

4th GRADE

CLASSIFICATION - DICHOTOMOUS KEYS

Summary: Classification of organisms is explored through the use of dichotomous keys. Students study different amphibians, seeds, and leaves in order to identify them using dichotomous keys. Finally, the students will create their own dichotomous key to classify five animals of their choosing.

Intended Learning Outcomes 4th Grade:

- 1b. Sort and sequence data according to a given criterion.
- 1c. Make simple predictions and inferences based upon observations.
- 1d. Compare things and events.
- 1g. Develop and use simple classification systems.
- 3a. Know science information specified for their grade level.
- 3b. Distinguish between examples and non-examples of science concepts taught.

Utah State Core Curriculum Tie:

Standard 5 Objective 3:

- a. Explain how scientists use classification schemes.
- b. Use a simple classification system to classify unfamiliar Utah plants or animals.

Preparation time: 1 hour the first time, then 15 min thereafter

Lesson time: 1 hour

Small group size: works best with one adult for every 5 students

Materials:

1. Seed Identification Kit, acornnaturalists.com, KIT-8301, \$39.95.
2. Leaf Identification Kit, acornnaturalists.com, KIT-8297, \$39.95.
3. Amphibian Information Cards handout and Dichotomous Key for Common Utah Amphibians handout from <http://www.uen.org/Lessonplan/preview.cgi?LPid=15085>
4. gallon size Ziploc bags
5. assorted small plastic animals, have at least 5 for each group but they can be placed into one large bucket for students to sort through

Alternative to Purchasing Seed and Leaf Kits: The seeds and leaves found in the kits are common in Utah. Using a tree guide, you can isolate the seeds and leaves on your own and allow them to dry. After drying, the leaves and seeds can be placed in individual Ziploc bags. It is not necessary to have every leaf and seed from the kits. Those trees that are hard to find can just be omitted.

Preparation: The following materials must be organized and placed into Ziploc bags before the first lesson. This allows the lesson to be organized so that groups can access new materials each time they finish an activity.

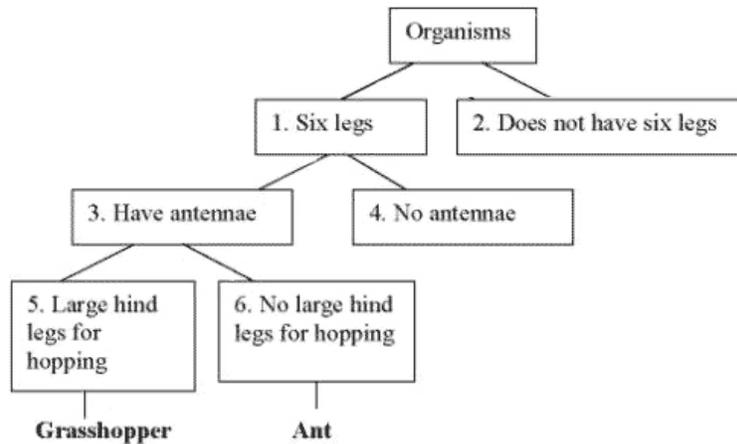
Seeds – Make 20 copies of the seed key found in the booklet from kit 8301. Place 5 of them into 4 separate Ziploc bags titled 'seed key 1' (two of these) and 'seed key 2' (two of these). Place one of the seed key answer keys into each of the 4 bags. Place one unknown bag of seeds #1 – #6 into the bag titled 'seed key 1' (fill both of these bags because you have two of each unknown from the kit.) Place one unknown bag of seeds #7 – #13 into the bag titled 'seed key 2' (fill both of these bags). When completed you have 2 sets of 2 different seed key bags.

Leaves - Make 20 copies of the leaf key, exhibit II – A, and exhibit II - B pages found in the booklet from kit 8297. Place 5 of each of them into 4 separate Ziploc bags titled 'leaf key 1' (two of these) and 'leaf key 2' (two of these). Place one of the leaf key answer keys into each of the 4 bags. Place one unknown bag of leaves #1 – #6 into the bag titled 'leaf key 1' (fill both of these bags because you have two of each unknown from the kit.) Place one unknown bag of leaves #7 – #13 into the bag titled 'leaf key 2' (fill both of these bags). When completed you have 2 sets of 2 different leaf key bags.

Amphibians – Make 7 copies of the Amphibian Information Cards. Place one copy into 6 separate Ziploc Bags titled 'amphibian classification key'. For the last copy, use Wite-Out to cover up the names of the amphibians. Then make 6 different copies of this new version of the Amphibian Information Cards. For these copies cut out each animal card. Place one set of cards into each of the 'amphibian classification key' bags. Make 30 copies of the 'Dichotomous Key for Common Utah Amphibians' handout. Place 5 of these into each 'amphibian classification key' bag. When completed you have 6 sets of amphibian materials, enough for 6 different groups.

Background information:

Classification is a system used by scientists to group and categorize organisms based on their shared physical characteristics. This system of sorting helps us better understand the world around us. Classification of organisms can be broad such as plant or animal, or more specific such as marsupials, monotremes, and placental mammals.



A dichotomous key can be used to identify biological organisms. The word dichotomous means two forks and is the most common system used to classify organisms. In a dichotomous key, one consecutively chooses between two mutually exclusive characteristics until one arrives at the identification of the organism. The key begins with two general characteristic choices and gets more specific which each group of questions. Each set of questions eliminates others, eventually leading to the identification of the mystery item. This lesson includes the use of an indented and a bracketed dichotomous key.

Pre-lab discussion: Discuss with students the use of classification. Ask them to tell you the 6 types of animals (mammals, birds, fish, reptiles, amphibians, and invertebrates). Ask them what some characteristics of mammals are. Explain to them that because scientists have classified animals we can understand what a mammal is without knowing exactly which mammal someone is talking about. Ask for 6 different shoes from 6 students. Place the shoes on a desk in front of the students. Ask the students to discuss how they are similar and how they are different. Using the whiteboard, begin to make a dichotomous key to identify the six shoes. Have the students help you consecutively divide the shoes into two categories to build the dichotomous key. Use the handout, 'sample water animal classification key' to help you build your shoe dichotomous key.

Instructional procedure: Separate the class into 5 or 6 larger groups. Have each group complete the Amphibians activity first. Then groups can complete the seed key 1, seed key 2, leaf key 1, and leaf key 2 activities in any order depending on when the supplies become available. The final activity will be IV where the students make their own classification key for animals from the 'animal bucket'. For each activity students can work independently or in groups of two within the larger class groups so that supplies can be shared.

I. Amphibian classification: Give one amphibian classification key bag to each group of 5 or 6 students. The teacher or adult for that group should hide the answer key.

1. Hand out the amphibian classification key and a picture of a frog or toad to either individuals or groups of two students within the larger group.

2. Students read the information card for their specimen and then use the amphibian classification key. Students work through the key until they identify what they think is the name of their amphibian. They should tell the adult or teacher the name and the adult checks that name with the answer key. If students identify the wrong animal they should go back and try it again.

3. Students within the group can switch off the cards until each individual has correctly identified all the cards.

II. Seed classification: Students can classify the seeds in seed key bag 1 and seed key bag 2. The procedure is the same for both seed key bags; the specimens are just split up so that there is more availability of materials for the groups. The process for identifying the seeds is the same as for the amphibian classification activity.

III. Leaf classification: Students can classify the leaves in leaf key bag 1 and leaf key bag 2. The procedure is the same for both leaf key bags; the specimens are just split up so that there is more availability of materials for the groups. In this case, give each individual or group of students the key, and other supplemental papers. It helps if the adult with the group shows the students how to use the exhibit pages. Note that the alternate or opposite classification is printed directly on the sample unknown card. The process for identifying the leaves is the same as for the amphibian classification activity.

IV. On their own animal classification:

1. Students pick out 5 animals from the animal bucket. They study the 5 animals and decide on their similarities and differences.

2. On a blank piece of paper they classify their 5 animals using the same process as seen on the handout "sample water animal classification key".

3. After completing their key they can switch their key and animals with another group and see if the other group can classify their five animals using their key.