

Hardware Cladogram #1

In this activity you will act as an evolutionary biologist.

Your group will be given a collection of 20 different pieces of hardware. Each piece of hardware represents an “organism” of a different “species” or taxa.

1. You will work with your group to classify each piece of hardware in your collection into **4 separate phyla, each with 2-3 classes** (Remember **KPCOFGS**-Kings play chess on fine grained sand).
2. You will construct a cladogram on poster paper or using a cladistics software program showing the “evolutionary relationships” between the different organisms.
3. You will present your cladogram to the class and explain how you classified your organisms, what characteristics you used to classify each organism and why you chose those characteristics
4. You may use the internet to determine the function of any pieces of hardware you are not familiar with if you think it would help in constructing your cladogram
5. The Presentation Rubric will be used to grade your cladogram presentation

Methodology of a Cladistic Analysis

HOW TO CONSTRUCT CLADOGRAMS

Here is an outline of the steps necessary for completing a cladistic analysis. Don't be fooled, however, by the simplicity of these steps. Seeing a real cladistic analysis out to fruition can be a difficult and time consuming task.

1. **Determine the characters** (features of the organisms) and examine each taxon to determine the character states (decide whether each taxon does or does not have each character). All taxa must be unique.
2. **Determine the polarity of characters** (whether each character state is original or derived in each taxon). Note that this step is not absolutely necessary.
3. **Group taxa by synapomorphies** (shared derived characteristics) not plesiomorphies (original, or "primitive", characteristics).
4. Work out conflicts that arise by some clearly stated method, usually parsimony (minimizing the number of conflicts).
5. **Build your cladogram**, which is NOT an evolutionary tree, following these rules:
 - All taxa go on the endpoints of the cladogram, never at nodes.
 - All cladogram nodes must have a list of synapomorphies which are common to all taxa above the node
 - All synapomorphies appear on the cladogram only once unless the character state was derived separately by evolutionary parallelism.

To accomplish the task of creating a good cladogram, you must use your judgement.

Ask yourself the following questions and answer them carefully.

- Could a supposed synapomorphy be the result of independent evolutionary development?
- Are your characteristics chosen well?
- Should you consider other characteristics?
- Should you consider additional taxa?