



Beautiful Earth

Overview

Through observations, experiments and investigations, children find out about flowering plants and the conditions they need to survive and thrive. As part of the investigations, children observe and sketch the variety of plants in their natural environments, and begin to classify both flowering and non-flowering plants. They find out about the life-cycle of a plant and how water is transported through it.

In the wild they observe that while animals have ways to defend themselves against predators, or enemies who might want to eat them for lunch, plants cannot defend themselves as easily because they cannot move. Some plants have thorns, spikes or

other outward ways to ward off predators. However, many plants use the internal, or inside, defense of poison. Learners explore ways of keeping safe and preventing harm to themselves and others.

In groups and based on their findings, they undertake research into plants which are 'safe', and design a miniature garden. They select plants to grow in a wheelbarrow, planter, or hanging basket, which are displayed in the School's 'Flower Show'. Each container of plants will be labelled with 'care advice' for nurturing the selected plants. In order to track their investigation, they create care labels, and advice charts on different plants.

WM1	WM2	WM3	WM4	WM5	WM6
Inquiry	Design context and innovative thinking	Diversity of life	Properties of materials	Forces and motion	Algorithms
Impact of Science and Technology	Design decision-making	Biological Processes	Chemical Reactions	Energy	Data
	Design communication	Health and Disease	Extraction, refinement and analysis	Electricity	Computational systems
	Systems thinking			Waves	Cyber security
	Prototyping and making			Magnetism	





Rich Task

Please refer to the PDF and Teacher Notes that accompany this Rich Task

'What are the factors we need to consider when creating a garden for people to enjoy?'

The school would like your help! They want some new plants to display around the school to create a beautiful environment that everyone can enjoy. Your class has been asked to show people how to do this, by planning a miniature garden such as a hanging basket, planter or wheelbarrow. You need to remember to include all the steps involved, so make care labels and posters keep a video diary or blog to remind people of what needs to be considered in order to stay safe when cultivating a garden.

First, find out about the variety of plants in your locality, both flowering and non-flowering.

Through careful observation, sketch or draw the plants you see and discuss their features. Find out about a plant's life-cycle.

In order to create a beautiful miniature garden, work in groups and investigate which plants would be safe to use in a miniature garden. Using this information, decide on what your garden will be like and plan it out, and choose and label the plants carefully.

Communicating Scientifically

The children **observe** and **sketch/draw annotated pictures** of flowering and non-flowering plants they see in their locality. They use **labelled diagrams, the internet** and **reference books** to identify parts of a flowering plant. They **research** the conditions needed for plants to grow well together. They create a **plan of a miniature garden** and add **detailed care labels** for the plants they choose. Edit the plan to accompany their miniature garden showing the steps involved in the project.

Key Scientific Concepts

- The structure and function of plant – name the different parts of the plant and understand what their functions are.
- Plant survival – understand the different conditions that plants need to survive.
- Water transportation – understand how water is transported around the plants.
- Plant life cycle – understand the different stages that make up a plant’s life cycle and understand the order that these stages occur in.

Opportunities for...

Literacy	Numeracy	Digital Competence
Recount Non-fiction Recount ways in which to keep safe when handling plants. Create a poster or notice to outline safety considerations for gardeners.	Number Compare numbers in context	Search the <i>internet</i> for some unusual and/or harmful plants plants and flowers. Find the online prices of a variety of seeds and seedlings.
Research and note take Find out about plants by talking to gardeners and using the internet. Keep notes of what you find.	Measures Length, capacity and volume Time	Make a record of the information on plants using <i>J2launch</i> (chart), so creating a <i>table of information</i> . Turn this into a <i>bar chart</i> .
Instructional Text How to make a rainbow rose OR How to take care of a miniature garden	Data Represent data using tables, diagrams and bar graphs	Using <i>NumbersExcel</i> , (teacher to set up a spreadsheet model) create a plan to show in which month seeds should be planted and watered.

Expressive Arts			Health and Well-being					Humanities					
WM1	WM2	WM3	WM1	WM2	WM3	WM4	WM5	WM1	WM2	WM3	WM4	WM5	
		✓						✓		✓			
LLC				Maths and Numeracy				SciTech					
WM1	WM2	WM3	WM4	WM1	WM2	WM3	WM4	WM1	WM2	WM3	WM4	WM5	WM6
✓	✓✓	✓✓		✓	✓	✓	✓	✓✓	✓	✓✓			✓

Key Vocabulary

Fertilisation: The name of the process which occurs when the pollen and egg join to form the seed.

Flowers: The section of the plant where reproduction takes place. Flowers are often brightly coloured with a strong smell to help attract insects.

Germination: The first stage of a seed's growth.

Leaves: The part of the plant where the plant makes its food.

Light: One of the conditions that plants require to survive. Plants use light to make food during the process of photosynthesis.

Nutrients – One of the conditions that plants require to survive. Plants require different nutrients and the plant's growth and colour can be affected if nutrients are deficient.

Pollination: The name of the process which occurs when pollen is transported from the male part of a plant, the anther, to the female part of the plant, the stigma.

Photosynthesis: The name for the process plants undertake to make food. Plants make food from carbon dioxide and water using light energy.

Roots: The parts of the plant that grow down into the soil. The roots provide support for the plant and absorb water and nutrients.

Seed Dispersal: When seeds are transported away from their 'parent' plant. This dispersal can be done by animals, the wind or by explosion.

Stem: The part of the plant that grows up from the seed and provides support. Water, nutrients and food produced in photosynthesis are transported through the stem to different areas of the plant.

Trunk: The name for the stem when referring to trees.

Water: One of the conditions that plants require to survive. The roots of the plants absorb the water from the soil.

Specific Investigations or Experiments:

Investigation 1: Treasure Trail

Sketch plants in the locality of the school, sort and classify - flowering and non-flowering identifying the features of each.

Investigation 2: Hidden Defences

An investigation into different poisonous plants and their dangerous effects.

Investigation 3: Rainbow Roses

Investigating how water travels through a plant.

Investigation 4: Bursting into life!

Discovering and modelling the life-cycle of a plant.

Investigation 5: Stupendous seeds

Designing your own seed.



Acquisition of Skills

Anchor Phase

Possible Starters...

Take all safety precautions and risk assess.

- What is your favourite plant? Why?
- Which plants can you name?
- What are the different parts of a plant called?
- What does each part of the plant do?
- Why do you think flowers are often brightly coloured and can have a strong smell?
- What do you think a plant might need to survive? Why?
- How do plants take up water and get food?
- Have you heard the words pollination, seed formation or seed dispersal? Tell a friend what you think these words might be about.

Teacher Prompts

Talk to the children about plants that they like or know about.

Introduce key words associated with plants, growth and life-cycles to see if they are able to comment on, or expand their ideas.

Take the children for a walk either in the school garden or local park or woodland. Show the children different plants in their natural environments. Look at the variety of different plants and see if the children recognise any. Point out any plants which may harm them from stinging nettles to poison ivy.

While out on your walk, show the children the different parts of the plants. The children should understand that plants are made up of roots, stems (or trunks if talking about trees), leaves and flowers. Look at the variety of one aspect you see on your walk e.g. compare the roots of a large tree, with that of a small wild flower. Ask the children if they know or can guess what each part of the plant does.

Ask the children what they think plants need to survive, for example you could ask them what a plant needs to be able to grow.



Application of Skills

Fusion Phase

Steps to Success

Let's create a beautiful environment to be proud of! Let's set about growing miniature gardens of planters, hanging baskets and wheelbarrow gardens that are full of plants and flowers.

Let's get started...

Making a miniature garden takes planning, time and care. It doesn't happen overnight and you will need to patiently tend to the growing plants.

Work safely and be aware of risks.

Undertake out-of-classroom inquiry to classify and identify plants.

Use a range of scientific equipment to observe, measure and record.

Let's get researching, investigating, planning and planting!

Working scientifically...

You are going to carry out a number of investigations into plants and use your results to create a beautiful, flowering environment for the school.


As you learn new information about plants, you will use this information to design, plan and plant flowers in a miniature garden. There will be a lot of information to consider, so you are asked to track your progress and findings by keeping notes. This can be done as a class, in a group or with a friend.



Investigation 1

Treasure Trail

Sketch plants in the locality of the school, sort and classify - flowering non-flowering identifying the features of each.

 *A Risk Assessment should be undertaken for the plants found at each location, to ensure that they are safe for children to touch, before embarking on the trail. This is the sole responsibility of the teacher. Children should be reminded that they should never pick wild flowers or eat any plant material. They should wash their hands carefully after handling plants.

There are many plants in the environment but because we see them everyday we don't always notice them. In this investigation, you are going to work in groups to closely observe plants in your environment.

Equipment

- Sketch books/paper and clip boards
- Pencils
- Charcoal
- Magnifying glasses
- Access to research books and the internet (on return to school)
- A safe route
- Access to a garden, woodland, park

Organisation

Class walk
Working on individual sketches
Sharing observations with a partner or small group on return
Camera or iPad for capturing key events for blog/videodiary

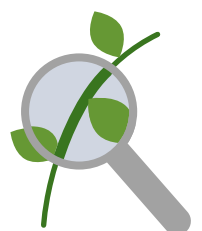
Procedure

Step 1

Walk around the environment your teacher has chosen for you.

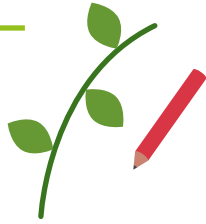
Step 2

Observe plants in their natural environment and observe them closely, using magnifying glass. You may also photograph or video key moments.



Step 3

Choose one or two plants to sketch in detail, capturing their beauty and diversity.



Step 4

Discuss your observations on return to school with a friend or in a small group.



Step 5

Research to find out the names of the plants you sketched.



Step 6

Identify some key characteristics of plants and sort them according to the agreed criteria. Find out how plants are classified.

Communicate your findings

Sketches of plants

Add the **name of the plant** as a title to your artwork and sketches





Investigation 2

Hidden Defences

An investigation into different poisonous plants and their dangerous effects.

*A Risk Assessment should be undertaken for the plants found at each location, to ensure that they are safe for children to touch, before embarking on the trail. This is the sole responsibility of the teacher. Children should be reminded that they should never pick wild flowers or eat any plant material. They should wash their hands carefully after handling plants.

Plants are all around us, and we use many of them for food or decoration in our gardens. There are some plants, however, that are poisonous to humans and animals. Some plants have thorns, spikes or other outward ways to ward off predators. However, many plants use the internal, or inside, defense of poison.

Equipment

- Sketch books and pencils
- Gloves
- Access to reference materials - paper-based and online

Organisation

Small groups of 3-4 children
A group walk
Class discussion on return

Procedure

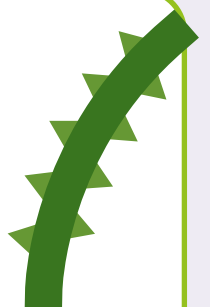
Step 1

Look at plants in the environment



Step 2

Identify and discuss their visible defence features - thorns, spikes or other outward ways to ward off predators.



Step 3

Discuss internal, or inside, defence of poison of plants that cannot be seen.



Step 4

Discuss 'contact' hazards and 'ingestion' hazards.

Step 5

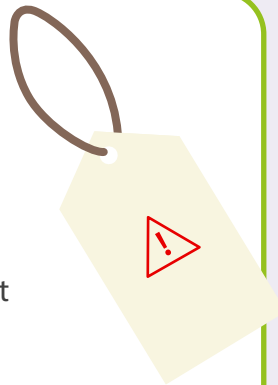
Discuss plants which can be eaten and plants which cannot be eaten.

Step 6

Explore parts of plants which can be ingested and the parts which cannot be ingested - e.g. take a stick of rhubarb, identify the leaf blade. The leaf blade is the poisonous part, but the stem is edible.

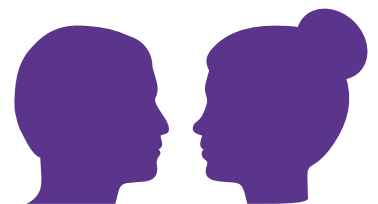
Step 7

Develop some labels and notices to warn people about the hazards associated with specific plants and how they protect the plants but cause harm to humans and other animals.



Step 8

Develop 'what to do' scenarios using drama and role play.



Communicate your findings

Use all of the information you have gathered to create some **notices and labels** for plants and parts of plants that cause harm to humans and other animals. Develop some **scenarios using drama devices** to help inform people about the dangers of some plants/parts of plants.



Investigation 3

Rainbow Roses

Water transport through a plant

All living things need water in order to survive. When humans need water we have a drink. This investigation will help you to see how plants and flowers take in water to the parts that need it.

Equipment

- White roses (or carnations) preferably in bloom
- A variety of bright food colouring - red, yellow, blue, green
- 4 beakers
- Water
- Sharp knife

Organisation

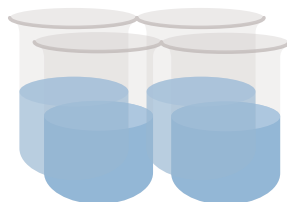
Pairs or small groups

Procedure

Photograph or video each step of this investigation, ready for your diary or blog.

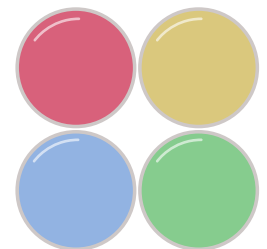
Step 1

Fill each beaker with water. Place the beakers next to each other so that they are touching.



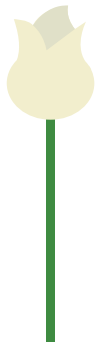
Step 2

Add several drops of food colouring to the beakers to make a strong coloured solution - one of each colour. Mix it well.



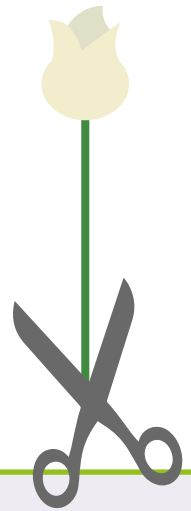
Step 3

⚠ Trim any leaves from the stem of the rose (or carnation) - taking care not to scratch yourself on the rose's thorns!



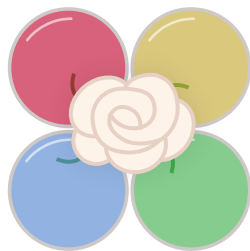
Step 4

Carefully cut the stem lengthways into four quarters (adult help may be required for this part) - each cut should be long enough to allow the stem-section to stand in one of the beakers of coloured water.



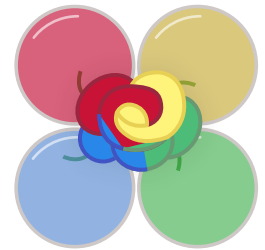
Step 5

Leave the flower to stand in the water for several days.



Step 6

Observe the flower as it changes, as the coloured water is drawn up the stem.



Communicate your findings

Create some **instructions** for a friend who may want to make their own rainbow roses. As well as **written instructions**, you may use the **photographs** you have taken to show the different steps involved. Explain how and why the flower changed colour and how you think the water travels through a plant.



An alternative to this method is to have one flower per beaker, rather than splitting the stem four-ways.



Investigation 4

Bursting into life!

Life-cycle of a plant

Use reference books and the internet to find out what happens in the process of pollination and how this leads to seed formation. Then use role play to help you and your classmates to understand these processes.

Equipment

- Card
- Stapler
- Coloured pens
- Scissors
- Sellotape
- Double sided sellotape
- Drinking straws
- Orange or apple squash
- Plastic cups
- Cotton wool balls
- Large seeds e.g.sunflower

Organisation

Groups of 5 or 6

Procedure

You will be practising and performing a play which will help you and your class to understand what happens in the process of pollination.

Cast for the play:

One or two bees

One or two butterflies

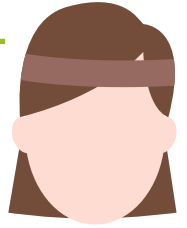
At least two flowers, you can have more.

Step 1

Decide who will play each part.

Step 2

Each person in the group needs to make a cardboard headband.



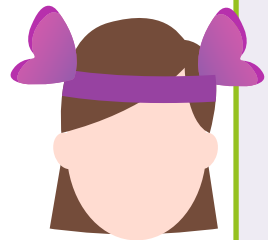
Step 3

The bee should colour their headband in yellow and black stripes.



Step 4

The butterfly should cut out some butterfly shaped wings, decorate them and attach them to their headband.



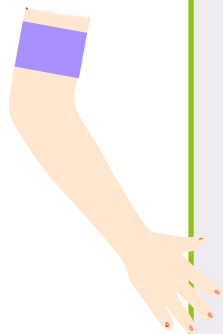
Step 5

The flowers should cut out petal shapes, colour them brightly and attach them to their headband.



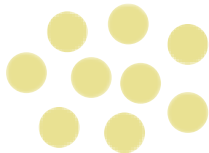
Step 6

Each person should take some double sided Sellotape. The bee and butterfly should fasten a strip around their arm. The flowers should stick two or three strips on their chest.



Step 7

The first flower should stick the cotton wool balls onto the Sellotape on their chest. These represent the **pollen**. You could colour them in yellow if you wish.



Step 8

The bee and butterfly put a straw into their mouth. This represents their **proboscis**. Insects use these to suck up **nectar** from flowers.



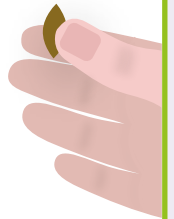
Step 9

Carefully pour a small amount of squash into the plastic cups. Each flower should each hold a cup of squash. This represents the **nectar**.



Step 10

The remaining flowers should hold a seed tightly in their hands.



You are now ready to start acting out the process of **Pollination**

Step 11

The bee should go to the first flower and use the straw proboscis to suck up some nectar. As they do this they should pick up one of the cotton wool balls (pollen grains) off the first flower using the sticky tape on their arm.



Step 12

They should then 'fly' to the second flower, sip some nectar and deposit the cotton wool ball onto the sticky tape on the new flower's chest. When the pollen has been deposited the flower should open up their hand to reveal the seed.



Step 13

The butterfly can then go the first flower, sip the nectar, (squash) pick up some pollen (cotton wool ball) and transfer it to the second flower who receives the pollen and produces a seed.



Step 14

Continue like this until you have transferred all the 'pollen' from the first flower to the other flowers.



 **Safety:** Remember to wash your hands afterwards if you have been handling seeds.

Communicate your findings

Practise your role play several times. Make sure you know what each part represents:

Cotton wool = pollen

Straw = proboscis

Apple squash = nectar

Choose a narrator and **perform your play** to the rest of your class. The narrator should explain to the class what is happening at each stage of the play. You could try **freeze framing** (stop acting suddenly) and ask the class if they know what happens next. You could **record your play using an iPad**.





Investigation 5

Stupendous seeds

Designing your own seed

Equipment

- Scissors
- Glue
- Card
- Pipe cleaners
- Sellotape
- Egg boxes
- Fur fabric
- Velcro

Organisation

Pairs or individuals

Procedure

Step 1

Use the Internet and reference books to find out about all the different ways that seeds are carried from one place to another. This is called seed dispersal.



Step 2

Find out why it is important that seeds move away from the plant that made them.



Step 3

Using the information you have found out design an imaginary seed of your own. Think about the special features your seed will have that will enable it to be carried to a new place. How will it be dispersed? Will it travel by wind, water, animals or explosion?

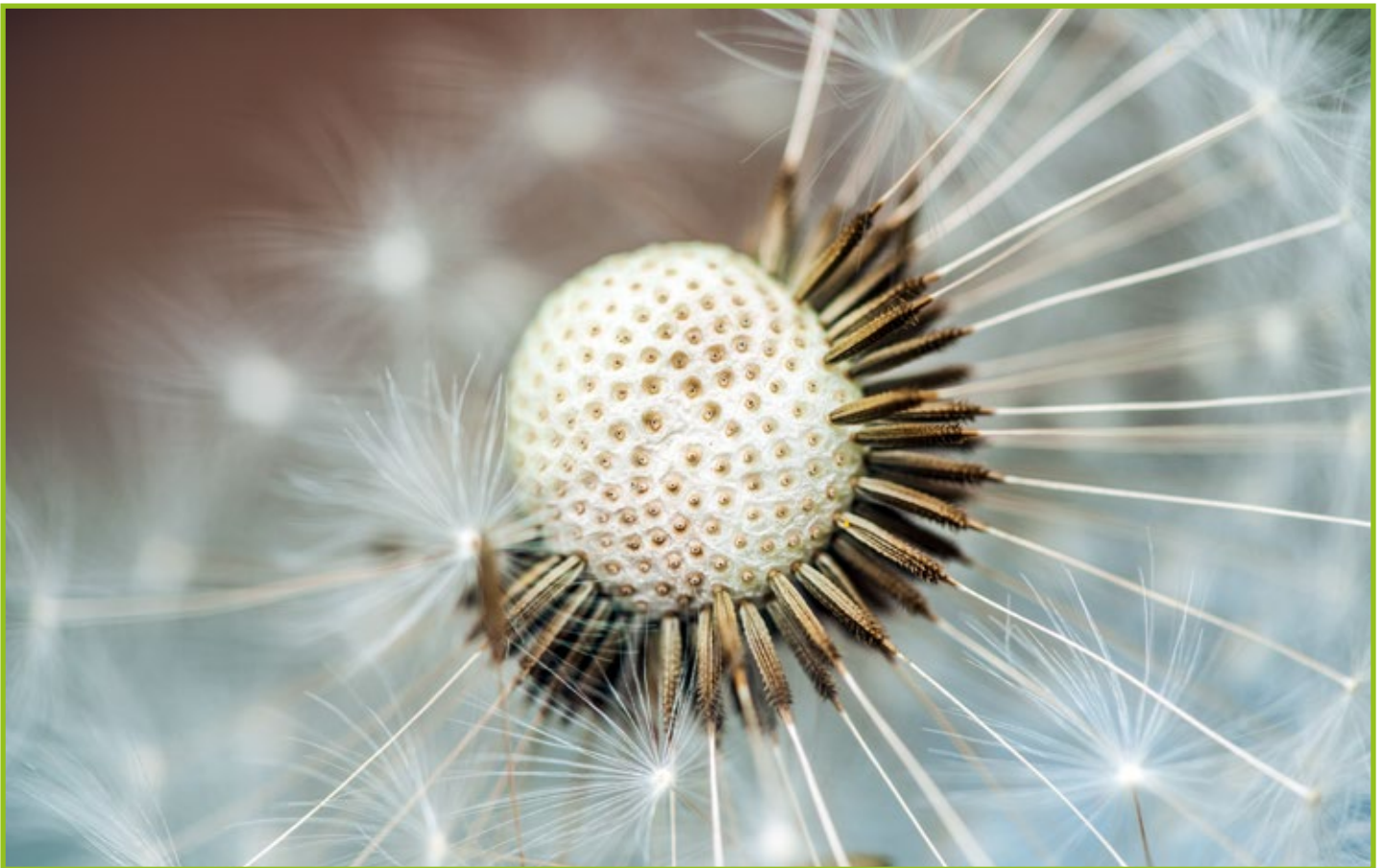
Step 4

Now make a model of your seed. Think up a name for the imaginary plant that produced it.



Communicate your findings

Show your seed to another group and **describe how your seed travels** to a new place. Remember to describe the special features that your seed has that allow it to be dispersed or spread in that way.



Communicate your findings

You are now well equipped to develop some miniature gardens full of plants to make the school grounds really special. Working in small groups, or as a class, you are going to grow some plants in different environments using the information from the experiments you have undertaken to help you make the best decisions for a healthy garden.

Choose a location for your miniature garden and consider where you will place your garden and how much light and water the plants will get. Research the plants that would do well in those conditions. Avoid plants which are harmful.



In groups, design, plan and set up a number of different miniature gardens by planting seeds in a variety of containers - planters, wheelbarrows, hanging baskets or something else that would be unusual and interesting; perhaps a wellington boot!

Go along to the garden centre to choose your seeds, taking account of your design and research.

Create some information and care labels for the plants you chose for your garden. You may want to find out about different nutrients that help plants to thrive and add some 'feed' to the soil.



Care for your garden over a period of time. You and your friends will need to regularly check how your plants are doing – are they growing or have they changed colour at all?

When the gardens are in bloom, invite your family and friends to a garden party and show off all your hard work. Let them enjoy your miniature gardens too. Ask them for their opinions and listen to their comments.



Concluding the Rich Task

‘What are the factors we need to consider when creating a garden for people to enjoy?’

To conclude the Rich Task, go through the information, pictures and videos you gathered along the way in creating your miniature garden. Arrange and edit it all so that you can give some helpful hints to gardeners who are just setting out



Reflection Phase

- How did I work today?
- Did I work in a scientific way?
- Can I identify harmful plants/parts of a plant?
- Can I identify ways to keep safe when enjoying the natural world of plants?
- Can I explain to my family what a plant needs to survive?
- Can I explain to my teacher what the different parts of a flower are called?
- Can I explain what each part of a flower does?
- Can I explain what happens in pollination?
- Do I understand how seeds are formed and the different ways they can be dispersed?
- Can I explain how water is transported around a plant?
- Did I enjoy growing some plants?
- Did I work well in a group?
- What was my best contribution to group work? Why?
- What would my friend say about working with me as a partner?
- What did I enjoy the most?
- What is the best thing about my miniature garden?
- What will I do differently next time? Why?
- Can I see myself as a gardener in future? Why? Why not?