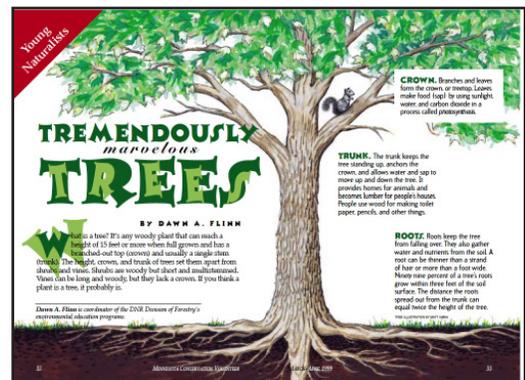


Teachers Guide

Prepared by **“Tremendously Marvelous Trees” Multidisciplinary Classroom Activities**
 Jack Judkins,

Curriculum Connections Minnesota Teachers guide for the Young Naturalists article “Tremendously Marvelous Trees” by Dawn A. Flinn. Published in the March-April 1999 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/trees.

Young Naturalists teachers guides are provided free of charge to classroom teachers, parents, and students. This guide contains a brief summary of the article, suggested independent reading levels, word count, materials list, estimates of preparation and instructional time, academic standards applications, preview strategies and study questions overview, adaptations for special needs students, assessment options, extension activities, Web resources (including related Conservation Volunteer articles), copy-ready study questions with answer key, and a copy-ready vocabulary sheet and vocabulary study cards. There is also a practice quiz (with answer key) in Minnesota Comprehensive Assessments format. Materials may be reproduced and/or modified to suit user needs. Users are encouraged to provide feedback through an online survey at www.mndnr.gov/education/teachers/activities/ynstudyguides/survey.html.



Summary

“Tremendously Marvelous Trees” differentiates trees from shrubs and vines, describes basic tree structures and their functions, and provides clues to tree identification through leaf patterns. Additional topics include tree physiology and common Minnesota coniferous and deciduous species. Readers will also learn how Arbor Day and Arbor Month began and about Minnesota’s school forest law.

Suggested reading levels:

intermediate through middle/junior high school grades

Total words:

1,120

Materials:

paper, poster board, colored pencils, crayons, pens, markers, charcoal, and leaf samples and tree wafers from several species, as well as print and online resources your media specialist may provide

Preparation time:

One to two hours, not including time for extension activities

Estimated instructional time:

One or two 50-minute class periods (not including extensions)

“Tremendously Marvelous Trees”—Teachers Guide

Minnesota Academic Standards Applications:

“Tremendously Marvelous Trees” may be applied to the following Minnesota Department of Education standards:

Language Arts

Reading Benchmarks

Informational Text K–5; 6–12

- Key Ideas and Details
- Craft and Structure
- Integration of Knowledge and Ideas
- Range of Reading and Level of Text Complexity

Foundational Skills K–5

- Phonics and Word Recognition
- Fluency

Writing Benchmarks K–5; 6–12

- Text Types and Purposes
- Writing Process (6–12: Production and Distribution of Writing)
- Research to Build and Present Knowledge
- Range of Writing

Speaking, Viewing, Listening and

Media Literacy Benchmarks K–5

- Comprehension and Collaboration
- Presentation of Knowledge and Ideas
- Media Literacy

Language Benchmarks K–5

- Conventions of Standard English
- Knowledge of Language
- Vocabulary Acquisition and Use

Reading Benchmarks: Literacy in Science and Technical Subjects 6–12

- Key Ideas and Details
- Craft and Structure
- Integration of Knowledge and Ideas
- Range of Reading and Level of Text Complexity

Writing Benchmarks: Literacy in History/Social Studies, Science and Technical Subjects 6–12

- Text Types and Purposes
- Writing Process: Production and Distribution of Writing
- Research to Build and Present Knowledge
- Range of Writing

Social Studies Grades 4–8

- Minnesota History: II.E
- Geography: V.A.1. Students will locate major Minnesota ecosystems, topographic features, continental divides, river valleys, and cities.
- V.C.1. Students will identify and compare and contrast the landforms, natural vegetation, climate, and systems of rivers and lakes of Minnesota with those of other parts of the United States.
- V.D.1. Students will identify factors that drew people to their local communities. Students will recognize changes over time in nearby landscapes, resulting from human occupation.
- V.D.2. Students will analyze how the physical environment influences human activities.
- Economics: VI.C.1. Students will identify and compare and contrast various industries and the occupations related to them.

Continued on next page ...

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Minnesota Academic Standards Applications Continued:

Science

Grade 3: Life Science

3.4.1.1.1; 3.4.1.1.2; 3.4.3.2.1

Grade 5: Life Science

5.4.1.1.1; 5.4.2.1.1; 5.4.2.1.2;
5.4.4.1.1

Grade 7: Life Science

7.4.2.1.1; 7.4.1.2.2; 7.4.1.2.3;
7.4.2.1.1; 7.4.2.1.2; 7.4.2.1.3;
7.4.2.2.1; 7.4.2.2.2; 7.4.2.2.3
7.4.3.1.1; 7.4.3.1.2; 7.4.3.1.3;
7.4.3.2.1; 7.4.3.2.2; 7.4.3.2.3;
7.4.3.2.4; 7.4.4.1.1; 7.4.4.1.2

Arts

Grades K–12

1. Artistic Foundations: Visual Arts
2. Artistic Process: Create or Make: Visual Arts
3. Artistic Process: Perform or Present: Visual Arts
4. Artistic Process: Respond or Critique: Visual Arts

Current, complete Minnesota Academic Standards are available at www.education.state.mn.us. Teachers who find other connections to standards are encouraged to contact *Minnesota Conservation Volunteer*.

Preview

Ask students to survey the article. Examine the illustrations. If you have samples of leaves and wafers from species in the article, pass them around. Use the **KWL** strategy (Ogle, 1986) to find out what your students already know (**K**) about trees, what they would like to learn (**W**), and eventually what they learned (**L**) while reading the article and related materials, and through participating in extension activities. You might begin by asking small groups to brainstorm their ideas. Then combine the groups' data to make a class list. Display your **K** and **W** ideas on poster board or paper (see Vocabulary preview). Add to your **L** list as you read and discuss the article. See www.teach-nology.com/web_tools/graphic_org/kwl for a KWL generator that will produce individual organizers for your students that may be used to record answers to **W** questions. KWL also gives you the opportunity to introduce interdisciplinary connections you will make during extension activities. If you use the article in social studies, science, or art class you may wish to focus your prereading discussion on academic standards that apply for that class.

Another strategy for accessing prior knowledge is a brainstorming web. You may download a printable web at www.teachervision.fen.com/tv/printables/TCR/0743932080_007.pdf.

Vocabulary preview

See the copy-ready vocabulary list included in this guide. You may wish to modify the list based on your knowledge of your students' needs or the subject you are teaching. Pretesting vocabulary individually, in small groups, or with your entire class can be an effective vocabulary preview strategy. You may then post-test at the conclusion of this activity (see Assessment section below). You may wish to use the study cards found at the end of this guide. Cut along the horizontal line; fold in the middle and tape or staple. Study cards (see *Strategic Tutoring*, Hock, Deshler, and Schumaker, 2000) can be applied to any subject area. On one side of the card, in large letters, write a key word or phrase that students are expected to know. In smaller letters frame the word or phrase in a question or statement. On the other side of the card, in large letters, write the answer to the question. Finally, in smaller letters, frame the answer in a question or statement. Blanks are provided to allow you or your students to add new words or phrases.

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Study questions overview

Study questions parallel the story (the answer to the first question appears first in the article, followed by the second, and so on). Preview the entire guide with your class before you read the article. You may wish to read the story aloud and complete the study questions in class, in small groups, or as an independent activity. The questions may be assigned as homework, depending on the reading ability of your students. Inclusion teachers may provide more direct support to special needs students (see Adaptations section). The study questions may be also used as a quiz. Note: Items 2, 5, 6, 8, and 9 and the Challenge require varying degrees of critical thinking.

Adaptations

Read aloud to special needs students. Abbreviate the study questions or highlight priority items to be completed first. If time allows, remaining items may be attempted. Peer helpers, paraprofessionals, or adult volunteers may lend a hand with the study questions. With close teacher supervision, cooperative groups can also offer effective support to special needs students, especially for extension activities.

Assessment

You may use all or part of the study guide, combined with vocabulary, as a quiz. Other assessment ideas include: (1) Students may write an essay comparing and contrasting coniferous and deciduous trees. (2) Have students write multiple-choice, true-false, or short-answer questions, then select the best items for a class quiz. (3) Poster presentations may display one or more of the following, depending on the standard addressed: a map of Minnesota indicating where tree species are found, distinctive features of one or more species, products made from particular species, photosynthesis. (4) Ask students to identify different trees from photos, from leaf samples, or (if you have access to a school forest, state park, or other forested area) during a field trip.

Extension activities

1. Invite a DNR forestry specialist to visit your classroom to present information about one or more of the topics in the article. See www.dnr.state.mn.us/forestry/index.html.
2. Contact park naturalists to schedule visits and programs. See www.dnr.state.mn.us/state_parks/index.html.
3. Take your class for a walk. Collect various leaf types. Ask students to make sketches of leaves and/or make leaf rubbings with charcoal. Then make drawings of several species of trees and match leaves to trees. Display drawings or include in portfolios.
4. Trees make excellent subjects for portfolio assessment, especially if the teacher plans activities throughout the year. Students collect work on species identification in the fall, and on physiology during winter and spring. Each project ties the portfolio together.
5. Visit a sugar bush (group of trees where sap is collected) in the spring to observe maple sap collection. Relate your experience to tree physiology. Why doesn't sap collection damage the tree?
6. See *Ininatig's Gift of Sugar*, by Laura Waterman Wittstock, from the *We Are Still Here: Native Americans Today* series, ISBN: 0-8225-9642-3, Lerner Publishing, Minneapolis. Also *Minnesota Conservation Volunteer* stories "Sugar Bush Journal," March-April 1991, and "One Sweet Time," March-April 2000.
7. If your school is near an area suitable for planting trees, see your local soil and water conservation district or DNR Forestry office for assistance in planning a tree-planting project to celebrate Arbor Day or Arbor Month.
8. Tree trunk wafers, sanded and varnished, reveal much about the climatic history of your area. Students can analyze and present growth-ring data as part of this activity or other social studies or science units.

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Web resources

Tree Identification and Descriptions

www.treelink.org/whattree/
www.extension.umn.edu/distribution/naturalresources/DD6593.html
www.extension.umn.edu/distribution/naturalresources/DD0486.html
www.hort.uconn.edu/plants/common/a.html
www.fs.fed.us/database/feis/plants/tree/index.html
www.mndnr.gov/snapshots/plants/index.html

Minnesota Forests Industries

www.minntrees.org/asp/default.asp?PageID-41

Leaf Anatomy

www.enchantedlearning.com/subjects/plants/leaf/

Project Learning Tree

www.mndnr.gov/plt/index.html

Arbor Month Resources & Activities

www.mndnr.gov/arbormonth/index.html

Leaf color change

www.mndnr.gov/young_naturalists/color

Discovery Guide

<http://files.dnr.state.mn.us/forestry/education/discoveryguide/discoveryguide.pdf>

Minnesota DNR Teachers’ Resources

www.mndnr.gov/education/teachers/index.html

*Note: All websites were active at the time of this guide’s publication. However, some may no longer be active when this guide is accessed.

Other Resources

The following resources are available for free by contacting the DNR Information Center at 651-296-6157, toll free in Minnesota 888-646-6367, or info@dnr.state.mn.us.

1. Minnesota’s Forest Treasures Poster – features 35 of the 52 native tree species in Minnesota.
2. Teacher’s Guide to Arbor Month Activities for grades K–8 – centered around Arbor Month (May) to encourage exploration of Minnesota’s trees and forests.
3. Minnesota Biomes Poster – colorful poster highlighting the three biomes of Minnesota: prairie grassland, deciduous forest, and coniferous forest.

Related articles

Many related Minnesota Conservation Volunteer articles are available online at www.mndnr.gov/volunteer/articles/index.html, including:

January-February 1996

“Busy Biomes” (YN article)

www.mndnr.gov/young_naturalists/biome/index.html

September-October 2000

“Changing Colors” (YN article)

www.mndnr.gov/young_naturalists/color/index.html

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Related articles

November-December 2002

“Conservation Careers” (YN article)

www.mndnr.gov/young_naturalists/careers/index.html

September-October 2003

“Mirrors of Minnesota” (YN article with teachers guide)

www.mndnr.gov/young_naturalists/symbols/index.html

September-October 2006

“Ready, Set, Grow” (YN article with teachers guide)

www.mndnr.gov/young_naturalists/seeds/index.html

September-October 2008

“Tree Guardians” (YN article with teachers guide)

www.mndnr.gov/young_naturalists/tree_guardians/index.html

November-December 2008

“Sweat Pads, Logging Berries, and Blackjack” (YN article with teachers guide)

www.mndnr.gov/young_naturalists/logging/index.html

January-February 2009

“Ubiquitous Conifers” (YN article with teachers guide)

www.mndnr.gov/young_naturalists/conifers/index.html

March-April 2009

“Sugar from Trees” (YN article with teachers guide)

www.mndnr.gov/young_naturalists/syrup/index.html

January-February 2010

“Forest Builders” (YN article with teachers guide)

www.mndnr.gov/young_naturalists/forest_builders/index.html

References

- Hock, M.F., Deshler, D.D., and Schumaker, J.B. *Strategic Tutoring*. Lawrence, Kan.: Edge Enterprises, 2000.
- Ogle, D.S. K-W-L Group Instructional Strategy. In A.S. Palincsar, D.S. Ogle, B.F. Jones, and E.G. Carr (Eds.), *Teaching Reading as Thinking: Teleconference Resource Guide*, pp.11–17. Alexandria, Va.: Association for Supervision and Curriculum Development, 1986.

“Tremendously Marvelous Trees”—Teachers Guide

Study Questions

Teachers guide for the Young Naturalists article “Tremendously Marvelous Trees” by Dawn A. Flinn. Published in the March-April 1999 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/trees.

Name _____ Period _____ Date _____

1. Trees are defined by the following characteristics:

- a. _____
- b. _____
- c. _____
- d. _____

2. How do shrubs and vines differ from trees? _____

3. Describe the functions of these parts of a tree:

a. crown _____

b. trunk _____

c. roots _____

4. Draw a cross-section of a tree trunk and label the following parts: heartwood, xylem, cambium, phloem, and outer bark.

5. About how old is the tree pictured on page 34? _____

6. When did Minnesota's native tree species first take root here? _____

Why do they thrive here? _____

7. Leaf clues help us identify tree species. Describe (a) how simple leaves differ from compound leaves, (b) two types of leaf arrangements, and (c) whether leaf edges are associated with the identification of deciduous or coniferous trees.

a. _____

b. _____

c. _____

8. Compare and contrast coniferous and deciduous trees. How are they alike? How do they differ?

Alike _____

Different _____

9. Select a kind of tree from each list. Describe its essential characteristics. What makes it unique?

Coniferous

- Fir
- Spruce
- Pine
- Cedar

Deciduous

- Oak
- Maple
- Elm
- Ash
- Birch
- Poplar

10. Matching:

- | | |
|---|----------------------|
| 1. Minnesota State Tree_____ | a. covered seeds |
| 2. angiosperm_____ | b. balsam fir |
| 3. crown_____ | c. Norway (red) pine |
| 4. sapwood_____ | d. photosynthesis |
| 5. inner bark_____ | e. xylem |
| 6. gymnosperm_____ | f. heartwood |
| 7. flat, single needles_____ | g. ash |
| 8. center of trunk_____ | h. phloem |
| 9. sunlight, water, carbon dioxide_____ | i. uncovered seeds |
| 10. <i>Fraxinus</i> species_____ | j. treetop |

Challenge: What do *Picea*, *Pinus*, and *Thuja* species have in common? _____

“Tremendously Marvelous Trees”—Teachers Guide

Study Questions Answer Key

Teachers guide for the Young Naturalists article “Tremendously Marvelous Trees” by Dawn A. Flinn. Published in the March-April 1999 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/trees.

1. Trees are defined by the following characteristics: a. **Trees are woody plants**; b. **Trees are at least 15 feet tall**; c. **Trees have a branched-out top called a crown**; d. **Trees usually have a single stem, or trunk**.
2. How do shrubs and vines differ from trees? **Shrubs are woody, but short, with more than one stem. Vines are also woody, but do not have a crown.**
3. Describe the functions of these parts of a tree: a. **crown Makes food**; b. **trunk Supports the plant and transports water and sap**; c. **roots Anchors the plant to the ground. Absorbs water and nutrients**.
4. Draw a cross-section of a tree trunk and label the following parts: heartwood, xylem, cambium, phloem, and outer bark. **Drawing should include five labels on page 34 and be relatively accurate.**
5. About how old is the tree pictured on page 34? **25–30 years**
6. When did Minnesota’s native tree species first take root here? **About 10,000 years ago**
Why do they thrive here? **Answers will vary, but should include references to soil type, climate, moisture, and sunlight.**
7. Leaf clues help us identify tree species. Describe (a) how simple leaves differ from compound leaves, (b) two types of leaf arrangements, and (c) whether leaf edges are associated with the identification of deciduous or coniferous trees.
a. **Simple = one leaf per stem, Compound = more than one leaf per stem**; b. **Opposite v. alternate**;
c. **Leaf edges help identify deciduous trees.**
8. Compare and contrast coniferous and deciduous trees. How are they alike? How do they differ? **Answers will vary, but should include references to seed type, leaf type, and leaf replacement.**
9. Select a kind of tree from each list. Describe its essential characteristics. What makes it unique? **Answers will vary. Unique characteristics are most important.**
10. Matching:
 1. Minnesota State Tree **c**
 2. angiosperm **a**
 3. crown **j**
 4. sapwood **e**
 5. inner bark **h**
 6. gymnosperm **i**
 7. flat, single needles **b**
 8. center of trunk **f**
 9. sunlight, water, carbon dioxide **d**
 10. *Fraxinus* species **g**
 - a. covered seeds
 - b. balsam fir
 - c. Norway (red) pine
 - d. photosynthesis
 - e. xylem
 - f. heartwood
 - g. ash
 - h. phloem
 - i. uncovered seeds
 - j. treetop

Challenge: What do *Picea*, *Pinus*, and *Thuja* species have in common? **They are evergreens, are native to northern Minnesota, have cones, and are used in wood products.**

“Tremendously Marvelous Trees”—Teachers Guide

Minnesota Comprehensive Assessments Practice Items

Teachers guide for the Young Naturalists article “Tremendously Marvelous Trees” by Dawn A. Flinn. Published in the March-April 1999 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/trees.

Name _____ Period _____ Date _____

1. *Fraxinus* is distinguished by

- A. compound leaves
- B. an opposite leaf arrangement
- C. smooth leaf edges
- D. all of the above

2. School forests must be at least 50 acres.

- A. True
- B. False

3. Describe the history of Arbor Day. _____

4. What is the function of the cambium?

- A. protects the tree from insects
- B. helps the trunk and branches grow thicker
- C. stores sugars
- D. carries water and sap

5. Gymnosperm means

- A. strong seed
- B. covered seed
- C. multi seed
- D. bare seed

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Minnesota Comprehensive Assessments Answer Key

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1. *Fraxinus* is distinguished by **D. all of the above**
2. School forests must be at least 50 acres. **B. False**
3. Describe the history of Arbor Day. **J. Sterling Morton started Arbor Day in 1872 in Nebraska. He believed Nebraska needed more trees. Minnesota established Arbor Day in 1876, the fourth state to do so. Today we celebrate tree planting on the last Friday in April. Since 1978 Minnesota designates May and Arbor Month because May is a good time to plant trees.**
4. What is the function of the cambium? **B. helps the trunk and branches grow thicker.**
5. Gymnosperm means **D. bare seed.**

“Tremendously Marvelous Trees”—Teachers Guide

Vocabulary

Teachers guide for the Young Naturalists article “Tremendously Marvelous Trees” by Dawn A. Flinn. Published in the March-April 1999 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/trees.

compound leaf	several or many leaflets joined to a single stem
lobed leaf	a rounded leaf or leaf with rounded sections
photosynthesis	the process by which leaves convert sunlight, water, and carbon dioxide into sugar and oxygen
resin	sticky substance secreted by coniferous trees
species	group of similar plants or animals that may reproduce

“Tremendously Marvelous Trees”—Teachers Guide

Vocabulary Study Cards

Teachers guide for the Young Naturalists article “Tremendously Marvelous Trees” by Dawn A. Flinn. Published in the March-April 1999 *Minnesota Conservation Volunteer*, or visit www.mndnr.gov/young_naturalists/trees.

Cut along the horizontal lines, fold in the middle and tape or staple. Blanks are provided to allow you or your students to add new words or phrases.

What are
compound
leaves?

FOLD HERE

**Several or many leaflets
joined to a single stem**
are called

What are
lobed leaves?

FOLD HERE

Leaves that are **rounded or have
rounded sections** are called

What happens during
photosynthesis?

FOLD HERE

When **leaves convert sunlight,
water, and carbon dioxide into
sugar and oxygen** it is called

What is
resin?

FOLD HERE

The **sticky substance secreted by
coniferous trees** is

What is a
species?

FOLD HERE

**A group of similar plants or
animals that can reproduce**
is referred to as a

FOLD HERE

FOLD HERE

FOLD HERE

FOLD HERE