



10. Tree Identification: Using a Key to Identify “Mystery Trees”

Lesson Overview: In this activity, students examine botanical specimens of tree species and learn to use a dichotomous key to identify them.

Lesson Goal: Students will understand that tree species are diverse and that one can identify trees by looking at them carefully.

Objectives:

- Students can use a key to determine the tree species from a collection of images and specimens.

Subjects: Science, Mathematics (logic), Writing, Speaking and Listening

Duration: One half-hour session

Group size: Whole class, possibly working in teams of 2-3

Setting: Classroom or outdoors

Vocabulary: *bundle, dichotomous key*



Standards:		1st	2nd	3rd	4th	5th
CCSS	Reading: Informational Texts	4, 10	4, 10	4, 10	4, 10	4, 10
	Writing	2, 7, 8	2, 7, 8	2, 7, 10	2, 7, 9, 10	2, 7, 9, 10
	Speaking/Listening	1, 2, 4, 6	1, 2, 4, 6	1, 2, 4, 6	1, 2, 4, 6	1, 2, 4, 6
	Language Standards Math	1, 2, 4, 6 MP.2	1, 2, 4, 6 MP.2	1, 2, 3, 4, 6 MP.2	1, 2, 3, 4, 6 MP.2	1, 2, 3, 4, 6 MP.2
NGSS	Heredity: Inheritance and Variation of Traits	LS3.B				
	Biological Evolution: Unity and Diversity		LS4.D			
	From Molecules to Organisms: Structures and Processes			LS1.B, LS4.C	LS1.A	PS3.D
EEEEGL	Strand 1	A, B, C, E, F, G				A, B, C, E, F, G
	Strand 2.2	A, B, C				A, B, C

Teacher Background: To understand the complexity of fire’s role in forests, students must be able to distinguish among tree species. In this activity, they learn how to use a dichotomous key to identify 10 of the important trees in the northern Rocky Mountains and North Cascades.

FOR STUDENTS WITH GOOD READING SKILLS – UPPER ELEMENTARY GRADES: Have the class as a whole to identify 1 species from the photos and botanical specimens provided in the trunk.

Then have students visit 9 stations, each with specimens from 1 species, and use the key to identify them. The “Materials and Preparation” and “Procedures” sections below are written for this approach.

FOR STUDENTS WITH LIMITED READING SKILLS – EARLY ELEMENTARY GRADES: Do the activity together as a class, but use 10 student teams, one “in charge” of each set of botanical specimens:

- Project **Handout E10-page 1: Identify 10 summer trees!**
- Provide to each student team: a set of specimens from the trunk (tree bark/trunk, cone or flower, foliage, photo collection). The graphics are also available online: ***E10_TreePhotos.pdf***.
- Read the questions on the projected key together as a class.
- After reading each question, have the student teams examine the specimens. Have members of the teams raise their hands if they can answer “yes” to the question based on “their” tree specimens. Thus move through the key together to determine the correct species.

The code letters for the trees in this version of FireWorks are:

Black cottonwood	B
Douglas-fir	V
Engelmann spruce	H
Lodgepole pine	E
Ponderosa pine	O
Quaking aspen	L
Subalpine fir	C
Western larch	T
Western redcedar	D
Whitebark pine	J

The dichotomous key in **Handout E10-page 1** can also be used in the field, so this activity can prepare students for a field trip. If you want to test their knowledge in the field, find an area with several of these tree species represented, label the trees with the letter codes above, and have students fill in the handout as they move from tree to tree. In preparing the students, let them know that they are not likely to find EVERY species in the key living in one place, and they also are likely to find species that are NOT in the key. This makes it even more important to check the identifications they make with the key by reading the species descriptions on the second page of the handout.

NOTE: This key will not work well in winter because some of the trees will lose their leaves.

Materials and preparation:

- Print 1 copy/student of **Handout E10** (two pages)

- Keep the specimens/photos for species D (western redcedar) at your desk.
- Assemble 9 stations in the classroom, each containing the following for a species other than D:
 - Tree bark/trunk specimen (in trunk)
 - Cone or flower specimen (in trunk)
 - Foliage specimen (in trunk)
 - Photo collection of the tree species (in trunk and also available: *Tree_ID_photos.pdf*)
- Project **Handout E10-page 1: Identify 10 summer trees!**

The Mystery Trees box in the trunk contains labels with the species names on them (*Tree_spp_labels.pdf*). Do not hand these out with the specimens. You will use them later.

Procedure:

1. Ask: Can you name any tree species that live in the Northern Rocky Mountains or northern Cascade Mountains? When you see this tree in the woods or on a mountainside, how do you know what kind it is – that is, how can you identify it? **Open-ended discussion. You could note species names and 1-2 characteristics on the board.**
2. Explain: Today we'll add to what you already know by learning how to use a dichotomous key to identify tree species. By the end of class, you'll be able to identify 10 species that live in Northern Rocky Mountains or northern Cascade Mountains forests. This key is not just useful for identifying dead tree parts in the classroom, like we're doing here. Once you know how to use the key, you can take it outdoors and identify trees in the forest. We'll identify one species together, and then you will do 9 others at stations.
3. Give each student a copy of **Handout E10**.
4. Project the first page of the handout. Starting at the top left side of the key, work with the students to identify "D," western redcedar. As you do this together, students will see how to identify a tree based on characteristics of the leaves, bark, cones, flowers, etc. Make these points:
 - When you're using the key, you always have to start at the top left box; you can't start identifying a species in the middle of the key.
 - Once you think you've made an identification, you must check your specimen against the species description on the second page of the handout. Why? **This key has only 10 species, but there are many more in the field. You'll need the extra clues to make sure you've got the species right.**
 - When you've made and confirmed an identification, enter the letter of the specimen in the box with the species name.

Assessment:

Have students circulate from one station to another (order doesn't matter), identify the tree species at each station, and enter the correct code letter in the handout. You may want to use a timer to make sure students move from one station to another and everyone gets a chance to examine every set of specimens.

OTHER IDEAS FOR ASSESSMENT OR FOLLOWUP: Quiz students by holding up a set of specimens (photos, bark, cones, leaves) and having them identify it using their completed keys.

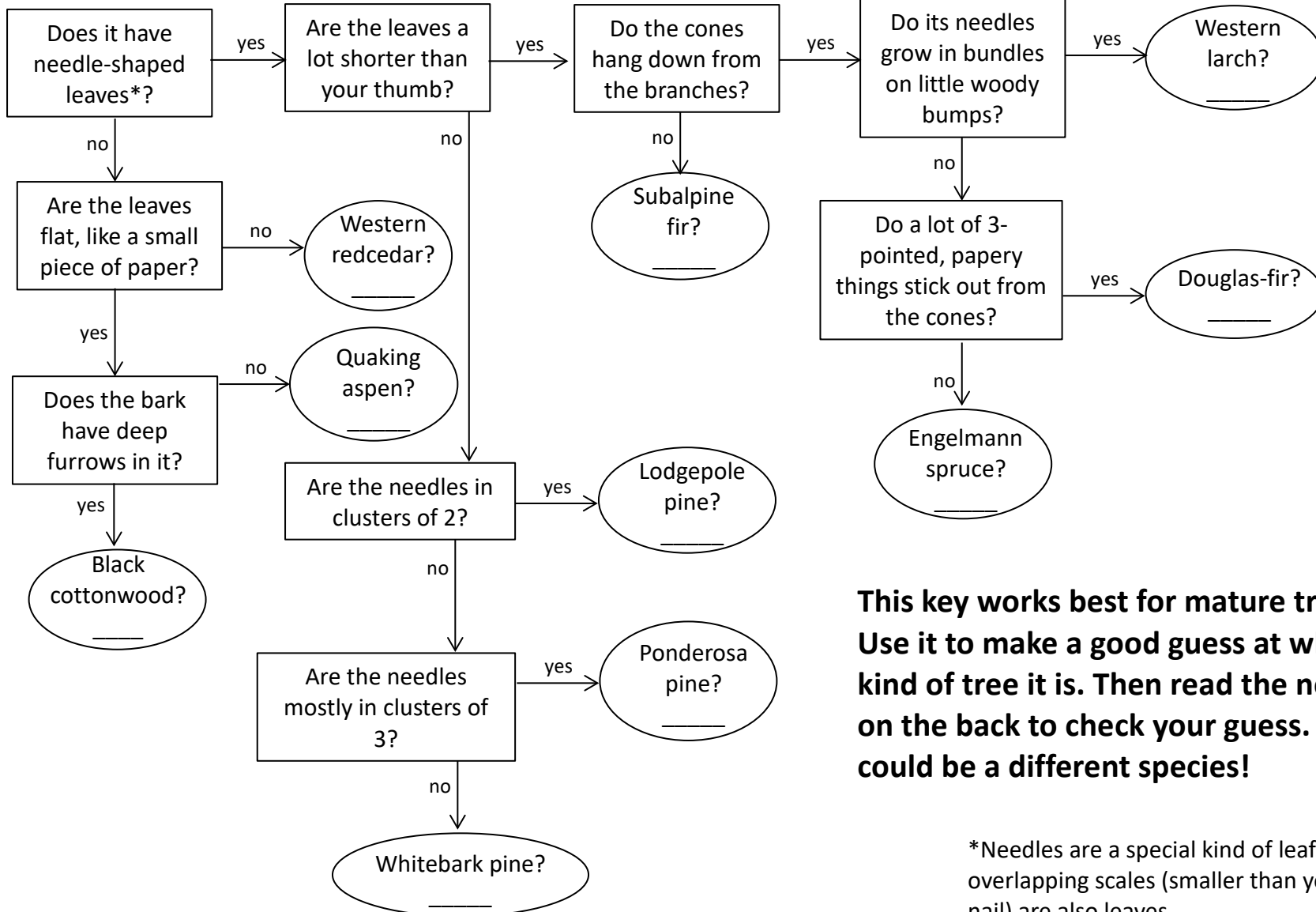
Quiz students by describing or sketching a trait and having them ask questions until they identify the species.

Evaluation:

Full Credit	Partial Credit	Less than Partial Credit
-Student correctly identified 8-10 species	-Student correctly identified 5-7 species	-Student correctly identified fewer than 5 species

Handout E10-page 1. Identify 10 summer trees!

Name _____



This key works best for mature trees. Use it to make a good guess at what kind of tree it is. Then read the notes on the back to check your guess. It could be a different species!

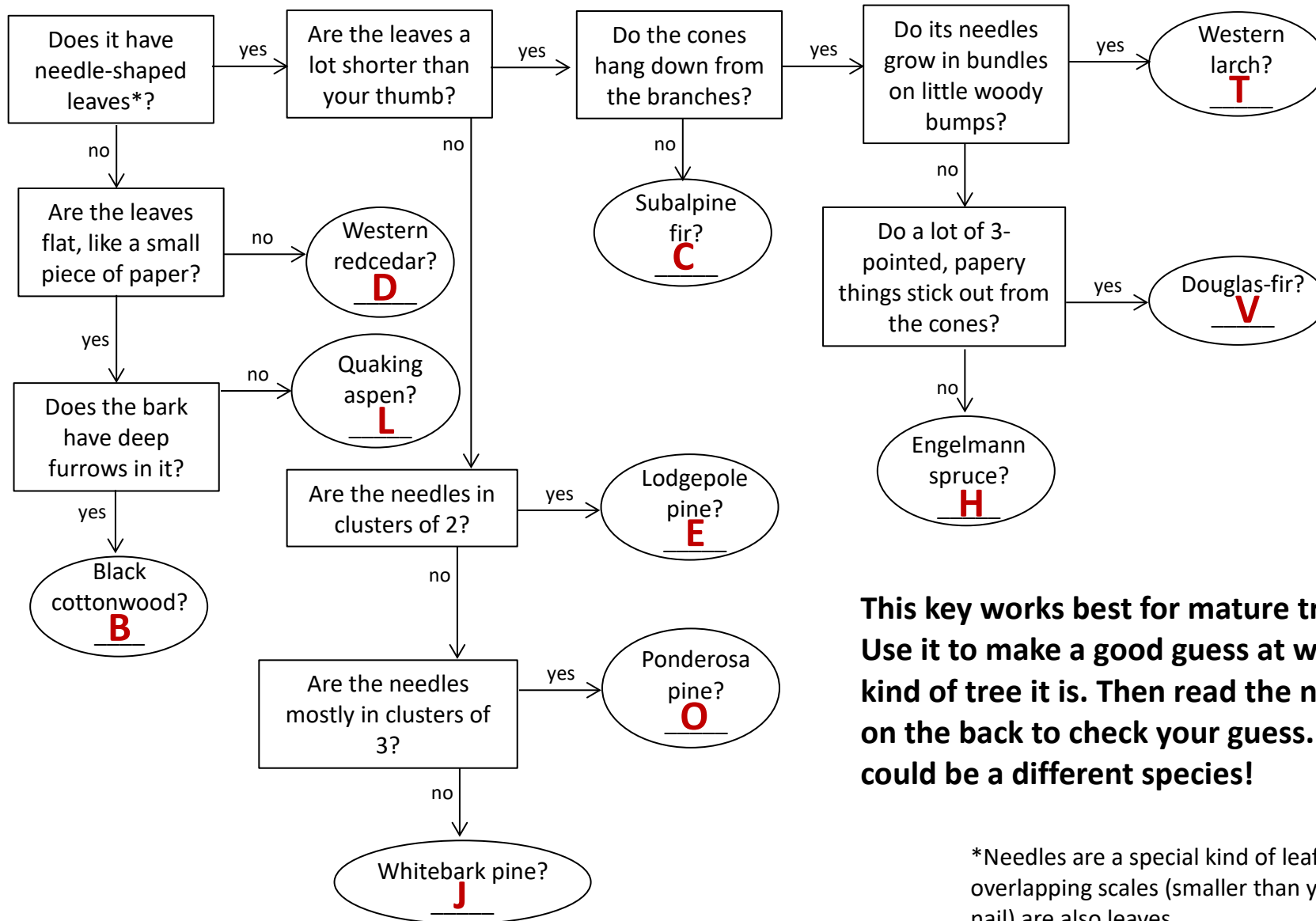
*Needles are a special kind of leaf. Tiny, overlapping scales (smaller than your pinkie nail) are also leaves.

Handout E10-page 2. Check your tree identification:

1. **Black cottonwoods** have long, flat, wide leaves that may be very shiny and have pointed tips. The buds at the ends of their twigs are pointy. In spring, they are also very sticky. Old cottonwoods have gray, deeply furrowed bark. Cottonwood seeds are packaged with lots of cottony fluff, which helps them float a long way on wind and water.
2. **Douglas-firs** have short, flat needles and brown, furrowed bark. The buds at the ends of their twigs are pointy. Their cones feel kind of papery (like spruce cones) but with this difference: Little, 3-pointed “wings” stick out from the cones. It looks like tiny mice are trying to burrow in, but they can’t hide completely!
3. **Engelmann spruces** have short needles with very sharp tips, which gives them the name “sticky spruce.” Their cones feel kind of papery. Their bark is grayish, with roundish pieces that sometimes flake off.
4. **Lodgepole pines** have fairly long needles that usually grow from the twig in bundles of 2. Their cones are pointy and very prickly. Sometimes their cones are closed tight so the seeds can’t get out; sometimes they are open. Lodgepole pine bark is dark and scaly.
5. **Ponderosa pines** have long very needles that usually grow from the twig in bundles of 3. Their cones are big and have prickles on them. Their bark is yellowish or brown, sometimes even orange. It falls off in pieces that look like they belong in a jigsaw puzzle. Ponderosa pine bark has a vanilla-like smell, especially in the spring.
6. **Quaking aspens** have flat, roundish leaves with a pointed tip. The leaves move almost all the time because they are very sensitive to wind. Their bark is mostly grayish-white and smooth, although old trees can have furrowed bark near the ground. Their seeds are packaged with cottony fluff that helps them float long distances on wind and water.
7. **Subalpine firs** have short, flat needles and gray bark. Their bark often looks like it has blisters on it. Their cones grow at the very tops of the trees, pointing upward toward the sky. The cones don’t fall off. Instead, they fall apart on the tree, and the pieces fall to the ground.
8. **Western larches** have short, soft needles. They grow in tufts of 10 or more out of little woody bumps on the twigs. The leaves turn gold in the autumn and then fall off. Therefore, they are conifers (cone bearers) but not evergreens like pines, firs, and spruces. Western larch cones are small and light. The tree’s bark is brown to reddish-brown.
9. **Western redcedars** have leaves that look like tiny, overlapping scales. Many leaves grow in a long row on each twig. The branches sometimes look a little like ferns. Their cones are small—about as big across as your thumbnail. Western redcedar bark is grayish, with furrows and loose strands. It looks like someone tried to peel or shred the bark.
10. **Whitebark pines** have fairly long needles that grow from the twig in clusters of 5. Their cones are purplish-brown but turn brown as they age. The cones don’t usually fall off the tree. Most of them ripen in the treetops and then get pulled apart by Clark’s nutcrackers, who their large seeds. The pieces of cone that the nutcrackers remove fall to the ground under the tree. Whitebark pine’s bark is whitish on young trees and gray to black on older trees.

Handout E10. Answer Key

Identify 10 summer trees!



This key works best for mature trees. Use it to make a good guess at what kind of tree it is. Then read the notes on the back to check your guess. It could be a different species!

*Needles are a special kind of leaf. Tiny, overlapping scales (smaller than your pinkie nail) are also leaves.