



Chapter 11

My Favorite Tree

OVERVIEW

Through this inquiry unit, the class works to answer the question, *What are the characteristics of trees?* Each group of students in the class selects a type of tree to investigate, such as oak, ash, or maple, and then answers the subquestion, “What are the characteristics of _____ trees?” The inquiry begins with a nature walk to observe trees. Students focus on the many different types of trees that can be found in a small area. Then, through research students discover that there are many different species of trees within a given genus (e.g., red, silver, and sugar maples).

Students practice their skills of observation while they pay attention to the details of the trees’ characteristics. They analyze the differences between the trees and then synthesize the information to generate a list of common characteristics for their tree genus. They compile the information generated by each group into a guide to local trees. Students then apply what they have learned as they decide which trees are best suited for specific purposes in a park setting.

OBJECTIVES

- Recognize that trees are a diverse group of organisms
- Compare different species within a genus (e.g., sugar maple and silver maple)
- Write and illustrate informative text to convey information about trees
- Recognize that the characteristics of some trees make them well suited for specific uses
- Use multiple sources of information to verify facts

STANDARDS ALIGNMENT

National Science Education Standards

SCIENCE AS INQUIRY

- K–4, 5–8 Abilities Necessary to Do Scientific Inquiry
- K–4 Understanding About Scientific Inquiry

LIFE SCIENCE

- K–4 Characteristics of Organisms
- 5–8 Diversity and Adaptations of Organisms

Common Core State Standards for English Language Arts

INFORMATIONAL TEXT

- Grades 3–5 Craft and Structure

WRITING

- Grades 3–5 Text Types and Purposes

For a detailed standards alignment, see Appendix 3 (p. 282).

TIME FRAME

- Nine 45-minute class periods

SCIENTIFIC BACKGROUND INFORMATION

There are approximately 100,000 species of trees on Earth, accounting for 25% of all plants (Botanic Gardens Conservation International 2007). Within this number of species is an astonishing amount of diversity. Trees exhibit a wide variety of adaptations ranging from seeds that float to specialized leaves to root adaptations, and they are found on every continent but Antarctica.

A single genus of trees can include many different species. The largest genus of broadleaf trees, *Acer* (maple trees), includes at least 140 species (Chen 2007), 13 of which can be found in North America (U.S. Geological Survey 2006). Conversely, a single genus may also include only one species, as in the *Ginkgo biloba*.

Several characteristics can be used to differentiate one tree species from another. Leaves, bark, twigs, and fruit are commonly used to identify trees. Dichotomous keys organize information about these characteristics in a way that allows scientists to quickly navigate through large amounts of information and identify trees at the species level. Field guides are also used to differentiate between tree species, but these guides do not always include a dichotomous key. Dichotomous keys rely heavily on scientific terminology, whereas field guides include less terminology and often include drawings or photographs of many of the species included in the guide.

MISCONCEPTIONS

There are many misconceptions about plants, including misconceptions about photosynthesis, plant respiration, seed germination, and plant reproduction. Table 11.1 lists misconceptions reported by Barman et al. (2006) that are relevant to this unit.

Through this inquiry students begin to recognize this diversity through careful observation that leads to very basic classification. Children tend to have more trouble classifying plants than animals (Driver et al. 1994). This unit provides an opportunity to talk about trees as plants, not as a focus of inquiry, but in a casual way. It would be appropriate when reading *My Favorite Tree* to mention that trees are very interesting plants, or to mention that the trees are the biggest plants you see on the nature walk. Providing this scaffolding will help students begin to make the connection independently.

MY FAVORITE TREE

TABLE 11.1. COMMON MISCONCEPTIONS ABOUT TREES

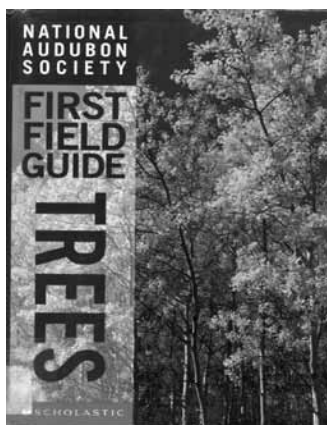
Common Misconception	Scientifically Accurate Concept
Trees are not plants.	Trees are classified in the kingdom Plantae. They are multicellular organisms capable of producing their own food through photosynthesis. They generally contain chlorophyll, and their cellular structure includes components common to plants such as chloroplasts and a cell wall.
Plants have specific characteristics or parts such as flowers and stems, are green, and grow in soil.	Plants are a diverse group of organisms with adaptations that help enhance their survival. They are photosynthetic, sexually reproducing, and multicellular. Plants grow in a variety of conditions, some of which do not involve soil. Some plants, such as ferns, do not have stems or flowers. Others, such as mosses, do not produce seeds.

TEXT SET



My Favorite Tree: Terrific Trees of North America by Diane Iverson (Nevada City, CA: Dawn Publications, 1999); reference, Flesch-Kincaid reading level 4.3.

Each two-page spread of this engaging book introduces students to the wide variety of trees found in North America. The left-hand pages feature short comments by children and lifelike illustrations of their favorite tree, while right-hand pages provide encyclopedia-like entries about the tree.



National Audubon Society First Field Guide: Trees by Brian Cassie (New York: Scholastic, 1999); field guide, Flesch-Kincaid reading level undetermined.

Students will find more than 450 color photographs that capture the diversity of trees commonly found in North America. The text describing each tree is clear and concise.



Peterson First Guides: Trees by George A. Petrides (Boston: Houghton Mifflin Harcourt, 1998); field guide, Flesch-Kincaid reading level undetermined.

This compact field guide provides information about 243 trees common to North America. Illustrations of the twigs, fruit, and leaves are provided for each tree. The organization of the guide makes it easy to compare similar trees.



Trees, Leaves, and Bark by Diane Burns (New York: Gareth Stevens, 1998); field guide, Flesch-Kincaid reading level 3.8.

A guide to 15 trees found in the United States, providing information about their lifespan, uses, leaves, bark, and seeds.

MATERIALS

- Clipboards or science notebooks
- Paper and crayons for rubbings
- Computer with internet connection
- Digital camera (optional)
- Copies of supporting document

SUPPORTING DOCUMENT

- “Characteristics of My Tree” graphic organizer

SAFETY CONSIDERATIONS

Avoid areas where students could come in contact with poison ivy or similar plants. Show students pictures of poison ivy and similar plants and caution them to not touch anything that resembles the pictures.

My Favorite Tree Inquiry Unit

ENGAGE

In the engage phase, students begin to recognize that there are many different kinds of trees. Read aloud *My Favorite Tree* (left-hand pages only). As you are reading, comment on the many different types of trees. Wrap up with, “Wow! I didn’t know there were so many different kinds of trees! How many types of trees do you think there are in our city (school, park, neighborhood)?” Allow students to make guesses about how many different types of trees might be found in the area.

Assess this phase: Formative assessment is used at this point in the inquiry to check student progress and help you determine if instructional modifications are needed. Student responses to your questions will help you gauge their prior knowledge of tree species and the types of trees found in the area.

EXPLORE

In the explore phase, students investigate tree diversity as they observe, identify, and research different species in a genus of trees.

1. Take students on a nature walk to observe trees. Bring along field guides such as *Trees, Leaves, and Bark* and *Peterson First Guide to Trees*, clipboards or science notebooks, and paper and crayons for rubbings. The walk can take place on school grounds, at a local park, through the neighborhood, at an arboretum, or any other place where a variety of trees grow. The emphasis is on observations, noticing, describing, and illustrating the unique characteristics of a tree in detail.
2. Start the walk by casually observing trees. Ask students what they notice about each tree. Encourage them to make careful observations, noticing the smallest details. Point out some tree characteristics like the shape of the leaves, the bark, fruits or seeds/nuts, and whether the tree is deciduous or evergreen. This is a good opportunity to point out the difference between simple and compound leaves. If the walk takes place somewhere that students are free to wander, you may need to regroup as a whole class from time to time to share general information about characteristics of trees.
3. Collect samples to bring back to the classroom, including leaves (or leaf rubbings), bark rubbings, and fruits and nuts. Digital photography can also be used to document trees and their leaves. If time permits, allow students to identify trees on site, recording a list of trees in their student science notebooks.

4. Return to the classroom and continue to identify trees using the leaves, rubbings, fruits and nuts, and photographs. Generate a list of trees identified by the class and post this on chart paper. Encourage students to observe and identify trees at home or around town and bring in rubbings and leaves. Continue to add to the list of trees posted in the classroom. When the list is sufficiently long, ask students to indicate which of the trees on the list is their favorite tree and why.
5. Divide students into small groups and assign each group a genus or type of tree that students have identified locally. For example, one group of students might be assigned oaks, a second maples, and a third pine. Consider using the students' favorite tree as an organizer and if possible, allow them to research that tree. Each group will use field guides and online resources to research the trees they have been assigned. Each group is answering the more specific question, "What are the characteristics of [insert tree type, e.g., maple] trees?" Each group will research three or four varieties within their tree's genus. For example, if they are researching maples, they might research a silver maple, sugar maple, and red maple. The goal of the research is to determine what distinguishes one tree from another within the genus, such as number of leaflets on leaf and shape of nut. Groups will complete a "Characteristics of My Tree" graphic organizer for each specific tree. They will then compare across the specific trees to generate a list of characteristics for the genus. An example of student work is shown at the end of the chapter.

A variety of field guides can be used, and several are mentioned in the text set. You can also contact your state's department of natural resources or forestry for information. Suggested online resources are listed below, with QR codes provided for your convenience. Use a scanning app on your smartphone, on your tablet, or with the webcam on your computer to scan and quickly access the online field guides.

- What Tree Is It? www.oplin.org/tree (QR Code 1). This describes trees in Ohio, but would work for much of the eastern or northeastern United States.
- ArboDay.org Tree Guide, www.arboday.org/treeguide (QR Code 2)
- What Tree Is That? www.arboday.org/trees/whattree/?TrackingID=908 (QR Code 3). Includes some technical language.
- Audubon Guides, www.audubonguides.com/home.html (QR Code 4). Requires signup. Reading level may be a bit high.



QR CODE 1



QR CODE 2



QR CODE 3



QR CODE 4

MY FAVORITE TREE

6. Develop a “Common Characteristics Banner” for their genus. The banner should be long enough to span the “Characteristics of My Tree” graphic organizers for their group.

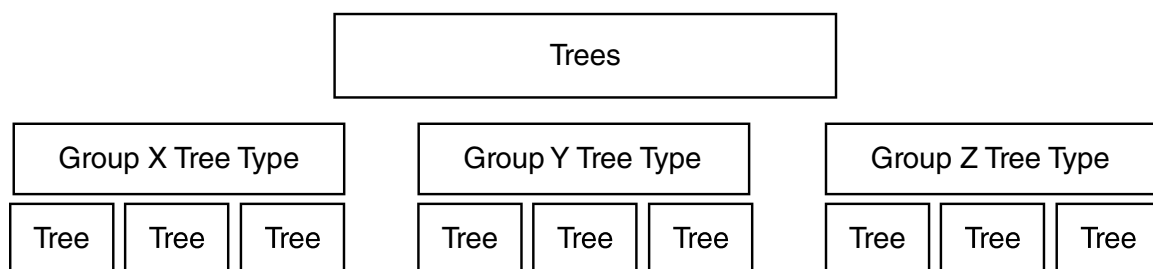
Assess this phase: Formative assessment happens throughout this phase. Observe students on the nature walk and as they work to identify tree species. Ensure that they understand terminology and criteria used for classification (simple vs. compound leaves, leaflets, and so on) and that they are able to use print and online field guides. These skills are also important during the research phase. Make sure that students have selected sources that are accurate and age appropriate in terms of reading levels and sophistication of concepts. Monitor student work on the graphic organizers to ensure that students are focusing on distinguishing characteristics. Use guiding questions to help students look across species and identify similar characteristics within their genus.

EXPLAIN

In the explain phase, students demonstrate their expertise by sharing their findings and creating a local tree guide.

1. Each group will present their findings to the class. One group member will describe the common characteristics for their tree genus. Each group member will then describe the characteristics of a specific tree that distinguish it from the rest of the trees in that genus.
2. Have students organize the group products under a larger banner labeled “Trees,” as shown in Figure 11.1.

FIGURE 11.1. ORGANIZATION OF GROUP PRODUCTS



3. Create a class guide to local trees, with each student contributing a page. Decide as a class how each page will be formatted and what information will be provided. You may wish to have students use the field guides (from the explore phase) as mentor texts. Students can consider the information presented in the field guides and the format of the guide, then make decisions as a class about the information and format of their own guide. For example, they might include written descriptions, hand-drawn illustrations, photographs, and leaf and bark rubbings in the field guides.

Assess this phase: Student presentations serve as formative assessment. Each student's presentation should clearly describe distinguishing characteristics of their species, and the group should be able to explain how these species are related in one genus. If a group has difficulty identifying common characteristics, return to the research portion of the explore phase and use guiding questions to help the group look across species and focus on the relevant characteristics.

Student pages will serve as one form of summative assessment. Each page should describe a species of tree, its larger group, and its distinguishing characteristics. Illustrations and diagrams should be clearly labeled. The "Science and Literacy Rubric" in Appendix 2 (p. 276) can be used to assess student performance, and the "Achievement Grading Standards" (also in Appendix 2, p. 277) can translate this into a numerical grade. If students fall below 75%, return to the explore phase for additional work before revising their page for the class guide.

EXPAND

In the expand phase, students apply what they have learned to select trees for a local park.

1. Tell students that the class has been asked by a local park director to select the specific types of trees that will be planted in a new park. The director wants trees for each of the following park features:
 - » Picnic area: Trees planted here must provide shade.
 - » Wildlife area: Trees planted here must provide food and shelter for birds and squirrels.
 - » Scenic walkways: Trees planted along the walkways should have showy flowers in the spring, have brightly colored leaves in the fall, or be very fragrant (e.g., pines). A combination of these types of trees would be best.
2. Reorganize so that each group is composed of students that researched different tree genera. A group might include a student who researched oaks, another who researched maples, and another who researched pines.
3. Working in their mixed groups, students will decide which trees would best fit the park director's needs. After selecting the trees, they will write and illustrate a paragraph describing the trees they have selected and explaining how these trees fit the park's needs. They will also create a map of the park indicating where the picnic area, wildlife area, scenic walkways, and trees will be located.

Assess this phase: The written product and map created in this phase also serve as summative assessment. Students should be able to apply the knowledge gained about their tree species to determine which trees would be best placed in each area. The "Science and Literacy Rubric" in Appendix 2 (p. 276) can be used to assess student performance, and the "Achievement Grading Standards" (also in Appendix 2, p. 277) can translate this into a numerical grade. If students fall below 75%, return to the explore phase for additional work to help students match their tree species to park features.

MY FAVORITE TREE

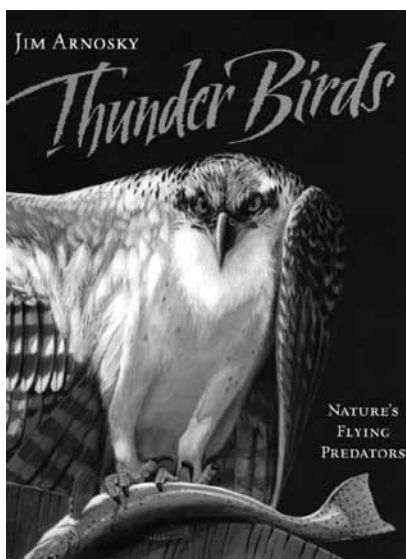
Investigating Different Types of Organisms

This inquiry unit can easily be adapted for the investigation of many different types of organisms. Follow the basic format of an authentic experience such as a nature walk for direct observations, identification and grouping using field guides or online resources, creation of a class guide, and application of new knowledge to a real-world situation. Here are some suggested text sets for birds, frogs, and insects.

TEXT SET**Birds**

Olivia's Birds: Saving the Coast by Olivia Boulter (New York: Sterling, 2011); narrative expository, Flesch-Kincaid reading level 5.1.

Eleven-year-old Olivia Boulter, the writer and artist of this book, illustrates facts about birds with lovely, colorful drawings. Olivia describes how she sold drawings like these to raise over \$150,000 for her Save the Gulf project after the devastating Gulf oil spill.



Thunder Birds: Nature's Flying Predators by Jim Arnosky (New York: Sterling, 2011); reference, Flesch-Kincaid reading level 5.9.

Well-known writer-artist Jim Arnosky describes different types of birds he observed and the features that make them unique. The many life-size paintings of birds are spectacular, including four foldout pages that can't help but garner a "Wow!"

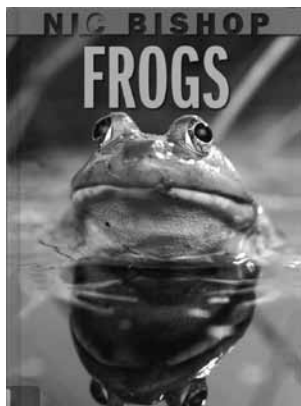
You can also use various bird field guides, such as *Backyard Birds* by Karen Stray Nolting and Jonathan Latimer (New York: Houghton Mifflin, 1999) and *National Audubon Society First Field Guide: Birds* by Scott Weidensaul (New York: Scholastic, 1998).

Frogs



Frogs Sing Songs by Yvonne Winer (Watertown, MA: Charlesbridge, 2003); poetry, Flesch-Kincaid reading level 2.5.

Each lyrical four-line poem begins the same way: “Frogs sing their songs,” and the poem goes on to describe how, when, where, or why they sing. Beautiful, realistic watercolor paintings show the frogs in their habitats, and thumbnail paintings illustrate a frog identification guide at the end of the book.

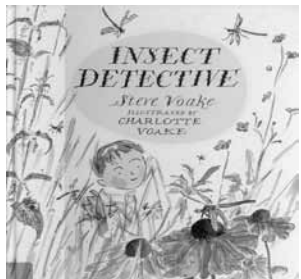


Frogs by Nic Bishop (New York: Scholastic, 2008); reference, Flesch-Kincaid reading level 4.8.

Straightforward text conveys basic information as well as cool and quirky facts about frogs. Large—*really large* in comparison to the real-life size of the frogs—color photos allow the reader to see details that would otherwise be very difficult to see.

You can also use various amphibian field guides, such as *Frogs and Toads* by Dave Showler and Barry Croucher (New York: St. Martin’s Press, 2004) and *National Audubon Society First Field Guide: Amphibians* by Brian Cassie (New York: Scholastic, 1999).

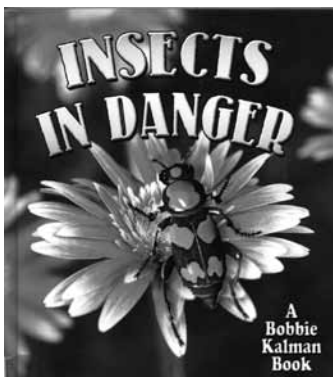
Insects



Insect Detective by Steve Voake (Somerville, MA: Candlewick Press, 2010); narrative expository, Flesch-Kincaid reading level 4.6.

Beneath the ground, under rocks, in cracks in walls—you can see insects everywhere if you know where to look. Would-be insect detectives will find good information about specific insects as well as information about insects in general. Soft-color pen and watercolor drawings illustrate the text.

MY FAVORITE TREE



Insects In Danger by Kathryn Smithyman and Bobbie Kalman (New York: Crabtree, 2006); reference, Flesch-Kincaid reading level 5.1.

This book describes the danger insects face from environmental circumstances that threaten their habitats.

You can also use various insect field guides, such as *National Audubon Society First Field Guide: Insects* by Christina Wilsdon (New York: Scholastic, 1998) and *Peterson First Guide to Insects of North America* by Christopher Leahy (New York: Houghton Mifflin Harcourt, 1998).

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Name _____ Date _____

CHARACTERISTICS OF MY TREE

Tree Name:	
Leaf Shape	Leaf Size
Leaf Color (summer and fall)	Fruit/Nut/Seed

LEAF DRAWING

MY FAVORITE TREE

Name _____ Date _____

EXAMPLE GROUP PRODUCT

A team of three students is assigned maple trees as the tree type they will research. They decide to research the red, sugar, and silver maple. After looking at several resources each student completes a summary sheet for one of the trees. They then analyze the information looking for characteristics shared by all of the trees in the group.

