

DICHOTOMOUS

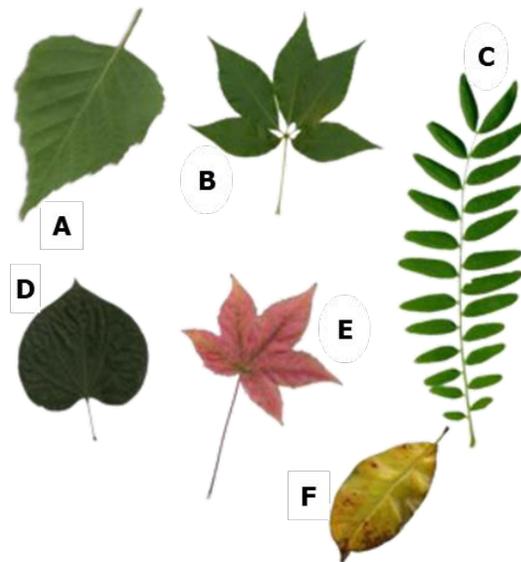
Keys

Scientists use various tools to help them study and compare organisms. One of these tools is known as a dichotomous key. Dichotomous keys provide scientists with a way to identify an organism based on questions about opposing characteristics. If you were using a key about birds, a question might ask if the bird's beak is pointed or rounded on the end. Your answer would lead you to another question about the bird. You would continue to answer questions until you successfully identified the bird. Luckily, these tools are so easy to use, we can use them, too!

Often, the hardest part about using a dichotomous key is understanding the terminology in the key. For example, most dichotomous keys dealing with plants use the following terms: leaf shape, veins, leaf margin, and arrangement. Leaf shape may describe the geometric shape the leaf most closely resembles or whether the leaf has lobes. Many keys also provide vein options such as *pinnate* (meaning veins grow away from a central vein in a uniform fashion) and *palmate* (meaning the veins start from a central point near the bottom of the leaf and spread out sporadically in various directions). The leaf margin is the outer edge of the leaf; this surface can be *entire* (meaning it is smooth with no wavy or pointed edges) or it can be *toothed* (with small points along the surface). Leaf arrangement is determined by how the leaves are arranged on a stem; *simple* leaves have only one leaf attached, while *compound* leaves have multiple leaflets attached.

Dichotomous Key for Leaves

- 1a. Compound leaf.....go to 2
- 1b. Simple leaf.....go to 3
- 2a. Leaflets are palmate.....Buckeye
- 2b. Leaflets are pinnate.....Locust
- 3a. Veins are pinnate.....go to 4
- 3b. Veins are palmate.....go to 5
- 4a. Leaf edge is toothed.....Birch
- 4b. Leaf edge is entire.....Magnolia
- 5a. Leaf is star-shaped.....Sweet Gum
- 5b. Leaf is heart-shaped.....Redbud



If we look at the dichotomous key, left, we can use the terms to determine which leaf belongs to which tree. Let's identify Leaf A. Starting with question 1, we must first establish if this is a compound or simple leaf. Since

there is only one leaf attached, we classify this as a simple leaf and move on to question 3. For question 3, we look at the veins. This leaf has pinnate veins because there is a central vein from which other veins come, leading us to question 4. If we study the edge of the leaf, we see it is jagged or toothed, telling us that this leaf belongs to a birch tree. See if you can use the dichotomous key to identify the other five leaves!

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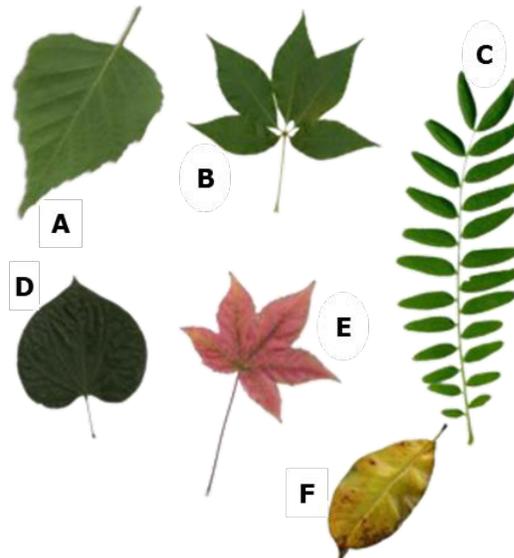
Keys

Scientists use various tools to help them study organisms. One of these tools is called a dichotomous key. Dichotomous keys give scientists a way to identify an organism based on questions about sets of traits. If you used a key about birds, a question might ask if the bird's beak is pointed or rounded on the end. Your answer would lead you to another question about the bird. You would follow these steps until you successfully identified the bird. Luckily, these tools are so easy to use, we can use them, too!

The hardest part about using a dichotomous key is knowing the names for the characteristics of some organisms. For example, most dichotomous keys for plants use the following terms: leaf shape, veins, leaf margin, and arrangement. Leaf shape may describe the geometric shape it looks like or whether it has lobes (sections). Many keys provide vein options such as *pinnate* (meaning small side veins branch in a pattern away from a thick middle vein) and *palmate* (meaning the veins start from a central point toward the bottom of the leaf and then spread out). The leaf margin is the outer edge of the leaf. This surface can be *entire*, meaning it is smooth with no wavy or pointed edges or it can be *toothed* with small points along the surface. Leaf arrangement tells how the leaves are laid out on a stem. *Simple* leaves have only one leaf attached, while *compound* leaves have more than one leaflet attached.

Dichotomous Key for Leaves

- 1a. Compound leaf..... go to 2
- 1b. Simple leaf..... go to 3
- 2a. Leaflets are palmate..... Buckeye
- 2b. Leaflets are pinnate..... Locust
- 3a. Veins are pinnate..... go to 4
- 3b. Veins are palmate..... go to 5
- 4a. Leaf edge is toothed..... Birch
- 4b. Leaf edge is entire..... Magnolia
- 5a. Leaf is star-shaped..... Sweet Gum
- 5b. Leaf is heart-shaped..... Redbud



If we look at the dichotomous key, we can use these terms to help us see which leaf belongs to which tree. Let's start with Leaf A. Starting with question 1, we need to figure out if this is a compound or simple leaf. Since there is only one leaf attached, this is a simple leaf, and we move on to question 3. Here, we look at

the veins of the leaf. This leaf has pinnate veins because there is a central vein from which other veins come, leading us to question 4. If we study the edge of the leaf, we see it is jagged or toothed, telling us that this leaf belongs to a birch tree. See if you can use the dichotomous key to identify the other five leaves!

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Comprehension QUESTIONS

Answer the questions below based on the article about dichotomous keys.

1. What is the purpose of using a dichotomous key?

2. What are some other organisms we could identify using a dichotomous key?

3. Identify the other 5 leaves.

B. _____

D. _____

C. _____

E. _____

F. _____

4. Why would we not use words like "large" or "tall" in a dichotomous key?

5. What are some characteristics that a dichotomous key for insects might have?

Mini-PROJECT: **YOUR OWN DICHOTOMOUS KEY**

DIRECTIONS: Make your own dichotomous key. Your teacher may provide you with objects or organisms to use for your key. You may also use objects found in your home (for example, different shoes) or classroom (for example, school supplies like paper clips and binder clips).

DIY DICHOTOMOUS KEY

DIRECTIONS: Make your own dichotomous key. Your teacher may provide you with objects or organisms to use for your key. You may also use objects found in your home (for example, different shoes) or classroom (for example, school supplies like paper clips and binder clips).