Overview:

In this lesson, students determine proper classification of organisms according to taxonomic levels, explore characteristics that determine classification, and create methods to recall ordered taxonomic terminology.

Objectives:

The student will:

- describe the use and function of a taxonomy, specifically to order and classify living organisms; and
- identify and list taxonomic levels of biological classification.

Targeted Alaska Grade Level Expectations:

Science

[7] SC2.2 The student demonstrates an understanding of the structure, function, behavior, development, life cycles, and diversity of living organisms by identifying the seven levels of classification of organisms.

[7] SA1.1 The student demonstrates an understanding of the processes of science by asking questions, predicting, observing, describing, measuring, classifying, makign generalizations, inferring, and communicating.

Vocabulary:

animalia— one of six kingdoms, including most living things that are able to move and digest food internally

plantae –one of six kingdoms, including living things that generally manufacture their own food through the use of photosynthesis

fungi – one of six kingdoms, mostly living things that are nonmobile and assist in the decomposition process, including yeasts, molds, and mushrooms

binomial nomenclature – a scientific naming system that gives a unique name ("scientific name") to each species, using organisms' genus and species as its two parts (e.g., "Homo sapiens" for humans)

class – a taxonomic rank below (more specific than) phylum and above (less specific than) order

classification-a method of grouping, used in biology to understand and indicate evolutionary relationships between organisms

family- a taxonomic rank below (more specific than) order and above (less specific than) genus

genus – a taxonomic rank below (more specific than) family and above (less specific than) species

kingdom – taxonomic rank below Domain and above Phylum

order – a taxonomic rank below (more specific than) class and above (less specific than) family

phylum – a taxonomic rank below (more specific than) kingdom and above (less specific than) class

species – the lowest and most specific taxonomic rank; a group of similar organisms that can interbreed with fertile offspring

taxonomy – the system and study of classification arranged by hierarchy ("above/below" levels)

Materials:

- Set of six Exhibit Sheets containing animal pictures (one set per group)
- Set of Exhibit Sheets for Teacher as a visual aid for ordering

Activity 1 *(The Moose and its Relatives)*
Activity Preparation:

1. After removing titles of Exhibit Sheets that follow, assemble a set of Exhibit Sheets (in random order) for each small group of students in the class.

2. On the back of each Exhibit Sheet, print the listed appropriate classification level (e.g., "Order: Artiodactyla" for Exhibit Sheet 3).

Procedure:

1. Divide students into small groups of three or four students per group.
2. Distribute one set of Exhibit Sheets to each group.
3. Describe the Exhibit Sheets to student groups by noting that the organisms pictured on each page are related to one another in some way, some more closely than others.
4. Instruct students to order the Sheets from the "closest" (or "most specific") relationship to the "furthest" (or "most general"), explaining that it may be helpful to discuss the characteristics each individual organism pictured shares as a way to identify the "closeness" of relationships.
5. After 10 or 15 minutes of group deliberation, reassemble the class to discuss their findings.
6. Solicit and list each group's order for the class to see, identifying each ordered sheet by its respective classification level printed on the back of the sheet.

   Teacher's Note: It will be helpful to point out, throughout this activity, that the moose (Alces alces) represents only one unique example of a species, and that the class could perform the same activity, with similar but different results, using the other species pictured, or different animals (or plants, or fungi) entirely.

7. Discuss any differences between groups' ordering of sheets, including the characteristics organisms in the pictures do and do not share.

   Critical Thinking Activity: *More Taxonomy.* During the discussion, ask students to consider how they might group their student materials (e.g., pens, pencils, notebooks, textbooks) or other classroom materials in similar ways, according to relative shared appearance, characteristics, functions, etc.

8. Identify and clarify, through discussion, correct order of the sheets (from bottom to top: Species / Family / Order / Class / Phylum / Kingdom), pointing out that for the Moose, the species Alces alces is the only occupant of the genus Alces (as a result, adding "Genus" taxon listing in correct location, between "Species" and "Family").

Activity 2 *(Mnemonic Mad Libs)*
Activity Preparation:

1. Create a fill-in-the-blank list for the class to see, as follows:
   Adjective (1): _____
   Noun (1): _____
   Adverb: _____
   Verb: _____
   Adjective (2): _____
   Adjective (3): _____
   Noun (2): _____

Procedure:

1. Pointing out the blank list to students, solicit suggestions for words to fill in the blanks.
2. Word suggestions, however, should come in order, and should fit the following criteria:
   a. The first adjective must begin with "K" (possibilities, in case students have difficulty: "kind," "keen," "kooky," "knitted").
   b. The first noun should begin with "P" (possibilities: "pigs," "puppies," "pirates," pictures")
   c. The adverb must begin with "C" (possibilities: "clearly," "carelessly," "correctly")
   d. The verb must begin with "O" (possibilities: "open(s)," "offer(s)," "order(s)" "operate(s)")
   e. The second adjective must begin with "F" (possibilities: "five," "fake," "famous," "fabulous," "fancy")
   f. The third adjective must begin with "G" (possibilities: "giant," "gross," "green")
   g. The second noun must begin with "S" (possibilities: "scissors," "skis," "stores," "stopwatches")

3. Move through the list, settling on a choice for each blank in order and helping students decide on options that will fit together in a conceptual (though perhaps silly) way to make a sentence in the order of the list.
4. After the class has developed the list of words that fit the criteria, write the sentence for the class to see, noting that it will be a memorable method for remembering the proper order of taxonomic levels of biological classification.
5. Solicit and list each group's order for the class to see, identifying each ordered sheet by its respective classification level printed on the back of the sheet.

Teacher's Note: In case there is particular difficulty when assembling student suggestions into a fully formed sentence, it may be helpful to develop ready-made alternatives that make sense to students, such as "Kenai Peninsula clearly offers fifty glacier segments."

6. Discuss the importance of taxonomic levels being listed in the proper order and the problems with considering them out of order or missing levels.

Extension Idea:

From descriptions and discussion of classification of organisms according to external features apparent from pictures on Exhibit Sheets, it may make clear sense to use activities or discussion regarding internal makeup and functions as well, including digestive and/or reproductive processes, skeleton and/or exoskeleton, and organ complexity ([7] SC2.3, [8] SC2.1).

Resources:

http://en.wikipedia.org/wiki/Biological_classification

http://en.wikipedia.org/wiki/Moose

http://en.wikipedia.org/wiki/Taxonomy

http://en.wikipedia.org/wiki/Yukon_Flats_National_Wildlife_Refuge

http://www.alaskaone.com/yukon-flats-wildlife-refuge/

http://www.fs.fed.us/land/pubs/ecoregions/ch10.html

http://www.iucnredlist.org/apps/redlist/details/41782

http://www.nature.nps.gov/parkscience/index.cfm?ArticleID=400

http://www.nps.gov/dena/planyourvisit/wildlife-viewing.htm

http://www.nps.gov/lacl/naturescience/animals.htm

http://www.nps.gov/miss/naturescience/4spotskimmer.htm

http://www.nps.gov/yose/naturescience/great-gray-owl.htm

http://www.npwrc.usgs.gov/resource/birds/chekbird/r7/yukflats.htm

http://www.pbs.org/safarchive/5_cool/galapagos/g52b_tax.html

http://www.yukonflats.net/

http://yukonflats.fws.gov/