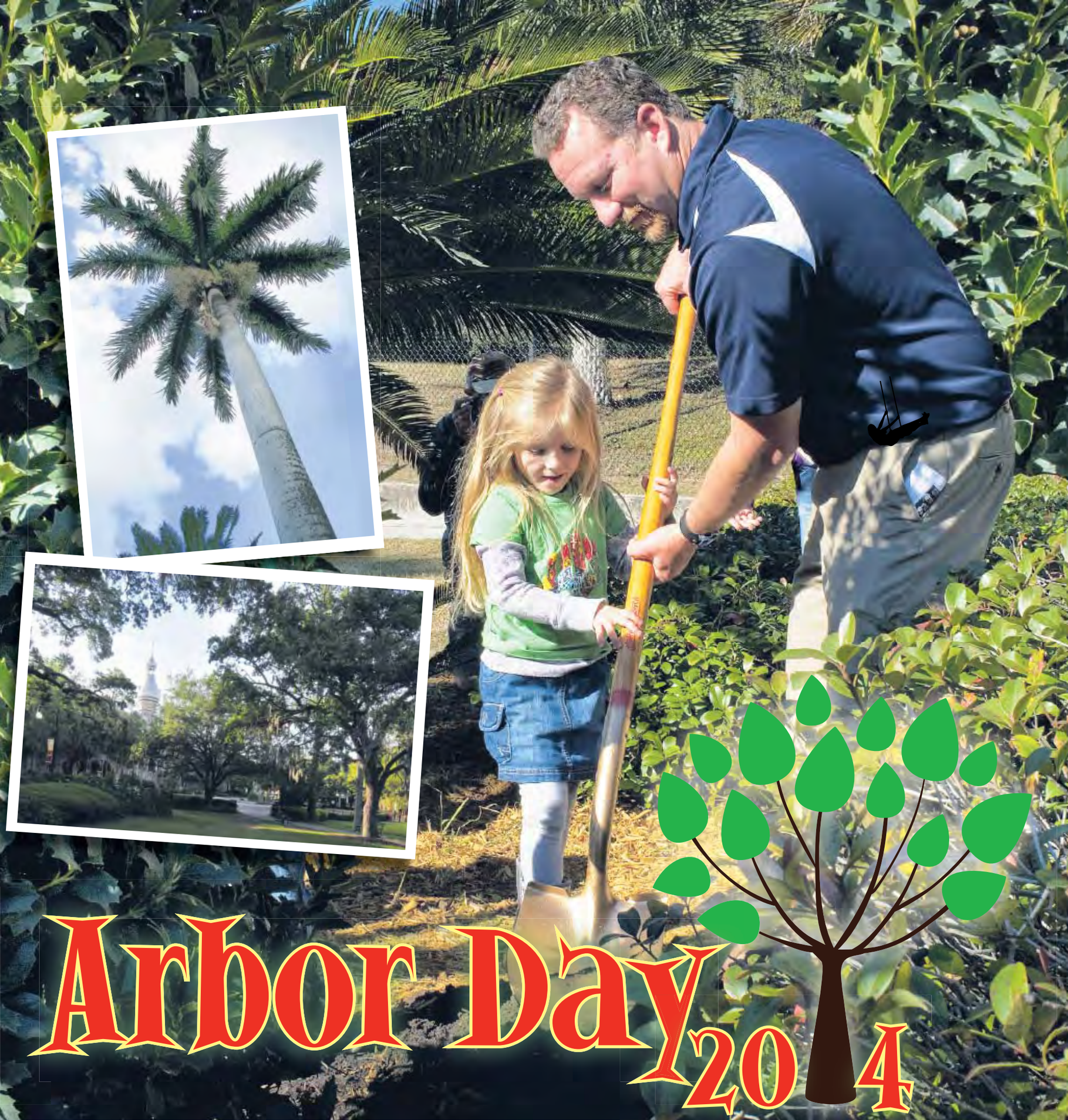

Arbor Day 2014

City of Tampa Florida

TD Green Streets

UF IFAS Extension UNIVERSITY of FLORIDA

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Tampa Bay Times NIE newspaper in education tampabay.com/nie

Trees:

a woody perennial plant

A tree is a type of woody perennial, or long-lived, plant. Although there are more than 20,000 different kinds of trees in the world, all trees share three characteristics that distinguish them from other plants:

- Trees are much larger than other plants. Live oak trees, one of Florida's largest trees, can grow to a height of more than 75 feet and as wide as 120 feet.
- Trees grow to be much older than other plants. In fact, trees are the longest-living organisms on Earth. Live oaks can live for centuries.
- Trees have a hard, woody stem, or trunk.

Although many plants share one or two of these characteristics, only trees have all three.

Trees are seed plants. That means they reproduce by seed. There are two types.Gymnosperms are trees with cones or seeds that develop on the surface, such as cypress and pine trees. Angiosperms are trees whose seeds are enclosed within a fruit or other structure, such as oak, elm and maple trees.

Trees are also classified as deciduous or evergreen. Deciduous trees lose their leaves and go dormant periodically, while evergreen trees never lose their leaves or go dormant.

Sources: Arbor Day Foundation, Penn State Cooperative Extension, University of Florida IFAS Extension

Biology of trees

A tree is made up of three main parts: the crown, or canopy; the trunk and the roots.

The canopy consists of the tree's branches and leaves, and it is where the tree uses energy from the sun to produce its food by photosynthesis, the process in which plants use water, carbon dioxide and sunlight to produce carbohydrates (sugars and starches) and oxygen. Chlorophyll, a green pigment found in the leaves of plants, drives this chemical reaction inside a special type of cell called a chloroplast.

The trunk is the stem of the tree. It supports the canopy, allows the tree to get above other plants to capture more sunlight and transports water and nutrients between the roots, branches and leaves. The interior of the trunk is made up of different types of cells called phloem, xylem and cambium. Phloem tissue conducts food made in the leaves through the process of photosynthesis to the rest of the tree. Xylem is water-conducting tissue that carries water and nutrients from the roots to the rest of the tree.

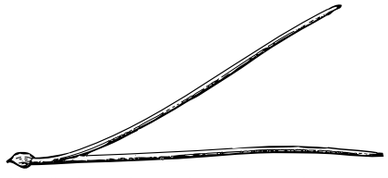
As new xylem grows, the old xylem no longer conducts water, but instead serves as a "skeleton" for the tree. Finally, cambium cells form a layer between the phloem and xylem and are responsible for the secondary growth, or thickening, of the tree, forming the wood and inner bark of the tree.

Bark is the outer layer of the trunk. Although the appearance and thickness of bark varies widely among species, it performs the same function for all trees: It helps to protect them from injury and disease caused by insects, fungus and even fire. Bark also minimizes water loss through evaporation.

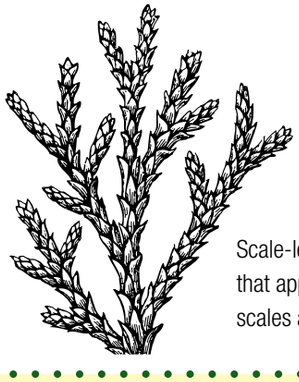
The roots of a tree absorb water and nutrients from the soil and serve as an anchor, holding the tree down and helping it to remain upright.

Sources: Arbor Day Foundation, Encyclopedia Britannica, Penn State Cooperative Extension, Public Broadcasting System (PBS)

Broad-leaved trees have flat, thin leaves and are generally deciduous.



Needle-leaved trees have leaves that are needle-like and are generally evergreen.

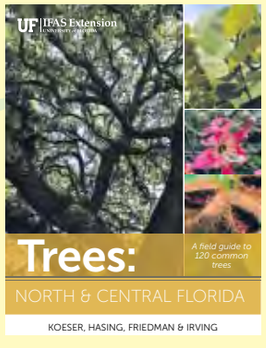


Scale-leaved trees have leaves that appear to be covered with tiny scales and are generally evergreen.

Learning with the *Times*

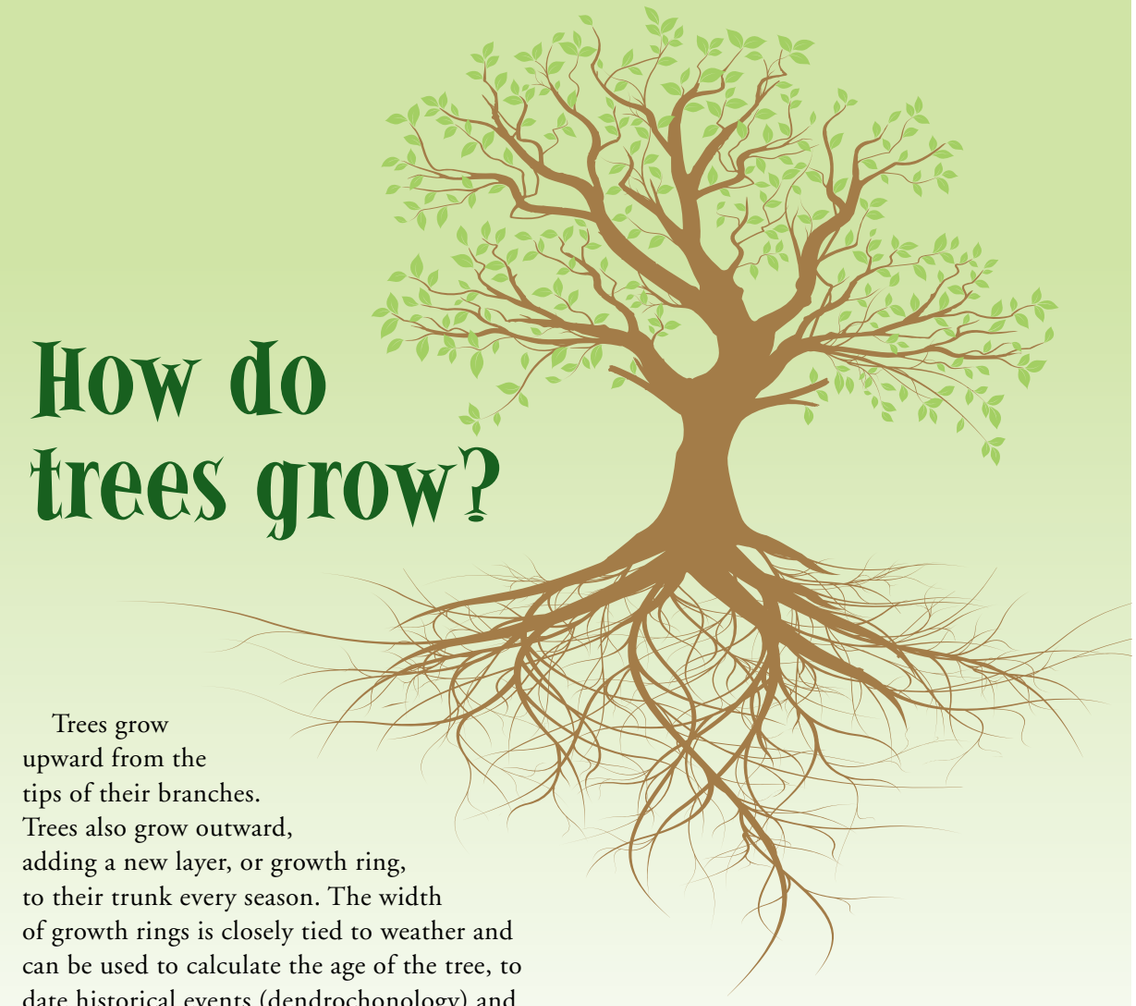
Ecosystems

An urban forest is a type of ecosystem. An ecosystem is a biological community of interacting organisms and their physical environment. In other words, an ecosystem is a community of living and nonliving things that work together. Think about all of the different parts of the urban forest ecosystem. Make a list of all of the interacting organisms in what would be in an urban forest. Next, look for articles, photos and advertisements in the *Tampa Bay Times* that illustrate these ideas. Make a list of all of the parts of an urban forest ecosystem that you find in the *Times*. Choose some of the most important parts and create a cartoon depicting this ecosystem.



The University of Florida's *Trees: North & Central Florida* field identification guide (Fall 2014) will make it easy to identify common Tampa Bay area trees by their leaves, bark, flowers and other characteristics. Visit gardeningsolutions.ifas.ufl.edu/tree-guide for more information.

How do trees grow?



Trees grow upward from the tips of their branches. Trees also grow outward, adding a new layer, or growth ring, to their trunk every season. The width of growth rings is closely tied to weather and can be used to calculate the age of the tree, to date historical events (dendrochonology) and to study past environmental events such as fires and droughts.

Tree roots grow like branches: from their tips and in diameter, or thickness. Most tree roots grow within the top two feet of soil all around a tree. Trees in the Tampa Bay region do not put down deep roots because the water table is so close to the surface, but desert species, such as mesquite, can reach depths of almost 200 feet. Roots can grow outward to about three times the canopy spread of a tree.

Sources: Encyclopedia Britannica, International Society of Arboriculture, Penn State Cooperative Extension, University of Florida IFAS Extension, University of Arizona

Tampa's urban forest

Tampa was once covered by extensive forests. Downtown was an upland forest dominated by live oaks, Channelside was a salt marsh and Hyde Park was grassy scrub. South and East Tampa were primarily pine forest, while West and North Tampa contained mainly marshes, wetlands and cypress stands.

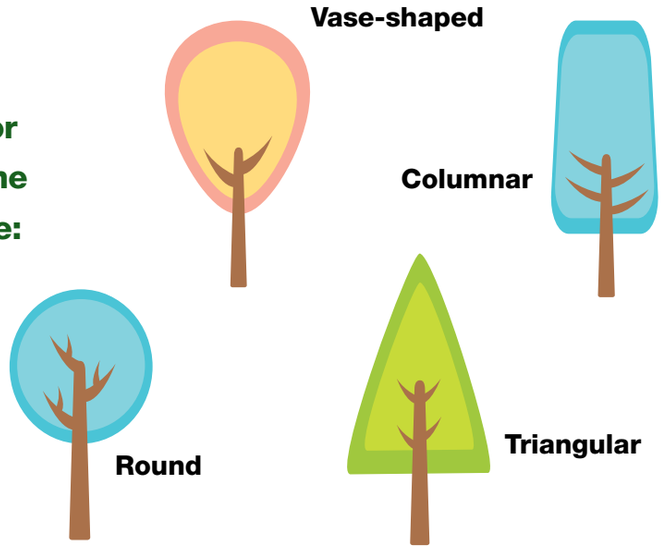
For thousands of years, Native Floridians managed the forests by starting forests for hunting and agriculture. Later, the Spanish logged cypress for use as ship masts, and during the last half of the 19th century, Tampa-area sawmills were also milling pine and cedar. By the early 20th century, the forests of Tampa had been extensively cut.

Since that time, formerly native forests have become urban and residential landscapes, and residents of the city of Tampa now live within an urban forest.

Tampa's urban forest consists of the remaining native forest found on public and private land in places such as parks, medians and undeveloped lots, plus all the planted trees, palms and shrubs on both public and private land. Tampa's urban forest provides numerous benefits to neighborhoods and communities, including lowering the air temperature, reducing energy consumption, removing pollutants from the air and water, reducing flooding, enhancing property values, increasing recreational opportunities and providing aesthetic diversity.

Source: City of Tampa 2011 Urban Forest Analysis

The shapes of trees vary among different species as much as leaf shapes or bark patterns. Some of the most common shapes are:



Sources: Arbor Day Foundation, Penn State Cooperative Extension, University of Florida IFAS Extension

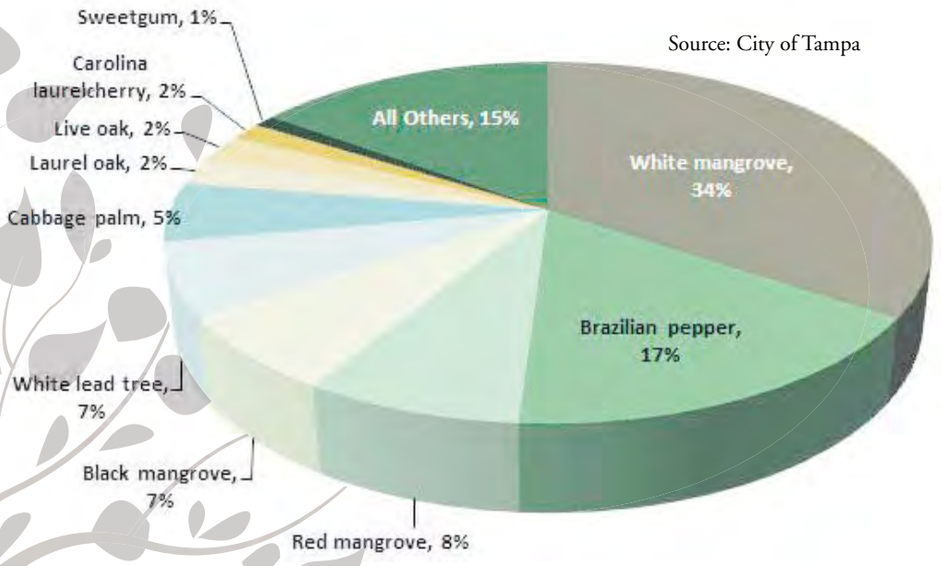
Research activity
Urban forest

Research the term "urban forest" on the Internet. What is an urban forest? How does an urban forest differ from a traditional forest? Create a chart showing the attributes of both urban and traditional forests. Be sure to include at least three points on your chart. Take the information you have gathered and write either a comparison or argument essay about this topic.

Brazilian pepper tree

Tampa's top 10

There are an estimated 8.7 million trees in the city of Tampa. Because Tampa is located in a transitional zone between temperate north Florida and tropical south Florida, it contains a uniquely diverse assortment of tree species. The 10 most common tree species include two invasive species, the Brazilian pepper and white lead trees.



Source: City of Tampa

Native, exotic and invasive species

Native species are those found in Florida before European colonization in the 16th century. Exotic, or nonnative, species are those that have been introduced outside of their native area by humans, either intentionally or by accident.

Invasive species are those that are able to spread into and dominate an area due to a lack of natural predators and disease. Invasive species cause ecological damage and harm native ecosystems by displacing native plants, decreasing diversity and even causing the extinction of native species. They also can have negative economic effects and even be harmful to human health. Invasive species can be native or nonnative.

The Brazilian pepper tree is one of the most aggressive and widespread invasive plants in the state of Florida. Native to Argentina, Paraguay and Brazil, it was originally imported in the mid-1800s as an ornamental landscape plant. There are now more than 700,000 acres of land infested with the Brazilian pepper tree in Florida. It is the second-most common tree species in the city of Tampa.

Brazilian pepper trees can grow to more than 30 feet high and have a dense canopy that shades out all other plants. The Brazilian pepper produces allergens that cause respiratory difficulty, and, because it is in the same plant family as poison ivy, poison oak and poison sumac, it can cause skin irritation.

Due to its invasive nature, the Brazilian pepper is classified as a Class I Prohibited Aquatic Plant by the Florida Department of Environmental Protection and as Category I on the Florida Exotic Pest Plant Council's list of Invasive Plant Species. The sale or movement of the Brazilian pepper is illegal.

Sources: Arbor Day Foundation, City of Tampa, Penn State Cooperative Extension, University of Florida IFAS Extension, U.S. Fish and Wildlife Service

Tree removal

All trees with trunks of five inches or more in diameter and all cypress and mangrove trees, regardless of size, are protected in the city of Tampa. Trees with trunks of 34 inches or more in diameter may qualify for designation as grand trees, which have additional protections. A permit must be obtained from the city before removing most trees. For more information, visit tampagov.net/DEPT_PLANNING/INFORMATION_RESOURCES/TREE_REMOVAL_INFORMATION.ASP.

To report an unpermitted tree removal, call the City of Tampa's tree hotline at 813-258-TREE.

Source: City of Tampa

Learning with the *Times*

Invasive species

The National Ocean Service defines an invasive species, also known as an exotic or nuisance species, as "an organism or plant that is introduced into a new environment, where it is not native." Invasive species can be in the form of plants or animals. The nonnative dwellers can be hazardous to an ecosystem. Look for articles in the *Tampa Bay Times* that focus on local ecosystems, and invasive and threatened species. Pay special attention to the information about the effects of human activities and invasive species on ecosystems. Keep track in your journal of the articles you find. Choose one of the topics you have read about to do further research. Write a feature-style newspaper article about what you have discovered. Share this article with your class.

City of Tampa Urban Forest Management Plan

The City of Tampa Urban Forest Management Plan was developed through a collaborative effort that involved all the departments of the City of Tampa, the University of Florida, the University of South Florida, Hillsborough County Extension, business and professional organizations, neighborhood associations and citizens. It is a strategic plan for the management of Tampa's urban forest that addresses the numerous challenges to growing and maintaining a healthy urban forest in an efficient manner.

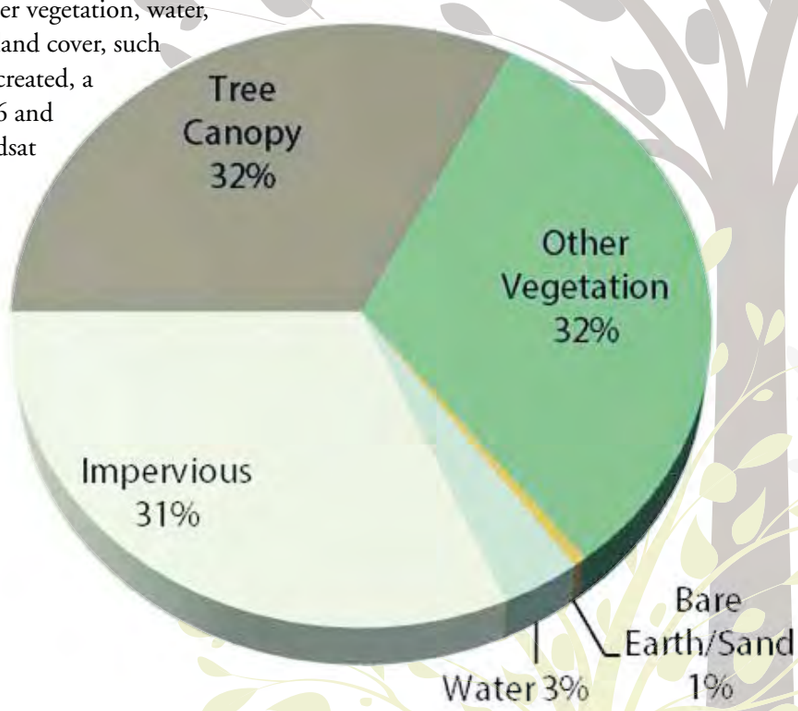
City of Tampa urban forest analysis

The City of Tampa's initial urban forest analysis took place in 2006-2007, and a follow-up assessment was completed in 2011-2012. The City of Tampa urban forest analysis provides a detailed scientific look at Tampa's urban forest.

Researchers used satellite and high-resolution aerial photography to identify and map the location of tree canopy, other vegetation, water, bare earth and impervious land cover, such as concrete. The map they created, a similar map created in 2006 and four decades of NASA Landsat satellite photographs were used to examine how tree canopy has changed in Tampa since 1975.

In 2011, approximately one-third of the city was tree canopy cover, one-third was covered by other vegetation such as grass, short plants and shrubs, and one-third was buildings, roads and other impervious surfaces.

Source: City of Tampa



i-Tree

Researchers used free software called i-Tree, created by the USDA Forest Service, to help them analyze the results of their study. The i-Tree suite of software offers analysis tools and utility programs to help individuals and communities quantify the environmental and economic impact of trees.

i-Tree Design is a simple online tool that lets you calculate the benefits of planting trees on your property. By entering your address, you can virtually "plant" one or more trees around your home and see how tree type, size and placement affects energy use, greenhouse gas mitigation, air quality improvements and stormwater interception. Visit itreetools.org/design to get started.

Sources: City of Tampa, USDA Forest Service

City of Tampa Urban Forest Management Plan goals

1. To understand and communicate the need to maintain and protect the complexity of natural systems in the urban forest so that the public will support a rich, diverse habitat.
2. To advance public appreciation of the economic, social and environmental values of Tampa's urban forest in all education settings, from in-school to adult education and public service campaigns, so as to create an ethic of individual stewardship.
3. To promote proper tree care in the urban forest through education and enforcement.
4. To create inclusive partnerships that encourage collaboration among all affected parties to benefit Tampa's urban forest.
5. To improve the policy framework for the conservation, reclamation, restoration and increase of natural resources within the urban forest.
6. To promote recognition, maintenance and regeneration of Tampa's urban forest that is economically and ecologically feasible.

Source: City of Tampa

The right tree in the right place

All trees are not the same, and each has specific needs. Careful planning is necessary before you plant to make sure that your tree will grow well, stay healthy and provide you with the maximum environmental, economic and aesthetic benefits. There are several factors that you should take into consideration:

Height – Are there power lines or other obstacles above your planting site that the tree might bump into when it is fully grown?

Canopy spread – Are there other trees or structures nearby that your tree might grow too close to?

Distance from paved surface – A tree's roots can grow outward to about three times its canopy spread. Is there a road, sidewalk or other hard surface near your planting site that might interfere with your tree's roots?

Root depth – Call 811 before you dig to find out if there are any utility lines underneath your planting site.

Type – Is the tree deciduous or evergreen? Will it drop leaves, fruit, berries or flowers on a sidewalk or patio?

Shape – A columnar tree needs less space to grow, while round and vase-shaped species provide more shade.

Growth rate – How long will it take for your tree to reach maturity?

Soil requirements – There are many different types of soils, and each species of tree grows best in specific types of soil. Different species of trees also require varying soil areas.

Sun – How much sunlight does your planting site get? Different species of trees prefer full sun, partial sun or shady locations.

Moisture – How much water will your tree need to get established? What level of moisture does it need when mature?

Hardiness zone – What temperature extremes can your tree tolerate?

The Arbor Day Foundation offers an online quiz at arborday.org/trees/righttreeandplace/quiz.cfm to help you learn how the characteristics of trees influence how and where they should be planted.

Sources: Arbor Day Foundation, Penn State Cooperative Extension, University of Florida IFAS Extension

Learning with the *Times*

Planning for planting

All trees are not the same, and each has specific needs. Careful planning is necessary before you plant. Using the information on these pages and the information on the Web links, create a tree-planting plan for your school. Ask your teacher to split your class into small groups. Be sure to implement all of the parts of the writing process in your plan. Begin by brainstorming some ideas with your classmates. Next, engage in a prewriting activity. The next step will be to create an outline. Once you have all of your ideas together, you can begin writing your plan. Don't forget to edit and proofread before submitting your final draft. Along with your plan, you are going to create a blueprint or map to illustrate your ideas. Share your plan and blueprint with your class.

Tree-mendous Tampa

Tampa recognizes the benefits of its trees and is committed to the conservation and enhancement of its environment. The Tree-mendous Tampa program provides individuals and neighborhood associations with free trees for planting on city land, greenways and street rights of way. Visit tampagov.net/dept_parks_and_recreation/programs_and_services/PROGRAMS/TREEMENDOUS_TAMPA/ to learn more.

To receive your free tree, submit an online request at tampagov.net/FreeTree.

Source: City of Tampa

Neighborhood Tree Steward program

The Neighborhood Tree Steward program is a partnership between the University of Florida IFAS – Hillsborough County and the City of Tampa offering educational programs on tree care for neighborhoods. For more information, visit tampagov.net/dept_planning/files/TUEA_files/Practical_Educational_Programs_for_Neighborhoods.pdf or call 813-744-5519, ext. 54106.

Source: City of Tampa

Neighborhood Tree Watch program

Planting and caring for trees are among the most valuable investments we make in our community. Tampa's Neighborhood Tree Watch program promotes awareness of our urban forest through advocacy, education and action, and encourages citizens to serve as stewards to protect the trees in their neighborhoods. The goals of the Neighborhood Tree Watch program are to:

- Teach citizens to identify protected tree species and grand trees.
- Provide citizens with a better understanding of Tampa's regulations and codes applicable to neighborhood trees.
- Assist in identifying violations involving the removal or trimming of protected or grand trees.
- Provide continuing education on pruning, tree biology and planting to citizens.

Source: City of Tampa

Tampa tree matrix

The City of Tampa has developed a tree matrix to help city residents choose the right tree.

The table on this page contains a selection of hardy trees and their most important attributes. All of these trees are drought-tolerant and wind-resistant, and most are Florida natives. Once you choose your planting site, you can identify trees that are suitable in size. You can learn more about each of these trees and view pictures of them at edis.ifas.ufl.edu. Many are available at local tree nurseries.

The full matrix is available online at tampagov.net/dept_planning/files/TUEA_files/City_of_Tampa_Tree_Matrix_4_23_2013_Updated.pdf.

Source: City of Tampa

Common Name	Florida Native	Mature Spread	Mature Height	Drought Tolerance	Wind Resistance	Soil Area (w/3-ft depth)	Distance from Paved Surface
American Holly	Yes	15 to 25 feet	35 to 50 feet	Medium	Highest	20' x 20'	6 feet
Baldcypress	Yes	25 to 35 feet	60 to 80 feet	Medium	Highest	30' x 30'	10 feet
Blackhaw (Viburnum)	Yes	6 to 10 feet	8 to 25 feet	High	N/A	10' x 10'	2 feet
Cabbage Palm	Yes	10 to 15 feet	40 to 50 feet	High	Highest	20' x 20'	6 feet
Chickasaw Plum	Yes	15 to 20 feet	12 to 20 feet	High	Medium High	10' x 10'	2 feet
Crape Myrtle	No	15 to 25 feet	10 to 30 feet	High	Highest	10' x 10'	2 feet
Date Palm	No	12 to 15 feet	50 to 80 feet	Medium	Highest	30' x 30'	10 feet
Eastern Redbud	Yes	15 to 25 feet	20 to 30 feet	Medium	Medium High	10' x 10'	2 feet
Florida Sugar Maple	Yes	25 to 40 feet	50 to 60 feet	Medium	Yes	30' x 30'	10 feet
Flowering Dogwood	Yes	25 to 30 feet	20 to 30 feet	Low To Medium	Highest	10' x 10'	2 feet
Myrtle Oak	Yes	35 to 40 feet	8 feet	High	Highest	20' x 20'	6 feet
Olive	No	35 to 50 feet	25 to 50 feet	High	N/A	20' x 20'	6 feet
Pignut Hickory	Yes	30 to 40 feet	50 to 65 feet	Medium	Medium High	30' x 30'	10 feet
Pindo Palm	No	10 to 15 feet	15 to 25 fee	High	Highest	10' x 10'	2 feet
Podocarpus	No	20 to 25 feet	30 to 40 feet	High	Highest	30' x 30'	10 feet
Pondcypress	Yes	10 to 15 feet	50 to 60 feet	Medium	Highest	30' x 30'	10 feet
Possumhaw	Yes	10 to 15 feet	10 to 15 feet	High	N/A	10' x 10'	2 feet
Purple Tabebuia	No	10 to 15 feet	12 to 18 feet	Medium	N/A	10' x 10'	2 feet
Red Maple	Yes	25 to 35 feet	60 to 75 feet	Medium	Medium	30' x 30'	10 feet
Sand Live Oak	Yes	45 to 60 feet	30 to 50 feet	High	Highest	30' x 30'	10 feet
Seagrape	Yes	20 to 30 feet	25 to 30 feet	High	Medium High	10' x 10'	2 feet
Southern Live Oak	Yes	60 to 120 feet	60 t o 80 feet	High	Highest	30' x 30'	10 feet
Southern Magnolia	Yes	30 to 40 feet	60 to 80 feet	Medium	Highest	30' x 30'	10 feet
Sweet Acacia	Yes	15 to 25 feet	15 to 25 feet	High	N/A	10' x 10'	2 feet
Turkey Oak	Yes	25 to 30 feet	30 to 40 feet	High	Highest	20' x 20'	6 feet
Winged Elm	Yes	30 to 40 feet	45 to 70 feet	Medium	Medium	30' x 30'	10 feet
Yaupon Holly	Yes	15 to 20 feet	15 to 20 feet	High	Highest	10' x 10'	2 feet

Learning with the *Times*

Environment editorial

Think about the importance of the environment as it relates to the future of mankind and the quality of life. Deforestation is a hot topic when it comes to the environment. Whether we are talking about urban or traditional forests, trees and plants play an important role in the environment. With your class, make a list of ways these concepts are interconnected. Next, in a small group, look for articles in the *Tampa Bay Times* about the environment, such as preservation, conservation, recycling, pollution or any other topics you discussed with your class. Based on the information you read in these articles, write an editorial on the importance of protecting your environment. Use the editorials in the *Times* as models.

Environmental, social and

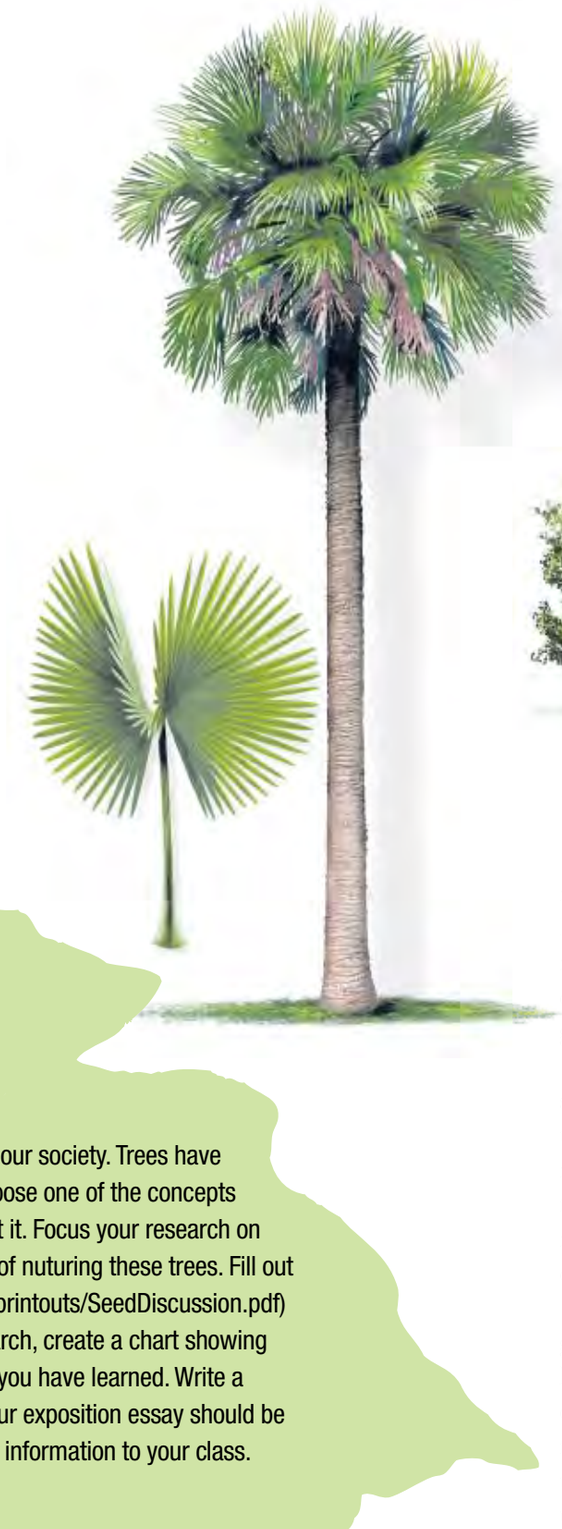
Palms

The sabal palm, also known as the cabbage palm, is Florida's state tree and appears on the state seal. However, palms are not actually trees at all, but a type of flowering plant called a monocotyledon. Unlike those of trees, the stems and roots of palms cannot grow in thickness. Most palms also have only one growing point, unlike trees.

Although not a tree, the sabal palm grows in almost any soil and has many uses, including food, medicine and landscaping. It is the most common type of palm in the city of Tampa and in the state of Florida. Sabal palms make up 7 percent of Tampa's urban forest.

In general, palms are fairly easy to care for. Unfortunately, many people overprune their palms. Palms should have round, full crowns, not "feather-duster" crowns. Palms do not require pruning at all. Overpruned palms are unattractive, provide little shade and are weaker than full-canopied palms, with reduced photosynthetic ability and diminished resistance to disease and insects. "Hurricane-cut" palms, which have been severely pruned with the intent of protecting the palm by reducing wind resistance, have been shown instead to be more likely to sustain damage in high winds than palms with fuller crowns.

Sources: Encyclopedia Britannica, Florida Division of Historical Resources



Trees provide shade, reducing the energy needed to cool and heat buildings and cars. In 2011, trees saved Tampa residents a total of $5.2 million in energy costs. Did you know that parking a car in the shade reduces the evaporation of gasoline, which contributes to the formation of the greenhouse gas ozone?

Trees remove pollutants from the atmosphere. Tampa's trees and shrubs removed 1,163 tons of pollutants such as carbon monoxide, nitrogen dioxide, ozone and sulfur dioxide from the air in 2011, saving an estimated $5.4 million in airborne pollutant-related healthcare costs.

Trees sequester, or "lock up," the greenhouse gas carbon dioxide in their tissue for their lifetime. The total amount of carbon dioxide currently stored by the trees in Tampa's urban forest is approximately 619,000 tons. Thirty-three percent of this is in live oaks, which live up to 300 years.

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Sources: City of Tampa 20
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Learning with the *Times*

Going beyond the text

There is no doubt about it: Trees are important to our society. Trees have environmental, social and economic benefits. Choose one of the concepts from this page and do some more research about it. Focus your research on the environmental, social and economic benefits of nuturing these trees. Fill out a Seed Chart (readwritethink.org/files/resources/printouts/SeedDiscussion.pdf) for your topic. When you have finished your research, create a chart showing the environmental, social and economic benefits you have learned. Write a short essay explaining what you have learned. Your exposition essay should be written in third person point of view. Present your information to your class.

economic benefits of trees

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11 Urban Forest Analysis,
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ROBERT O'BRIEN DESIGN

Mangroves

Mangroves are a unique type of salt-tolerant tree that live in intertidal areas of salty or brackish water. Because they are extremely sensitive to cold, in the continental United States mangrove forests are only found on the southern coasts of Florida and Texas. Three species of mangrove live in Florida: red, white and black. Fourty-nine percent of the trees in Tampa are mangroves.

Red mangroves are the most recognizable mangrove trees due to their arching prop roots, which provide support and stability for the tree and supply oxygen to the buried roots.

Black mangroves are most easily recognized by their vertical, pencil-like aerial roots called pneumatophores. Like the prop roots of the red mangrove, pneumatophores provide oxygen to the tree's underground roots.

White mangroves are the smallest of Florida's mangroves and live further inshore than the other two mangrove species. Depending on their habitat, they may have prop roots, pneumatophores or neither.

Unlike freshwater plants, mangroves have evolved to thrive in salty or brackish water. Red mangroves block the absorption of salt at their roots, while black and white mangroves excrete salt through specialized glands on the surface of their leaves.

Mangroves have an unusual way of reproducing. They are viviparous, which means

that their seeds, called propagules, germinate while still on the mother plant. Once the propagule is mature, it breaks off from the tree. A propagule can float in the water for up to a year. Once it is washed ashore in a suitable place, it develops roots and establishes itself as a new mangrove plant.

Mangrove forests are extremely important ecologically. Mangroves filter out pollution, protect the shoreline from erosion and provide essential feeding, nesting and nursery habitat for a variety of fish, shellfish, crustaceans, birds and other wildlife. Destruction of mangrove habitat by shoreline development can increase coastal erosion, change waterfront runoff patterns and impact biodiversity. In Tampa Bay, almost 50 percent of the mangrove forest was lost in the past 100 years. Florida law now protects mangroves and their removal is regulated by state and local laws.

Sources: City of Tampa, University of Florida Cooperative Extension Program

Learning with the *Times*

Native, exotic, invasive … Oh, my!

When you study new things, you often come up against some tough vocabulary words! Most vocabulary words are learned from context clues or good old-fashioned dictionary work. While you read this publication, be sure to highlight or circle words you don't know. Try to figure out the words' meanings by looking for clues in the sentences around them. Write down your best guess, and then look up the words in a dictionary. As a group activity, make a list of the words your classmates identified and see which ones stumped the class. Next, use these words for a news scavenger hunt. See if you can find these words in the *Tampa Bay Times*. The group that finds the most words wins the game.

Buying the best tree

Once you have selected the type of tree you would like to plant, it is important to choose a strong and healthy tree. Inspect the tree carefully before purchasing it.

A healthy tree has:

- A strong, straight trunk that is not cut or damaged
- Evenly spaced branches that are not split or broken
- A full canopy of green and healthy leaves (unless dormant)
- No diseases or harmful insects
- No roots growing out of the bottom of the container
- No roots circling the top of the container
- No weeds growing in the container
- Moist soil in the container

TIP: Always lift a tree by the container, not by the trunk. Lifting a tree by the trunk breaks the contact between the roots and the soil and also may damage or break roots.

Planting a container tree

1. Dig a hole three to four times wider than the container. The hole should have sloping sides to allow for root growth. The depth of the hole should allow the top of the root ball to protrude a little above the ground. Note that the height of the root ball is shorter than the height of the container. Put the soil that you dig out – called backfill – in a wheelbarrow or on top of a plastic tarp.

2. Carefully slide the tree from the container, taking care not to yank it. Carefully cutting down the sides of the container with a utility knife or tapping the sides of the container may help to release the tree.

3. Cut any roots that circle the outside of the root ball. If not removed, circling roots can strangle the tree as it grows.

4. Set the tree in the center of the hole. Using some soil, secure the tree in a straight position, then firmly pack the hole with the backfill. Keep backfilling until the soil is just below the root collar. Any extra soil on top of the root ball will reduce the amount of oxygen and water getting to the roots.

5. Create a water-holding basin around the hole by using backfill to make a 3-inch-high berm around the edge of the root ball.

6. Water the tree well.

7. Spread organic mulch 2 to 4 inches deep in a 3-foot diameter area around the base of the tree. Mulch moderates the soil temperature, acts as a blanket to hold in moisture and reduces the growth of grass and weeds. Leave a 2-inch area around the base of the tree mulch-free. Organic mulch consists of bark, wood chips, straw or similar materials. Inorganic mulch such as stone, crushed shells or rubber does not offer the same benefits as organic mulch.

8. Remove any tags or labels from the tree.

9. Prune off any branches that are broken, unhealthy or dead.

TIP: If you are not going to plant your tree as soon as you get it home, keep it in a shady place until you are ready to plant. Container-grown trees dry out very quickly, so it's important to keep the soil moist, but not wet, until you plant. Water the tree slowly just until water runs from the bottom of the container. Many container trees will need water every day.

Sources: Arbor Day Foundation, International Society of Arboriculture, Penn State Cooperative Extension, University of Florida IFAS Extension

Learning with the *Times*

Just breathe

Trees help us breathe by taking carbon dioxide out of the air that we exhale and producing oxygen that we inhale. All living things breathe, and, therefore, are affected by the presence of trees. Look for photos and cartoons of living things in the *Tampa Bay Times*. Create a collage showing all of the photos you find. Make a note next to the photo indicating if the organism inhales oxygen or carbon dioxide. Share your information with your class.

Establishing your tree

Newly planted trees need time and care to become established. Depending on the size of your tree, it may take six to nine months of care to ensure that your tree gets off to a good start.

During this period, you will need to make sure that the soil stays moist. Water your tree when the soil is dry below the surface of the mulch, or at least once a week. At each watering, your tree should get approximately 2 gallons of water per inch of trunk diameter. As the tree grows older, you can water it less often. Mature trees do not require watering except in drought conditions.

Do not use fertilizer or chemicals on your newly planted tree. Trees do not need to be fertilized when they are planted. After your tree is established, it may benefit from fertilizer. Always check with a tree-care professional before using chemicals or fertilizer on your tree.

Sources: Arbor Day Foundation, International Society of Arboriculture, Penn State Cooperative Extension, University of Florida IFAS Extension

Proper pruning

It's important not to over prune your young tree. When pruning back to the trunk or a larger branch, cut down and outward, leaving the branch collar (the swollen area at the branch base) intact. When shortening a small branch, cut at a slight angle about ¼ inch beyond a bud or another branch.

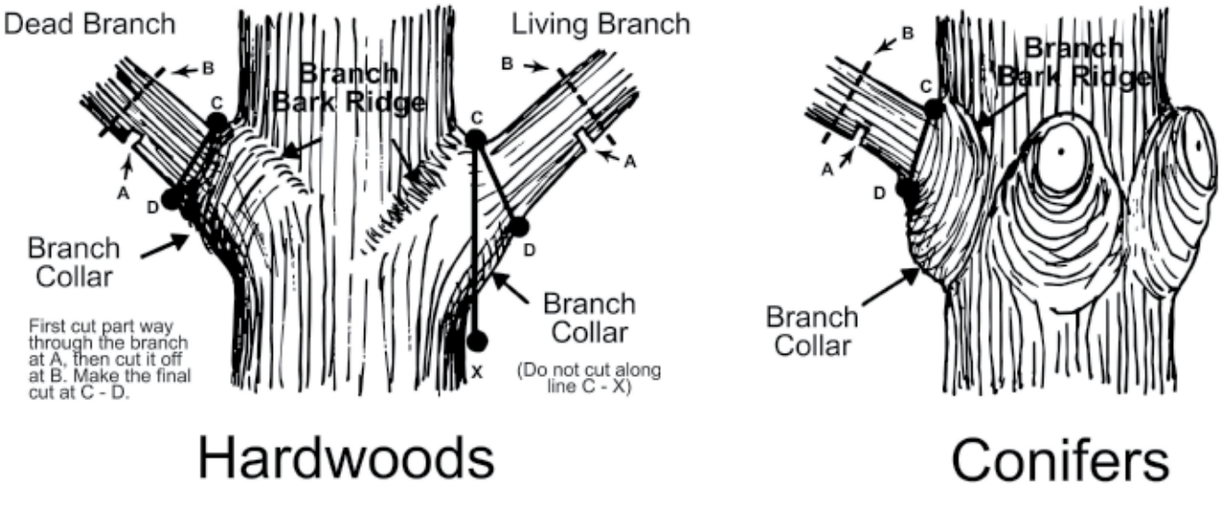
- Identify the best leader (the shoot at the top of the tree that leads the growth) and remove any competing leaders.
- Remove any branches that are broken or damaged, unhealthy, crooked, dead or not growing.
- Remove suckers (branches growing from the base of the tree).
- Remove any branches that cross another branch.
- Do not remove more than 25 percent of the tree's canopy in any one year.

Sources: Arbor Day Foundation, International Society of Arboriculture, Penn State Cooperative Extension, University of Florida IFAS Extension

Recording your results

Keep a journal of your tree-planting experience. Be sure to include photos of your tree at different stages. You also can predict tree growth. For example, if trees grow 6 inches in height per year, how tall will your tree be in five years? You also can predict the circumference of the tree. Make a chart of your predictions and fill it in as you check your tree's progress.

Proper Pruning Principles



Arbor Day Foundation

Danger signals

As your tree grows, monitor it for signs of environmental stresses. The most common dangers are harmful insects, disease and chemicals. Your tree also may be receiving too much, or not enough, water or sunlight.

Most insects do not harm plants, and many are actually beneficial, helping with pollination or acting as predators of other, more harmful insects. Pesticides should not be used on your tree unless a tree-care professional has determined that it is necessary.

Lawn chemicals should never be applied under the canopy spread of any tree.

Signs that your tree may be in distress include:

- Wilting leaves or branches
- Webs or sticky residue (honeydew) on leaves
- Notches or holes on leaves
- Holes in the trunk or branches
- Changes in leaf color

The best treatment method for a particular problem will depend on a variety of factors specific to the situation. Always consult a tree-care professional if you have any questions about the nature of the problem or proper treatment.

Sources: Arbor Day Foundation, International Society of Arboriculture, Penn State Cooperative Extension, University of Florida IFAS Extension

City of Tampa
Urban Forest

Tampa Tree Map: Mapping Tampa and USF's trees and growing a green future together

tampatreemap.usf.edu

One of the best ways to ensure that trees are properly cared for and maintained is to have an accurate and current inventory of the urban tree population. The Tampa Tree Map is a Web-based map database of trees within the City of Tampa and the University of South Florida (USF) campus, created as a collaboration of government, nonprofits, businesses and community members.

The Tampa Tree Map allows anyone to calculate the ecological benefits of individual trees and of the entire urban forest. The more trees included in the map, the more accurate it will be.

Use the Tampa Tree Map to search for trees near a specific address or in a general neighborhood, to add trees near your home or in your neighborhood to the map and to update trees already mapped with new information.

1 **Find a tree** – Search for nearby trees that interest you. Find native trees, fruit trees or those with beautiful flowers. Search for the biggest trees in your neighborhood and then go visit them!

2 **Add a tree** – The Tampa Tree Map grows as urban foresters like you add trees. Show a tree's location by placing it on the map, and then provide as much additional information as you can.

3 **Edit a tree** – Start by searching for trees near you. Update what data you can and add photos and alerts. With your help the professionals will track changes in Tampa Bay's urban forest and watch it grow.

Source: City of Tampa

Map your school's urban forest

In order to map your school's urban forest on the Tampa Tree Map, your school administrator will need to create a free account at **tampatreemap.usf.edu.**

How to add a tree to the Tampa Tree Map

Search – Search the Tampa Tree Map database to make sure that the tree you want to add isn't already listed.

Click the Add a Tree button.

Enter the address – Type in the address of your tree location and click the Update Map button.

Specify the placement – Click and drag the orange circle that represents your tree to the location where you think the trunk is located under the canopy. You can refine the position later.

Enter the tree and plot information – This is where you will enter detailed information about the tree you are mapping, including its species, trunk size, tree height and details about the location where the tree is planted.

Click the Add this Tree button.

Add additional information – Once you have added your tree, you can upload a photo of it and add additional information to its record.

On your tree's profile page, you can see the ecological benefits that the tree brings to our community, including the amount and value of intercepted stormwater, energy conserved, air pollutants removed, carbon dioxide reduced and total carbon dioxide stored to date.

Visit tampatreemap.usf.edu/how-to/ for complete, step-by-step instructions on how to use the Tampa Tree Map.

Source: Tampa Tree Map

Measuring for height

You will need two people for this activity. You also will need a yardstick, notepad and pencil.

Step 1: One team member should stand next to the tree that you want to measure.

Step 2: The second team member should walk away from the tree until the tree appears smaller than the yardstick.

Step 3: Use the yardstick to measure the apparent height of the tree and record your answer.

Step 4: Use the yardstick to measure the apparent height of the student and record your answer.

Step 5: Measure the actual height of the first team member.

Step 6: Calculate the actual height of the tree using this formula:

actual height of tree (X) = (measured tree height ÷ measured height of student) x actual height of student

This will give you the actual height of the tree in inches. Divide your result by 12 to get the actual height of the tree in feet.

Example: Jennifer and Mike are measuring the height of a large live oak tree on their school grounds. Jennifer measures the apparent height of the tree to be 25 inches, and the apparent height of Mike to be 5 inches. Mike's actual height is 5 feet (60 inches). To determine the actual height of the tree, Jennifer and Mike solve for X:

X = (25 ÷ 5) x 60

X = 5 x 60

X = 300

The live oak tree is 300 inches or 25 feet tall.

Source: Florida Gulf Coast University Research and Education Center

Finding the diameter of a tree trunk

Professional arborists use the diameter of trees to estimate many things, including the age of the tree and the extent of the roots. They determine the diameter by first measuring the circumference of the trunk.

Supplies needed:

- Ruler, yardstick or tape measure
- Piece of string long enough to wrap completely around the trunk
- Marker
- Thumbtack or pushpin

Step 1: Wrap your tape measure or string around the tree at chest height (approximately 4½ feet). If the tree is too big for you to reach around, use a thumbtack to secure one end of your tape measure or string to the tree, and walk around the tree, making sure to keep the tape or string at the same level all the way around.

Step 2: Using your marker, mark the place where the tape or string overlaps itself.

Step 3: If you are using a tape measure, this is the circumference of the tree. If you are using a string, place the string on your ruler or yardstick, and measure the distance from the end of the string to the mark that you made to find the circumference.

Step 4: Calculate the diameter by using this formula: Diameter = Circumference ÷ 3.14 (If you're entering a tree in the Tampa Tree Map, you can enter the circumference and the application will calculate the diameter for you.)

An instructional video illustrating how to measure the circumference of many different types of tree can be found at tampatreemap.usf.edu/how-to/.

Sources: MathsIsFun.com, Tampa Tree Map

Learning with the *Times*

Environmental factors in comics

We often think of the environment in terms of real-life situations. Since comic strips often relate to real-life situations, the background or environmental surroundings of comic strips also may relate to reality. Comic strips may utilize one basic environmental type or ecosystem, or they may contain multiple types. Using the comics in the *Tampa Bay Times* as your source, identify several environmental types found. List the types you find on a chart. For each type that you identify, list the factors that are typical in that ecosystem. Next, think about the images presented in the comic. Are comic strip environmental types presented in accurate form or are they exaggerated? Write an argument essay based on your thoughts and the strip. Be sure to use specific examples to support your claims.

Careers in arboriculture, forestry and natural resources

Are you interested in exploring career paths that have to do with researching, conserving or working with the natural world? There are hundreds of options, including the ones outlined on these pages.

Forester

Foresters manage forests, parks, rangelands and other natural resources. Their duties vary widely, depending on their employer. Foresters may be responsible for choosing and preparing sites for new trees, monitoring the regeneration and status of forests, directing forest fire suppression efforts and supervising tree harvests. Urban foresters live and work in cities and manage urban trees. Foresters typically need a four-year degree in forestry or a related field. Foresters may begin their careers as forestry technicians or conservation workers.

Arborist

An arborist is an individual responsible for the long-term care and management of trees. Arborists can work for municipalities, utilities, private companies, educational institutions and nonprofit organizations. Typical arborists' duties include tree planting, early tree care, disease and pest control, pruning and tree removal.

Some arborists climb trees using specialized equipment. With proper training and specialized gear, they are able to safely prune and maintain tall growing trees from inside the canopy.

Arborists typically have a two- or four-year college degree in forestry, horticulture or a related field as well as experience in tree and plant care operations.

Certification by the International Society of Arboriculture or the American Society of Consulting Arborists is necessary for many arborist positions. Many arborists begin their careers as lower-level tree care professionals known as groundworkers.

Environmental planner

Urban and regional planners develop plans for the use of land. Environmental planners focus on preventing, minimizing and reversing the harmful effects that development can have on the environment. Environmental planners gather and analyze environmental data, review site plans submitted by developers and assess proposals for feasibility and environmental impact. They seek to protect and conserve natural resources, prevent the destruction of ecosystems and restore polluted areas. Most environmental planners have a master's degree in urban or regional planning.

Park ranger

Park rangers have a wide range of duties at county, state and national parks as guides, interpreters and law enforcement officers. Rangers lead educational activities for children and adults, work at visitor centers, lead tours and hikes, ensure that

Learning with the *Times*

Making a difference

Career paths focusing on researching, conserving or working with the natural world can be very exciting and fulfilling. Using the information on these pages, write down the main points for each job. Create a chart with this information. What other types of jobs do you think there may be? Check out the websites listed as resources. Choose five of these jobs and write a few sentences about how you feel these people make a difference in their community. Next, find an article in the *Tampa Bay Times* that depicts someone making a difference in the community. Write down the main points of the article. Share what you have learned with your class.

visitors follow park regulations and local, state and federal laws, provide first aid and rescue stranded guests.

Park ranger positions typically require a four-year degree in environmental studies, natural resources, science, law enforcement or another relevant field. Many rangers begin their careers as volunteers, interns or seasonal employees and work their way up to permanent jobs.

Wildlife biologist

A wildlife biologist studies animals and other wildlife and their habitats. Wildlife biologists may work outdoors studying animals in their natural habitats, in a laboratory or in an office. They may work for local, state or national governments, nonprofit organizations, or educational or research institutions. Wildlife biologists typically have a minimum of a four-year degree in biology or another life science, and many have graduate and post-graduate qualifications.

Wildlife law enforcement officer

A wildlife law enforcement officer protects natural resources by enforcing wildlife laws and regulations. Wildlife law enforcement officers are sworn law enforcement officers with full police powers.

Florida Fish and Wildlife Conservation Commission officers patrol rural, wilderness and inshore and offshore areas and enforce federal marine fisheries and wildlife laws as well as state laws.

Wildlife law enforcement officers typically need a minimum of a high school diploma plus law enforcement or military experience, meet medical, vision and physical fitness requirements, and have clean criminal and driving records.

Groundworker

Groundworker is an entry-level position in arboriculture. Duties may include assisting climbers, chipping brush, cutting wood and site cleanup after tree care operations. Positions are available with government, utility and residential/commercial tree care operations.

Typically, there are no formal educational requirements for the position of groundworker, but a high school diploma is recommended and a Commercial Driver's License (CDL) may be required. Groundworkers who wish to advance as a tree care professional should seek ISA qualification and/or certification.

Garden center / greenhouse / nursery worker

Many tree care professionals initially enter the field through positions in garden centers, greenhouses or nurseries. Typical duties can include planting, cultivating, managing and harvesting greenhouse and nursery crops or selling plants, tools and supplies in a retail outlet.

There is a wide range of educational requirements, but a high school diploma is recommended. More advanced positions typically require a two- or four-year college degree in horticulture or environmental horticulture.

Landscape / lawn care professional

Landscape and lawn care professionals plant and maintain residential, commercial and municipal landscapes, gardens and lawns.

Lawn care professionals may be employed by commercial lawn care companies, but may also work for landscape firms or local or state government. There are generally no formal educational requirements for lawn care positions, but a high school diploma is recommended.

More advanced positions typically require a two- or four-year college degree in horticulture or turf management.

Resources

To learn more about careers in arboriculture, forestry and natural resources, visit these online resources:

American Planning Association
planning.org

American Society of Consulting Arborists asca-consultants.org

American Society for Horticultural Science
ashs.org

American Society of Landscape Architects
asla.org

Florida Fish and Wildlife Conservation Commission
myfwc.com

International Society of Arboriculture
isa-arbor.com

National Park Service
nps.gov

Society of American Foresters
safnet.org and forestrycareers.org

U.S. Department of Labor Occupational Outlook Handbook
bls.gov/ooh

Wildlife Society
wildlife.org

Sources: Florida Fish and Wildlife Conservation Commission, International Society of Arboriculture, University of Kentucky Cooperative Extension Service, U.S. Department of Labor, *Washington Post*, Wildlife Society, American Society of Consulting Arborists

University of South Florida

The University of South Florida is one of the largest public universities in the nation, and among the top 50 universities, public or private, for federal research expenditures. USF is one of only four Florida public universities classified by the Carnegie Foundation for the Advancement of Teaching in the top tier of research universities, a distinction attained by only 2.3 percent of all universities.

Researchers at the University of South Florida work with faculty and staff at the University of Florida and UF/IFAS Extension to assist the City of Tampa with urban forest research and management projects, including the development of TampaTreeMap.org.

City of Tampa

Tampa is the largest city in Hillsborough County, is the county seat and is the third-most populous city in Florida. The population of the city represents approximately one-third of the total population of Hillsborough County.

The City of Tampa is proud to have been designated a Tree City USA by the Arbor Day Foundation for more than 32 years, recognizing its commitment to caring for and managing its public trees. The Tree City USA program is a national program that provides the framework for community forestry management for cities and towns across America.

In 2014, Tampa was awarded the Tree City USA Growth Award for its Urban Forest Management Plan and Urban Forest Analysis. The Growth Award is awarded by the foundation to recognize higher levels of tree care by participating Tree City USA communities.

Arbor Day Foundation

The Arbor Day Foundation is a nonprofit conservation and education organization of nearly 1 million members, with a mission to inspire people to plant, celebrate and nurture trees.

Founded in 1972 to celebrate the 100th anniversary of the first Arbor Day, the Arbor Day Foundation is one of the world's largest nonprofit conservation organizations dedicated to planting trees. The foundation plants and distributes more than 10 million trees each year.

National Arbor Day is celebrated annually on the last Friday in April. Many states observe Arbor Day on different dates according to their best tree-planting times.

For more information about the Arbor Day Foundation, visit arborday.org.

TD Green Streets

TD Green Streets is a TD Bank program administered by the Arbor Day Foundation. TD Green Streets supports innovative practices in community forestry. Through the program, municipalities are eligible to receive one of 10 $20,000 grants in support of local forestry projects in low- to moderate-income neighborhoods.

TD Bank, America's Most Convenient Bank, is one of the 10 largest banks in the U.S., providing nearly 8 million customers with a full range of retail, small business and commercial banking products and services at nearly 1,300 convenient locations throughout the Northeast, the Mid-Atlantic, Metro D.C., the Carolinas and Florida.

To learn more about TD Green Streets, visit arborday.org/programs/tdgreenstreets.

UF/IFAS Extension

Extension is a partnership between state, federal and county governments to provide scientific knowledge and expertise to the public. The University of Florida (UF), together with Florida A&M University (FAMU), administers the Florida Cooperative Extension Service.

At the University of Florida, Extension is located in the Institute of Food and Agricultural Sciences (IFAS), along with the College of Agricultural and Life Sciences (CALS) and the Florida Agricultural Experiment Station, and is called UF/IFAS Extension.

UF/IFAS Extension in Hillsborough County, located just minutes from Tampa, is an educational service provided by both the University of Florida and Hillsborough County. It provides information to the public through workshops, publications and mass media. For more information, visit hillsborough.ifas.ufl.edu.

Newspaper in Education

The Tampa Bay Times Newspaper in Education (NIE) program is a cooperative effort between schools and the *Times* to promote the use of newspapers in print and electronic form as educational resources. Our educational resources fall into the category of informational text.

Informational text is a type of nonfiction text. The primary purpose of informational text is to convey information about the natural or social world. And since the mid-1970s, NIE has provided schools with class sets of informational text in the form of the daily newspaper and our award-winning original curriculum, at no cost to teachers or schools.

In the Tampa Bay area each year, more than 5 million newspapers and electronic licenses are provided to teachers and students free of charge thanks to our generous individual, corporate and foundation sponsors.

In addition to providing free supplemental materials to educators, NIE hosts free educator workshops and webinars. Our teaching materials cover a variety of subjects and are consistent with the Florida Standards.

For more information about NIE, visit tampabay.com/nie or call 800-333-7505, ext. 8138. Follow us on Twitter at Twitter.com/TBTimesNIE.

For additional copies of this NIE publication, email ordernie@tampabay.com.

NIE staff

Jodi Pushkin, manager, jpushkin@tampabay.com
Sue Bedry, development specialist, sbedry@tampabay.com

Credits

Researched and written by Sue Bedry and Jodi Pushkin, *Tampa Bay Times*
Designed by Stacy Rector, Fluid Graphic Design LLC
Cover photos by Edmund D. Fountain, *Tampa Bay Times* and Robert Johnson

Contributors

Kathy Beck, natural resources coordinator, Planning and Urban Design, City of Tampa
Robert Irving, urban forestry coordinator, Parks and Recreation, City of Tampa
Andrew Koeser, assistant professor, Landscape Management, Florida Gulf Coast University Research and Education Center
Shawn Landry, program director and research associate professor, School of Architecture and Community Design, University of South Florida
Rob Northrop, extension forester, University of Florida/Hillsborough County Extension

Florida Standards

This publication and the newspaper activities focus on the following Florida Standards for middle school: **Science** SC.6.E.6.2; SC.6.E.7.8; SC.7.E.6.3; SC.7.E.6.6; SC.7.L.17.2; SC.7.L.17.3; SC.8.L.18.1; SC.8.N.4.1; SC.8.N.4.2 **Language Arts** LAFS.6.RI.1.1; LAFS.6.RI.1.2; LAFS.6.RI.1.3; LAFS.6.RI.1.4; LAFS.6.RI.1.5;LAFS.6.RI.1.6; LAFS.6.RI.1.7; LAFS.6.RI.1.8; LAFS.6.RI.1.9; LAFS.7.RI.1.1;LAFS.7.RI.1.2; LAFS.7.RI.1.3; LAFS.7.RI.1.4; LAFS.7.RI.1.5; LAFS.7.RI.1.6;LAFS.7.RI.1.7; LAFS.7.RI.1.8; LAFS.7.RI.1.9; LAFS.8.RI.1.1; LAFS.8.RI.1.2;LAFS.8.RI.1.3; LAFS.8.RI.1.4; LAFS.8.RI.1.5; LAFS.8.RI.1.6; LAFS.8.RI.1.7;LAFS.8.RI.1.8; LAFS.8.RI.1.9 **Writing** LAFS.6.W.1.1; LAFS.6.W.1.2; LAFS.6.W.1.3;LAFS.6.W.2.4; LAFS.6.W.2.5; LAFS.6.W.2.6; LAFS.6.W.2.7; LAFS.6.W.2.8;LAFS.6.W.2.9; LAFS.7.W.1.1; LAFS.7.W.1.2; LAFS.7.W.1.3; LAFS.7.W.2.4;LAFS.7.W.2.5; LAFS.7.W.2.6; LAFS.7.W.2.7; LAFS.7.W.2.8; LAFS.7.W.2.9;LAFS.8.W.1.1; LAFS.8.W.1.2; LAFS.8.W.1.3; LAFS.8.W.2.4; LAFS.8.W.2.5;LAFS.8.W.2.6; LAFS.8.W.2.7; LAFS.8.W.2.8; LAFS.8.W.2.9 **Speaking and Listening** LAFS.6.SL.1.1; LAFS.6.SL.1.2; LAFS.6.SL.1.3; LAFS.6.SL.1.4; LAFS.6.SL.1.5;LAFS.6.SL.1.6; LAFS.7.SL.1.1; LAFS.7.SL.1.2; LAFS.7.SL.1.3; LAFS.7.SL.1.4;LAFS.7.SL.1.5; LAFS.7.SL.1.6; LAFS.8.SL.1.1; LAFS.8.SL.1.2; LAFS.8.SL.1.3;LAFS.8.SL.1.4; LAFS.8.SL.1.5; LAFS.8.SL.1.6 **Language** LAFS.6.L.1.1;LAFS.6.L.1.2; LAFS.6.L.1.3; LAFS.6.L.1.4; LAFS.6.L.1.5; LAFS.6.L.1.6 **Math** MAFS.6.NS.1.1; MAFS.6.NS.2.2; MAFS.6.NS.2.3; MAFS.6.EE.3.9; MAFS.6.SP.1.1; MAFS.6.SP.1.2; MAFS.6.SP.1.3; MAFS.7.RP.1.1; MAFS.7.RP.1.3; MAFS.7.NS.1.2; MAFS.7.NS.1.3; MAFS.7.EE.2.3; MAFS.7.EE.2.4; MAFS.7.SP.1.2; MAFS.8.EE.2.5; MAFS.8.SP.1.