From the booklet: Grouping and Classification

*Teaching Notes*

**Making a key and using leaves (mainly from tree and hedgerow plants)**

This activity builds on other activities that have focussed on children making observations on leaves and describing them. The activity leads children to the stage of being able to construct their own key, using the observations they have made. The finished key can then be used to ‘identify’ a particular leaf by working systematically through the series of questions, and following the pathway that leads on from each answer. Before starting this activity, teachers may find it helpful to read the notes on ‘Constructing keys’ found below.

**Resources and preparation for the activity**

You need some leaves – a minimum of five species and up to a maximum of about eight. The Pupil Sheet gives examples of suitable leaves. If you choose two leaves from each group, you have a good selection to make a key.

If possible, collect fresh leaves for the children to use for their observations. In an urban area, most of the leaves can be obtained from trees or hedges in parks or gardens, or in the school grounds. You can use the set of scanned leaves from the Pupil Sheet if you are unable to find fresh leaves. Note that some features of the leaf, such as texture or hairiness, are not easy to describe from scanned leaves.

**The** **activity**

The children work in groups. Give each group some leaves from one of the species you have chosen. Each group has a different leaf species. First, ask each group to look carefully at the leaves they have been given and collect information about them. They record this information in the ‘Leaf fact file’ on the Pupil Sheet. On the same page, the children can draw a picture of their leaf, being careful that they have accurately represented all features, especially those that they have recorded in their fact file.

Next, working as a whole class, collect information about all the leaves and put this into a ‘leaf character table’. Write the names of the species used in the boxes across the top of the table.

Now the children can begin to construct a key. Work with the children to help them sort the leaves into two groups, using the information in the character table. Using ‘post-it’ notes, write down the character they have used to make the separation and stick these notes onto a board. Alternatively, you may prefer to work with an interactive whiteboard. Then take each of the two groups in turn and divide it into successively smaller groups. At each stage, record the character used to make the separation on post-it notes. An example of a key created in this way with liquorice allsorts is shown in Figure 1.

Let the children check whether the key works. They choose a leaf, then try to key it out by beginning at the START and see whether the children can identify the leaf correctly. Remember, the key does not work for leaves outside the list you used to construct it.

***Constructing keys***

The principles that provide the basis for construction of keys have all been covered, stage by stage, in the various activities of Booklet 5: Grouping and Classification (found on the SAPS website). Children who have progressed through a reasonable selection of these activities should have developed skills that enable them both to use and to construct a key. You (and the children) may be surprised that it does fall into place, usually quite successfully.

The liquorice allsorts activity is a good, simple sorting activity. The characters used (mostly shape, colour and arrangement of the different layers) are obvious, bright and appealing. Children are likely to get on with the sorting and devising questions to support their groups and have built up a simple key before they realise what they have done. It is, therefore, good as an activity to introduce constructing keys.

To construct (and use) keys with plant material, involves much more information. Children need to make more critical observations of features in the plant material. They also learn that living things often show a lot of variability and this needs to be considered when handling the information. For example, individual plants of the same species may have flowers of different colours and even single plants may have leaves with different shapes and sizes. The best characters to use for sorting and classifying are those that don’t vary.

Children then need to organise the information into a form they can utilise when building up a key. Creating a ‘fact file’ can prove very useful as an intermediate step. Following on from this, the ‘character table’ is a way of collecting together information from different groups of children who will have been making their own fact files for different material. With the help of the teacher, this information can then easily be sorted into a simple key (see Figure 1). More able children can be encouraged to move on from a YES / NO approach in answer to questions to devising matched alternative descriptions for their choices when moving through the key.

We suggest the following sequence of steps for constructing a simple dichotomous key. (This is a key with two branches at each stage.)

* **Step 1. Describing and making a fact file**

The children make careful observations and accurately describe the specimens (items / objects / species) they have been given or chosen. They should be encouraged to use suitable vocabulary and give measurements where appropriate. It is often helpful to guide children by giving them a series of questions. These questions help them collect suitable information and to create a ‘fact file’ for the specimens they are looking at.

* **Step 2. Creating a character table**

The information collected in the fact files created by the children is collated and summarised in a ‘character table’.

* **Step 3. Separating the specimens into groups**

The children use the character table, and look for differences and similarities between the specimens. Using their sorting skills, they then separate the specimens into two groups. Then, taking each of these two groups in turn, the children progressively sort the specimens into smaller groups and finally to individuals.

When separating items (specimens) into groups, there is no need for these groups to be equal in size. This is often advocated by teachers as the only correct way of making a key. Equal-sized groups do lead to a shorter key and, conversely, keying off one specimen at a time gives a longer key. Some sort of compromise needs to be reached. If a specimen has a very distinctive character (say prickles) which is not shared by any of the other specimens, it is often useful to separate this specimen right at the beginning of the key. This would lead to a ‘very small’ group, but the rest may be more evenly balanced. We should not lose sight of the fact that, in the real world, the best (and most user-friendly) keys often have uneven-sized groups. The compromise is likely to be a mixture of these two approaches.

Note that when using plant material, the ‘specimens’ are often (but not always) separate species. Remember – there are usually several different ways that you can construct a key, but at each stage, you focus on the special characters of a particular species, and this would enable a person to name the species you are referring to.

When the key is complete, it can be tidied up and perhaps formatted to fit an A3 or A4 page. The key can be written manually or it may be possible for children to use their IT skills. You may also be able to photocopy or scan the children’s drawings, reduce them in size and use them to illustrate the key.

Figure 1. An example of a simple key to six liquorice allsorts.

An alternative activity for constructing a key using fruit dispersal mechanisms is available on the SAPS website. This shows an example of a key devised in this way by pupils from Ursuline Preparatory School, Wimbledon (in October 2001).



Figure 2. Leaves chosen: holly, cherry, honeysuckle, sycamore, field-maple, beech. The shorter key on the left uses equal-sized groups. The key on the right keys off one specimen at a time and results in a longer key, but sometimes this is appropriate for part of the key.