Activity 1: Sorting the Solar System developed by Anna Hurst
This activity has students explore some of the different objects in the Solar System and create their own categories for them. They then have a discussion about what categories scientists currently assign to each object.

Pass out a set of the 24 Solar System Cards (http://www.astrosociety.org/education/publications/tnl/70/solarsystemcards.pdf) to each group of students, available here for download as a PDF. Together, they should sort their cards into a number of groups using whatever criteria they choose. Each card has an image of an object and information about its size, its distance from the Sun, what object it orbits, and its composition, but it does not identify the object. Encourage students to invent their own categories, rather than using categories they have already heard. For example, they might create a "lumpy potato-like" category, rather than "asteroids". Have students list the criteria they used to create the categories, so that if they were given a new object, they could easily place it into one of the categories.

Another variation would be to have each group sort according to different criteria, such as appearance, size, composition, etc. You could then have the groups circulate and guess what criteria each other group used to sort the cards.

After they have finished sorting, you can facilitate a discussion with students about their categories and how they chose them. Write a few categories on the board. What criteria did they use? Were there other criteria they could have used? Were there any that didn't quite fit into a category? Choose a card and ask a group in which of their categories the object belongs.

Now lead a discussion of how scientists currently classify these objects. Explain that in many sciences there are collections of objects that get sorted and classified: birds, plants, bacteria, rocks, etc. Scientists come up with lists of questions or criteria to help determine which group an object will ultimately belong to. As new objects are discovered, these questions can help decide if they are like other things that we already know something about, or, if they are unique. Of course, sometimes new discoveries make us think about our definitions in new ways, so that sometimes revisions need to be made. The discovery of Eris (the "tenth planet") forced astronomers to give a fresh look at their definition of a planet and make revisions. As they discover ever more planets around other stars, they will probably have to revise it again.

There are six types of objects represented on the cards: star, planet, dwarf planet, moon, comet, and asteroid. The identity of each object and a definition of each of the categories is also provided in the Solar System Cards PDF. You may want to define the categories and have students try to sort the cards again, in small groups or together as a class. Are there any that don't fit these categories? Could any of the definitions be improved? What if we wanted to use these definitions for a system around another star?