Name _____ Class _____ Date _____

Using Dichotomous Keys

What tools are available to help people identify unfamiliar organisms? One is a field guide, a book with illustrations that highlight differences between similar-looking organisms. Another tool used to identify organisms is a dichotomous key. A dichotomous key is a series of paired statements that describe physical characteristics of different organisms. In this activity, you will use a dichotomous key to identify tree leaves.

Problem

How are dichotomous keys used and made?

Materials

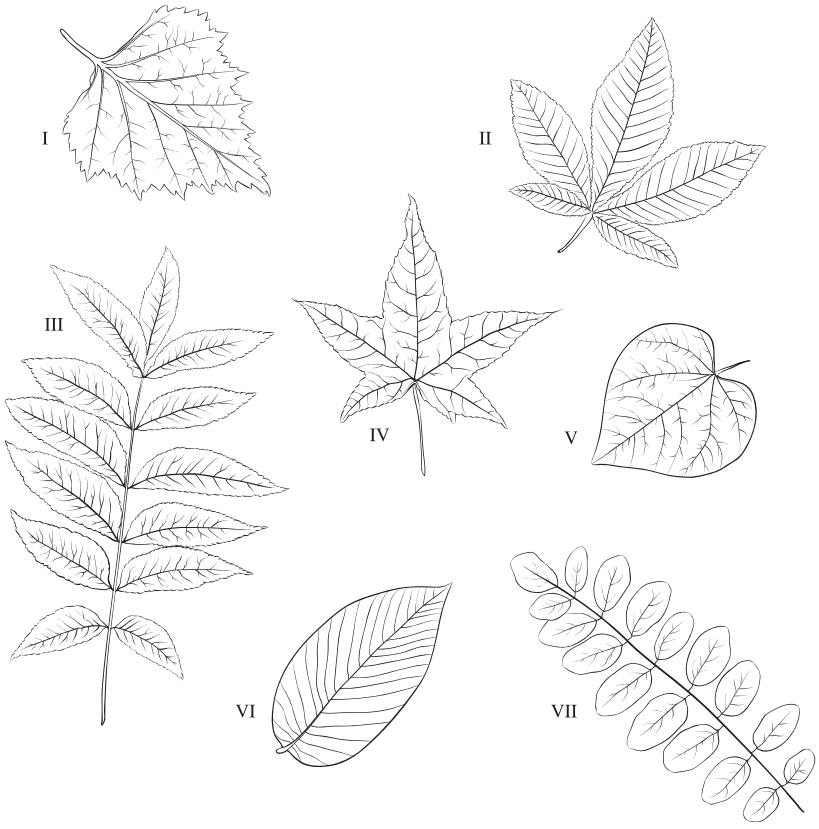
- 6–8 writing implements or other group of common items

Skills Observing, Classifying, Forming Operational Definitions

Design Your Experiment

Part A: Using a Dichotomous Key

1. To use the Dichotomous Key for Leaves on page 51, begin by reading paired statements 1a and 1b. Notice that the statements are opposites.



2. Carefully observe the leaf labeled I on page 50. Decide which statement, 1a or 1b, applies to this leaf. Then, follow the direction at the end of the statement. For example, because the leaf is a simple leaf, go to step 4.
3. Continue reading the paired statements and following the direction at the end of the applicable statement until you determine the identity of leaf I. Include that information as part of your answer to question 1 on page 52.

Dichotomous Key for Leaves

1. Compound or simple leaf
   - 1a) Compound leaf (leaf divided into leaflets) .....go to step 2
   - 1b) Simple leaf (leaf not divided into leaflets) .....go to step 4
2. Arrangement of leaflets
   - 2a) Palmate arrangement of leaflets (leaflets all attached at one central point) .....*Aesculus* (buckeye)
   - 2b) Pinnate arrangement of leaflets (leaflets attached at several points) .....go to step 3
3. Leaflet shape
   - 3a) Leaflets taper to pointed tips .....*Carya* (pecan)
   - 3b) Oval leaflets with rounded tips .....*Robinia* (locust)
4. Arrangement of leaf veins
   - 4a) Veins branch out from one central point .....go to step 5
   - 4b) Veins branch off main vein in the middle of the leaf.....go to step 6
5. Overall shape of leaf
   - 5a) Leaf is heart-shaped.....*Cercis* (redbud)
   - 5b) Leaf is star-shaped .....*Liquidambar* (sweet gum)
6. Appearance of leaf edge
   - 6a) Leaf has toothed (jagged) edge .....*Betula* (birch)
   - 6b) Leaf has untoothed (smooth) edge .....*Magnolia* (magnolia)

4. Repeat steps 2 and 3 for leaves II through VII.

Part B: Constructing a Dichotomous Key

5. Examine the writing implements or other group of items your teacher gives you. List some characteristics that you could use to classify these items into groups.
6. Using the dichotomous key from Part A as a model, construct a dichotomous key for your group of items. You may wish to use some of the characteristics you listed in step 5 to construct your key. Make sure that the paired statements in your key are opposites.

Name _____ Class _____ Date _____

7. Once your dichotomous key is complete, test it with each item and revise your key, if necessary.
8. Exchange keys and items with a classmate. Use your classmate's key to identify his or her items. Then, suggest ways to improve that key.

Analyze and Conclude

1. **Classifying** In Part A, identify leaves I through VII.

2. **Applying Concepts** In Part B, how did you choose the characteristics for your key? How did you decide on the key's order?

3. **Evaluating and Revising** Based on your classmate's feedback, does the key you developed in Part B need to be revised? If so, how?

4. **Inferring** Why is it important that the paired statements in a dichotomous key be opposites?