crayons, preferably fat ones
- Tracing Paper
- Diluted Bleach
- Colored Paper
- Collected Leaves
- Thin Plastic Gloves



1 ACTIVITY THREE

Examining Leaves and Twigs

Objective:

To study leaves as primary tools for tree identification and to study twigs as an observation of tree growth.

Background:

Tree species can be identified by their characteristic leaves and twigs. By learning to distinguish among species, participants will be able to compare and contrast how well each species is reacting to the rigors of city life, including resistance to insect damage, compacted soil and chemicals that may be introduced.

MATERIALS:

Collected Leaves

Collected Twigs

Small Magnifying Glasses

Tracing Paper

Crayons, preferably fat ones

Procedure: Leaves

1. Ask participants to each bring 10 different types of leaves to class. (Taking one or two leaves from a tree after it has fully leafed out will not damage the tree.) They should examine each leaf carefully with magnifying glasses.

- Leaf margins: Are they jagged or smooth?
- Arrangement of leaf veins.
- Differences in color.
- Differences in the two sides.
- Differences in the length of the stems.

2. Sort the leaves by the categories listed above. Participants may write their various observations for posting.

3. Using the Leaf Key on page 9, now group the leaves that look alike. Identify the trees from which each group of leaves have been collected.

4. Using the tracing paper and crayons, create leaf rubbings that can be displayed with the bark rubbings in the exhibit. Print the names of the trees on the leaf rubbings.

Procedure: Twigs

1. Ask participants to each bring five different types of twigs to class. (Cutting a few twigs from growing trees will not damage the trees, but do not tear them off.) Using the Twig Key on page 10, they should observe them carefully.

Observation points are:

- Differences in shape of buds.
- Placement of leaf scars.
- Placement and number of bud scale scars.

Can you tell how many years each twig has been growing?

GUIDE TO TREES IN NEW YORK CITY

DECIDUOUS LEAVES — SIMPLE


American Elm


Beech


Callery Pear


Catalpa


Cherry


Crabapple


Cucumber Magnolia


Eastern Redbud


Ginkgo


Hawthorn


Japanese Tree Lilac


Katsura


Linden


Norway Maple


Paper (White) Birch


Pin Oak


Red Maple


Red Oak


Scarlet Oak


Serviceberry


Silver Maple


Sweet Gum


Sycamore/London Plane


Tulip Poplar


White Oak


Willow


Zelkova

DECIDUOUS LEAVES — COMPOUND


Ash


Butternut


Golden Raintree


Honeylocust


Horsechestnut


Kentucky Coffeetree


Scholar Tree


Tree of Heaven

CONIFERS


Colorado Blue Spruce


Dawn Redwood


Eastern Hemlock


Northern White-Cedar

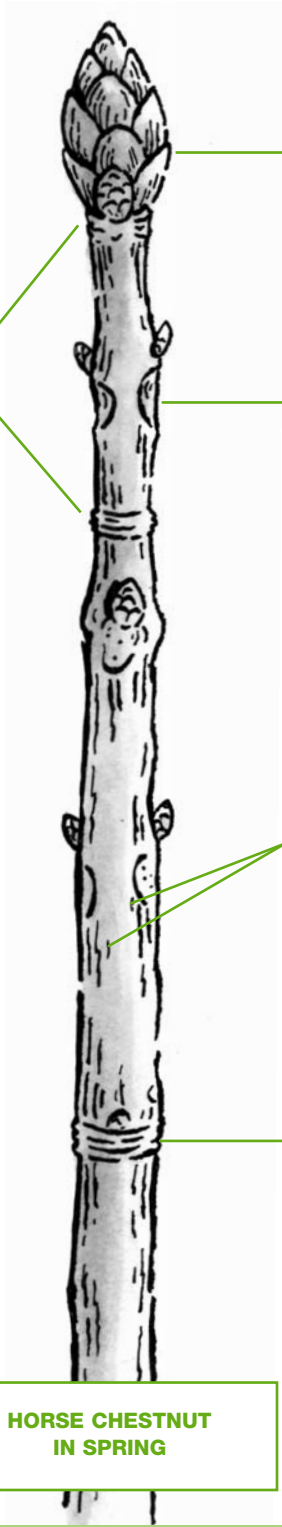

Red Pine


Scotch Pine


White Pine

For additional tree identification information, go to www.arborday.org.

TREE TWIG



Terminal Bud
Most twigs have a terminal bud or a cluster of buds. From this terminal bud will come the new growth that will lengthen the stem.

Last Year's Growth

Leaf Scar
Where the stem of a leaf was attached last year.

Lenticels
These little dots are actually openings, which allow the twig to take in carbon dioxide and release oxygen.

Bud Scale Scar
Where the little bud scales protecting last year's terminal bud were located.

HORSE CHESTNUT IN SPRING

Mapping a Square Block

Objective:

To prepare a visual record of the participants' own urban forest.

Background:

Participants will later be studying maps and charts of New York City's urban forest, as provided by the New York City Department of Parks & Recreation. By making observations and simple maps of their own square block area, they can see how this data compares and contrasts with the information from the overall records.

In obtaining this data, participants will also become more familiar with the condition of some of the trees that make up their urban forest.

MATERIALS:

- Clipboard for each Participant
- Blank Paper
- Pencils
- Colored Pens
- Cameras
- Observation Guide for Tree Walk

Procedure:

1. Divide the class of participants into four smaller groups. Each group will be responsible for data collection on one of the four streets to be examined. If assistants are available, the groups can be split up to go to their respective streets. Otherwise, the group can stay together, but each group will have a lead in examining its assigned block.

2. Using clipboards and blank paper, draw a simple square or rectangle to begin the process. Mark the names of each of the four streets that will be examined in the trip around the square block.

3. While outdoors, have each group locate and identify (if possible) each tree on its own assigned block. Pace off the number of steps from the corner to the first tree, from the first tree to the second and so on. Measurements do not have to be exact, but a long step is approximately one foot. Mark each tree's location on your map with a circle. If the tree is dead, note its site and mark an "X". Trees might be planted equal distances from each other on the street or there may be long stretches between trees. Some blocks may have no trees at all.

4. After the trees are marked in the notes, examine each tree using the Observation Guide for Tree Walk.

MAPPING AND OBSERVATION GUIDE

1. What is the name of the tree? If you cannot match it to the leaf key, mark it **Unknown**.

2. Is it a large, mature tree or a small one just beginning to grow?

3. Is its bark smooth, scaly or ridged?

4. Are there holes or torn spots in the bark?

5. Is the tree leaf one large one, or does it have many little leaflets?

6. Do you see any seeds or nuts on the tree?

7. If it is a small tree, what helps it to stand up straight?

8. Does your tree stand straight or lean toward the sunlight?

9. Are any animals or insects living on the tree?

10. Is there any litter around the tree?

11. Do you see any evidence that dogs are using the tree for a bathroom?

12. Do you see any ways that the tree is protected from dogs and parking cars?

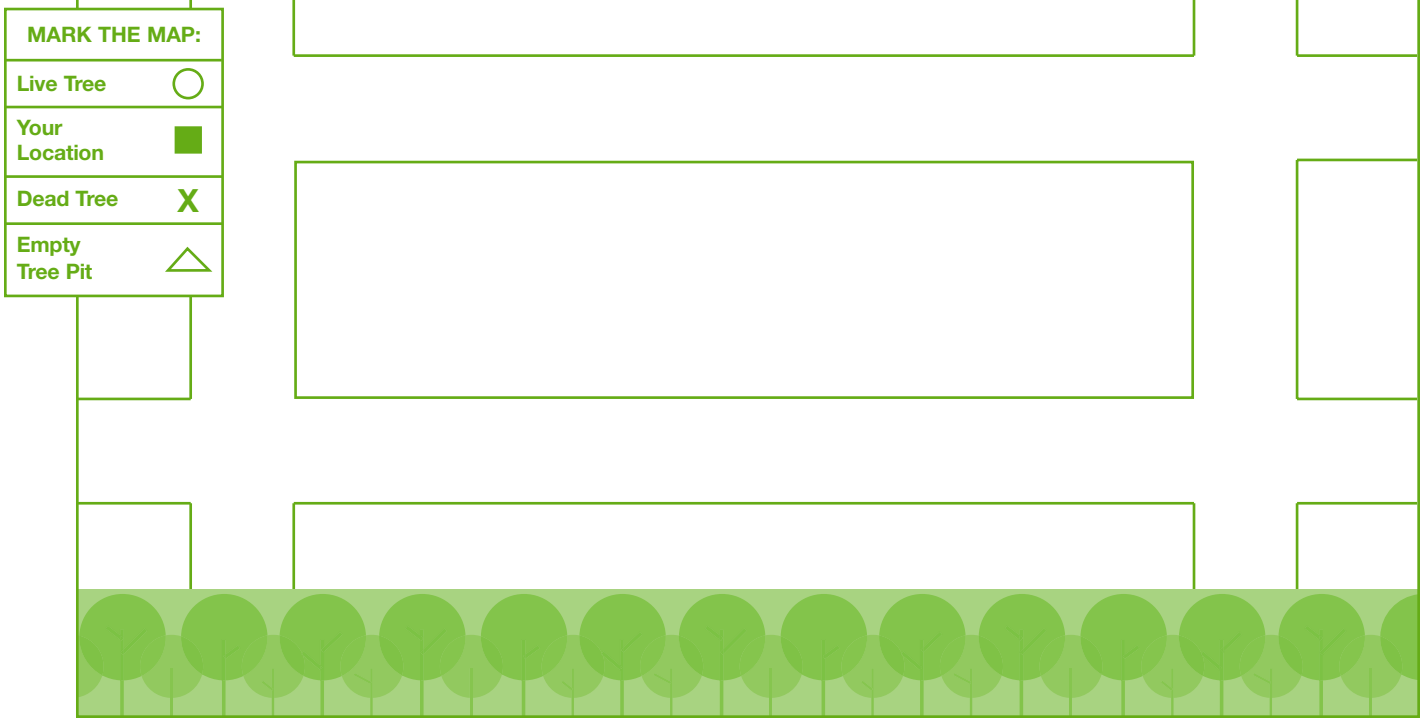
13. Are the tree's roots pushing up the sidewalk around the tree?

14. Are there lots of healthy-looking green leaves on the tree or does the tree have only a few leaves?

Based on your observation, grade the condition of each live tree you have observed:

1. Excellent
2. Good
3. Fair
4. Poor
5. Dying

Mark the correct number by each circle on your map. If cameras are available, take pictures of each of the trees on the block.



1 ACTIVITY FIVE

Compare Your Data with the Data from New York City Parks Department

Objective:

To create local, urban forest data that compares and contrasts to citywide data.

Background:

Much of the data shown on the Parks Department maps was gathered in the same way that participants have gathered their own data. In some cases, hand-held computers were used, but many volunteers used clipboards and marking sheets. The data provided by Parks reflects the picture of the urban forest citywide. Participants have created their own data for the local picture that can be compared and contrasted to the larger one.

MATERIALS:

Large Poster Boards

Pens

Markers

Parks Department Data Sheets

Procedure:

1. Using the information gathered outdoors, create larger maps that clearly show the general location of trees, their species according to the leaf key, locations of any dead trees and locations of sites where new trees could be planted. (These do not have to be to scale.) Display the larger maps in the classroom for continued study.

2. Examine the Parks Department data sheets in the following order, and fill in answers to the questions. Discuss the participants' data and compare/ contrast this with the data collected for the whole city located below.

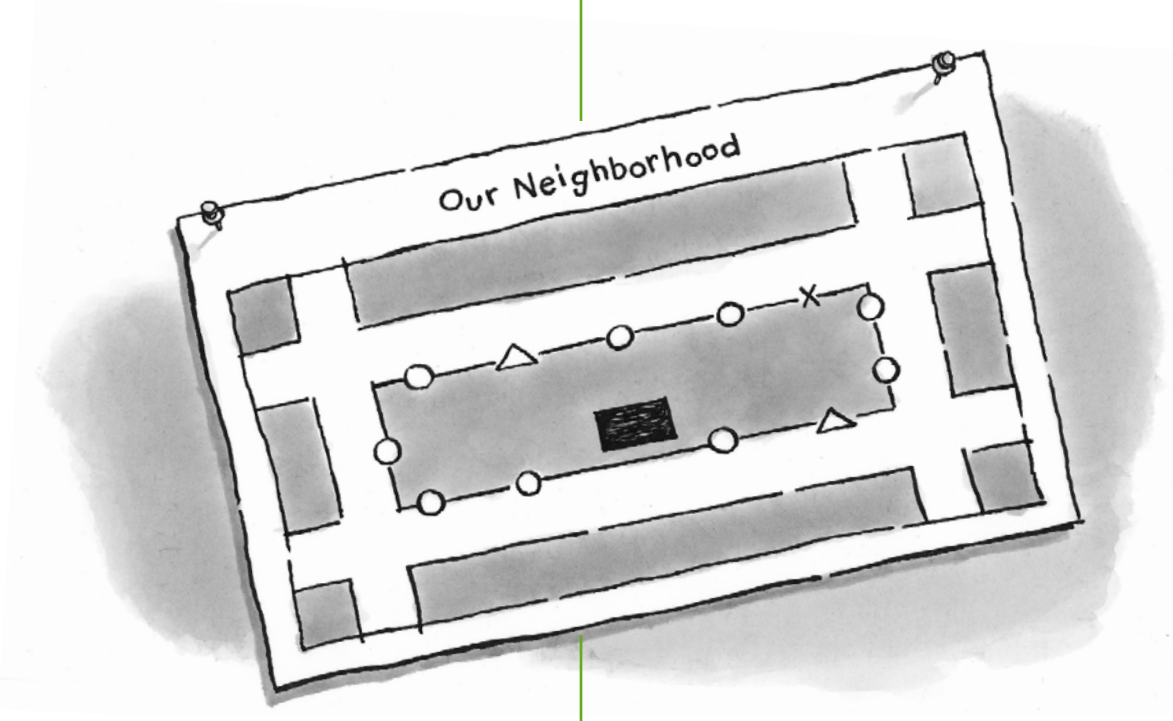
A. Urban Forest Benefits

B. Street Tree Census Results

C. PlaNYC – Street Tree Location

D. Canopy Cover

E. NYC Street Trees – Value



A. URBAN FOREST BENEFITS

Review the list of tree benefits below. Which ones do you think are most important?

Create your own ranking of the importance of some of the benefits: #1 for the greatest benefit to #6 for the least important benefit.

1. _____

2. _____

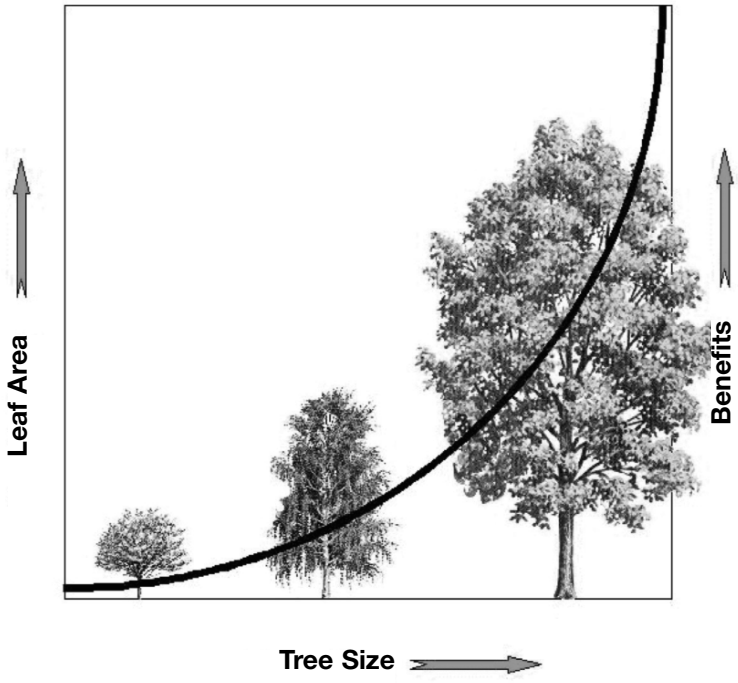
3. _____

4. _____

5. _____

6. _____

- Slow global warming
- Improve the quality of our air and water
- Reduce storm water runoff, flooding and erosion
- Reduce air pollution
- Decrease low-level ozone and smog levels
- Lower summer air temperatures
- Reduce energy consumption and costs
- Encourage active, healthy living
- Improve human and community health
- Create wildlife habitats
- Increase property values
- Attract customers to business districts



Courtesy of NYC Department of Parks & Recreation

B. STREET TREE CENSUS RESULTS

The New York City Street Tree Census shows that there are more of some types of trees and fewer of other types of trees. Locate your own neighborhood in the City to see which tree has the highest number. Did you find that tree on your block?

_____

_____

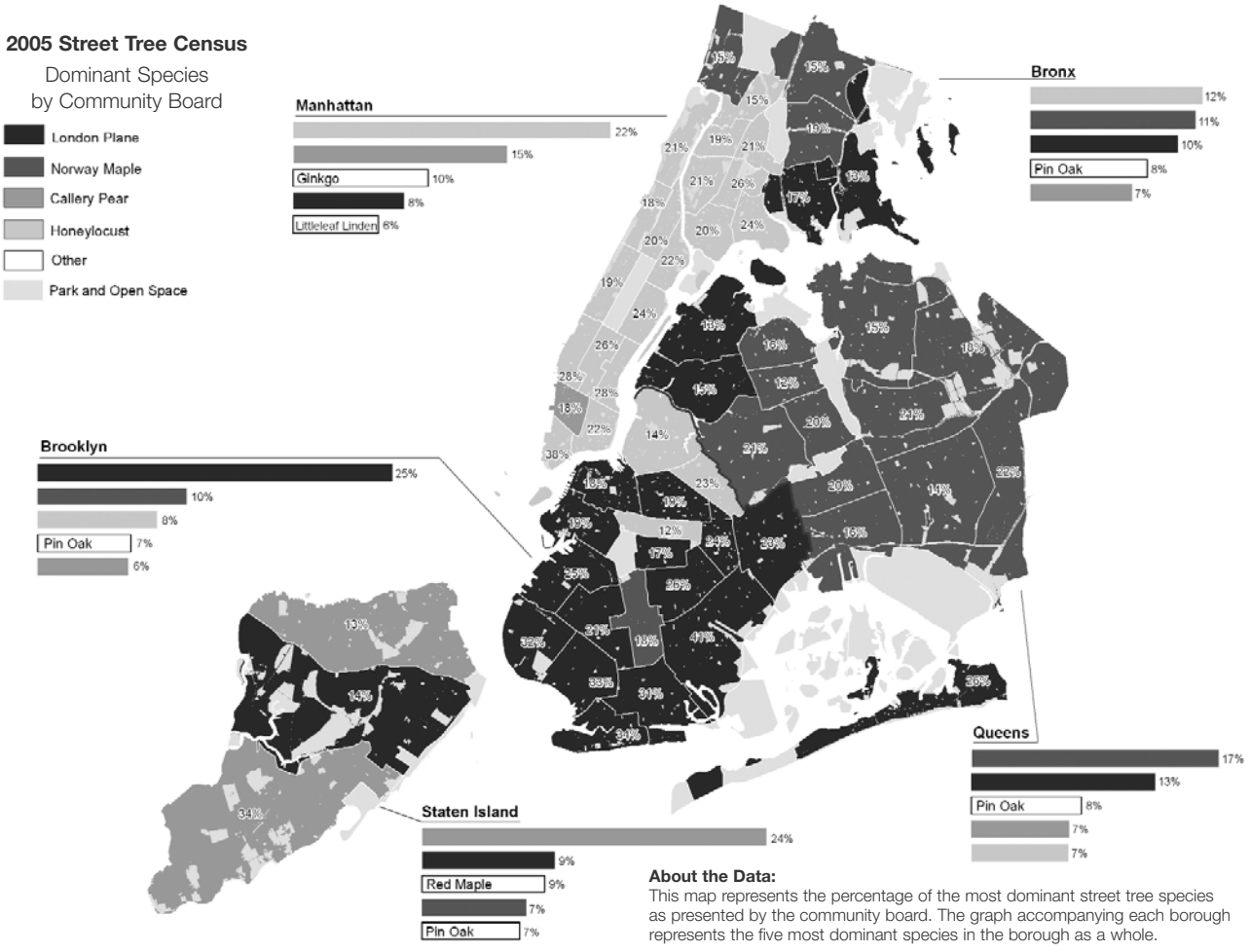
What about your block? Which type of tree had the highest number? Which had the least?

_____

_____

_____

_____



About the Data:
This map represents the percentage of the most dominant street tree species as presented by the community board. The graph accompanying each borough represents the five most dominant species in the borough as a whole.

Courtesy of NYC Department of Parks & Recreation

C. PLANYC – STREET TREE LOCATION

C. **Tree stocking level** means the number of trees actually planted along the street compared to the number of available sites.

What is the percentage of trees in your neighborhood, according to the Parks Department map?

How many new trees will your borough receive?

_____

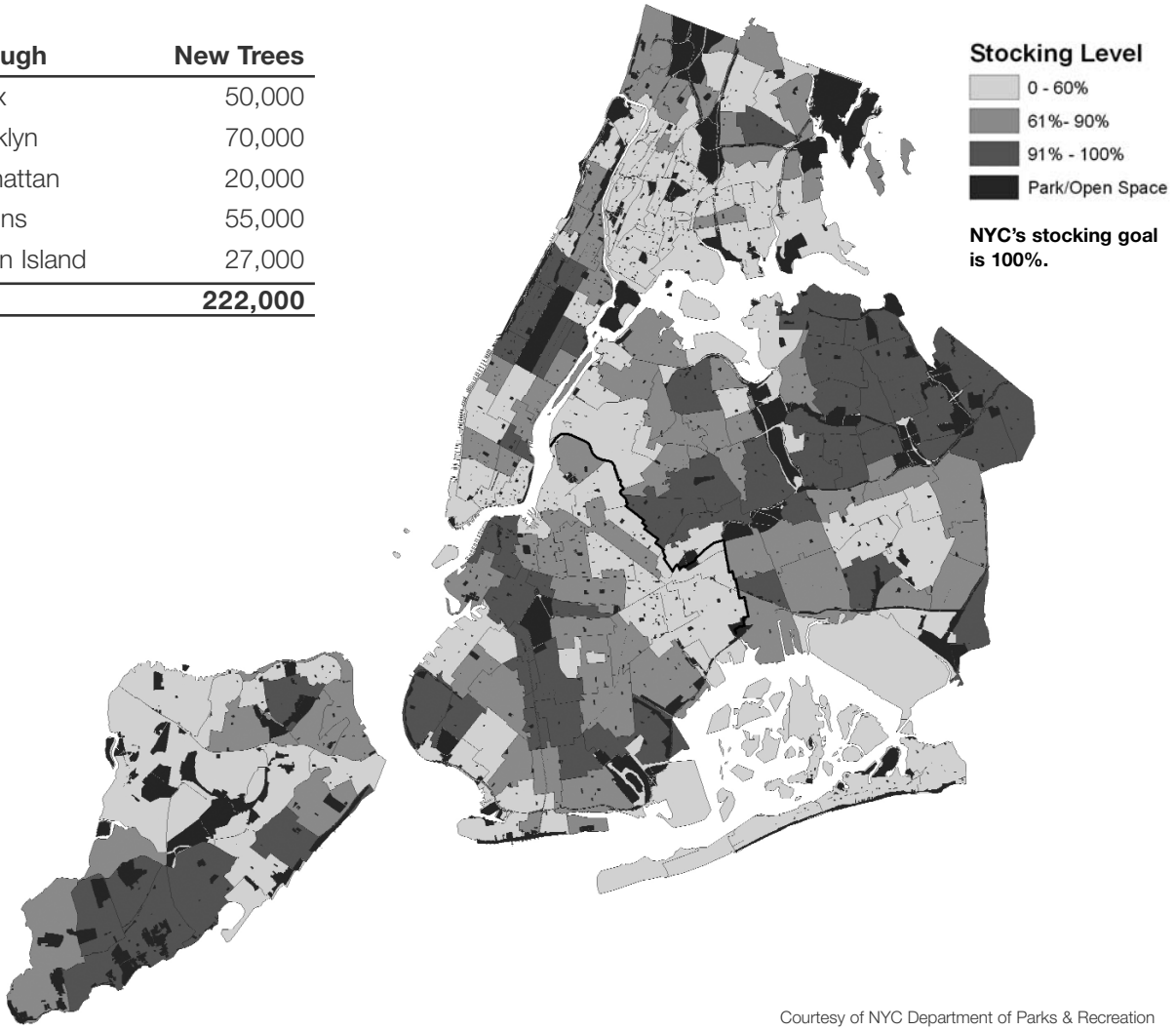
_____

_____

_____

_____

Borough	New Trees
Bronx	50,000
Brooklyn	70,000
Manhattan	20,000
Queens	55,000
Staten Island	27,000
Total	**222,000**



Courtesy of NYC Department of Parks & Recreation

D. CANOPY COVER

D. **Canopy cover** means the area of the streets and sidewalks that are shaded by trees when they are in leaf. A higher canopy cover delivers more benefits to our city's citizens and communities. American Forests, a national environmental organization, recommends tree canopy cover of 40%.

What is the percentage of canopy cover in your neighborhood?

_____

_____

How many more percentage points must New York City create to reach the American Forest's tree canopy goal of 40%?

_____

_____

_____

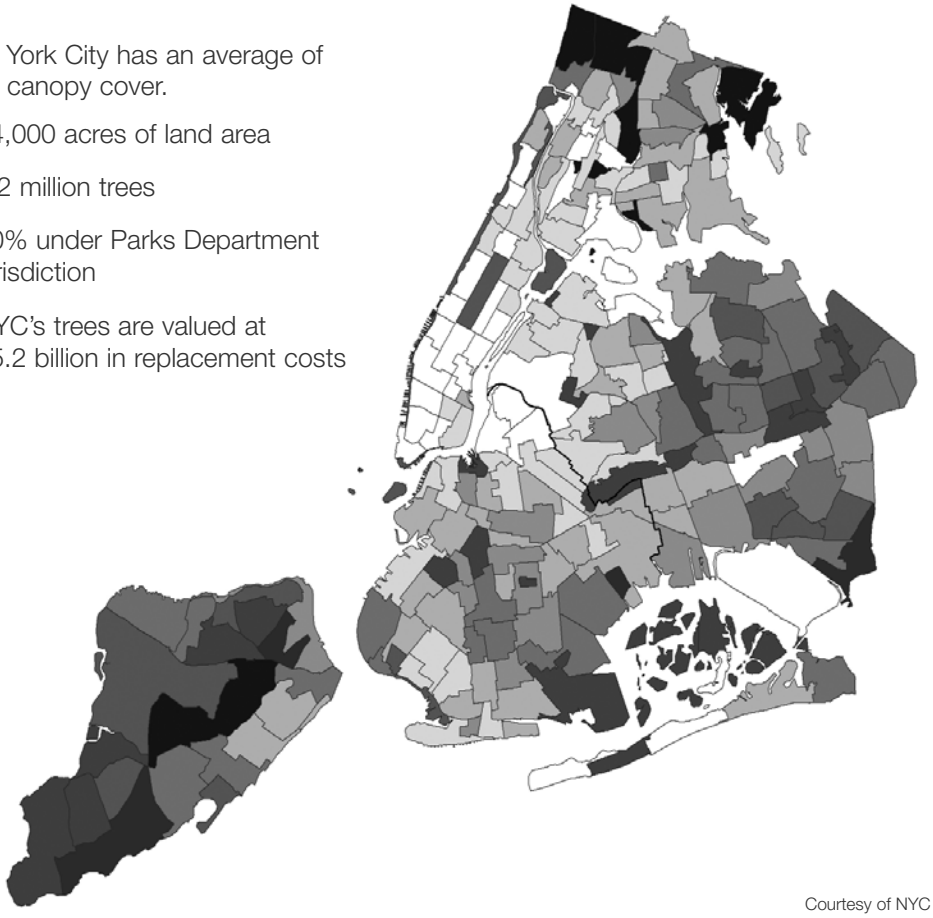
_____

_____

_____

New York City has an average of 24% canopy cover.

- 44,000 acres of land area
- 5.2 million trees
- 50% under Parks Department jurisdiction
- NYC's trees are valued at $5.2 billion in replacement costs



City	Tree Cover (%)
Atlanta, GA	37
Austin, TX	34
Boston, MA	29
Washington, DC	28
Seattle, WA	25
New York City, NY	**24**
Baltimore, MD	19
Philadelphia, PA	16
Jersey City, NJ	12
Milwaukee, WI	11
Chicago, IL	11

Courtesy of NYC Department of Parks & Recreation

E. NYC STREET TREES – VALUE

Research shows that New York City's street trees have enormous value as a result of their benefits. The average value is $208.82 per tree.

Counting all the trees on your own maps, what street tree value does your block provide?

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

NYC Street Trees—Value

Annual Benefits of New York City Street Trees (STRATUM 2007)

Annual Benefits	Total ($)	$/tree	$/capita
Aesthetic/Other	52,492,384	89.88	6.43
Storm Water Control	35,628,224	61.00	4.36
Energy Conservation	27,818,220	47.63	3.41
Air Quality Improvement	5,269,572	9.02	.65
Carbon Dioxide Removal	754,947	1.29	0.09
Total	**121,963,347**	**208.82**	**14.94**

Benefit cost ratio of NYC's street trees is 5:1

Courtesy of NYC Department of Parks & Recreation

Lesson 2

Choosing Your Sites

Concept: Trees and other plants are a vital part of the urban landscape. They provide shade, act as wind buffers, absorb noise, trap pollutants as they filter the air, manufacture oxygen as part of photosynthesis and create shelter for wildlife. Further, they enhance aesthetic pleasure, break the monotony of stone and concrete structures and link urban dwellers to the natural world.

This lesson is designed to heighten students' sensitivity to the various elements of the immediate landscape, as well as to inform and guide decisions on where best to plant trees and other plants for initial establishment and ultimate survival.

2 ACTIVITY ONE

Investigating the Trees and Landscape

Objective:

To discover how the school, park or neighborhood surroundings have been landscaped and to determine suitable sites for planting(s).

Background:

Not every spot in a park, community center or schoolyard is suitable for planting, even if there is soil available. Participants will need to survey areas under consideration to determine factors that might positively or negatively affect newly planted trees, shrubs or seedlings. In addition to participants' own survey, school or municipal authorities must be contacted, both for their approval of the site and for their specialized information that must be obtained.

MATERIALS:
Clipboards
Pencils
Hand Trowels

Procedure:

Divide students or other participants into study groups of 4 to 6 persons. Using the Site Survey Worksheet, assist them as they investigate the schoolyard, nearby parks or other planting areas.

SITE SURVEY WORKSHEET

1. How many trees, shrubs or other plants are growing around your selected site in a schoolyard, playground or park?

2. From your observation, do the trees or other plants seem small, medium or large?

3. Who may have planted these trees and other plants? Why might they have been planted? Are there some that might not have been deliberately planted by people?

4. Is there sunlight during most of the day at this site? Can you find plants growing where there isn't much light? Are any trees leaning toward the sunlight? What area may be the best spot for your tree, shrubs or seedlings?

5. How do the trees and other plants on the site get water if it doesn't rain? Can you find a planting spot where a hose could be extended for watering them?

6. Are there any empty tree pits where a tree might be planted?

SITE SURVEY WORKSHEET

7. Do you see any trees growing close to buildings or fences? Could they cause damage if they continue to grow? Do you see any damage that has already been done? What could happen if you plant your tree too close to a building or fence?

_____

_____

_____

_____

_____

8. Do you think anyone is caring for the trees and other plants at this site? Are there any signs of neglect? Are there exposed roots that might be damaged by people walking on them? Are any of the plants dead?

_____

_____

_____

9. Can you find branches from two trees growing too closely together? What would happen if you planted your tree too close to another tree?

_____

_____

_____

_____

10. A tree can need a lot of space to grow. Your site may not be suitable for trees. Are there areas where you could plant small shrubs or vines for birds, butterflies or beneficial insects to feed or find shelter? These areas are often located near a fence or near a wooden structure, such as a trellis. Shrubs and vines can be planted on slopes too steep for trees. Look for sites that receive lots of sunlight.

_____

_____

_____

11. Use hand trowels to investigate the hardness of the soil at your proposed site. Is it loose or packed down? Will your plants be able to get water to their roots if the soil is too hard? How will you protect the soil around your plants from becoming hard and packed down?

_____

_____

_____

12. Is there a driveway or main walkway near your proposed site? How far do you think you should plant a tree from a sidewalk or driveway to help protect it from cars, trucks or careless walkers?

_____

_____

Measuring and Mapping a Planting Site

Objective:

To learn how to correctly **measure dimensions and objects** in a selected site and to **transfer that information to usable maps** that will aid in planning and planting at the site.

Background:

Once a site for a tree or wildlife shrub/seedlings is chosen, proper placement must be planned so that the plants will be able to grow successfully. Observation and measurement of the chosen site can help identify proper size and spacing, whether it is one tree or a number of smaller plants.

After field measurements have been taken, data can be transferred to graph paper indoors to complete small, accurate maps.

MATERIALS:

Clipboards

Pencils and Colored Markers

Site Survey Worksheets (previously prepared)

Blank Paper for Note-taking

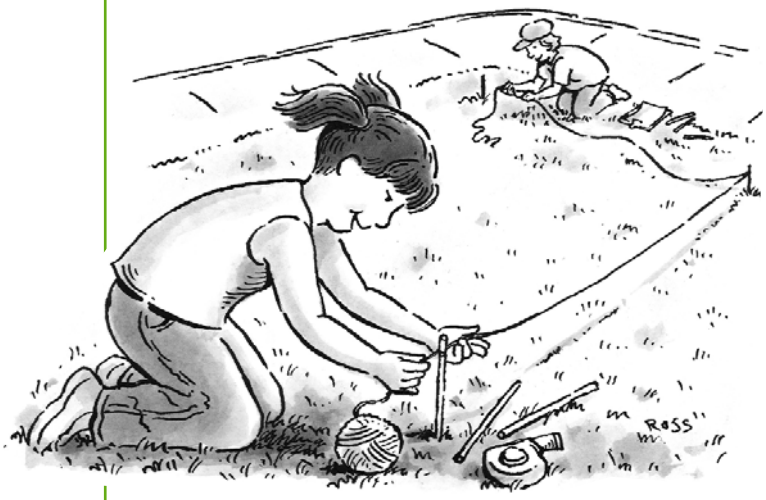
One or More 50-foot Tape Measures

Small, Wooden Stakes or Dowels

String

Graph Paper, 8.5" x 11" size

Poster Boards for larger displays



This information may also be transferred to larger poster boards for easier planning.

Procedure:

1. After careful observation, a site for a tree or for wildlife shrub/seedlings should be chosen. Refer to the Site Survey Worksheets previously prepared.

2. Using tape measures, carefully measure the chosen site. Adequate square footage for a **tree** will be a rectangle or square that is 100 square feet. Adequate square footage for a free, urban **wildlife shrub/seedling** packet will be a rectangle or square that is 900 square feet. Seedlings should be planted 6 feet apart.

3. Using the colored markers, mark the ground at the corners of your measured site(s).

4. Put stakes or dowels at the corners and tie string tightly between the stakes/dowels.

5. Measure again with the tape measures and record the measurements in your notes.

6. If there are already plants, trees or built structures in your site, measure how far they are from the outside dimensions, as outlined by the strings.

7. Indoors, transfer the data collected to individual maps on graph paper. Use a common ratio for the transfer, such as 10 feet equals 1/4 inch.

8. For larger displays and for easier planning, transfer the measurements to poster boards. Use common ratios for accurate reading of data.

(See page 37 for ordering information.)

Measuring Slope

Objective:

To show how land can be surveyed for **slope** and to consider how slope can affect site selection and planting.

Background:

Soil erosion is a serious problem in the establishment of healthy, growing trees. In order to help ensure the survival of your tree, it is important that the tree be planted in an area with a slope of less than 10% off the horizontal plane.

A slope of 10% to 15% indicates a special need for erosion control methods, such as placement of wooden barriers (cribbing) to keep soil from washing away. Since most schoolyards and parks have already been graded, it would be unusual to find a slope of more than 5%. The following exercise can be used by students to find the slope percentage and to compare different planting sites.

MATERIALS:

A Wooden or Plastic Board, 100 inches long

A Small Plastic Jar with Water (Baby food jar is ideal.)

A Ruler

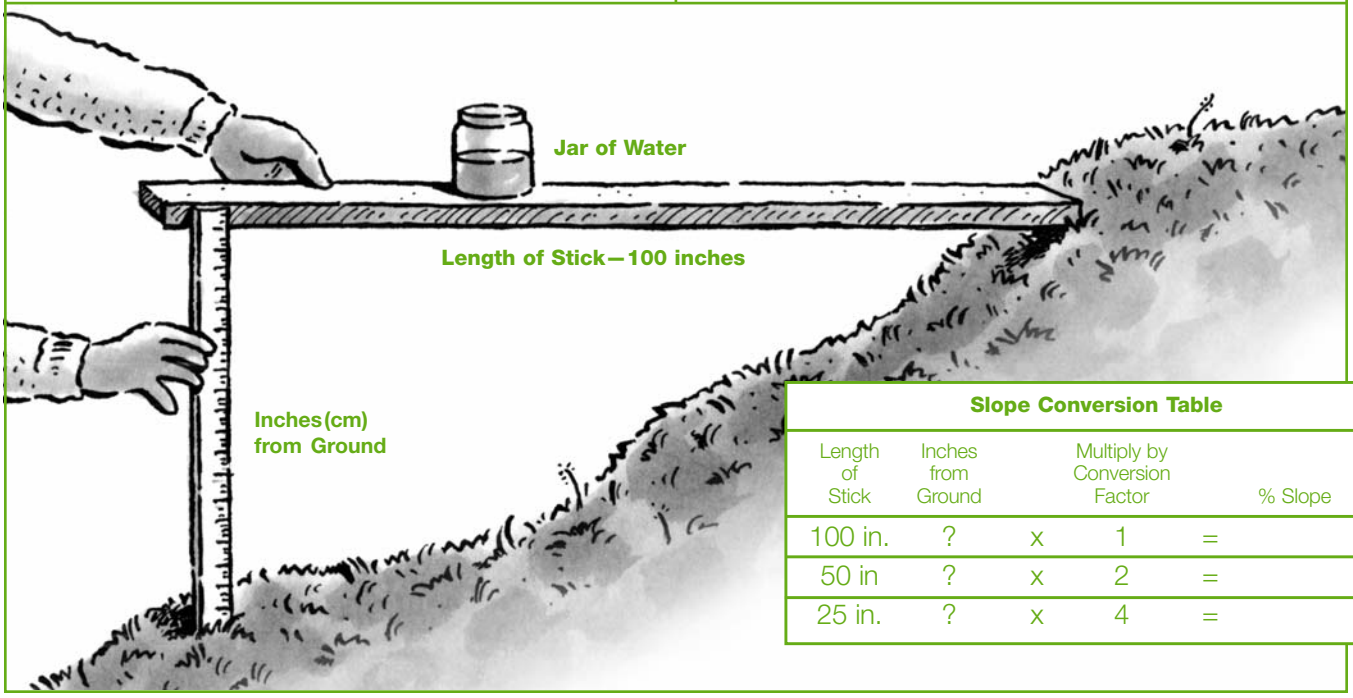
Procedure:

1. Place a 100-inch-long board on the ground and place a small jar of water on one end of the board to act as a level.

2. Raise the board by lifting the end with the jar until the water in the jar is exactly level.

3. Measure the number of inches between the lifted end of the board and the ground. Given the 100-inch length of the board, the slope of the land in percentage is equal to the distance in inches between the board and the ground. (For example: 3 inches = 3%.)

4. Find the area with the greatest slope in your site selection area. Is there evidence of soil erosion? Are plants or trees being negatively affected by the slope? Shrubs and vines can often be successfully planted on steeper slopes. Areas with erosion can be good places to add more soil and establish these plants, as they can help hold the soil.



Slope Conversion Table

Length of Stick	Inches from Ground		Multiply by Conversion Factor		% Slope
100 in.	?	x	1	=	
50 in	?	x	2	=	
25 in.	?	x	4	=	

2 ACTIVITY FOUR

Testing pH

Objective:

To understand the importance of **soil acidity** or **alkalinity**, its effect on plant growth and how it can be tested.

Background:

Plants need sun, soil, air and water to survive. Some plants grow better in shade or can withstand colder weather conditions. Most need a particular type of soil in which to grow well. Tests for pH will indicate how acidic or alkaline the soil is and aid in determining the choice of the tree to be planted. The following experiment introduces the concept of pH and should be followed by an actual soil test.

MATERIALS:

- Grape Juice
- Baking Soda
- Vinegar
- Water
- Two 8-ounce Plastic Glasses
- One Teaspoon Measuring Spoon
- Eye-dropper

Procedure:

1. Put one teaspoonful of grape juice in a glass.

2. Fill glass with water and mix well.

3. Add one teaspoonful of baking soda to another glass of water, and stir until soda is dissolved.

4. Using the eye-dropper, add the baking soda solution to the glass of diluted grape juice, drop by drop, until it turns blue or purple.

5. Using the eye-dropper, add vinegar, drop by drop, until the liquid turns pink or red.

Explanation:

The **pigment** in grape juice (anthocyanin) is a natural indicator of the acidity or alkalinity of a substance. It changes color in the presence of an acid (pinker) or alkaline (bluer). The addition of baking soda (NaHCO3) causes the blue color to appear. Vinegar contains acetic acid, which causes the color to change to pink.

Most urban trees thrive in slightly acidic soil; a few prefer neutral to slightly alkaline soils. See the list of common trees available, with preferred soil conditions on page 25. To test soil at the selected site, purchase a low-cost soil test kit at a local hardware or plant store, or send a soil sample to Cornell University for testing. For more information, access www.css.cornell.edu/soiltest.

TREES PREFER PROPER SOIL PH

Trees thrive when they are planted in soils with appropriate pH levels. Most trees will do well in soils between pH 6.5 and 7.0. However, some trees must have acidic soils (< 7.0), some can grow well into the neutral range (< 7.5) and some can tolerate pH's up into the alkaline range (< 8.2). The trees below are arranged in their preferred pH range.

These trees prefer more acidic soil (pH < 7.0)


Cherry


Cucumber Magnolia


Pin Oak


Red Maple

Cherry
Cucumber Magnolia
Pin Oak
Red Maple

These trees can grow in a more neutral soil (pH < 7.5)


Beech


Dawn Redwood


Eastern Hemlock


Paper (White) Birch


Red Pine


Red Oak


Scarlet Oak


Scotch Pine


Serviceberry


Sweet Gum


White Oak

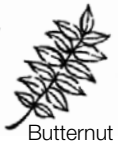

White Pine

Beech
Dawn Redwood
Eastern Hemlock
Paper (White) Birch
Red Pine
Red Oak
Scarlet Oak
Scotch Pine
Serviceberry
Sweet Gum
White Oak
White Pine

These trees can tolerate a high pH (pH < 8.2)


American Elm


Ash


Butternut


Callery Pear


Catalpa


Colorado Blue Spruce


Crabapple


Eastern Redbud


Ginkgo


Golden Raintree


Hawthorn


Honeylocust


Horsechestnut


Japanese Tree Lilac


Katsura


Kentucky Coffeetree


Linden


Northern White-Cedar


Norway Maple


Scholar Tree


Silver Maple


Sycamore/London Plane


Tree of Heaven


Tulip Poplar


Willow


Zelkova

American Elm
Ash
Butternut
Callery Pear
Catalpa
Colorado Blue Spruce
Crabapple
Eastern Redbud
Ginkgo
Golden Raintree
Hawthorn
Honeylocust
Horsechestnut
Japanese Tree Lilac
Katsura
Kentucky Coffeetree
Linden
Northern White-Cedar
Norway Maple
Scholar Tree
Silver Maple
Sycamore/London Plane
Tree of Heaven
Tulip Poplar
Willow
Zelkova

Competition & Survival

Objective:

To understand how plants compete for available space, food and light.

Background:

All plants have the same basic needs for survival. Therefore, plants growing next to each other are competing for the same nutrients, water and sunlight. Plants have evolved mechanisms for seed dispersal to ensure the survival of their species. This classroom experiment illustrates how competition can affect plant growth. As a result of this experiment, students will logically select a planting site that offers as little competition for the new tree as possible.

MATERIALS:

- Four One-quart Milk Cartons
- Small Bag of Potting Soil
- Bean Seeds (62)

Procedure:

1. Cut four milk cartons in half, and punch holes in the bottom for drainage.
2. Place 2 in. of potting soil in each container.
3. Label cartons #1, #2, #3 and #4.
4. Place 2 seeds in carton #1, 10 in #2, 20 in #3 and 30 in #4.
5. Cover seeds with soil and keep moist, but not soggy.
6. Place in a warm, well-lighted location.
7. Record the height of the growing plants after every 3rd day.
8. After 2 weeks, remove the soil and examine the roots. What is happening to the plants in the crowded cartons? Can students find similar examples of competition among street trees or among trees and plants in parks or vacant lots?

How Chemicals Affect Plants

Objective:

To show how plants can be harmed by pollutants dispersed by people.

Background:

Even if a tree has a plentiful supply of water, loose soil for its roots and a good nutrient supply, it can still be harmed by chemical pollutants from winter salting, carbon monoxide and lead from cars and trucks and contaminants from dog urine.

Your Arbor Day site may be too close to a driveway or a heat vent from a building. The tree may become a favorite post for neighborhood dogs. Trees affected by air pollutants may respond by the yellowing of leaves or premature leaf drop. Trunks of trees that are favorite destination spots for dogs will eventually show resulting bark damage. Small trees are highly affected by urine salts that desiccate the tiny root hairs just underground. Arbor Day trees should, if possible, be protected from these harmful effects.

MATERIALS:

- Three Small Leafy Plants in Pots
- Table Salt
- Ink
- Cleaning Solvents
- Oil

Procedure:

1. Select 3 separate plants in pots for the experiment.
2. Water two of the plants with salty water and the third with normal tap water.
3. Observe the condition of the plants over time. Continue to water two with salty water, while watering the other one with normal tap water. Observe the effects.
4. Under controlled conditions, you may introduce other possibly harmful substances, such as inky water, cleaning solvents or household oils. Observe the results.

Lesson 3

Planting Your Tree

Concept: In the second lesson, participants learned how to assess and choose an appropriate planting site. This lesson focuses on successful tree planting. From the information that was gathered, the chosen site will allow enough space for a growing tree; good soil conditions; protection from pedestrians, cars or delivery trucks; and have minimal slope.

The next step is to successfully plant your tree. After your tree or trees have been planted, consider adopting a neighborhood street tree. These trees often need watering and other care. Regular attention can prolong their lives, so they can continue to add value and beauty to the community.

3 ACTIVITY ONE

Parts of a Deciduous Tree

Objective:

To acquire or review vocabulary words related to the scientific concepts involved in the study of trees, to gain an understanding of a tree as **a living organism** and to learn how a tree interacts with its surroundings.

Background:

In order to be able to understand the reasons for specific procedures involved in the planting of a tree, participants should study how the parts of a tree function. This lesson focuses on basic **botany** and the **anatomy** of a tree.

Procedure:

Using the tree diagrams provided, participants should label the following correctly:

1. Tree

A) Crown
B) Leaves
C) Trunk or Stem
D) Roots
E) Tap Root
F) Bark

2. Stump

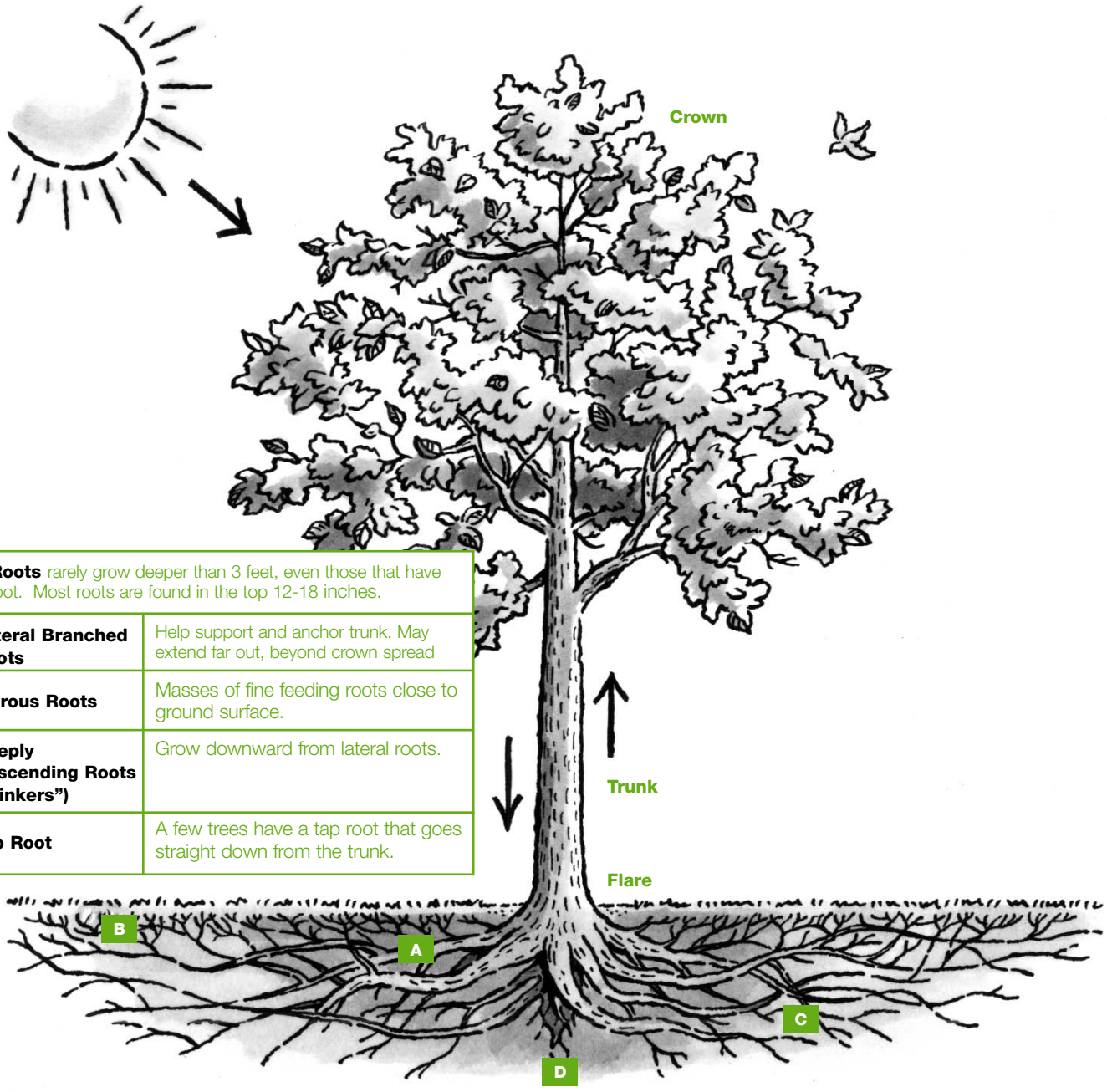
A) Growth ring
B) Outer bark
C) Cambium
D) Xylem
E) Phloem
F) Heartwood

Class Discussion:

Using the information provided and their own diagrams, lead the participants in a discussion of how the tree behaves as an organism and how it grows during spring, summer and fall. What happens to the tree in winter?

As part of an art class, the participants may draw their own versions of deciduous trees and the animals and insects they see associated with trees in their neighborhood.

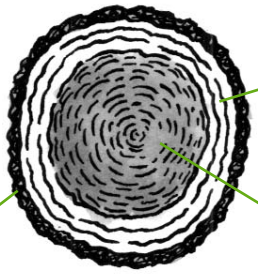
THE GROWTH OF A TREE



Tree Roots rarely grow deeper than 3 feet, even those that have a tap root. Most roots are found in the top 12-18 inches.		
A	**Lateral Branched Roots**	Help support and anchor trunk. May extend far out, beyond crown spread
B	**Fibrous Roots**	Masses of fine feeding roots close to ground surface.
C	**Deeply Descending Roots ("Sinkers")**	Grow downward from lateral roots.
D	**Tap Root**	A few trees have a tap root that goes straight down from the trunk.

Cambium is the layer of cells where growth in diameter occurs. It builds **Xylem** on the inside and **Phloem** on the outside.

Phloem cells allow the food made in the leaves to travel down to the branches, trunk and roots.



Xylem cells allow the sap to flow up from roots to the leaves.

Heartwood is composed of old, inactive xylem cells that give strength to the tree.

Invertebrates
which eat dead leaves:

Pill bugs (Isopods)
Worms
Beetles
Ants
Micro-organisms

Growth of Plant Roots

Objective:

To observe how roots grow and how they respond to their environment.

Background:

The roots and stems of plants contain chemicals called **auxins** that cause the roots to bend downward in response to gravity and the stems to grow up toward the light. If a tree is planted improperly, roots and stems continue to grow, but the tree's vigor, form and lifespan will be threatened.

Procedure:

1. Line the sides and bottom of a plastic glass with a wet paper towel. Keep a small amount of water in the bottom of the glass at all times. Slip bean seeds between the bottom and sides of the glass and the towel.

2. As the plant begins to grow, measure the roots until they are 2 to 3 inches long. Lay the glass on its side so that the roots are parallel to a table or shelf near the window or under a light.

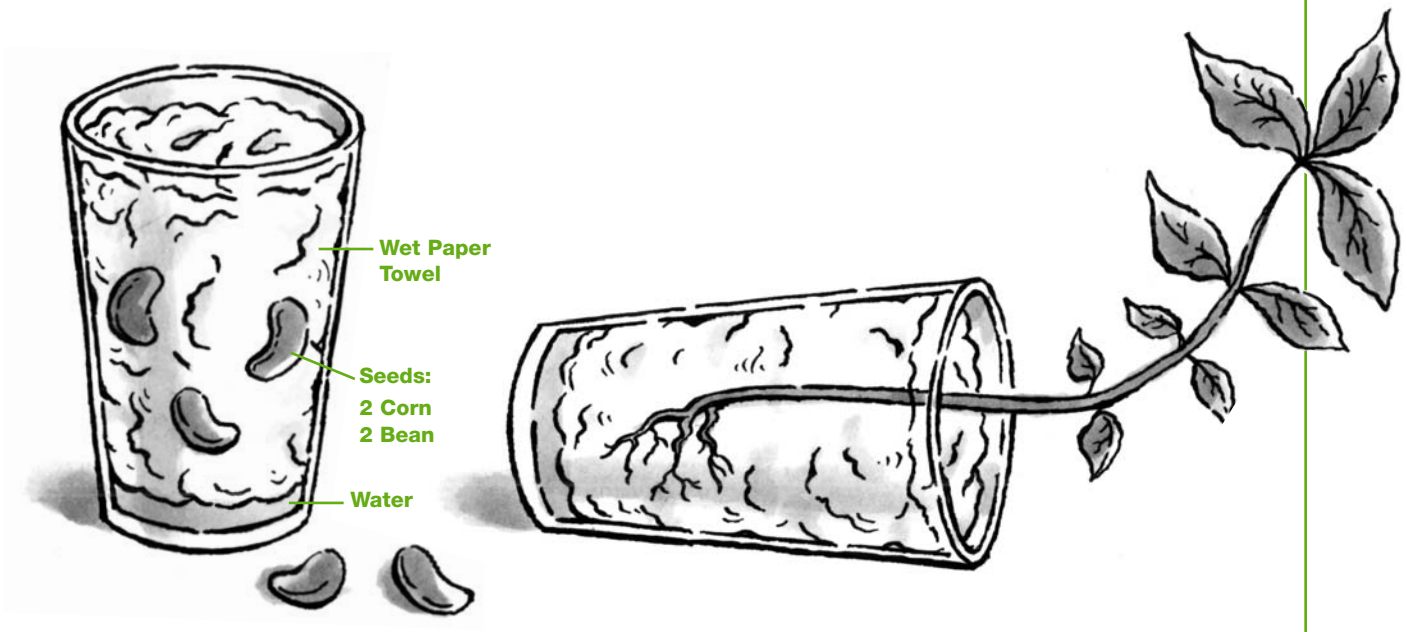
3. Observe the direction of growth of the roots and stems for one week. Observe as they begin to turn in response to the chemicals that build up in their tissues.

MATERIALS:

- One Plastic Glass
- Paper Towels
- Bean Seeds

Follow-up:

Establish a root collection by having students bring various common plants in to class from yards, gardens or vacant lots. Using curriculum information and student diagrams, look for **tap roots**, **fibrous roots** and **branched roots**. Once plants have been identified, cover the leafy areas and challenge students to identify the plants by their roots.



A Close Look at Soil

Objective:

To discover the components from which **soil** is made.

Background:

Soil is not just dirt. It is a mixture of **minerals, decaying leaves** and **living organisms.** The soil that is available for city trees is often generally deficient in **organic matter** and can lack important minerals and nutrients that are vital for proper plant development. However, in landscaped school yards, the soil is more likely to be sufficient for growing healthy trees.

MATERIALS:

- Hand Trowel
- Commercial Soil Mix
- Bean Seeds
- Plastic Jar with Cap

Procedure:

1. Collect some soil from the area where your tree will be planted.

2. Fill the jar half-way with the soil.

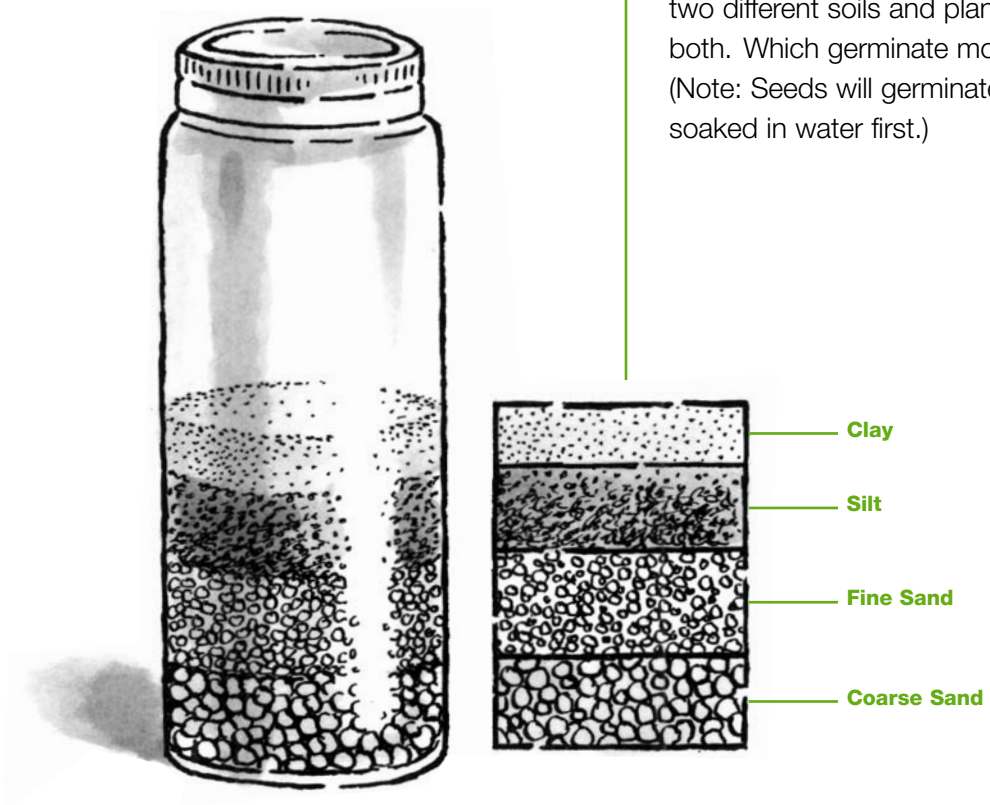
3. Fill with water, cover and shake vigorously.

4. The soil will settle to the bottom. Allow the jars to settle out, and leave them untouched overnight. Soil particles will settle out by size: layers of sand at bottom, particles of silt in the middle and fine clay above. Organic materials will float to the top.

5. Observing the jar, students can study and draw their own soil profiles of the planting site soil.

6. Repeat the experiment using commercial potting soil and compare the two results. Which soil profile would be able to sustain plants in a better way?

7. Prepare small plastic containers with the two different soils and plant bean seeds in both. Which germinate more quickly? (Note: Seeds will germinate more quickly if soaked in water first.)



Drainage

Objective:

To learn how poor **drainage** can affect the health and growth of plants.

Background:

The last activity introduced the idea that soil is made up of different materials and can be divided by soil **particle size**. Soils with large amounts of small particles, such as clay, are easily compacted and impede proper drainage. **Compaction** in clay soils suffocates the roots, since air is unable to reach them. Sandy soils tend to remain looser and hold water less effectively. Thus, extremes in either direction can negatively affect plant growth. Soil quality can be improved by mixing in organic material (leaves and compost) to reach the proper balance needed.

MATERIALS:

- Large Metal Can with Ends Removed
- Ruler
- Hammer and Trowel
- Watch with Second Hand or Digital Watch

Procedure:

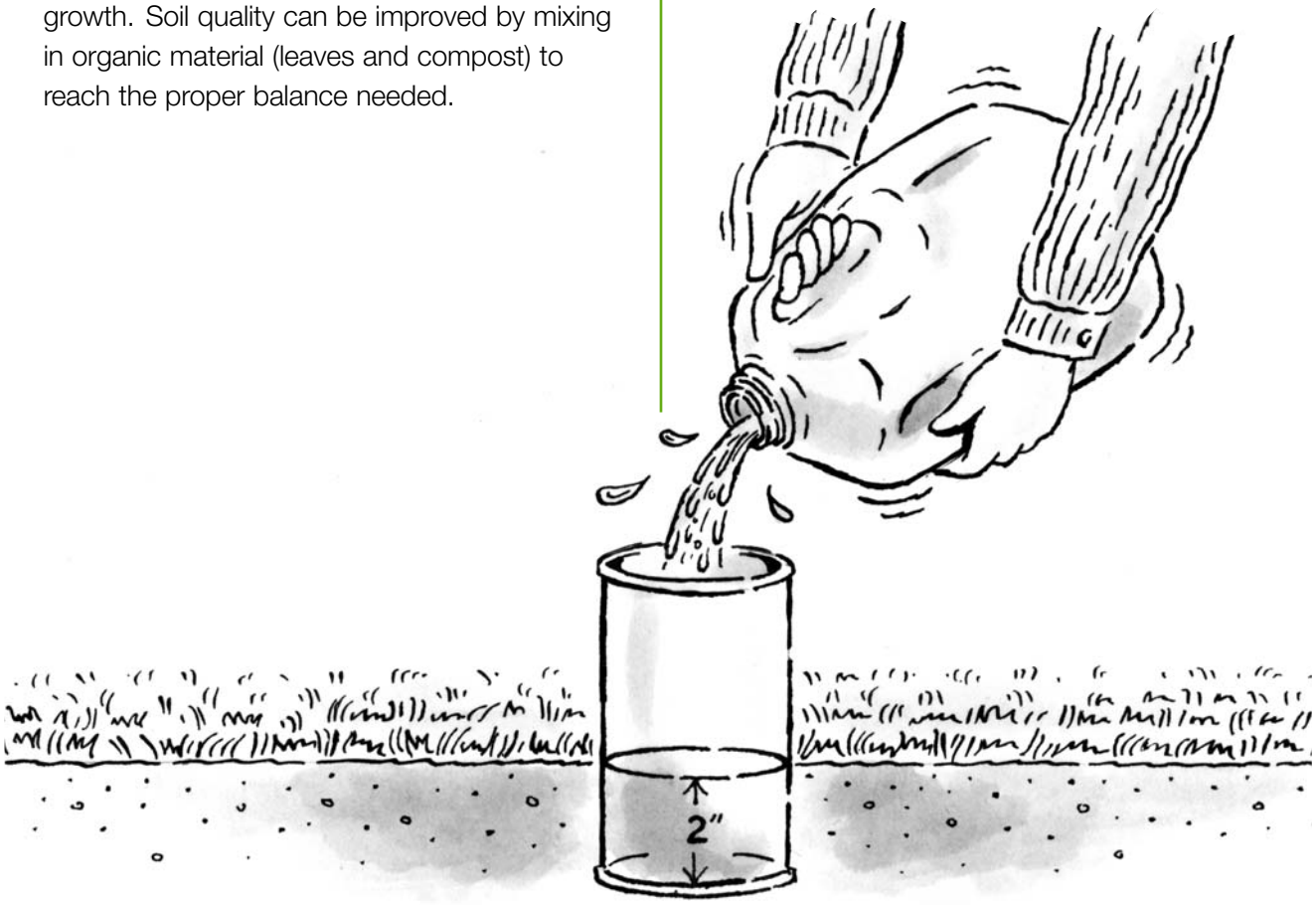
1. Identify a number of places where a tree could be planted.

2. Place the open can on the soil. Tap it in gently with the hammer to a depth of at least 1 inch.

3. Fill the can with water. Measure the amount that is absorbed by the soil over a 3-minute period.

4. Loosen the soil, and repeat the procedure.

5. Test to see if the hole dug in the tree site has drainage by leaving the can of water in place overnight. The water should be absorbed within 8 hours or there will be a danger of root decay due to a collection of excess water. To improve drainage, mix the soil with sand and organic materials.



3 ACTIVITY FIVE

How to Transplant

Objective:

To assist participants in the proper transplanting process that will result in a healthy, established tree.

Background:

Transplanting produces a shock to a tree's growth system. It must be done in a way that creates as little stress as possible. The danger of water loss is especially critical.

Preferably, the tree will be a small containerized one. It may also be one that is **bare-root**, with the roots wrapped in plastic or burlap. At all times, care must be taken to keep the roots moist, but not wet. (Larger trees, which may be **balled-and-burlapped**, will not normally be trees that young participants will plant without professional assistance.) If the tree is delivered before the planting day, it should be kept in a cool, dark place.

Procedure:

1. Dig the hole for the tree in the selected spot at least twice as wide and as deep as the root mass of the tree. Do not loosen soil at the bottom of the hole. Save the loose soil on a piece of plastic or on newspapers.

2. If the sides of the hole are shiny and compacted, break them up with the point of the spade or shovel.

3. Put some of the loose soil you have dug back into the hole, and press it down to make a solid base for the tree roots.

MATERIALS:

Digging Tools (such as spades and/or shovels)

Watering Cans or Jugs (A perfect container is a one-gallon milk or water jug that students can often decorate as part of an art lesson.)

Organic Material (such as shredded leaves or prepared compost.)

A Sheet of Plastic or Old Newspapers

Dig the hole as deep as the roots and at least twice as wide as the root span, or the rootball.

Prepare a firm base of soil at the bottom of the hole so the tree will be stable.

4. Pour one gallon of water into the hole, and let it absorb.

5. Place the tree carefully in the hole, making sure the roots do not curl around the trunk. The roots should be arranged to go outward in a circle away from the trunk. Be careful that the roots do not cross each other.

6. Using the remainder of the dug soil, fill in carefully around the roots, pressing down firmly.

7. **Important:** Make sure the trunk of the tree is above the ground and the roots are below. The bottom of the trunk spreads out slightly in an area called the **flare**.

The flare should be above ground and level with where the tree meets the surface of the soil.

8. Form a small basin of soil around the trunk to prevent water run-off.

9. Water thoroughly with 2-3 gallons of water.

10. Cover the top of the tree pit with shredded leaves, prepared compost or mulch. Do not pile compost up the side of the trunk.

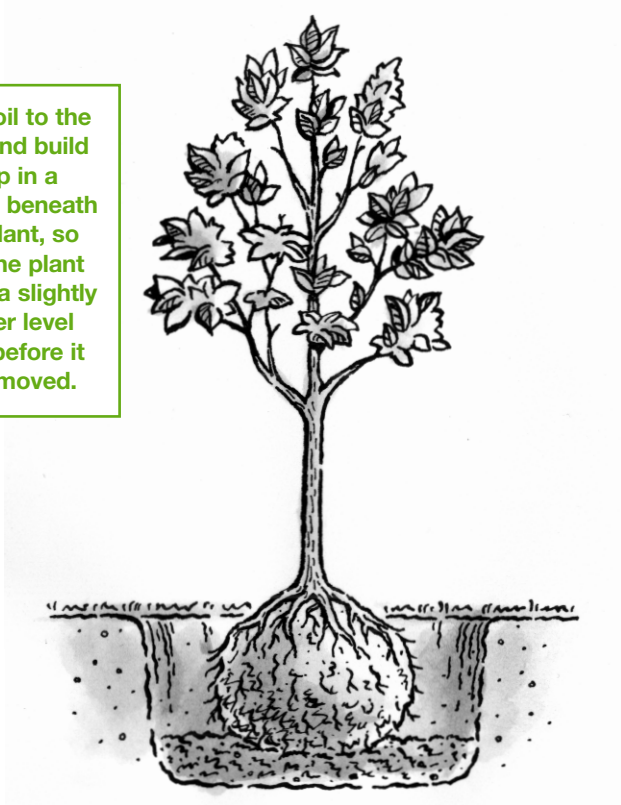
11. **Make a watering schedule. Slowly pour 8 gallons of water once a week around the tree. The tree will need regular watering for the first two growing seasons, except during periods of heavy rain. This will be especially important in the summer months.**

12. If the soil around the tree becomes compacted, loosen gently with hand trowels so water can penetrate the soil.

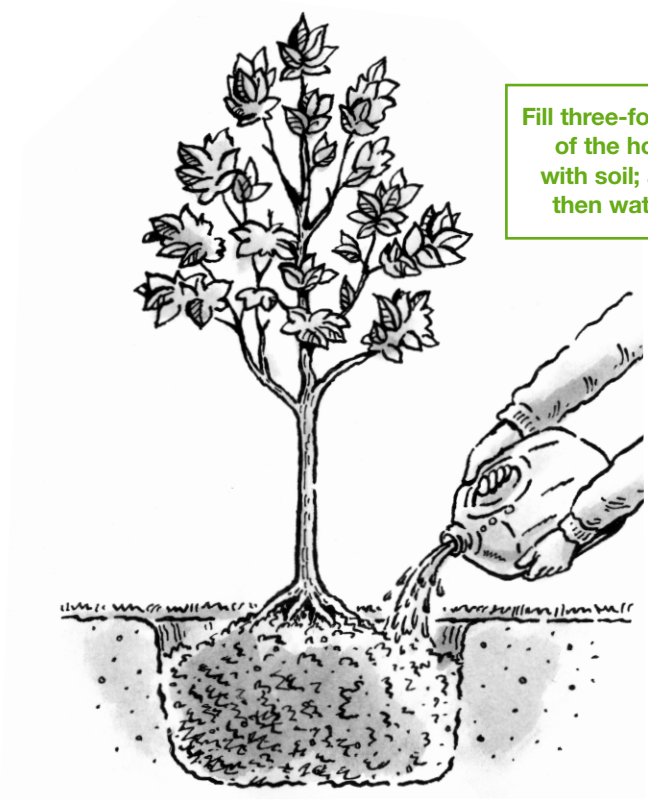
13. **Register your newly planted tree so it will be counted toward the MillionTreesNYC goal of planting one million new trees. Log on to www.milliontreesnyc.org, and follow instructions for registering your tree.**

(See page 37 for ordering information.)

Add soil to the hole and build it up in a mound beneath the plant, so that the plant sits at a slightly higher level than before it was moved.



Fill three-fourths of the hole with soil; and then water.



Transportation of Water Through Stems

Objective:

To demonstrate the function of the **trunk** or **stem**.

Background:

Plants have a plumbing system **(capillary action)** that allows them to transport water against the forces of gravity. Capillary action enables the watery nutrients absorbed by the roots to reach the leaves and take part in the process of photosynthesis. The tubes in which the water flows up are **xylem**; those carrying food back down to the growing leaves and roots are **phloem**.

MATERIALS:

- One Large Celery Stalk with Leaves
- Two Plastic Glasses
- Two Colors of Food Dye

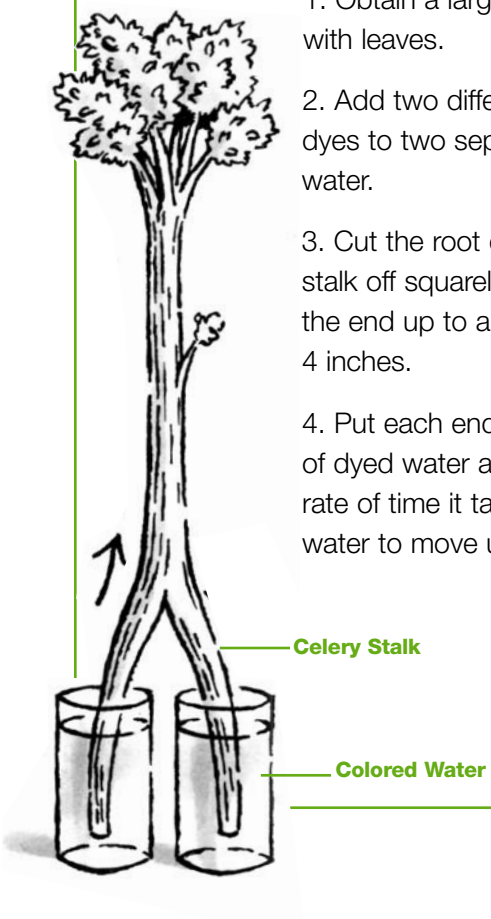
Procedure:

1. Obtain a large celery stalk with leaves.

2. Add two different vegetable dyes to two separate glasses of water.

3. Cut the root end of the celery stalk off squarely, and split the end up to approximately 4 inches.

4. Put each end in its own glass of dyed water and observe the rate of time it takes for the water to move up the stalk.



Function of Leaves

Objective:

To demonstrate the function of the leaves in establishing and sustaining tree growth.

Background:

The leaves of **deciduous** trees have pores called **stomata**. These are primarily on the underside of the leaves. Each stoma opens and closes in response to the amount of water in the leaves, and closes and retains water during dry periods. It is critical for leaves to retain water for the purpose of **photosynthesis**, during which the tree creates **starches** for survival.

MATERIALS:

- Two Clear Plastic Cups
- Thin Cardboard

Procedure:

1. Cut a piece of cardboard to fit over the top of a clear plastic cup. Fill the cup with water, and glue cardboard to the top.

2. Punch a hole through the cardboard, and place the stem of a freshly picked leaf through the hole into the water.

3. Cover the leaf with another plastic cup, and place in a warm spot.

4. Record what happens. How long does it take for moisture to form in the container? What happens to the leaf when the top plastic cup is taken away?

Follow-up:

Test the leaves for starch content by adding a drop of diluted iodine. A blue color indicates the presence of starch. Perform the same test on a piece of bread. How will the leaf respond to the starch test if it is taken away from the light?

Adopt-a-Tree

Objective:

To foster a sense of community responsibility for schoolyard and neighborhood street trees.

Background:

Using the knowledge gained in previous activities, participants will be able to provide simple maintenance for trees they have planted. They can also provide care for other trees nearby, on adjacent streets or in local parks.

Procedure:

Although trees need professional help as well, trained volunteers of all ages can assist by performing the following tasks:

1. Using gloves, clean out litter in tree pits. This litter is unsightly and may prevent water from reaching the roots.

2. Loosen compacted soil gently in the tree pit, allowing water to penetrate and help with air exchange to the roots.

3. Remove competitive weeds from the pit. Shred them to use as compost for the soil.

4. Water new trees and other trees when in a drought with 15-20 gallons of water per week during the growing season.

5. Create additional mulch by providing wood chips or by shredding dropped leaves.

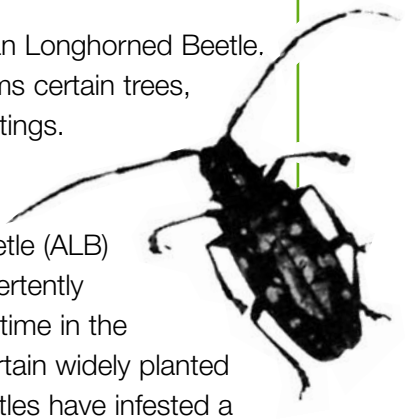
6. Ask dog-owners and dog-walkers to curb dogs as acidic urine can create holes in the bark or desiccate (dry out) tiny root hairs in the soil around the tree.

7. Create posters about caring for trees, and place them in nearby store windows. Laminate tree care information, and attach to tree guards.

Help Spot the Asian Longhorned Beetle!

Objective:

To learn to identify the Asian Longhorned Beetle. an invasive insect that harms certain trees, and to report possible sightings.



Background:

The Asian Longhorned Beetle (ALB) is an insect that was inadvertently imported from China sometime in the mid-1990's. It feeds on certain widely planted host trees. After these beetles have infested a tree for some time, they will have eaten so much of the cambium (growing) layer of tissue that the tree cannot survive.

ALB has continued to slowly infest many more trees. Though it is not eradicated, its spread has been curtailed. Informed citizens have been greatly helpful in identifying where trees have been infested. They report these trees and sites to the ALB Hotline.

Procedure:

1. Study the picture of the ALB that is provided. Look for beetles on trees or slowly flying from tree to tree. They are most active in spring.

2. Examine the trunks carefully. If you see small, round holes about the size of a dime, this could be evidence that adult beetles have matured inside the trees and have eaten their way out.

3. Carefully observe the soil at the bottom of the trees. There may be frass or sawdust that is left behind when the adult beetles exit the trees.

4. If you see a tree that you think is infested with ALB, report it at once to the Hotline.
Call: 1-877-STOPALB.

Late Winter Forced Blooms

Objective:

To study twigs in winter and observe early budding and blooming.

Background:

Trees can be studied, even when they are dormant during the winter season. As spring approaches and available light increases, various species begin to have swollen buds, blooms and leaves. Participants can best observe this by creating a classroom exhibit, even in the cold of February. The indoor warmth will help force the buds into early bloom. Charcoal keeps the water fresh.

Procedure:

1. Use data from previous activities to identify nearby trees, even when their leaves have dropped. After mid-February, cut twigs from various trees to bring indoors to observe their bloom.

2. Place each twig in a glass of water and put a small piece of charcoal in each glass to keep the water fresh. Trim all buds from the part of the twigs in the water. Do not label twigs at this time.

3. Place the glasses with twigs in a window with plenty of light and observe. Participants may keep a Twig Journal with their ongoing observations.

4. Periodically, take each twig out of the water, and clip the scab that forms at the base of the twig. Change the water at this time.

5. As weather becomes warmer and the length of daylight increases, the various twigs will begin their bud swell, blooming and leafing.

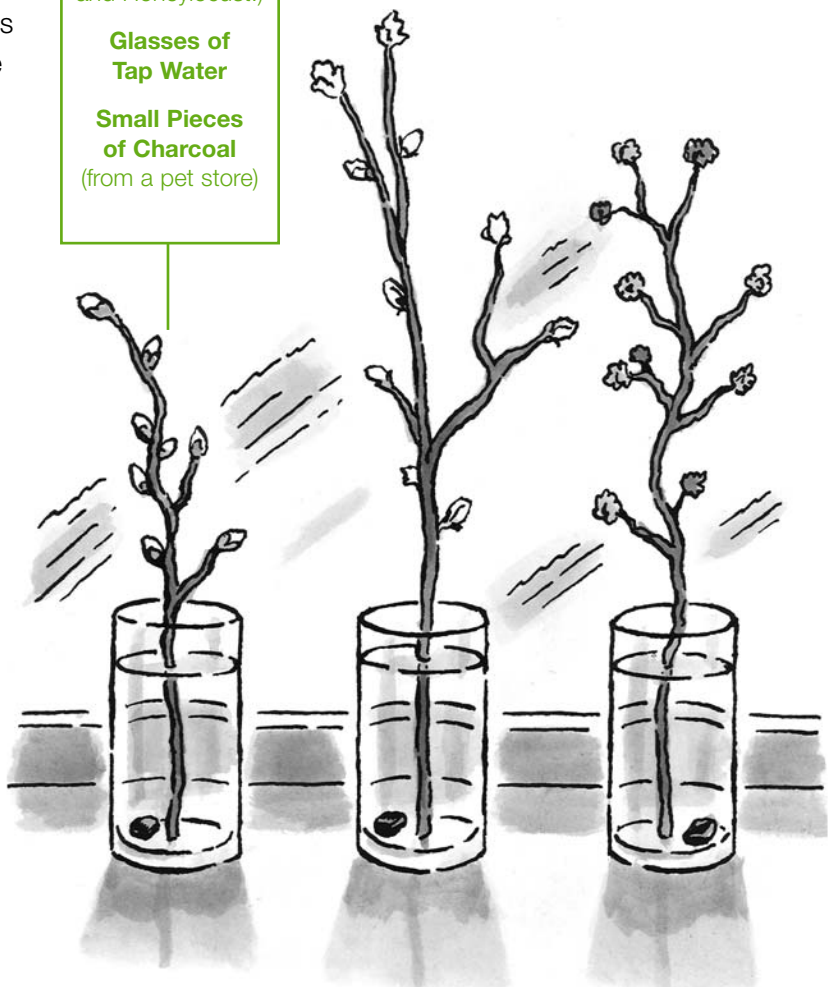
6. Identify each twig as the leaves and blooms appear.

MATERIALS:

Various Twigs from nearby Trees
(The following tree twigs force easily. They are listed in order of the first to the last to bloom out: Callery Pear, Cherry, Birch, Ginkgo, Maple, London Plane and Honeylocust.)

Glasses of Tap Water

Small Pieces of Charcoal
(from a pet store)



SOURCES FOR TREES & URBAN WILDLIFE PACKETS

John Bowne High School Grow-out Nursery

John Bowne High School, located in Flushing, Queens, has a tree nursery as part of its Land Lab where students learn about arboriculture, horticulture and forestry. At any one time, there are approximately 1,000 trees in the nursery, of different sizes, depending on when they were first planted there.

The trees start out as small seedlings that students pot up in 3-gallon containers, using special soil. Later, as the seedlings begin to grow, they are transferred to 5-gallon containers. After about two years, most of the trees have become large enough for transplanting to schoolyards, community gardens, parks and other public sites.

All trees from the Bowne nursery are FREE. For Arbor Day planting in the spring, schools and other groups may order trees to be delivered to their locations by the Parks Department. At other times, by special arrangement, trees may be picked up directly at Bowne.

Contacts:

Nancy Wolf, Director
Arbor Day Project
87 State Street
Brooklyn, New York 11201
(718) 834-4589
jlnwolfinc@aol.com

Steve Perry, Asst. Principal
John Bowne HS
63-25 Main Street
Flushing, New York 11367
(718) 263-5555
sperry@schools.nyc.gov

NYS Dept. of Environmental Conservation Saratoga Tree Nursery School Seedling Program

NYS DEC's Nursery in Saratoga, New York provides **FREE urban wildlife packets** to schools, shipping from early April through the second week in May of each year.

The urban wildlife packet contains a mix of 30 shrubs that will grow in a wide variety of soils. Shrubs include 10 highbush cranberries, 10 toringo crabapples and 10 wetland roses. All of these plants are particularly helpful as food for birds. The cranberries will grow to be 10-15 inch tall, while others will mature at a lower level.

Packets need to be ordered early in the calendar year for later delivery in the spring.

Contact:

Saratoga Tree Nursery
2369 Route 50 South
Saratoga Springs, New York 12866
(518) 581-1439
www.dec.ny.gov/animals/9393.html

Commercial Nurseries

If funds are available, trees may be purchased from commercial nurseries.

Tips for choosing the right tree:

A. Select the right containerized tree for the site—nursery personnel can be helpful.

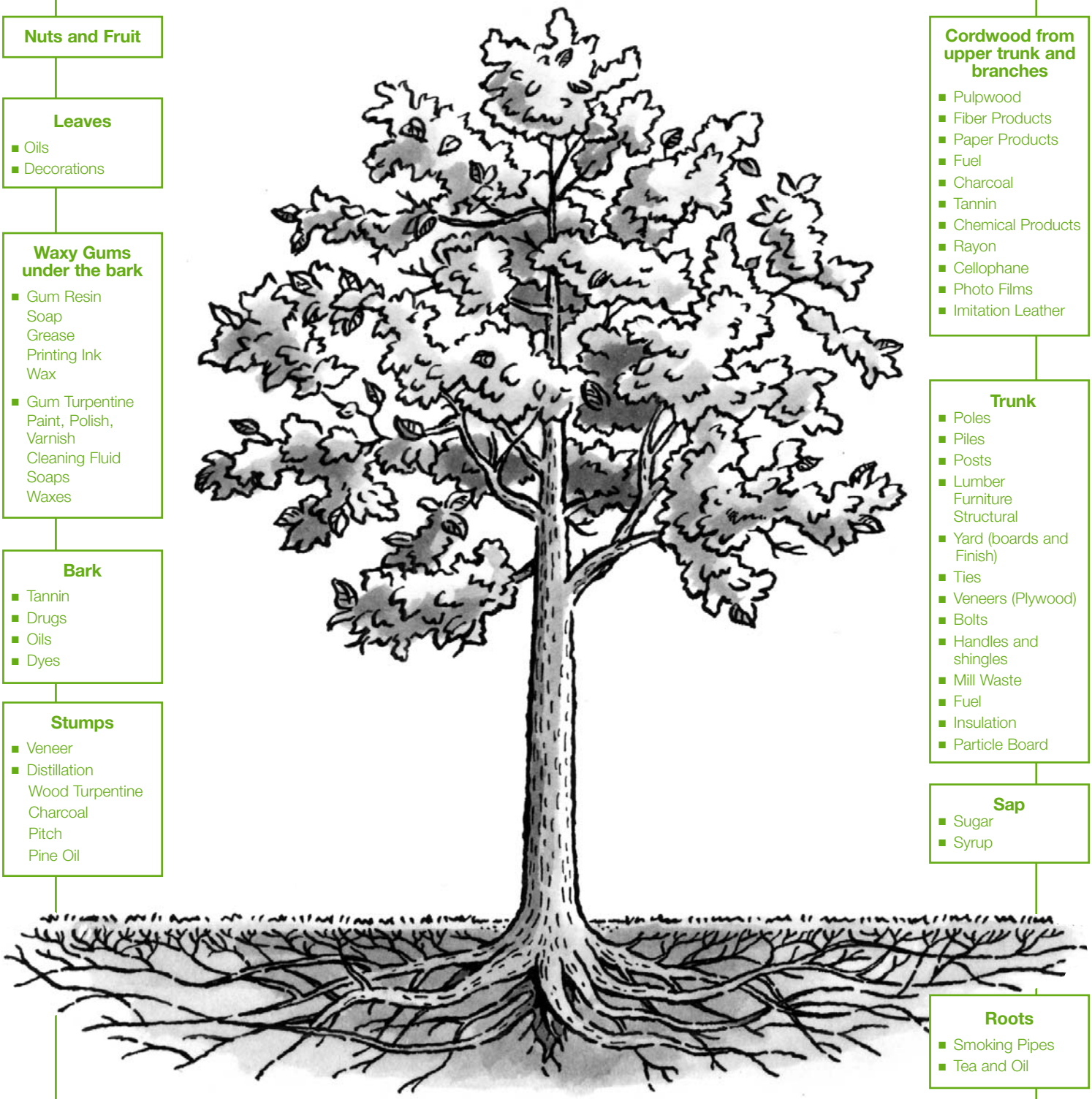
B. Do not accept a tree with a damaged trunk.

C. Look for the root flare at the base of the trunk to make sure the tree has not been planted too deeply.

D. Check for encircling roots. They will need to be spread out when planting.

E. Check soil for moisture—don't buy a plant that is dried out.

PRODUCTS WE GET FROM TREES



Nuts and Fruit

Leaves
- Oils
- Decorations

Waxy Gums under the bark
- Gum Resin
  Soap
  Grease
  Printing Ink
  Wax
- Gum Turpentine
  Paint, Polish, Varnish
  Cleaning Fluid
  Soaps
  Waxes

Bark
- Tannin
- Drugs
- Oils
- Dyes

Stumps
- Veneer
- Distillation
  Wood Turpentine
  Charcoal
  Pitch
  Pine Oil

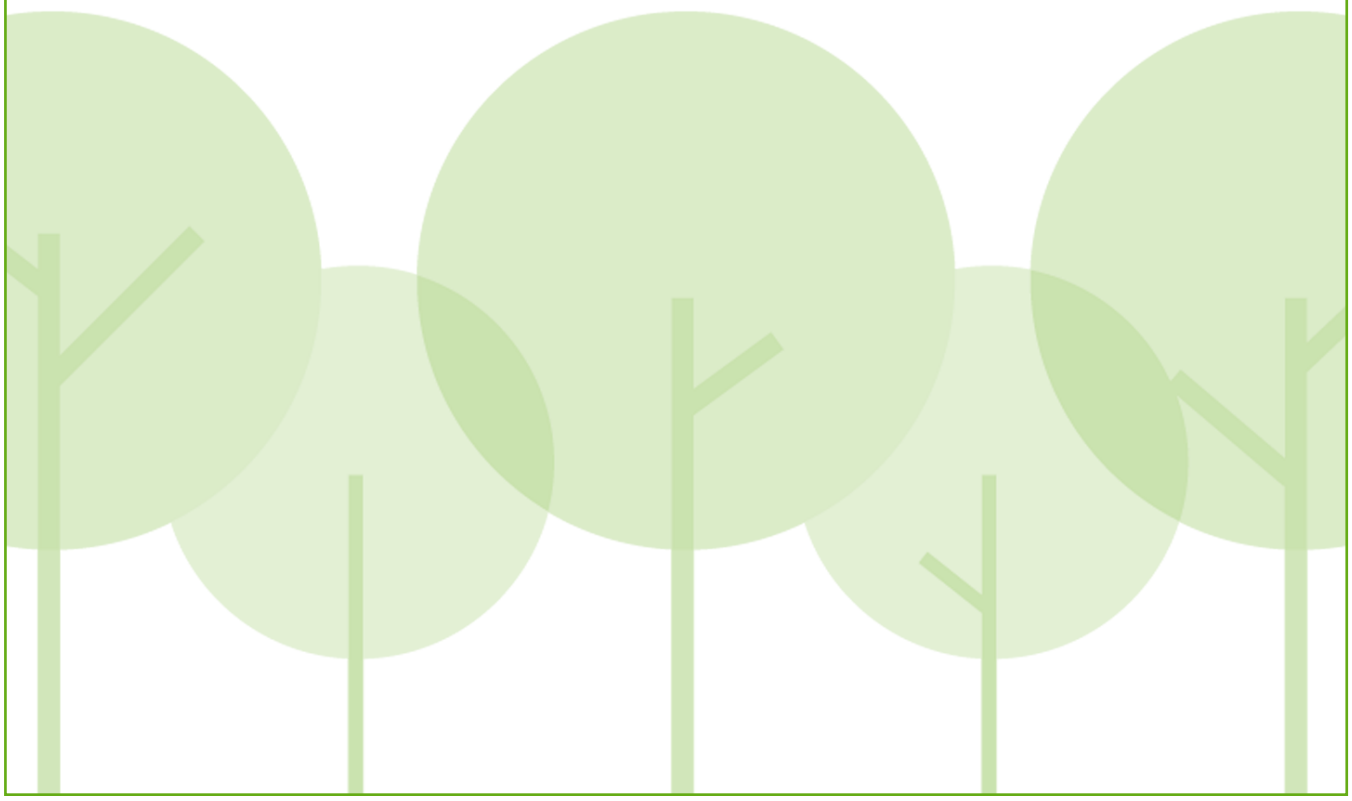
Cordwood from upper trunk and branches
- Pulpwood
- Fiber Products
- Paper Products
- Fuel
- Charcoal
- Tannin
- Chemical Products
- Rayon
- Cellophane
- Photo Films
- Imitation Leather

Trunk
- Poles
- Piles
- Posts
- Lumber
  Furniture
  Structural
- Yard (boards and Finish)
- Ties
- Veneers (Plywood)
- Bolts
- Handles and shingles
- Mill Waste
- Fuel
- Insulation
- Particle Board

Sap
- Sugar
- Syrup

Roots
- Smoking Pipes
- Tea and Oil

Additional Educational Resources



MILLIONTREESNYC MONTH

On April 1, 2008, New York City Mayor Michael R. Bloomberg proclaimed April 2008 to be New York City's very first **MillionTreesNYC Month**, kicking off four weeks of fun and interactive events and programs — all aligned with and aimed at supporting Mayor Bloomberg's PlaNYC initiative MillionTreesNYC. Recognizing the significance of Earth Day and Arbor Day (both observed in April), MillionTreesNYC Month was founded to expand on and extend the celebration of these two monumental days by highlighting the importance of respecting our Planet Earth and New York City's urban forest.

Led by the New York City Department of Parks & Recreation and New York Restoration Project (NYRP), MillionTreesNYC Month was established to serve as a platform from which MillionTreesNYC, its partners and community organizations could work collectively to promote tree-planting and stewardship opportunities throughout the five boroughs and to encourage every New Yorker to dig in and do their part to make New York City even greener.

In 2008, MillionTreesNYC Month was sponsored by BNP Paribas — an international leader in financial banking and environment and social responsibility. To honor New York City's inaugural MillionTreesNYC Month and this year's Arbor Day (April 25), NYRP Founder Bette Midler and approximately 450 BNP Paribas employees and New York City students planted 137 trees in Brooklyn's McCarren Park and the surrounding neighborhood of Greenpoint. Packed full of entertaining and exciting performances, such as a concert by emerging singer/songwriter Brendan James, an Arbor Day Chant by the ever-popular Blue Man Group and a reading of a MillionTreesNYC poem by Academy Award-winner Marcia Gay Harden, this year's Arbor Day celebration was one to remember!

Throughout this historic month, NYC Parks, NYRP and MillionTreesNYC partners hosted free citywide events — including tree-planting and care seminars, educational workshops, lectures, community and corporate volunteer days and five tree giveaways. Each event was designed to engage New Yorkers in learning about MillionTreesNYC and how everyone can contribute to greening their neighborhoods. In total, MillionTreesNYC and its partners successfully planted approximately 30,000 trees citywide during MillionTreesNYC Month alone, including the planting of 20,000 trees in parks throughout the five boroughs as part of New York Care's "Hands on New York Day." During the month thousands of volunteers showed their support for this important initiative by digging in and getting involved in tree-planting activities across the City.

Through such momentous events as the City's first annual MillionTreesNYC Month, MillionTreesNYC is successfully achieving its objective of celebrating green all yearlong. Join us as we work to make everyday an Arbor Day, and celebrate MillionTreesNYC Month every April.

milliontrees NYC
A PLANYC INITIATIVE WITH NYC PARKS AND THE NEW YORK RESTORATION PROJECT

NATIONAL ARBOR DAY

The organization most associated with Arbor Day is the nationally renowned **Arbor Day Foundation**. The Arbor Day Foundation is based in Lincoln, Nebraska, and owns and operates the historic birthplace of Arbor Day — Arbor Day Farm in Nebraska City, Nebraska. Arbor Day Farm was once part of the estate owned by J. Sterling Morton, who is recognized as the founder of Arbor Day.

Morton, who was born in upstate New York, grew up in the Midwest and moved to Nebraska with his bride to establish his family and his career. He inspired major tree-plantings there and the idea quickly spread throughout the country and around the world. Today, every state celebrates its own Arbor Day. The Arbor Day Foundation continues to inspire people to plant, nurture and celebrate trees year-round.

Arbor Day Farm is the only education complex of its kind dedicated to programs focusing on trees, conservation and environmental stewardship. It includes the world-class **Lied Lodge & Conference Center**, which is open to many events, including special educational conferences. Also at Arbor Day Farm is the **Tree Adventure** attraction, in which visitors can climb a 50-foot-tall tree house, a **Nature Explore Classroom** and the new **Discovery Ride** in which passengers can experience and learn about nature first-hand. Several conservation demonstrations areas are located throughout the grounds, including the **Lied Greenhouse**, which is used to grow seedlings that are distributed nationwide to hundreds of thousands of Arbor Day Foundation members.

The Arbor Day Foundation maintains an outstanding website, with creative ideas for tree-planting and education about trees. Some educational resources may be downloaded for free. A few of the programs and materials featured in the education section include the **Nature Explore Club**, the **Learning with Nature Idea Book**, **Grow Your Own Tree** and **Carly's Kids Corner**. Another helpful section of the website is **What Tree is That?**, a unique interactive guide that uses botanical illustrations to help identify more than 200 different species of trees. This is an invaluable aid for teachers and youth leaders who want to lead their classes in tree exploration.

The Arbor Day Foundation may be reached at:

Arbor Day Foundation
100 Arbor Avenue
Nebraska City, NE 68410
1-888-448-7337

The website is:
www.arborday.org

Arbor Day Foundation™

ARBOR DAY

Arbor Day in New York State

Arbor Day was created by a transplanted New Yorker, J. Sterling Morton, in Nebraska; the State of New York officially began its own celebration in 1888. More recently, the Legislature designated the last Friday in April as **New York State Arbor Day**, and an annual ceremony is held at the Governor's Mansion. Prompted by the statewide event, hundreds of communities hold their own Arbor Day celebrations, with parades and tree-planting events. Many schools plant trees in recognition of this special day with young people of all ages participating.

The **Arbor Day Poster Contest**, held in conjunction with NYS Arbor Day and the National Arbor Day Foundation, offers fifth grade students an opportunity to create posters following a theme that changes from year to year. Additional activities are also part of the fun. In recent years, over 2,000 students have participated in this competition. Entries are judged with the help of volunteers from New York ReLeaf and the chosen artist is honored by the Governor at the annual ceremony. The winning poster is submitted to the national competition held by the National Arbor Day Foundation and its artwork is also used in the NYS Arbor Day bookmark, widely distributed to schools and communities.

For more information on participating in the Arbor Day Poster Contest, contact:

Volunteer/Partnership Coordinator
Urban and Community Forestry Program
NYS Dept. of Environmental Conservation
625 Broadway
Albany, New York 12233
(518) 402-9412

Arbor Day in New York City

Arbor Day is widely celebrated in New York City, usually on the official NYS Arbor Day—the last Friday in April. However, school holidays are sometimes scheduled for the last week in April. In those years, many celebrations take place on the following Friday.

The citywide observation of Arbor Day has traditionally been organized by the New York City Department of Parks & Recreation, with a ceremonial tree-planting by the Parks Commissioner and other officials. Selected school classes have traditionally been invited to be part of these special ceremonies.

The "heart" of NYC Arbor Day, however, takes place in every borough—many times at schools, but also in parks, at community centers, and at events sponsored by environmental education organizations. Small trees are planted, usually by groups of young people, who also organize skits and sing songs. It is a real day of spring rejoicing.

Schools and other groups may receive free trees for Arbor Day from a nursery at John Bowne High School in Flushing, Queens. At the nursery, high school students plant and tend seedlings that are grown in containers until they are large enough to distribute for transplanting. Many different species of deciduous and conifer trees are available. See specific information on page 37.

City of New York
Parks & Recreation

NEW YORK RESTORATION PROJECT
NATURE IN MY NEIGHBORHOOD

Beginning fall 2008, **New York Restoration Project (NYRP)** is launching a new model of environmental educational programming—Nature in My Neighborhood. Created to facilitate environmental education among New York City schoolchildren, Nature in My Neighborhood is a menu of educational programming that takes place at NYRP's Swindler Cove Park in Upper Manhattan, NYRP's 57 community gardens throughout the five boroughs and public schoolyards citywide. Support for educators is available through pre, post and extension activities and NYRP teacher training workshops. NYRP designed Nature in My Neighborhood to teach students vital learning skills by empowering them to identify, care for and create nature in their own neighborhood. Each program exposes students to time and nature and addresses state learning standards in a fun and active way.

For more information, visit www.nyrp.org or call NYRP's Education Dept. at (212) 333-2552.

Tree programs and educational curricula include:

- **RESPECTree:** NYRP's in-depth, tree-education program that promotes the importance and function of trees in an urban setting and empowers New York City's youth to bring trees and green spaces to schoolyards and playgrounds located in Trees for Public Health neighborhoods. The program engages a class or school group in landscape design and tree-planting and stewardship activities over an eight-month period.
- **Make every day an Arbor Day Activity Guide:** A comprehensive guide on tree planting and stewardship for educators and youth leaders interested in planting trees and urban wildlife shrubs.
- **Talkin' Trees:** Students go on a tree hike to explore the value and variety of trees and the animals that depend on them for their homes.
- **15 For Trees:** For those teachers who do not have the time or resources to plant trees, but want to educate their students about New York City's urban forest and the benefits trees provide the City – this is the program for you! Designed with teachers' hectic schedules in mind, these 15-minute, interactive doable downloads are an easy way to teach students about trees and our environment without leaving the classroom.

Additional educational programs include:

- **Nature Mania:** A weeklong educational program aimed at connecting students with the environment.
- **Camp Swindler Cove:** Families spend the night learning about the environment and the habits of our city's nocturnal animals.
- **Highbridge Hike:** Students study rock formations and search for clues connecting wildlife and the outside environment.
- **NYRP Garden Games:** Games to enhance social skills, sharing and responsibility.
- **Restoration Conversation:** NYRP educators help facilitate a conversation with teachers and students interested in bringing green spaces to their schools.

NYRP
New York Restoration Project

NYC DEPARTMENT OF PARKS & RECREATION EDUCATION PROGRAMS

The **New York City Department of Parks & Recreation** offers a number of educational programs, either directly or through its many partners. There are activities in all five boroughs for young people, their adult leaders and their families. To access a wealth of information, go to: www.nycgovparks.org.

Among the programs offered are the following:

Urban Park Rangers

Urban Park Rangers work in parks at Ranger Stations and Nature Centers. The Urban Park Rangers' mission is to link New Yorkers to the natural world. Rangers teach people how to care for the environment and the parks, protect the parks and their wild residents and restore New York City's natural heritage.

For more than 20 years, the Rangers have provided programs that have given teachers the opportunity to use New York City parks as outdoor classrooms. A primary offering is **The Natural Classroom**, providing ten distinct programs for students in grades K-8. Some of the topics are "TreesNYC," "Conservation: Keep It Wild," "Ecology: The Web of Life," "Entomology: Buggin' Out" and "Ornithology: Parks Are For The Birds."

To learn more about the Rangers' programs, go to the Parks' website www.nycgovparks.org and click on About Parks/Divisions/Urban Park Rangers, or call 311 and ask for the Urban Park Rangers.

GreenApple Corps

GreenApple Corps members work actively in three program areas: **Environmental Education, Ecological Restoration** and **Urban Forestry**. These three strands form a public benefit program to preserve and restore natural ecosystems, increase the street tree population citywide and turn young students into environmentally aware citizens and stewards. Members commit to nine months of public service and work throughout the city.

To learn more about the Corps' offerings, e-mail: GreenApple@parks.nyc.gov or go to the Parks' website www.nycgovparks.org and click on About Parks/Divisions/GreenApple Corps.

CityParks Foundation/Partnerships for Parks

The City Parks Foundation was created to increase community involvement, including financial support, on behalf of parks. Founded in 1995, Partnerships works to start, strengthen and support neighborhood parks groups, to link these groups together and to promote collaborative efforts. There are many opportunities for students and their teachers, leaders and families to become involved in exciting and helpful projects to improve the urban environment.

The Foundation's "**Seeds to Trees**" environmental education program, which began in the elementary grades, has recently expanded to middle schools. Using the parks as science labs, students are introduced to forest ecology, including animal life.

To learn more about programs offered, go to www.partnershipforparks.org.

City of New York
Parks & Recreation

NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION EDUCATION PROGRAM

The **New York State Department of Environmental Conservation's** office in New York City (Region 2) sponsors a number of formal and informal programs. These include PLT (see page 46) and a variety of educational workshops for teachers and others.

For information, contact:

Betsy Ukeritis
Regional Environmental Educator
(718) 482-6404
baukerit@gw.dec.state.ny.us

Region 2 sponsors the **Camps Diversity Program**, which provides funding for a minority urban youth to attend a free week at one of DEC's summer camps. Youth at camp participate in fishing, canoeing, swimming, archery, hiking and overnight camping. There are two groups of campers by age: 12-14 and 15-16 and there are pre-camp and post-camp activities. Contact the New York City Metro Area Diversity Coordinator at (718) 482-7387.

DEC also sponsors **New York City ReLeaf**, the Region 2 volunteer planning committee for the statewide Urban and Community Forestry Program. **ReLeaf** sponsors workshops, primarily for adults, on issues such as tree planting and tree care, global warming, green architecture and other topics. Many of the workshops are of interest to formal and informal educators and provide helpful printed and audio-visual resources.

For information, contact:

Mary Kramarchyk, NY Releaf
Volunteer and Partnership Coordinator
(518) 402-9412
mckramar@gw.dec.state.ny.us.

The following Environmental Education Centers have staff and offer year-round programs:

Five Rivers Environmental Education Center
56 Game Farm Road
Delmar, New York 12054
(518) 439-8044
E-mail: 5rivers@gw.dec.state.ny.us

Rogers Environmental Education Center
2721 State Highway 80
Sherburne, New York 13460
(607) 674-4017
E-mail: rogers@gw.dec.state.ny.us

Stony Kill Farm Environmental Education Center
79 Farmstead Lane
Wappingers Falls, New York 12590
(845) 831-3416
E-mail: skfarm@gw.dec.state.ny.us

Quogue Wildlife Refuge
PO Box 492
Quogue, New York 11959
(631) 653-4771
E-mail: Quogue@gw.dec.state.ny.us

Special Teacher Institutes:
Each summer Rogers, Five Rivers and Stony Kill Farm host **weeklong teacher institutes**. Check with the individual center for information and registration. Also, check out the web page for specialized information.

For more information on DEC educational offerings and many other environmental topics, visit www.dec.ny.gov.

PROJECT LEARNING TREE

Project Learning Tree (PLT), a national program that is co-sponsored in New York State by the Department of Environmental Conservation and the Department of Education, is an award-winning environmental education program designed to help educators acquire knowledge of the natural world using the forest as a window. Under the guidance of these trained teachers, students of all ages have participated in the program.

PLT began in 1973 when natural resource managers from the American Forest Institute (now American Forest Foundation) and Western Regional Environmental Education Council (now Council of Environmental Education) formed a partnership to develop an unbiased, educationally sound program for national distribution and collaboration.

The **PLT Activity Guide** contains more than 90 different interdisciplinary, hands-on activities, which can be used with all areas of the curriculum. The materials are correlated to the NYS Science Core Curriculum and the NYS Social Studies Core Curriculum. In addition, PLT's Greenworks! Program links service learning with community action.

The PLT activity guide is only available by participating in a six-hour workshop, scheduled periodically throughout the State. They are usually co-facilitated by a forester and an educator. There is a nominal fee.

For more information about participating in PLT, contact:

Tom Shimalla, PLT State Coordinator
NYS Department of Environmental Conservation
625 Broadway, 2nd Floor
Albany, New York 12233
(518) 402-8043
teshimal@gw.dec.state.ny.us

Betsy Ukeritis, Regional Environmental Educator/PLT Coordinator
NYS DEC Region 2
47-40 21st Street
Long Island City, New York 11101
(718) 482-6404
baukerit@gw.dec.state.ny.us

The PLT national website is: http://www.plt.org

PROJECT LEARNING TREE

URBAN HORTICULTURE INSTITUTE
CORNELL UNIVERSITY

Cornell's Urban Horticulture Institute

Founded in 1980, the Urban Horticulture Institute program integrates plant stress physiology, horticultural science, plant ecology and soil science. Research conducted by Dr. Nina L. Bassuk, professor and program leader, has long benefited major studies at Cornell and other institutions of higher learning and has also provided important information to professionals in the fields of horticulture, arboriculture and forestry. Dr. Bassuk and her students have generously given advice to those in the educational field who are developing curricula and other materials for students at all levels.

Research conducted by professors and students at the Institute has focused on:

- The selection, evaluation and propagation of **superior plants** that can tolerate biotic and abiotic stress, while coping with a disturbed landscape such as those found in urban areas.
- The development of improved technologies for assessing **difficult planting sites** and providing ways of ameliorating those limitations.
- The development of improved transplant technologies to ensure **successful establishment of plants** in the urban environment.

Under the Institute's guidance, horticultural and arboricultural professionals working in urban areas have used **CU-Structural Soil®** that combines nutrients needed for urban tree soil with load-bearing requirements put in place by engineers. This soil allows for less compaction and better circulation of water and air to the tree roots.

Professionals and trained volunteers have also begun to plant more **bare-root trees**, rather than the more expensive and heavy **balled and burlapped trees** that are difficult for schools and communities to handle. The roots of **bare-root trees** are sprayed with a compound known as **hydrogel** to keep them from drying out and then transported to planting sites in plastic bags. Research by Dr. Bassuk shows that **bare-root trees** have 200% more root mass at planting than do **balled and burlapped trees**, thus assisting the trees to become better established.

The Institute's list of **recommended urban trees** has been widely circulated. In the past, many municipalities planted large percentages of very few trees, primarily maples, elms and oaks, but due to Dutch Elm Disease and the advent of exotic pests, such as the Asian Longhorned Beetle, wide stands of urban trees have been devastated. As a result, Dr. Bassuk and her students have vigorously encouraged the **planting of many different species** to protect the totality of the urban forest.

Contact:

Dr. Nina L. Bassuk
Room 134A Plant Science Building
Cornell University
Ithaca, New York 14853
(607) 255-4586
nlb2@cornell.edu
http://www.hort.cornell.edu/uhi

Cornell University

RESOURCES FROM OTHER GOVERNMENTAL AGENCIES AND NONPROFIT ORGANIZATIONS

Governmental Agencies

New York City Department of Environmental Protection

59-17 Junction Boulevard
Flushing, New York 11373

Contact:
Kim Estes-Fradis, Director of Education
(718) 595-3506
Kestes-fradis@dep.nyc.gov

Much of NYC DEP's education program focuses on protection of water supplies and water conservation. Extensive programs in the Catskill and other watersheds offer opportunities for students and teachers to learn directly about the areas protecting our water supplies. "**Green Connections**," an upstate-downstate project that connects schools in the City and in the watershed, provides forestry-related activities and information about forests as the preferred land use near the reservoirs.

For more information about DEP and its services, visit www.nyc.gov/dep

United States Environmental Protection Agency

Contact:
Teresa Ippolito, Environmental Educator
(212) 637-3671
Ippolito.teresa@epa.gov

EPA's Region 2 is headquartered in New York City and offers a wide variety of programs and environmental information. There is a yearly environmental education grant competition that supports selected activities.

Botanical Gardens

New York City is fortunate to be the home of many famous botanical gardens, located in the Bronx, Brooklyn, Queens and Staten Island. Each offers a wide variety of educational opportunities, ranging from those focused on school students to workshops and horticultural classes for adults. Each serves the entire public in all five boroughs.

Brooklyn Botanic Garden
1000 Washington Avenue
Brooklyn, New York 12225
(718) 623-7200
www.bbg.org

The New York Botanical Garden
Bronx, New York 10458
200th Street & Kazimiroff Boulevard
Bronx, New York 10458
(718) 817-8700
www.nybg.org

Queens Botanical Garden
43-50 Main Street
Flushing, New York 11355
(718) 886-3800
www.queensbotanical.org

Staten Island Botanical Garden
1000 Richmond Terrace
Staten Island, New York 10301
(718) 273-8200
www.sibg.org

Wave Hill
675 W. 252nd Street
Bronx, New York 10471
(718) 549-3200
www.wavehill.org

Citywide Nonprofit Organizations

Trees New York

51 Chambers Street, 14th Floor
New York, New York 10007

Contact:
Susan Gooberman, Executive Director
(212) 227-1887
susan@treesny.com
www.treesny.org

Trees New York was the first New York City nonprofit organization to adopt a mission directly related to the planting, caring and preserving of street trees. With the understanding of the many benefits of the urban forest, its focus remains targeted to the establishment of major canopy throughout the five boroughs.

TNY trains both adults and young people in its pruning and tree care courses. **Young Citizen Pruners** provides a NYC Board of Education approved academic credit, training and lifetime skills. It is now in many schools and has also become an after-school/summer training program.

The **Interactive Field Curriculum for Young Children** ("The Great Cookie Lesson") gives hands-on instruction of tree cross sections to explore topics involving the relationship of a tree's life within a historical, ecological and scientific context.

Council on the Environment of New York City

51 Chambers Street, Room 228
New York, New York 10007

Contact:
Michael Zamm
(212) 788-7932
cenyctso@hotmail.com
www.cenyc.org

CENYC's Environmental Education Program has long focused on a well-known high school curriculum, "**Training Student Organizers**." Many high schools around the city have participated in this program, but it has become an integral part of the High School for Environmental Studies. A wide range of environmental issues are explored in TSO, including major tree-planting activities with the NYC Parks' Natural Resources Group and the NYS Department of Environmental Protection's watershed program.

Horticultural Society of New York

148 W. 37th Street, 13th Floor
New York, New York 10018

Contact:
Pamela Ito
(212) 757-0915
www.hsny.org

HSNY focuses on communities that are most in need, including disadvantaged inner-city schools. School programs seek to connect horticulture with science, reading and math.

"**Apple Seed**" is an environmental education program providing innovative, hands-on activities and exploratory plant studies which emphasize critical thinking and the power of observation for schoolchildren in grades K-6. The program also provides teacher training and after-school classes.

New York City Audubon

71 W. 23rd Street
Suite 1523
New York, New York 10010

Contact:
Naola Gersten-Woolf
(212) 691-7483
info@nycaudubon.org
www.nycaudubon.org

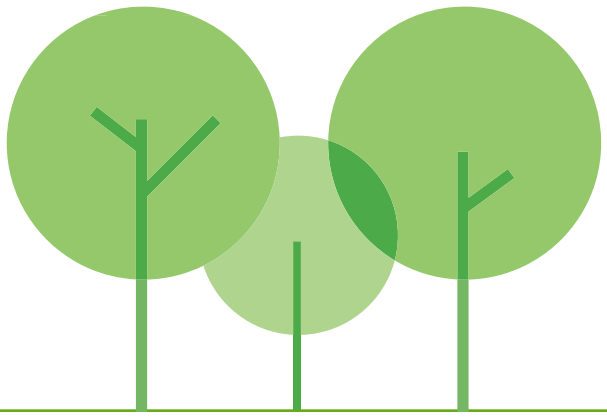
"**Look Around New York City**," published for over 20 years, is a widely distributed environmental publication for schoolchildren in Grades 4-6. It features articles by professionals, as well as young people. The publication aims to get city kids involved in their environment by promoting nature appreciation and preservation. Some titles include "City Bird—the Story of Pale Male," "Wise Up to Owls," "The Birds and the Bees and the Flowers and the Seeds" and "Native Plants." Contact Audubon's office for details on how to receive this publication.

Cornell University Cooperative Extension—NYC

Urban Environment Program Area
16 E, 34th Street, 8th Floor
New York, New York 10016

Contact:
Gretchen Ferenz
(212) 340-2926
gsf4@cornell.edu
http://nyc.cce.cornell.edu

CUCE-NYC works with partners in developing and implementing educational programs, particularly to enable diverse audiences to address local environmental needs through individual and community action. Its **Urban Environment Program Area** develops and implements learning opportunities in **Environmental and Science Education, Professional Development and Community Improvement and Sustainability.**



Borough-based Nonprofit Organizations

Bronx

Sustainable South Bronx
890 Garrison Avenue, 4th floor
Bronx, New York 10474
(718) 617-4668
www.ssbx.org

SSB has pioneered projects of all kinds to improve the lives of people living in a stressed environment. "**Greening for Breathing**" helped neighborhood activists create their own management plan for planting large numbers of trees in the area. Visit their website for details on their many current programs.

Bronx Green-Up
The New York Botanical Garden
Bronx, New York 10458
(718) 817-8026
www.nybg.org/bgu

Bronx Green-Up is an outreach program of The New York Botanical Garden and provides horticultural advice, technical assistance and training to school groups via **GreenSchool** workshops. The workshops begin indoors at their site and are followed by an exploration of the Botanical Garden's Conservatory, Forest and Garden grounds. The group also is a main sponsor of community gardens in the Bronx.

Brooklyn

Center for the Urban Environment
168 7th Street
Brooklyn, New York 11215
(718) 788-8500
www.bcue.org

CUE, formerly BCUE, founded as a small, urban environmental education program in 1979, has become an institution in Brooklyn. It has recently moved into a renovated building that will feature a LEED certified gold interior. Among its many programs is "**Urban Ecology**," which uses hands-on explorations to engage students and educators in scientific study. CUE's in-school, after-school and community-based programs have always featured the synthesis between the natural and the built environments. "**Urban Ecology**" has programs for grades 4-8 and also for high school.

Magnolia Tree Earth Center of Bedford-Stuyvesant
677 Lafayette Avenue
Brooklyn, New York 11216
(718) 387-2116
www.magnoliatreeearthcenter.org

Magnolia Tree was founded in 1972 by a group of neighbors who saved a landmark tree, bought the buildings that protected it and created a center of environmental, art and cultural information and action serving Central Brooklyn. Among its present programs are **Saturday workshops for children** that combine environmental and cultural training and the **Summer Tree Corps**, where youth from 12-15 years of age care for trees and gardens nearby. MTEC also coordinates the collaborative "**Green Horizons**," an annual citywide careers event for middle school students, science teachers and guidance counselors.

Manhattan

Lower East Side Ecology Center

Contact:
Tara DePorte, Program Director
(212) 477-4022
www.lesecologycenter.org

The Lower East Side Ecology Center has pioneered important recycling initiatives, including composting and worm-bin composting indoors and outdoors. It has developed educational components as part of the **NYC Climate Coalition**. Visit its website for more details.

Queens

Alley Pond Environmental Center

228-06 Northern Boulevard
Douglaston, New York 11363
(718) 229-4000
www.alleypond.com

Alley Pond focuses much of its program on the **extensive forested wetland** just outside its door. One example is its secondary education program which supplements Junior High, Regents and Advanced Placement curricula in the sciences. Among topics explored are endangered species, soil quality, geology of Alley Pond Park and water cycles/watersheds.

Staten Island

Greenbelt Nature Center

700 Rockland Avenue
Staten Island, New York 10314
(718) 667-7475
www.sigreenbelt.org

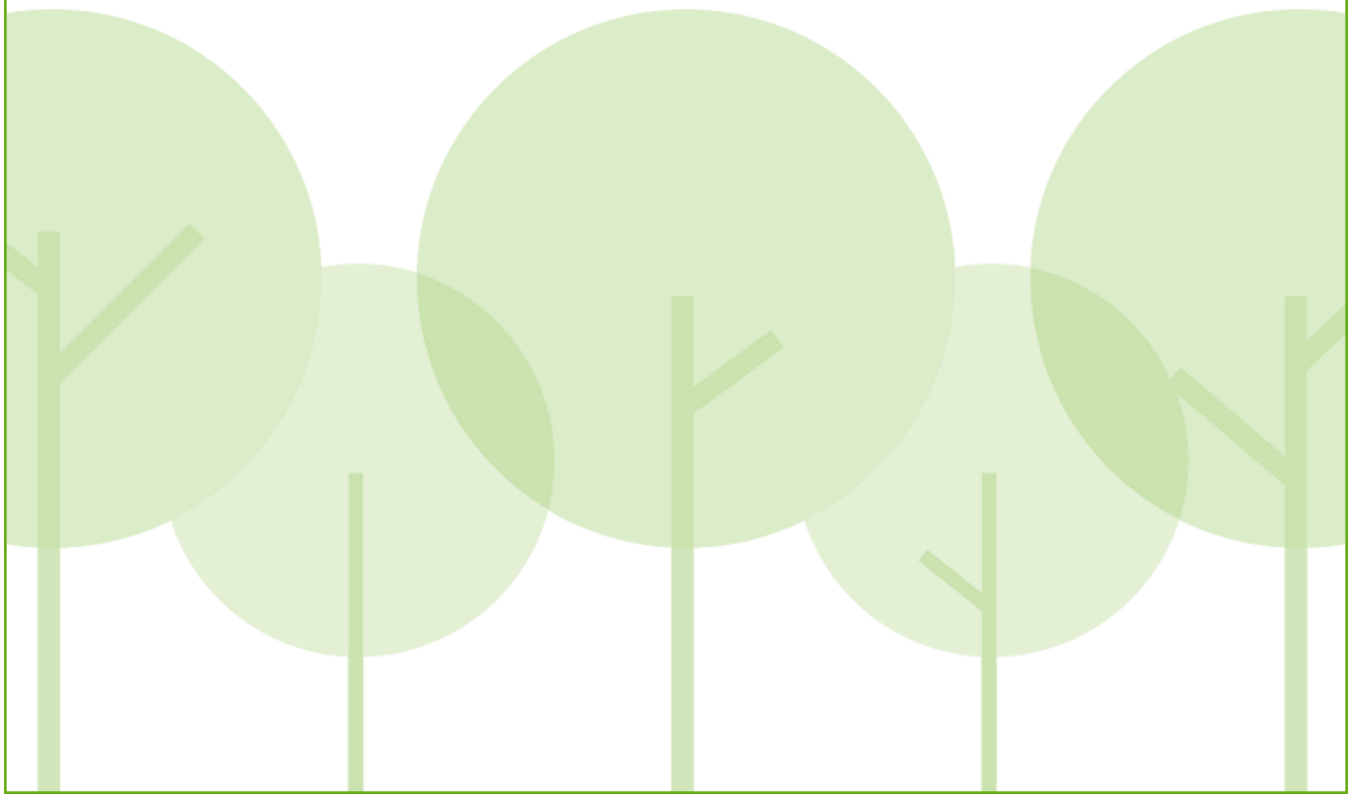
The Greenbelt Nature Center, a Partner of the New York City Department of Parks & Recreation, has an outstanding facility. It is located in High Rock Park, which is part of the Staten Island chain of parks, golf courses and other green areas known as the Staten Island Greenbelt. The Center features many **exhibits** and offers **interpretive trail walks**, as well as other environmental lessons.

Environmental Education Advisory Council

www.eeac-nyc.org

How do all the organizations and individuals in the Resources section keep up with each other and the latest information? Since 1974, the **Environmental Education Advisory Council** has provided vital links to professional development and collegial work. Membership is open to anyone with an interest in the environment. Visit EEAC's website to find out how to become involved.

Alignment with the NYS Dept. of Education Learning Standards for Science Education Grades K-8



Lesson One: Living in an Urban Forest

Activity 1: A Dialogue on Trees

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

Standard 4

PS3.1c: Observe and describe physical properties of objects using all of the appropriate senses

Grades 5-8

Standard 1

S1.3: Represent, present, and defend proposed explanations of everyday observations

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

Activity 2: Tree Walk

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

Standard 4

PS3.1c: Observe and describe physical properties of objects using all of the appropriate senses

PS3.1f: Objects and/or materials can be sorted or classified according to their properties

LE3.1b: Each plant has different structures that serve different functions in growth, survival, and reproduction

Grades 5-8

Standard 1

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

Standard 4

LE1.1f: Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities.

LE1.1h: Living things are classified by shared characteristics on cellular and organism level.

Activity 3: Examining Leaves and Twigs

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

Standard 4

PS3.1c: Observe and describe physical properties of objects using all of the appropriate senses

PS3.1e: Properties can be observed or measured with tools such as hand lenses, metric rulers, thermometers, balances, magnets, circuit testers, and graduated cylinders

PS3.1f: Objects and/or materials can be sorted or classified according to their properties

LE3.1b: Each plant has different structures that serve different functions in growth, survival, and reproduction

LE4.2a: Growth is the process by which plants and animals increase in size

Grades 5-8

Standard 1
S1.3: Represent, present, and defend proposed explanations of everyday observations

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

Standard 4
LE1.1f: Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities.

LE1.1h: Living things are classified by shared characteristics on cellular and organism level.

Activity 4: Mapping a Square Block

Grades K-4

Standard 1
S1.1a: Observe and discuss objects and events and record observations

Standard 4
LE5.2g: The health, growth, and development of organisms are affected by environmental conditions such as the availability of food, water, air, space, shelter, heat, and sunlight

PS3.1c: Observe and describe physical properties of objects using all of the appropriate senses

PS3.1d: Measurements can be made with standards metric units and nonstandard units

Standard 6
M6.2: Use different types of models, such as graphs, sketches, diagrams, and maps to represent various aspects of the real world

Grades 5-8

Standard 1
S1.3: Represent, present, and defend proposed explanations of everyday observations

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

Standard 6
M6.2.1: Models are simplified representations of objects, structures, or systems used in analysis. Select an appropriate model to begin the search for answers or solutions to a question or problem.

Activity 5: Compare your Data with the data from New York City Parks Dept.

Grades K-4

Standard 1
M1.1c: Apply mathematical skills to describe the natural world

M2.1b: Explain verbally, graphically, or in writing patterns and relationships observed in the physical and living environment

S1.1a: Observe and discuss objects and events and record observations

Standard 4
LE5.2g: The health, growth, and development of organisms are affected by environmental conditions such as the availability of food, water, air, space, shelter, heat, and sunlight

LE7.1b: Over time humans have changed their environment

LE7.1c: Humans, as individuals or communities, change environments in ways that can be either helpful or harmful for themselves and other organisms

Standard 6
M6.2: Use different types of models, such as graphs, sketches, diagrams, and maps to represent various aspects of the real world

Grades 5-8

Standard 1
M1.1c: Apply mathematical equations to describe relationships among variables in the natural world

M2.1b: Quantify patterns and trends

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

Standard 4
LE5.1g: The survival of an organism depends on its ability to sense and respond to its external environment

LE7.2c: Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, waste disposal, etc.

LE7.2d: Since the Industrial Revolution, human activities have resulted in major pollution of air, water, and soil

Standard 6
M6.2.1: Models are simplified representations of objects, structures, or systems used in analysis.

Select an appropriate model to begin the search for answers or solutions to a question or problem.

Lesson Two: Choosing Your Sites

Activity 1: Investigating the Trees and Landscape

Grades K-4

Standard 1
S1.1a: Observe and discuss objects and events and record observations

Standard 4
LE1.1b: Plants require air, water, nutrients and light in order to live and thrive

LE3.2a: Individuals within a species may compete with each other for food, mates, space, water, and shelter in their environment

LE5.2a: Plants respond to changes in their environment

LE5.2g: The health, growth, and development of organisms are affected by environmental conditions such as the availability of food, water, air, space, shelter, heat, and sunlight

Grades 5-8

Standard 1
S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

Standard 4
LE5.1g: The survival of an organism depends on its ability to sense and respond to its external environment

LE7.1e: The environment may contain dangerous levels of substances that are harmful to organisms

Activity 2: Measuring and Mapping a Planting Site

Grades K-4

Standard 1

M1.1c: Apply mathematical skills to describe the natural world

M2.1b: Explain verbally, graphically, or in writing patterns and relationships observed in the physical and living environment

M3.1a: Use appropriate scientific tools to solve problems about the natural world

S1.1a: Observe and discuss objects and events and record observations

Standard 4

LE4.2a: Growth is the process by which plants and animals increase in size

LE7.1c: Humans, as individuals or communities, change environments in ways that can be either helpful or harmful for themselves and other organisms

PS3.1d: Measurements can be made with standards metric units and nonstandard units

Grades 5-8

Standard 1

M1.1c: Apply mathematical equations to describe relationships among variables in the natural world

M2.1b: Quantify patterns and trends

M3.1a: Use appropriate scientific tools to solve problems about the natural world

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

Standard 4

LE5.1g: The survival of an organism depends on its ability to sense and respond to its external environment

LE7.2c: Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, waste disposal, etc.

Activity 3: Measuring Slope

Grades K-4

Standard 1

M1.1c: Apply mathematical skills to describe the natural world

M2.1b: Explain verbally, graphically, or in writing patterns and relationships observed in the physical and living environment

M3.1a: Use appropriate scientific tools to solve problems about the natural world

S1.1a: Observe and discuss objects and events and record observations

S2.3a: Use appropriate "inquiry and process" skills to collect data

Standard 4

LE1.1b: Plants require air, water, nutrients and light in order to live and thrive

LE5.1g: The survival of an organism depends on its ability to sense and respond to its external environment

LE7.1c: Humans, as individuals or communities, change environments in ways that can be either helpful or harmful for themselves and other organisms

PS2.1d: Erosion and deposition result from the interaction among air, water, and land

PS3.1d: Measurements can be made with standard metric units and nonstandard units

Grades 5-8

Standard 1

M1.1c: Apply mathematical equations to describe relationships among variables in the natural world

M2.1b: Quantify patterns and trends

M3.1a: Use appropriate scientific tools to solve problems about the natural world

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

Standard 4

LE5.1g: The survival of an organism depends on its ability to sense and respond to its external environment

LE7.2c: Human activities can bring about environmental degradation through resource acquisition, urban growth, land-use decisions, waste disposal, etc.

Activity 4: Testing pH

Grades K-4

Standard 1

M3.1a: Use appropriate scientific tools to solve problems about the natural world

Grades 5-8

Standard 1

M3.1a: Use appropriate scientific tools to solve problems about the natural world

Standard 4

LE7.1e: The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.

LE7.1d: The survival of living things on our planet depends on the conservation and protection of Earth's resources

Activity 5: Competition and Survival

Grades K-4

Standard 1

M1.1c: Apply mathematical skills to describe the natural world

S1.1a: Observe and discuss objects and events and record observations

S2.3a: Use appropriate "inquiry and process" skills to collect data

S2.3b: Record observations accurately and concisely

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Standard 4

LE1.1b: Plants require air, water, nutrients, and light in order to live and thrive

LE3.2a: Individuals within a species may compete with each other for food, mates, space, water, and shelter in their environment

LE4.2a: Each kind of plant goes through its own stages of growth and development that may include seed, young plant, and mature plant

LE5.2a: Plants respond to changes in their environment

Grades 5-8

Standard 1

M1.1c: Apply mathematical equations to describe relationships among variables in the natural world

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S2.3b: Conduct a scientific investigation

S2.3c: Collect quantitative and qualitative data

S3.2d: Formulate and defend explanations and conclusions as they related to scientific phenomena

Standard 4
LE3.2a: In all environments, organisms with similar needs may compete with one another for resources

LE7.1b: Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem

LE7.1e: The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.

Activity 6: How Chemicals Affect Plants

Grades K-4

Standard 1
M1.1c: Apply mathematical skills to describe the natural world

S1.1a: Observe and discuss objects and events and record observations

S3.2a: State orally and in writing any inferences or generalizations indicated by the data collected

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Standard 4
LE5.2a: Plants respond to changes in their environment

LE7.1c: Humans, as individuals or communities, change environments in way that can be either helpful or harmful for themselves and other organisms

Grades 5-8

Standard 1
M1.1c: Apply mathematical equations to describe relationships among variables in the natural world

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S2.3b: Conduct a scientific investigation

Standard 4
LE7.1e: The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.

LE7.1d: The survival of living things on our planet depends on the conservation and protection of Earth's resources

Lesson Three: Planting your tree

Activity 1: Parts of a Deciduous Tree

Grades K-4

Standard 4

LE3.1b: Each plant has different structures that serve different functions in growth, survival, and reproduction

Grades 5-8

Standard 4

LE1.1f: Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities

Activity 2: Growth of Plant Roots

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

S2.3a: Use appropriate "inquiry and process" skills to collect data

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Standard 4

LE3.1b: Each plant has different structures that serve different functions in growth, survival, and reproduction

LE5.2a: Plants respond to changes in their environment

PS3.1d: Measurements can be made with standard metric units and nonstandard units

PS3.2c: Changes in the properties or materials of objects can be observed and described

Grades 5-8

Standard 1

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S2.3b: Conduct a scientific investigation

S2.3c: Collect quantitative and qualitative data

Standard 4

LE1.1f: Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities

LE7.1b: Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem

LE7.1e: The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.

Activity 3: A Close Look at Soil

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

S2.3a: Use appropriate "inquiry and process" skills to collect data

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Standard 4
LE1.1b: Plants require air, water, nutrients, and light in order to live and thrive

LE5.2a: Plants respond to changes in their environment

LE5.3g: The health, growth, and development of organisms are affected by environmental conditions

PS2.1d: Erosion and deposition result from the interaction among air, water, and land

Grades 5-8

Standard 1
S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S2.3b: Conduct a scientific investigation

S3.2d: Formulate and defend explanations and conclusions as they related to scientific phenomena

Standard 4
LE7.1e: The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.

PS2.1h: The process of weathering breaks down rocks to form sediment. Soil consists of sediment, organic material, water, and air

PS2.1i: Erosion is the transport of sediment. Gravity is the driving force behind erosion. Gravity can act directly or through agents such as moving water, wind, and glaciers.

Activity 4: Drainage

Grades K-4

Standard 1
S1.1a: Observe and discuss objects and events and record observations

S2.3a: Use appropriate "inquiry and process" skills to collect data

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Standard 4
LE1.1b: Plants require air, water, nutrients, and light in order to live and thrive

PS2.1c: Water is recycled by natural processes on Earth

Grades 5-8

Standard 1
S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S2.3b: Conduct a scientific investigation

S3.2d: Formulate and defend explanations and conclusions as they related to scientific phenomena

Standard 4
LE7.1b: Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem

LE7.1e: The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.

PS2.1h: The process of weathering breaks down rocks to form sediment. Soil consists of sediment, organic material, water, and air

Activity 5: How to Transplant

Grades K-4

Standard 4

LE1.1b: Plants require air, water, nutrients, and light in order to live and thrive

LE3.1b: Each plant has different structures that serve different functions in growth, survival, and reproduction

LE5.3g: The health, growth, and development of organisms are affected by environmental conditions

LE7.1c: Humans, as individuals or communities, change environments in way that can be either helpful or harmful for themselves and other organisms

Grades 5-8

Standard 4

LE1.1f: Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities

LE7.1b: Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem

LE7.1e: The environment may contain dangerous levels of substances (pollutants) that are harmful to organisms. Therefore, the good health of environments and individuals requires the monitoring of soil, air, and water, and taking steps to keep them safe.

LE7.1d: The survival of living things on our planet depends on the conservation and protection of Earth's resources

Activity 6: Transportation of Water through Stems

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

S2.3b: Record observations accurately and concisely

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Standard 4

LE3.1b: Each plant has different structures that serve different functions in growth, survival, and reproduction

PS2.1c: Water is recycled by natural processes on Earth

Grades 5-8

Standard 1

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S2.3c: Collect quantitative and qualitative data

S3.2d: Formulate and defend explanations and conclusions as they related to scientific phenomena

Standard 4

LE1.1f: Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities

Activity 7: Function of Leaves

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

S2.3b: Record observations accurately and concisely

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Standard 4

LE1.1b: Plants require air, water, nutrients, and light in order to live and thrive

LE3.1b: Each plant has different structures that serve different functions in growth, survival, and reproduction

PS2.1c: Water is recycled by natural processes on Earth

Grades 5-8

Standard 1

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S2.3c: Collect quantitative and qualitative data

S3.2d: Formulate and defend explanations and conclusions as they related to scientific phenomena

Standard 4

LE1.1f: Many plants have roots, stems, leaves, and reproductive structures. These organized groups of tissues are responsible for a plant's life activities

LE6.2a: Photosynthesis is carried on by green plants and other organisms containing chlorophyll. In this process, the sun's energy is converted into and stored as chemical energy in the form of sugar

LE7.1b: Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem

Activity 8: Adopt a Tree

Grades K-4

Standard 4

LE1.1b: Plants require air, water, nutrients, and light in order to live and thrive

LE7.1c: Humans, as individuals or communities, change environments in way that can be either helpful or harmful for themselves and other organisms

Grades 5-8

Standard 4

LE7.2d: The survival of living things on our planet depends on the conservation and protection of Earth's resources.

Activity 9: Spot the Asian Longhorned Beetle

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Grades 5-8

Standard 1

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S3.2d: Formulate and defend explanations and conclusions as they related to scientific phenomena

Standard 4

LE7.1b: Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem

Activity 10: Late Winter Forced Blooms

Grades K-4

Standard 1

S1.1a: Observe and discuss objects and events and record observations

S3.3a: Explain findings to others and actively listen to suggestions for possible interpretations and ideas

Standard 4

LE1.1b: Plants require air, water, nutrients, and light in order to live and thrive

LE4.2a: Growth is the process by which plants and animals increase in size

LE5.2a: Plants respond to changes in their environment

Grades 5-8

Standard 1

S2.1d: Use appropriate tools and conventional techniques to solve problems about the natural world, including measuring, observing, describing, classifying, and sequencing

S3.2d: Formulate and defend explanations and conclusions as they related to scientific phenomena

Standard 4

LE7.1b: Lack of resources, habitat destruction, and other factors such as predation and climate limit the growth of certain populations in the ecosystem

LE7.2d: The survival of living things on our planet depends on the conservation and protection of Earth's resources.

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