Design

Introducing Gillian Hewitt, one of our guest presenters, she is the founder of Imaginaturalists who wishes to inspire a love of science in children by engaging them with creative expression and experiential learning. Imaginaturalists encourages children to utilise their powers of observation and gives them the skills to express these through fun and creative means.

Drawing is the best way of seeing!

The best way to notice the details about any object or process in our world is to use our Powers of Observation.

The best way to exercise these powers is to use them on a daily basis. The best way to sharpen these skills is to ask yourself to draw what you see.

When we draw something that we are observing, it forces our eyes to take note of the tiny details that come together to make the object complete.

Without noticing these small details, our brains fill in the gaps with 'best guesses' and trick us into thinking we see the true nature of the object. Drawing from observation is the best way to develop the ability to use our eyes and truly observe the way things are.

Observation is the first step in many scientific journeys, leading the scientist to ask many important questions, such as why is it like that, was it like that before, has it changed and if so why, how does it relate to its surroundings?

Drawing is one of the most important tools in communicating information in Science.

In this design session, Gillian will demonstrate how to draw plans from observation and how to prepare herbarium sheets to preserve specimens of plants for study.

Images courtesy Imaginaturalists

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Plants are the keystone to many of the natural processes on our Earth. Around 80% of plants growing on Earth today are flowering plants or Angiosperms. Understanding the anatomy of a plant, how it looks outside and what is inside is key to understanding life cycles, germination and pollination in angiosperms.

Activity:
Go into your garden and select something to draw, if possible, choose a specimen with a flower and a small number of leaves for your observations.

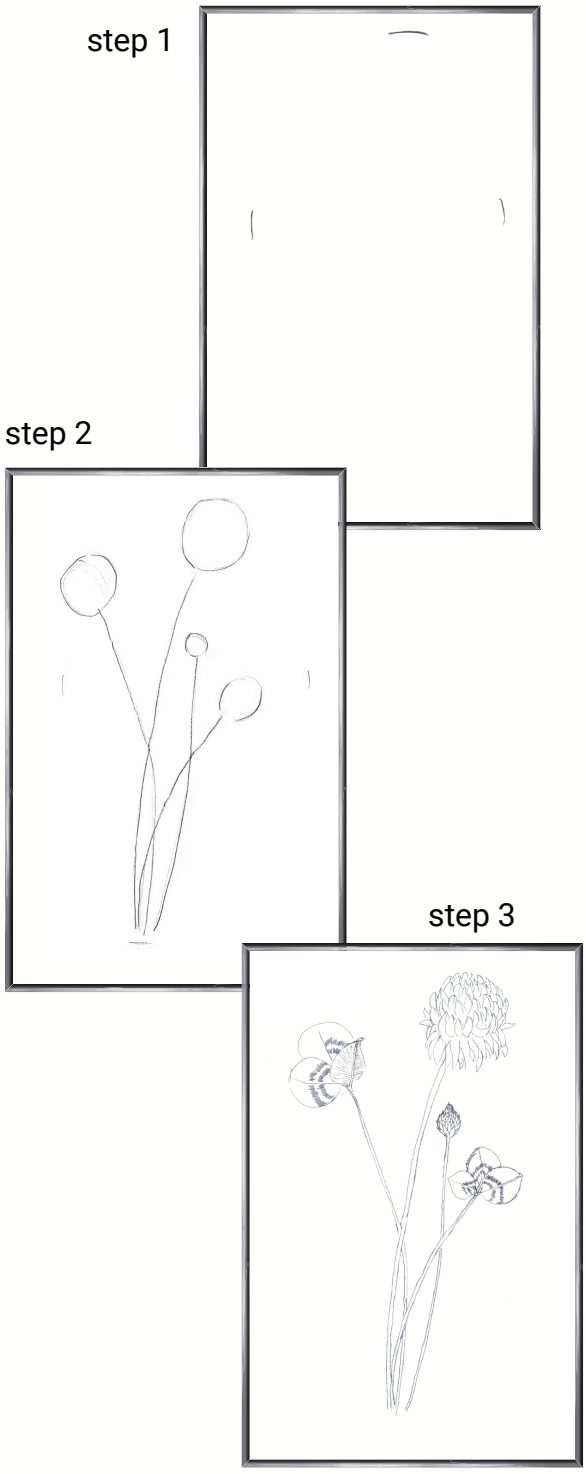
Hold your flower or place it in a vase for observation.

Look closely at the flower, notice the important details of how it is constructed. How many petals does it have? What colour is it? Does it have a distinctive repetitive pattern or is the pattern variegated (different coloured zones)?

On the next page make some quick observations of your plant. Start to make some rapid line drawing sketches. These drawings are meant to be informative and remind you of your observations.

Step 1. Begin by identifying the overall shapes that make up your plant. Put very light guidelines at the top and bottom, left and right of where your sketch will sit on your paper.
Step 2. Very lightly map in the overall shapes and how they will fit on your page before adding your detail.
Step 3. Add the detail. How are the petals arranged? Do the leaves grow exactly opposite each other on the stem or are they skewed? Is every petal, every leaf the same as each other or do they vary?

These may be questions you can ask yourself as you draw but keep in mind to use your own observations!



(Above) The steps to do an observational sketch, using clover as an example

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Use the space below to sketch out your plant

Step 4. Now that you have spent some time looking closely at your plant, you can add shading to make your sketch appear 3 dimensional.

Add small amount of pencil and use your finger to smudge it. The darkest shadows will be in the deepest corners between petals.

Don't be afraid to push the dark tones to make your sketch pop!
You may also choose one aspect of your plant to draw in greater detail, for instance in the clover example, the flower head is many flowers arranged in a sphere. Draw one of the flowers in close detail.

(Below) The clover example seen as a shaded sketch.

Reflection:
Did you find that your plant specimen was more complex than you thought it would be when you started to draw it?

Did you notice any details that you hadn't seen before you drew your specimen?

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Extension Activity: Herbarium Sheets

Botanists (scientists who study plants) often create **herbarium sheets** to preserve specimens of the plant that they are studying. There are many herbariums all over the world that store plant specimens in buildings just like libraries. Properly prepared plant specimens can last for hundreds of years in herbariums and are an important record of species diversity. Some plant species which have now become extinct, only exist in the preserved specimens in herbariums.

Herbarium sheets are created using acid-free heavy weight paper, cotton gloves and thread to stitch the specimen to the page, under climate-controlled conditions.

Herbarium sheets are basically pressings of the flower specimens. We can do this by using absorbent paper with tooth or weave in the texture. Heavy kitchen paper will work well. Do not use smooth photocopier paper as this will stick to your plant specimen. The open weave in absorbent paper (like a kitchen towel) will draw moisture out of the plant, yet leave open spaces so the specimen doesn't become stuck to the paper.

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Herbarium Sheet Instructions

Activity: Choose a sample that exhibits as many features of the plant as possible, as this is used for species identification. Leave on the stalks to show position, flowers and buds. Heavy things like nuts are stored in a little paper envelope next to the pressing. Juicy fruits such as mulberries should be avoided as the juice will lead to mould in your pressing.

If you are only pressing one sample, you can use the pages of a very heavy book. If you are doing multiple samples start with a piece of cardboard from a box, layer multiple pieces of newspaper on this for padding.

Next, lay your kitchen towel on the stack arrange your specimen so that the leaves are lying in a visible way, lay the flower open so you can see the inner petals and stamens if possible. Arrange all the parts so they are next to each other and easily visible.

Place another piece of kitchen towel on the top and add more newspaper, another piece of kitchen paper and your next specimen and so on until you are finished.

Top the pile off with another piece of cardboard and a piece of wood if you have one. Place a lot of weight on top and try to spread this evenly. Leave your press in a cool dry place for a few weeks, the longer you can leave it the better.

When your sample is dry and pressed, carefully open your press. Ease the samples from the kitchen towel carefully. You may need to use something like the tip of a skewer to tease them off without damaging them.

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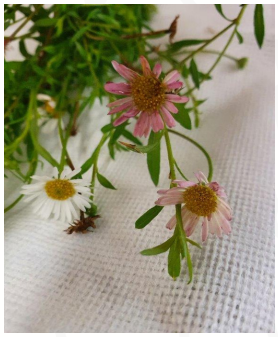

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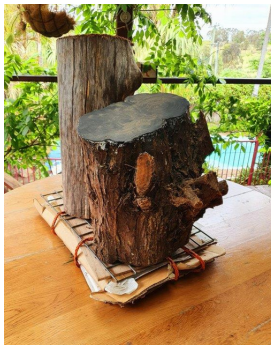

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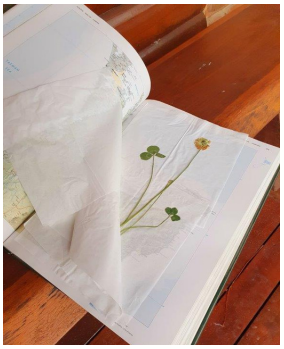

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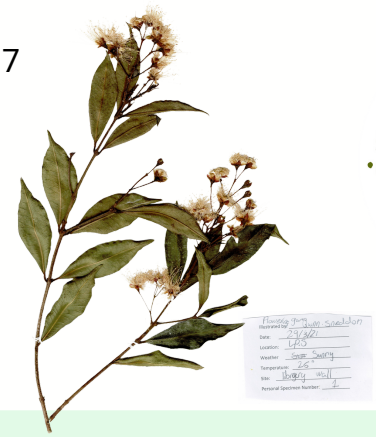

Lay your specimen in an orientation similar to how it grows in life. This is referred to as its “habit”. Using a needle and thread stitch the specimen to the paper in positions that will stop the plant from moving. Tie off the thread at the back. This should make your specimen look nice and neat from the front. Fill in your herbarium label and place it in the lower-left corner of your herbarium sheet.

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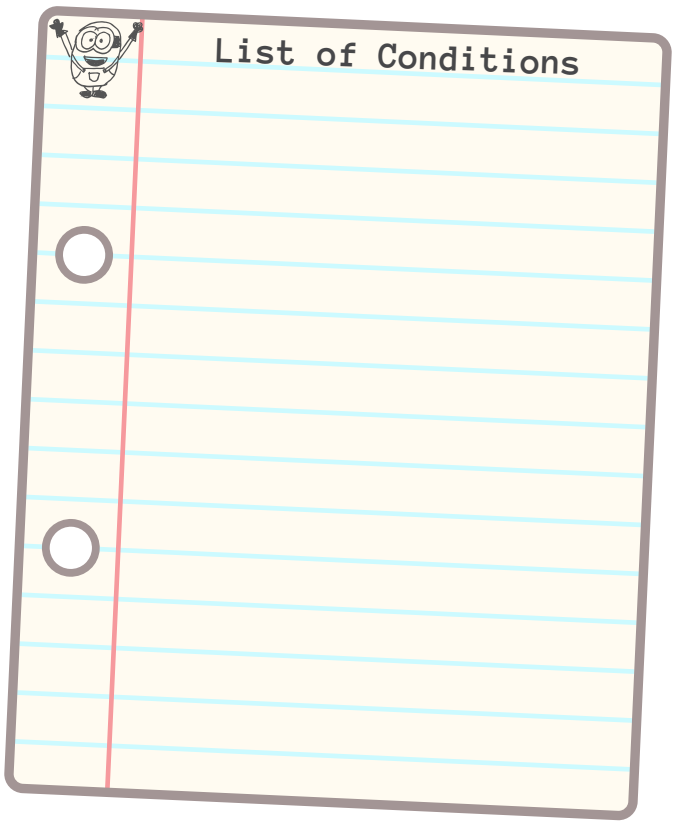
Be Creative - Unleash Your Creativity

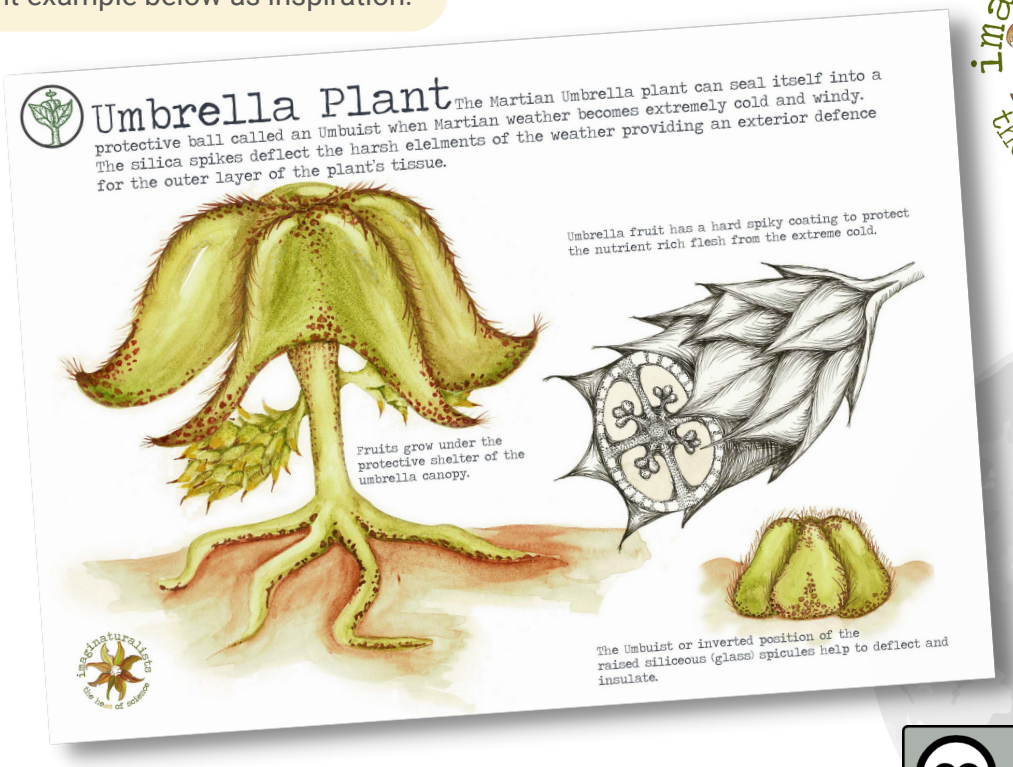
Extension Activity: Plants grow in many different ways in all climates on Earth and have many different life strategies (ways to survive). If we were to be able to grow plants in space. What would some of the different forces and processes do to their growth. Would it affect orientation, size, adaptation?

How would plants change in zero and microgravity environments? What if we could grow plants on the moon or Mars. How would the plants adapt to the pressures of these environments? Think about the things that plants in space would have to cope with to survive.



Activity:
Write a list of conditions that plants might need to be able to survive in space. How would they do this?

Activity: In the space provided on the next page, create an imaginative new plant species for either the environment of the Moon, Mars, or on an orbiting space station. What features would it have? Use our Mars Umbrella Plant example below as inspiration.



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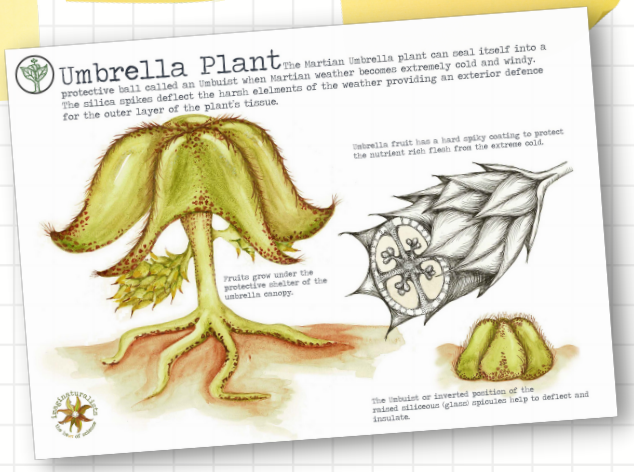
Be Creative - Unleash Your Creativity

Use your sketching skills to “nut out" your ideas with quick rapid pencils line sketches. When you have worked out its features add shading and colour to communicate the properties your new plant has and how it would survive in its environment.

Annotate your design using notes with arrows. Explain the highlights of your design.

Identify the different features of your design.

Visit https://imaginaturalists.com.au/ for more ideas



New Plant Species for Space