# Lesson 2: Cladograms 101

## Objective:

The concept of cladograms has been a very important one to the State of Ohio and can be confusing at first to understand. The hope is that by using manipulatives along with assistance all students, including those with visual impairments, will be able to master it for the End-of-Course tests.

## NGSS:

HS.LS1-4. Use a model based on evidence to illustrate the relationship between systems or between components of systems.

## Essential Question:

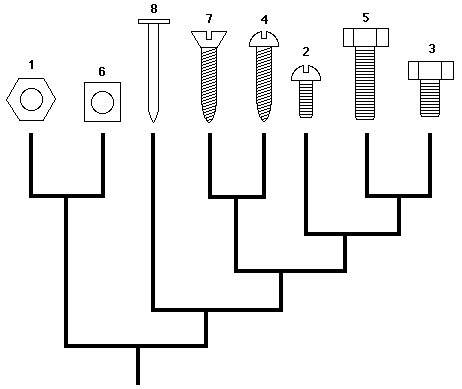
* What is a cladogram?

## Materials:

Various nuts and bolts—find different size nuts, bolts, and a nail commonly found in a toolbox. They should vary in size and usage.

## Directions:

1. Ask students to observe the nuts and bolts that you have given to them. Have a class discussion about the difference and similarities of the nuts and bolts.
2. Next, ask the students to begin to group the nuts and bolts into similar and different characteristics and what they have in common. For example, the nuts may all be one group, the bolts in another group, and the nail may be by itself due to the differences exhibited in the use and shape.
3. Within each of the major groups they just constructed, have students create another grouping. The three piles should now be split into six or more piles. Students should continue to create smaller groups until each nut and bolt is by itself.
4. Then, ask students to draw lines to create a diagram of the piles they just made. An example can be found below:



Source: <https://www2.nau.edu/lrm22/lessons/nuts_and_bolts/nuts_and_bolts.html>

## Extension Activity:

Ask students to create a dichotomous key for their materials. This key should use descriptive words to ensure that each individual nut, bolt, or nail can be identified. The students should start with two distinct characteristics before moving forward. For example, the students may start their key the following:

1a. Sharp point at the end Nail

1b. No sharp at the end Go to Question 2

2a. Has a hole Go to Question 3

2b. Without a hole Go to Question 4

Continue the key until each item has been identified on the chart created.

## Reference:

Taxonomy: The science of classification. (n.d.). [https://www2.nau.edu/lrm22/lessons/nuts\_and\_bolts/nuts\_and\_bolts.html](https://www2.nau.edu/lrm22/lessons/nuts_and_bolts/nuts_and_bolts.html" \o "Taxonomy: The Science of Classification)