Dichotomous Keys

Overview

Keys are important tools for identifying unknown plants and animals. Students will use two different *dichotomous keys* to "key out" common classroom objects.

Concepts

- Living things are grouped by shared characteristics.
- Scientists can identify unknown organisms by making observations about them and matching with *distinguishing characteristics* that are listed in a field guide or a key.

Materials

For each group:

- Copy of "Key #1" and "Key #2 To Common Classroom Objects"
- Thumb Tack
- Pencil
- Paper clip
- Fountain Pen
- Eraser
- Card Box
- Paper spindle

Preparation

Make enough copies both dichotomous keys for each group of four students.

Gather one set of classroom objects for each group. If needed, you may want to send a list of the supplies that are missing home with the students.

Divide the class into groups of four.

Construct a key in front of the class to demonstrate how they are used. For example, you might wish to "key out" your students. Make sure that you key one student all the way to the end. The steps might be as follows:

1a Students male (list all names).....Go to 2
1b Students female (all other names).....

2a With brown eyes (list all names).....Go to 3
2b With eye color other than brown.....

3a With red hair.....Bob Smith (only student with brown eyes and red hair)
3b With hair color other than red.....

Adjust as appropriate for your class

PROCEDURE

Engagement

Scientists use keys to identify unknown plants and animals. It involves carefully observing and recording information. The most common type of key (and the type that you will be using) is called a dichotomous key. This type offers two choices at every level, either a ÒyesÓ or a Òno.Ó The distinguishing characteristics of the objects that you will Òkey outÓ are easily observable and are quantifiable.

Activity

1. Gather the objects to Òkey outÓ from your teacher. Use Key #1 to identify each object. Choose one of the objects and begin at on the key. At each line, answer with a ÒyesÓ or a Òno.Ó The number at the end of each line tells you where to go if the answer is Òyes.Ó Keep moving down through the key until you have identified each object.
2. Now use Key #2, and repeat the activity. How are the keys similar? How are they different? Which key is easier to use?
3. What type of characteristic does Key #1 use for identification? What type of characteristic does Key #2 use for identification? What problems did you have using the keys? Would either of these keys work to identify tools from a hardware store? Why or why not? How might biologists use keys in a study of the tidepools?

Explanation

Ecology is the study of the relationships between organisms and their environment. In order to study these relationships, scientists must identify the organisms that live in the study area. Biologists have developed several systems for classifying animals and methods for identifying them. Scientists who study an area often create a ÒkeyÓ to help others easily classify the plants and animals found there. It is important to note that most keys are restricted to the organisms found in a specific area.

EXTENSION

Organize an outdoor field trip and have the students identify plants and/or animals using a commercially developed key.

Have the students choose an environment to study and then create their own keys. Perhaps take a field trip to that environment to test the keyÕs usefulness.

You can purchase a set of freeze-dried animals from a science supply store and have the students create and exchange keys that classify the animals.

Another option is to give students a variety of photos of organisms that they are familiar with. Have the students try to construct a key based on the distinguishing characteristics of these organisms. By doing this, they will learn how to discover which type of characteristics separate *species* from other similar organisms.

LINKS TO RELATED CD ACTIVITIES , IMAGES, AND MOVIES

Activity *Describing "Classroom Communities"*
Activity *Plankton Identification*

VOCABULARY

distinguishing characteristics *dichotomous key*

ecology *species*

SOURCE

Adapted from Kolb, James A., Project Director. *Marine Biology and Oceanography Grades 9 - 12.* Marine Science Project: FOR SEA. Marine Science Center, Poulsbo, WA. 1986.

KEY #1: A KEY TO COMMON OBJECTS FOUND ON A DESK

1a Object made entirely of metal 2
1b Object not made entirely of metal 5

2a Object has no thin metal projections 4
2b Object is flat at one end with a sharp projection coming from the center 3

3a Flat end is not larger than 1 cm ..... thumb tack
3b Flat end (base) is at least 5 cm in diameter ..... .paper spindle

4a Object is made of bent wire ..... paper clip
4b Object is "box shape" with a hinged lid ..... card box

5a Object is made entirely of rubber ..... eraser
5b Object may be rubber in part 6

6a Object is long, thin, has graphite inside and has rubber at one end ..... pencil
6b Object is long, thin, has removable cap, but does not have rubber at each end ..... fountain pen

KEY #2: A KEY TO COMMON OBJECTS FOUND ON A DESK

1a Object is used in the process of writing 2
1b Object is not used in the process of writing 4

2a Object has a cap and contains a fluid which is imparted to the paper with the process of writing ..... fountain pen
2b Object does not contain fluid 3

3a Object is long and slender, containing a dark, solid material used to mark paper in the process of writing ..... pencil
3b Object is made of rubber and used to remove lines in the process of writing..... ....eraser

4a Object is used to keep papers together 5
4b Object is used to attach papers to a wall or a solid object ..... thumb tack

5a Object is small and metal and used to keep small numbers of paper sheets ..... together..... ....paper clip
5b Object is used to keep large numbers of sheets together 6

6a Object holds papers together by securing them on a metal shaft with a sharp..... point..... ....paper spindle
6b Object is designed to arrange paper of uniform size so they do not spill and become mixed up..... ....card box