Dichotomous Key Activity

Students practice using a dichotomous tree key and then create their own place-based tree key.

Materials

- Activity Key
- Getting Started on Leaf Characteristics
- Sample Leaf Cards
- Tree Information Cards

Resources

- Texas A&M Forest Service, Trees of Texas
  - How to ID: http://texastreeid.tamu.edu/content/howToID/
  - ID by Leaf: http://texastreeid.tamu.edu/content/idByLeaf/
  - List of Trees: http://texastreeid.tamu.edu/content/listOfTrees/
  - Leaf Collection & Safety: http://texastreeid.tamu.edu/content/leafCollectingSafety/
- Arbor Day Foundation
  - What Tree Is That?: https://www.arborday.org/trees/whattree/

Instructions

1. Print activity pages, cutting Sample Leaf and Tree Information Cards apart. Print either a set for each group or individual, or enough to swap during the activity.

2. Review the handout Getting Started with Leaf Characteristics or use the How to ID section of the Trees of Texas website with students.

3. Provide the students with one of the Sample Leaf cards. Ask students to observe the characteristics of leaves: leaf tips and bases, leaf margins, leaf textures, leaf structure, and leaf arrangements. Optional: have them write a list of the characteristics for their leaf.

4. Have students use the Activity Key to identify their tree species.

5. Once the students have identified their species, give them their declared Tree Information Card to verify their decision. They can also look up their tree on the List of Trees section of the Trees of Texas website to review more information.

6. Have students continue practicing with the key by identifying all of the Sample Cards.
7. If leaves are available on your local trees, have students collect samples. Review the Leaf Collection & Safety section of the Trees of Texas website with students.

8. Have students identify their collected species using the ID by Leaf key on the Trees of Texas website or the What Tree Is That? key from the Arbor Day Foundation website.

**Extension**

Create a place-based tree key that is unique to your campus.

Have your students choose trees to include, collect leaf samples, categorize the leaves based on their characteristics, then write out a key. After creating the key, have another class or another group use it to identify the local trees. Publish a print copy of the key to share or add a digital version to your school website.

If your class or school already has a Tree Trail, consider creating a key for the trail. If you do not have a Tree Trail, find more information about creating one at [http://tfsweb.tamu.edu/ConservationEducationResources/TreeTrails/](http://tfsweb.tamu.edu/ConservationEducationResources/TreeTrails/).
<table>
<thead>
<tr>
<th>Question 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the tree coniferous? Does the tree have needle-like leaves and bear cones? Yes, you have a Loblolly Pine.</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>Is the tree a broadleaf? Does it have thin, flat leaves? Yes, go to Question 2.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the leaves simple? Is there one leaf attached to the petiole? Yes, go to Question 3.</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>Are the leaves compound? Are there multiple leaflets on a single petiole? Yes, go to Question 4.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the simple leaves opposite? Yes, you have a Red Maple.</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>Are the simple leaves alternate? Yes, go to Question 5.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the compound leaves alternate with lanceolate shaped leaflets? Yes, you have a Pecan.</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>Are the compound leaves opposite with oval shaped leaflets? Yes, you have a Texas Ash.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the margins serrated or toothed and is the leaf shape oval? Yes, you have an American Elm.</td>
</tr>
<tr>
<td>OR</td>
</tr>
<tr>
<td>Are the margins lobed and is the leaf apex rounded? Yes, you have a Post Oak.</td>
</tr>
</tbody>
</table>
Getting Started on Leaf Characteristics

Tree Type
Coniferous - a tree with needles or scales instead of leaves, bearing cones
Broadleaf - a tree with wide flat leaves

Parts of a Leaf
- Stem
- Petiole
- Base
- Blade
- Margin or Edge
- Primary Vein or Midrib
- Secondary or Lateral Veins
- Tip or Apex

Simple & Compound Leaf
- Finding the bud will help determine simple or compound arrangement
- Simple
  - Having one blade per leaf
- Compound
  - Having more than one leaflet per leaf

Leaf Arrangement
- Opposite
  - Leaves are attached opposite each other on the stem
- Alternate
  - Leaves are attached alternately along the stem
- Whorled
  - 3 or more leaves are attached at the same point on the stem

Leaf Shapes
- Lanceolate
- Deltoid
- Oval
- Star

Leaf Margins
- Entire
  - Having a smooth edge
- Lobed
  - Rounded segment not divided all the way to the midrib
- Dentate
  - Having triangular, tooth-like teeth
- Serrate/Toothed
  - Having sharp, saw-like teeth

Leaf Apexes and Bases
- Acuminate
  - Long tapered point
- Bristle
- Rounded
- Acute
- Rounded
- Cuneate
  - Wedge-shaped
- Inequalateral
  - Not same on both sides
- Truncate
  - Squared off

To find more Leaf Characteristics, visit the Trees of Texas website’s How to ID section: http://texastreeid.tamu.edu/content/howToID/

Illustrations copyright by Robert O’Brien
**Post Oak**

**Leaf**
Deciduous leaves are 4 to 6 inches long
Lobes form a cross shape

**Tree Description**
Medium to large size
Up to 50 feet tall with trunk 2 feet in diameter

**Bark**
Thick, gray-brown
Narrow, irregular cracks and scaly ridges on older trees

**Wood**
Heavy, hard
Used for crossties and fence posts, sometimes for lumber

**Notes**
So common that an entire ecoregion is named Post Oak Savannah

Trees of Texas website http://texastreeid.tamu.edu

---

**American Elm**

**Leaf**
Deciduous leaves are 4 to 6 inches long, 2 to 3 inches wide
Oval, tip comes to a point
Base is lopsided and double toothed

**Tree Description**
Large size, up to 90 feet tall

**Bark**
Dark gray
Divided into irregular flat-topped, thick ridges

**Wood**
Heavy, hard, strong
Once used for wheel hubs, furniture parts, veneer for baskets

**Notes**
Historically a common street tree, but almost wiped out by Dutch Elm Disease

Trees of Texas website http://texastreeid.tamu.edu
Red Maple

Leaf
Deciduous leaves are 2 to 5 inches long
Has 3 to 5 pointed saw-toothed lobes
In autumn, leaves turn a brilliant shade of red or orange-yellow

Tree Description
Medium size, fast growing, reaches 90 feet tall

Bark
Smooth and light gray on young tree
Rough, scaly, dark gray on old limbs and trees

Wood
Heavy, close-grained, light brown color
Used for furniture, turned items, fuel

Notes
Also named Swamp Maple, Trident Maple, Drummond Red Maple

Trees of Texas website http://texastreeid.tamu.edu

---

Pecan

Leaf
Deciduous leaves have 11 to 17 leaflets, lanceolate
Margins are finely-toothed and long-pointed

Tree Description
Large size, but can grow tall and slender in wooded settings
Up to 120 feet tall with trunk 4 feet in diameter

Bark
Gray-brown and smooth at first
Thin scales on older trees that flake off, creating a rough texture

Wood
Heavy and hard, but brittle and not strong
Used for flooring and cooking wood, especially for barbeques

Notes
State tree of Texas

Trees of Texas website http://texastreeid.tamu.edu
Loblolly Pine

Leaf
Evergreen needles in bundles of three, 5 to 10 inches long

Tree Description
Large, fast growing
Up to 125 feet tall with trunk 4 feet in diameter

Bark
Thick, dark red-brown to black flaky plates

Wood
Most commercially valuable southern pine, coarse-grained
For lumber, posts, boxes, pulp, and many more uses

Notes
Southern Pine Beetle once damaged large pine stands that today are protected by sustainable management practices
Find more at http://tfsweb.tamu.edu/insects

Texas Ash

Leaf
Deciduous leaves with 5 oval or round leaflets
Dark green on top, lighter below

Tree Description
Medium sized, oval crown
Up to 45 feet tall with trunk 2 feet in diameter

Bark
Gray with brown or black blotches with interlocking flattened ridges

Wood
Light colored with brown heartwood
Used for firewood and flooring

Notes
Emerald Ash Borer is a threat to all ash species and has been recently discovered in Texas
Find more at http://tfsweb.tamu.edu/eab

Trees of Texas website http://texastreeid.tamu.edu