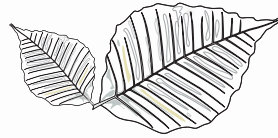


## 6. Garden of Colours



<b>Aim</b>	Younger pupils go on a colour hunt in the school garden and recognise that plants come in a large variety of colours. Older pupils observe coloured leaves and flowers in the garden and observe some under the microscope to identify chlorophyll and other pigments and their importance in photosynthesis.
<b>Recommended for</b>	All pupils
<b>Subject Links</b>	English: colours, shapes; Science: plant parts, photosynthesis (Primary 4 & 5)
<b>Horticultural Skills</b>	Selecting foliage plants, ornamental plants
<b>Process Skills</b>	Observing, comparing, measuring, generating
<b>Equipment/Materials</b>	Primary 1-3: Green colour chart (found in a file within the CD), Primary 4-6: microscopes, glass slides, cover slips, Petri dish with water, scalpel or razor
<b>Duration</b>	1 hour
<b>Preparation</b>	<ul style="list-style-type: none"> <li>• Photocopy the appropriate handout for the class (Handout 6a for Primary 1-3, handout 6b for Primary 4-6).</li> <li>• For Primary 1-3: print out several Green charts (in full colour) for each team (optional: have them laminated).</li> <li>• For Primary 4-6: collect variegated, red leaves and coloured flowers from the school garden and make fresh mount sections. Obtain the microscopes and set them up.</li> </ul>
<b>Safety</b>	Brief pupils on 'Garden Nasties' (see page 4). Look out for pupils who may be allergic to pollen in the air or plant sap.

### Preparation: How to prepare fresh sections of the leaf or flower:

1. Place the leaf or flower on a glass slide
2. Use a sharp razor or scalpel to cut thin sections (as thin as you can)
3. Transfer a few sections to a glass slide.
4. Add a drop of water and cover the sections with a cover slip.
5. Place the glass slide on the stage of a microscope and look for a good view of the cross-section of a leaf.



## Procedure

1. Ask the pupils if they had ever wondered why plants come in so many colours.
  - Different leaf colours allow plants to grow in different light conditions
  - Insects may use leaf and flower colour to recognise plants (e.g. to find nectar or lay eggs on)
  - For people, plant colours add beauty and variety to our gardens.

2. Explain the activities:

**For Primary 1-3  
Distribute only Handout 6a**

- Pupils will observe and record as many colours of plants, leaves and flowers in the garden as they can find.
- Each team chooses one green plant and answers the questions. Explain that they need to find the closest match of their chosen green plant with one of the shade numbers on the Green chart.

**For Primary 4-6  
Distribute only Handout 6b**

- Pupils look for 2-coloured leaves (variegated) and a red leaf in the school garden. They draw the leaves, showing the areas with different colours.
- They then go to the science lab to conduct the starch test (optional: view slides under a microscope)

3. Remind the pupils not to pluck or damage any plant parts unnecessarily. Brief the pupils on the safety issues (see page 4) and let them start the activities.
4. Debrief after they have finished the activities.
5. Encourage the pupils to post their reflections on your school blog or the NParks Gardening blog 'Young Gardeners' ([http://www.nparks.gov.sg/blogs/young\\_gardeners/](http://www.nparks.gov.sg/blogs/young_gardeners/)).
6. Extension:
  - Older pupils could photograph and identify the large variety of plants in your garden, and have a photograph exhibition.
  - Older pupils could do the starch test on the variegated and red leaves.



## Debrief/Background Knowledge

§ Recap the importance of colours to plants, animals and people

### Suggested answers/debriefing points

#### Handout 6a

##### Q1 Colour Hunt

- Green - leaves of most plants, mosses
- Red - flowers like Canna (*Canna hybrids*), Hibiscus (*Hibiscus rosa – sinensis cultivars*); leaves of some plants
- Orange – some flowers, some fallen leaves
- White - some flowers e.g. Spider Lily (*Hymenocallis speciosa*)
- Purple - some flowers
- Pink - some flowers e.g. Balsam (*Impatiens balsamina*), Starfruit (*Averrhoa carambola*)
- Yellow - some flowers, some fallen leaves, pollen of many flowers
- Blue - some flowers but rare.

##### Q2 Study a Green Leaf

This activity encourages pupils to examine a leaf more closely. The answers will vary according to which leaves they chose.

- Help pupils to recognise that green leaves are not of one colour but of different shades of green
- **Why do leaves come in different colours?** Leaves come in different colours because of the different amounts and types of plant pigments (photosynthetic substances) in them.
- Some leaves are rough, others are smooth. Rough leaves have very tiny hairs or spines on their surfaces
- Additional Information: Why are there different shades of green in leaves? Green leaves show different shades because of the different amounts of chlorophylls and other pigments they have within them.

**Handout 6b****Q1 Colour Hunt****What are the colours found in nature?**

Green, brown, red, orange, pink, purple, white, yellow, blue (rarer)

**What colours are living things almost never found in?**

Black, metallic

**Q2**

- **Are chloroplasts (containing chlorophyll) found in both leaves?**

Yes, chloroplasts (structures which contain chlorophyll) are found in both variegated and red leaves

- **Is the distribution of chlorophyll the same in all parts of each leaf?**

No

In the variegated leaf, chloroplasts containing green chlorophyll are found only in the green areas. The white sections do not have chloroplasts. Hence only the green areas of a variegated leaf can carry out photosynthesis.

In the red leaf, chloroplasts containing green chlorophyll are present although the leaf may not be green in colour. These are found in the palisade layer of the leaf and have been masked by the red pigments above and below them.

- **What causes the red colouration in leaves or flowers?**

Structures containing red pigments cause the red colouration in red leaves and flowers. They are often observed in the surface layer of cells (epithelium) or in the spongy layer of the leaf.

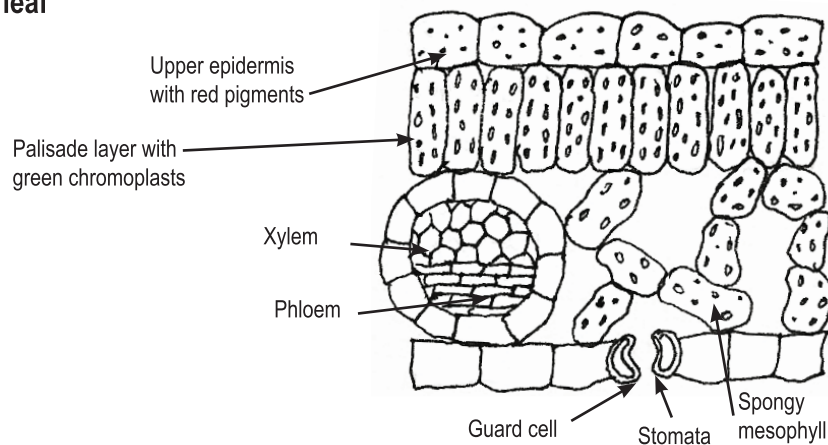
Red pigments cannot carry out the full process of photosynthesis but can assist chlorophyll to carry out photosynthesis.

**Coloured flower petals**

- This is to show the pupils how pigments in petals lend colour to the flower.
- Look out for chlorophyll in the section of the petal.

**Coloured leaves like *Coleus sp.***

- Coloured leaves have different coloured pigments (e.g. yellow and red) found in the cells of their leaves.
- Chlorophyll is still present, though often masked.

**Cross-section of a red leaf**

§ Ask pupils what they have learnt through this activity. Alternatively, you could ask them to fill in the reflection sheet in Annex 3 and discuss their reflections.



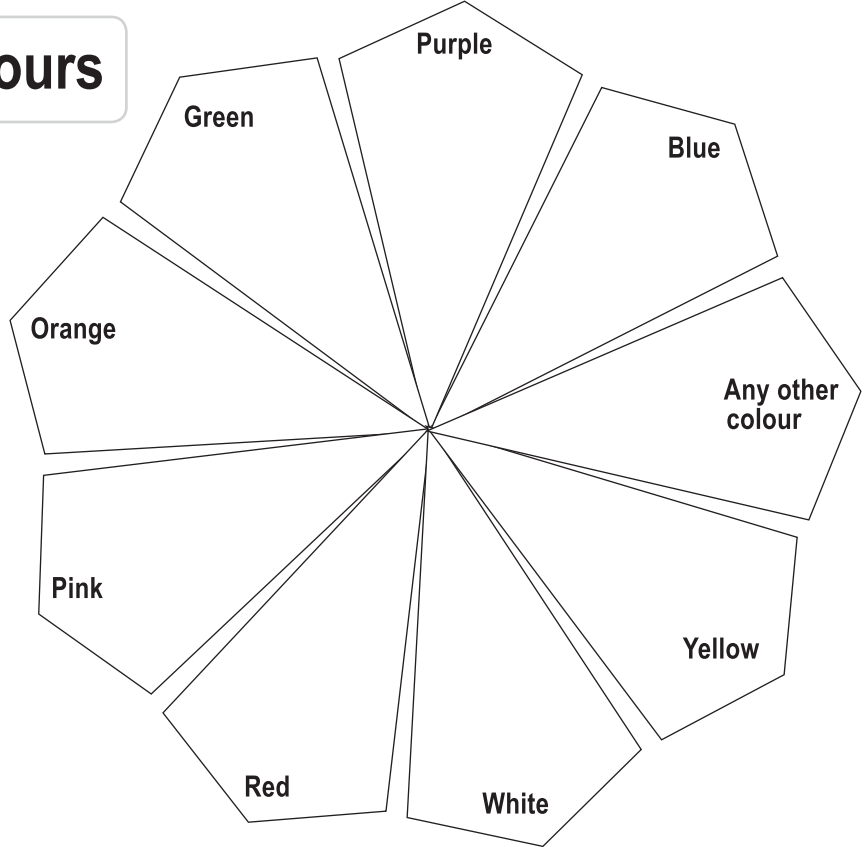
Name :

Members of your team :

# 6a. Garden of Colours

## 1. Colour Hunt

Walk around your school garden. Observe and record leaves and flowers which are:



## 2. Study a Green Leaf

Find a green leaf and answer the following questions (do not pluck the leaf from the plant):

Which shade of green is your leaf? Shade number  (of the green colour chart)

Is your chosen leaf smooth or rough? . Why do you think so?

What shape is your chosen leaf? (Tick the closest shape or draw your own)



Why do you think leaves come in different shades of the colour green?

HANDOUT 6A





Name :

Members of your team :

## 6b. Garden of Colours

### 1. Colour Hunt.

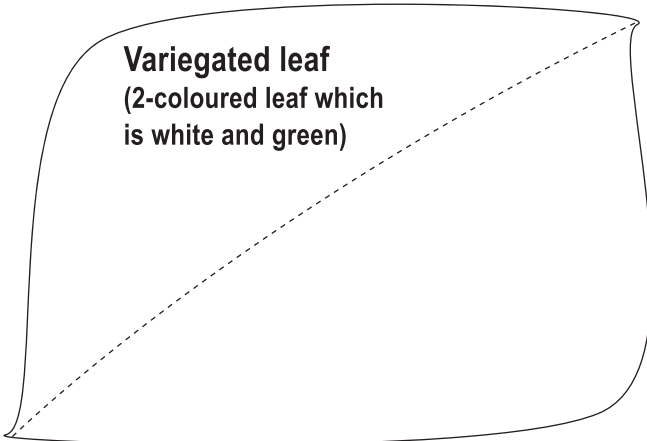
What are the colours found in nature?

What colours are almost never found in nature?

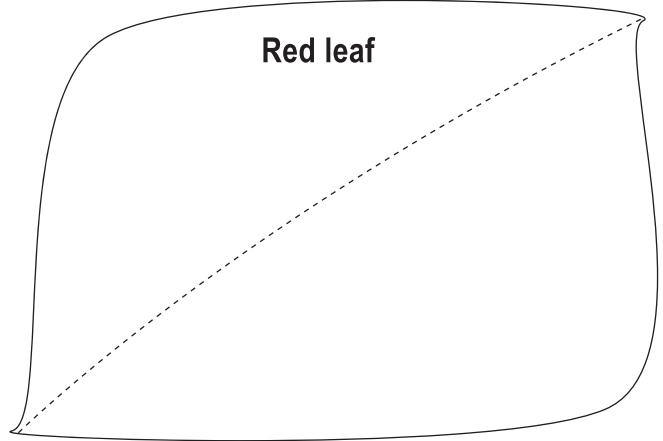
### 2. Look for a variegated (2-coloured) leaf and a red leaf in your school grounds.

Draw each leaf, showing the outline of the coloured areas.

**Variegated leaf**  
(2-coloured leaf which is white and green)



**Red leaf**



Go to the laboratory to observe sections of these leaves under the microscope.

Answer these questions from your observations of the cross-section of the leaves:

Are chloroplasts (which contain chlorophyll) found in both leaves?

Is the distribution of chlorophyll the same in all parts of each leaf?

What causes the red colouration in leaves or flowers?