

## Laboratory investigations of the Biological Kind: Construction and Use of a Dichotomous Key

Over 2050 years ago Aristotle classified plants and animals into subdivisions. Plants were grouped as trees, shrubs or herbs. Animals were grouped as those living in the air, land or sea. As humans explored the world new and ever more diverse organisms were discovered. Scientists began to require a more standardized method for naming and describing living things

Linnaeus in the late 1700's devised a standardized system using Latin names for all organisms. He described the organisms by specific criteria. These criteria were based on structures. He gave each living thing two names, a genus name and a species name. This two name system is called binomial nomenclature. Many closely related species make up one genus.

Today biologists use dichotomous keys to identify plants and animals (and pretty much anything else they need to identify). The word dichotomous means "dividing into two parts." A dichotomous key will list the similarities and differences between certain groups of living things. By using the process of elimination the user can arrive at the name of a specific organism on the basis of opposing characteristics. Use of the key allows you to eliminate groups of organisms in order to narrow your choices to one organism.

**In this investigation you will arrange a set of geometric figures into groups according to similar characteristics. Then you will use those groupings to create a dichotomous key that will classify each geometric figure.**

Practice://

At each step of a dichotomous key you are given two alternatives. On the basis of the object you are trying to identify, choose the more appropriate description. If you choose the correct option it will bring you closer to the identity of the object. If you choose incorrectly even once you will wind up with the wrong classification, so each choice must be made only after careful examination of the object.

As an example you have been provided with a simple dichotomous key that can be used to distinguish between a clown, a doctor, a biology teacher and a person who is criminally insane. To use the key start at step 1a and decide whether the person you wish to identify is wearing a red sponge nose. If the answer is yes then you follow the instruction to proceed to step 2a. If you answered no

then you would proceed to step 3a. Depending on the complexity of the objects or organisms you are attempting to identify the key may have dozens of steps before you reach a possible identification.

Procedure://

Cut out the geometric shapes on the following pages. You will only need one set of shapes per a lab team. After the shapes have been freed from their cellulose prisons begin to

construct a chart like the one on the next page by dividing the objects into groups by their differing characteristics. All of these geometric shapes belong to the domain of geometric shapes and the kingdom of paper objects. Now you must divide the objects into two phyla based upon their physical characteristics. Create names for each of the phyla you have just created. Keep in mind that the names for each level of classification should correlate with the shapes in that level. For example the phylum: circles should not contain any non circular objects. On your chart write the name of the two phylum and then the numbers of the geometric figures that belong to the phylum under its name.

Then divide each phylum into two classes and create appropriate names and write the numbers under the corresponding name. Continue this process until every paper object has been placed into its own level of classification by itself. Depending on how you chose to arrange your groups you may need to go as low as genus or species in your levels of classification. Some levels of classification may only have one specimen.

Now using your chart as a guide, create a dichotomous key that would allow someone to identify each geometric figure. Keep in mind that the rest of your classmates are not as smart as you are and therefore you should use language that they (or anyone) can understand without needing explanation. After you complete your key answer the following questions.

Analysis://

1. At what level of classification were all of the objects most alike? At what level were they the least alike?
2. Do all paper objects in the same class belong to the same order or phylum? Explain.
3. What features would you use to create a dichotomous key to identify the different people in this room?
4. For 15 extra work points create that key (be sure that every member of this classroom is identified)

#### A Simple Sample Dichotomous Key for Identifying People

1a. is the person wearing a red sponge nose	.....	go to #2a
1b. if no red sponge nose	.....	go to #3a
2a. person is holding a large axe and laughing	.....	criminally insane
2b. not holding large axe and laughing	.....	clown
3a. person is wearing a stethoscope and not laughing	.....	doctor
3b. person is wearing a stethoscope and laughing	.....	biology teacher

**Level of classification**

Domain

Geometric Shapes



Kingdom

Paper Objects

Phylum

Class

Order

Family

Genus

Species



















