

Making and using keys

➔ Teacher Guidance

Activities in earlier sections should have laid foundations that lead children to these more complex activities, in which they apply their observation and sorting skills to the practical activities of making and using a key. Using liquorice allsorts as a simple starter, children have a bit of fun and also establish the principles of making a key. They are then taken through a series of steps using leaves, first to make accurate observations that they build up into a 'fact file'. From this they can take the next steps and convert the 'fact file' into a key. At least one species of buttercup is likely to be found near most schools, so, for the final activity, children can 'follow the trail' and identify a buttercup. This is an activity that draws together a range of skills, particularly careful observation, developed in the earlier range of activities. This is beautifully illustrated with photographs, intended to be used for confirmation *after* the identification has been attempted. This activity also enables some revision of flower parts, providing a link with booklet 2.2 (*Reproduction and life cycles Part 2: Pollination, fertilisation, fruits and seed dispersal*).

Activity 1: Introducing keys - with liquorice allsorts

Several versions of 'liquorice allsorts' keys are already in circulation, and it is difficult to know where the idea originated. We include yet another version in this booklet, because liquorice allsorts are bright and appealing to children and also have enough different characters to enable children to sort and group them in different ways and then devise a simple key to 'identify' the particular one they have got. To make the exercise even more interesting, you may wish to give the children some information about the liquorice plant (see SAPS website).

Liquorice allsorts have differences and similarities that are easy to see and observe and only a simple vocabulary is needed to describe them. The characters include shape, colour and arrangement of the layers. (Similar exercises can be devised with 'Dolly mixtures'.) As a starter, this is a good way to establish the principles of making and using a key, before going ahead with more complex material using plants. (See also further information on making and using keys in Background information for teachers, page 33.)

You need a packet of liquorice allsorts from which you can make selections of different kind of sweets. It is best for the children to use the real thing in the activity, but you can use pictures if you have difficulty in obtaining liquorice allsorts. A set of photographs of the 'standard' kinds of liquorice allsorts in a typical pack is given on the SAPS website. You can download these and cut out the pictures for the children in your class.

The activity

The children work in small groups. Choose four liquorice allsorts and give each group of children a set of these four sweets. Ask the children to look at the characteristics (features) of their four sweets, then begin to collect their descriptions on the 'board' (in whatever form is suitable).

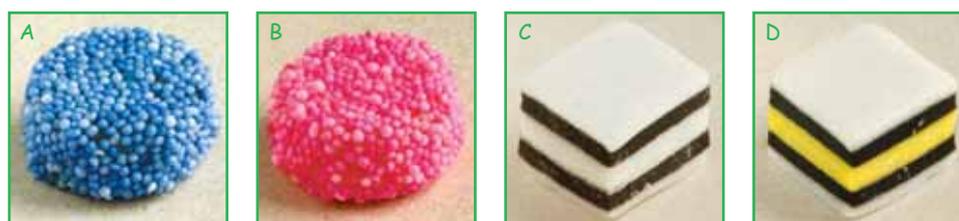


Figure 9. Examples of liquorice allsorts sweets, selected to make a simple key.

Next ask the children to sort the sweets into two groups. Then the children need to find a question that gives a reason for the separation into groups. An example could be “Is it round?”

If they use the four sweets shown on the previous page, the answer is YES for A and B, but NO for C and D. They can group the YES sweets together, separate from the NO sweets. They then find a question that can separate A and B, and another question that can separate C and D. Possible questions for A and B – “Is it blue?”, or for C and D – “Is it only black and white?”

Help the children build up a chart to summarise their questions. You can do this by using an interactive whiteboard or by writing the questions on ‘Post-it’ notes and sticking them on a board. Already they have created a very simple key. Here is how this could be laid out.

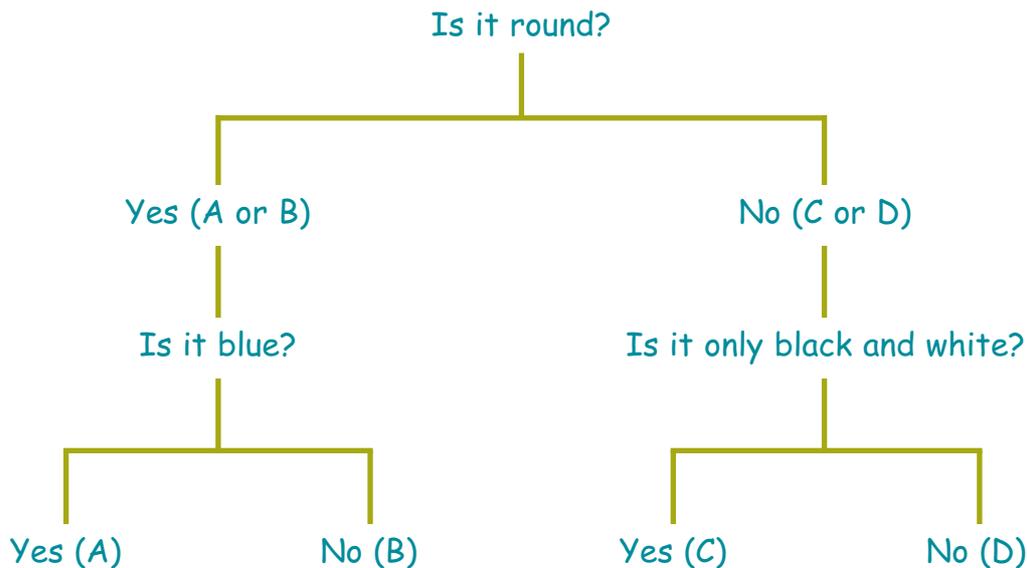


Figure 10. An example of a simple key to four liquorice allsort sweets, developed from a sorting exercise.

Let the children check the pathway through (to ‘identify’ a sweet). They pick one of the sweets, then start with the first question at the top.

You can extend the activity by using more sweets. Put the children into small groups and give six different sweets to each group. Soon they would see that this key works only for the four sweets used. If they want to add more sweets, they have to think of more questions. See if they can make their own key. They will probably find it helpful if they name each sweet, say with a letter or the name of a person. You can find an example of a key made with six liquorice allsorts on page 34.

From this introductory exercise, the children should then be ready to move on to a more advanced exercise, such as Activity 2 (Making a key – using leaves – see page 21) or Activity 3 (Using a key – following the trail with buttercups – see page 25). An activity giving further ways of using liquorice allsorts in the development of keys is available on the SAPS website.

Curriculum links

National Curriculum (Sc2)

KS2: 4a

QCA guidelines – Scheme of work

Unit 4B

Scottish ISE 5-14 framework/attainment targets

LT-C1.3; E1.2

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Activity 2: Making a key – 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' in the Background information for teachers (page 33).

Resources and preparation for the activity

You need some leaves – a minimum of five species and up to a maximum of about eight. Figure 11 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. The set of scanned leaves in Figure 3 (page 11) is also available on the SAPS website for you to download 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 (page 22). 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' (page 23). 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 16 (page 34) and an example of a key with leaves is given on the SAPS website.

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.

Curriculum links

National Curriculum (Sc2)

KS2: 4a

QCA guidelines – Scheme of work

Unit 4B

Scottish ISE 5-14 framework/attainment targets

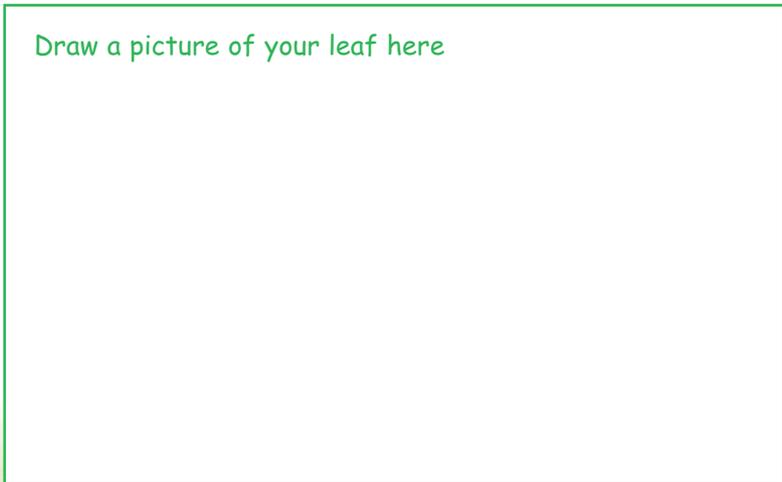
LT-C1.3

Leaf fact file

Look at your leaf and write the answer **yes** or **no** beside each question

1. Is the leaf lobed?  _____
2. Do the leaf edges have teeth or prickles?  _____
3. Are the leaf edges smooth or slightly wavy?  _____
4. Does the leaf have one main vein (running from the stalk to the leaf tip)?  _____
5. Does the leaf have more than one main vein (running from the leaf stalk to the leaf edges)?  _____
6. Do the side veins mostly come off the main veins in pairs?  _____
7. Do the side veins all come off the main vein one at a time?  _____
8. Is the leaf stalk longer than 1 cm? (You will need a ruler to answer this question) _____
9. Does the leaf stalk have small bumps on it? (These are glands)  _____
10. Is the leaf stalk red? _____
11. Is there anything else interesting about your leaf? _____

Draw a picture of your leaf here



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↓ Pupil Sheet

Leaf character table

Write the names of the leaves you are using in the class in the boxes under 'Leaf name'.

Tick in the boxes below if your leaf has these characters.

You can then use information from the leaf fact files from all the groups in the class to complete the table.

Character	Leaf name				
Leaf is lobed					
Leaf edge has teeth or prickles					
Leaf edge is smooth or slightly wavy					
Leaf has one main vein (running from stalk to leaf tip)					
Leaf has more than one main vein (running from the stalk to the leaf edges)					
Side veins mostly come off the main veins in pairs					
Side veins all come off the main vein one at a time					
Leaf stalk is longer than 1 cm					
Leaf stalk has small bumps on it (these are glands)					
Leaf stalk is red					

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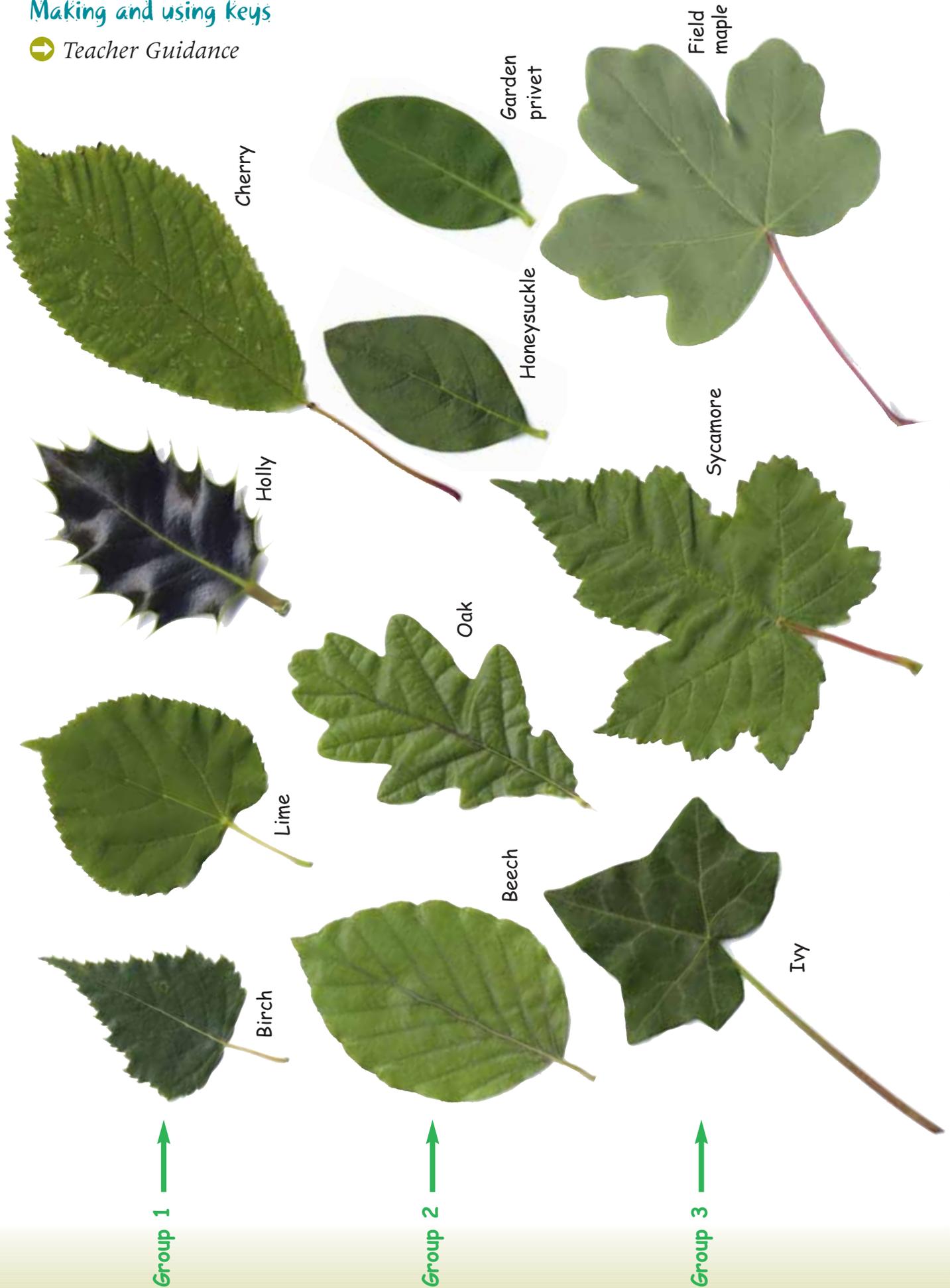


Figure 11. Suggested leaves to use for making a leaf key. Choose two leaves from each group to have a good selection. (These leaves are slightly smaller than life size.)

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→ *Teacher Guidance*

Activity 3: Using a key – following the trail with buttercups

This activity gives children an opportunity to use a key to identify (and name) certain buttercups. It is suitable for upper primary children, particularly as an extension activity.

The simple key provided includes seven members of the buttercup group (Genus *Ranunculus*). All have yellow flowers and are common and widespread. They include species known correctly as buttercups as well as some that closely resemble buttercups and are often mistaken for them. The buttercups included in the key flower from early spring to late summer. You only need one or two examples, so, wherever your school is, you should be able to find some buttercups in flower nearby. Usually the end of the summer term is the best time for this activity.

This activity provides a useful way of revising what the children know about the parts of a flower. Before using the key, let the children look closely at a buttercup flower and take it apart (see booklet 2.1 – *Reproduction and life cycles Part 1: Parts of a flower*, page 5). A drawing of a dissected buttercup flower is given on the SAPS website, together with notes that help to interpret its structure. Using the key then helps the children to reinforce what they have learnt and begin to understand how the flower parts, as well as characters of the leaf and stem, can be important when trying to identify the species.

The activity

Take the children out into the field where you know some buttercups are growing. Alternatively, do this as a classroom activity and bring some buttercup flowers into the room. It is very difficult to do this successfully from pictures of flowers, simply because the children cannot examine the flowers closely enough to see the necessary detail.

The children can work in groups. Ask the children, in their groups, to answer the questions on the Pupil Sheet 'Buttercup fact file' (page 26). As they do this, they can make a drawing of the buttercup flower and leaf, showing the important features that they have observed. This completes their observations on the buttercup.

The children can then start to work through the pathway of the key, starting from 'START HERE' at the top. At each level, they decide which alternative is correct, then follow the pathway to the next pair of statements in the trail. They have already answered several of the 'questions' when building up their Buttercup fact file.

Pictures and some notes relating to the different kinds of buttercup are provided on pages 28 to 29. These can be used for confirmation after the children have worked through the key.

Curriculum links

National Curriculum (Sc2)

KS2: 4a

QCA guidelines – Scheme of work

Unit 4B; Unit 6A

Scottish ISE 5-14 framework/attainment targets

LT-C1.3

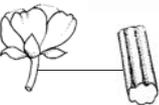
Buttercup fact file

1. How many sepals are there? _____ How many petals are there? _____

2. Are the leaf blades divided up into smaller leaflets or deeply lobed?  leaflet _____

3. Are the sepals turned back?  _____

4. Are the leaves covered in tiny hairs?  wrap the leaf around your finger and use a magnifying glass to see the hairs _____

5. Do the flower stalks have clear grooves running along their length?  _____

6. What sort of place was the plant growing in (e.g. a grassy field, a woodland, the edge of a pond)? _____

7. Is there anything else interesting that you have noticed about your plant? _____

Draw a picture of the flower here

Draw a picture of the leaf here

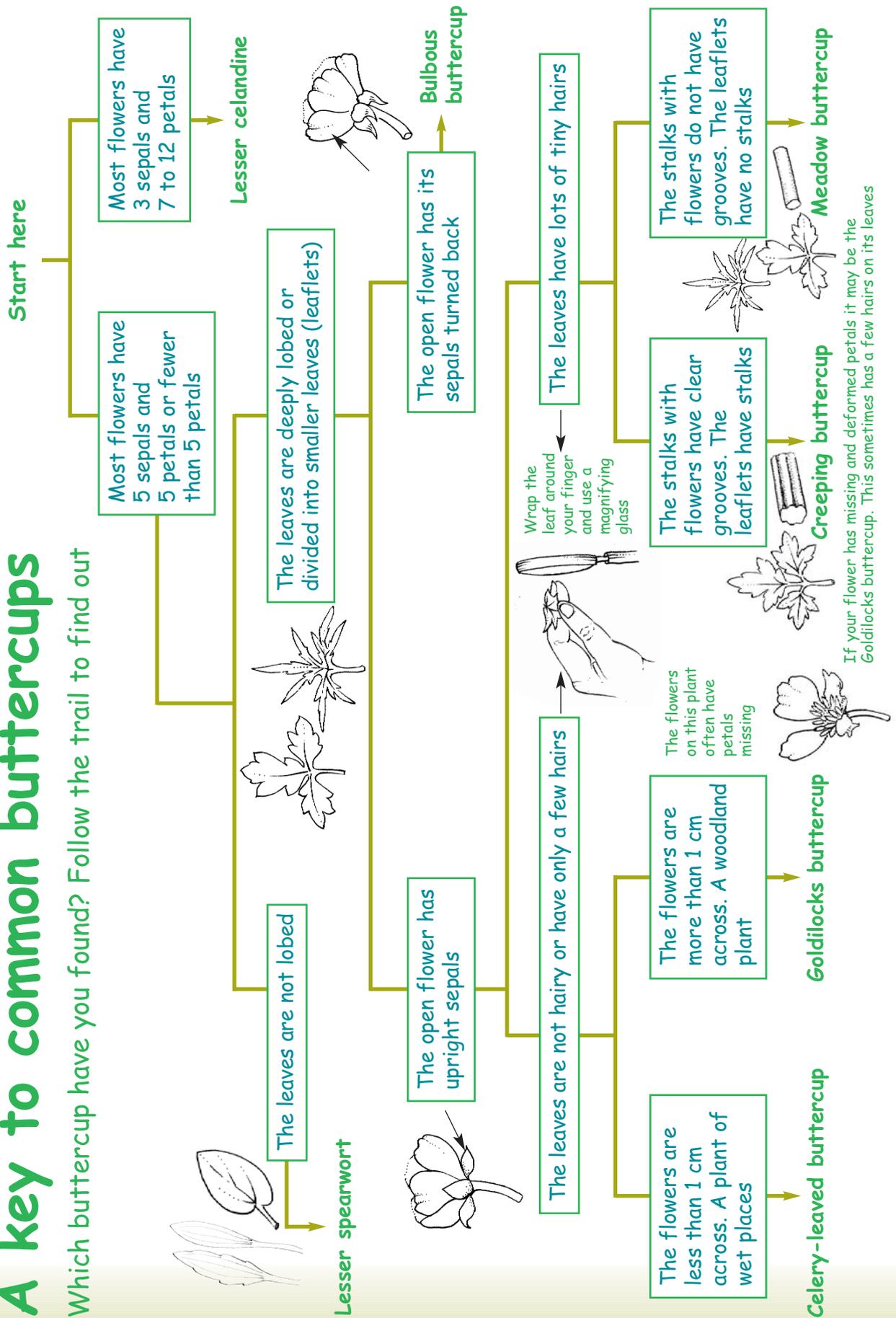
Now use the key to find out the name of your 'buttercup'.

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Pupil Sheet

A key to common buttercups

Which buttercup have you found? Follow the trail to find out



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➔ Pupil Sheet

Goldilocks buttercup

Usually found in woodland. Flowers in April and May.



Goldilocks flower showing missing and deformed petals.



Leaf at bottom of plant.



Leaf from flowering stem - notice it has no hairs.

Lesser celandine

Common in woodland, grassland and on stream sides. Flowers in April and May.



Most flowers of the lesser celandine have 3 sepals and 7 to 12 petals.

Heart-shaped lesser celandine leaves.



Celery-leaved buttercup

Common on damp mud at the edges of ponds. Flowers from May to September.



Leaf from celery-leaved buttercup showing no hairs.



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➔ Pupil Sheet

Bulbous buttercup Found in dry, grassy areas. Flowers in May and June.

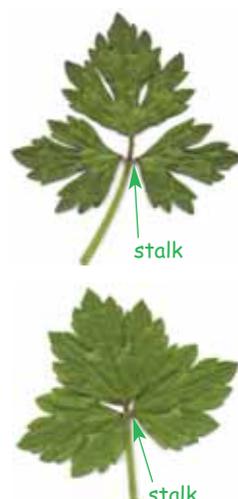


Bulbous buttercup showing its turned back sepals. Like the creeping buttercup (see below) the leaflets have stalks.

Lesser spearwort Common in wet places e.g. edges of ponds. Flowers from June to August.



Creeping buttercup Found in damp, grassy places and woodland. Also a common garden weed. Flowers from May to August.



Flower showing upright sepals and a grooved stalk. The leaflets have stalks.

Meadow buttercup Common in grassy places. Flowers in June and July.



Flower showing upright sepals and a smooth stalk. The leaflets have no stalks.