

ADVENTURES IN THE PLANT KINGDOM (LEVEL 2)







Description	Learners will explore the plant kingdom and learn about the importance of plants in our lives through different experiments and activities that will illustrate how plants behave and some of their characteristics.
Leading Question	Can you design your own plant?
Total Time Required	5.8 hours over 5 days
Supplies Required	Pen/pencil, paper, color pencils/crayons, scissors, 6 plastic bottles or 3 plastic bottles and 3 paper cups/small lightweight bowls, plant with roots, soil, leaves, water, string/thread, jar, seed, paper towels, and food coloring (optional)
Learning Outcomes	<ul style="list-style-type: none"> - Understanding the different parts of a plant and listing some of their functions compared to human body parts - Understanding the general life cycle of a plant - Understanding some of the uses of plants in daily life - Understanding the causes of desertification and the role of plants
Previous Learning	None.

DAY 1

Today you will begin by understanding the characteristics of living things and how plants adapt to their environment.

Suggested Duration	Activity and Description
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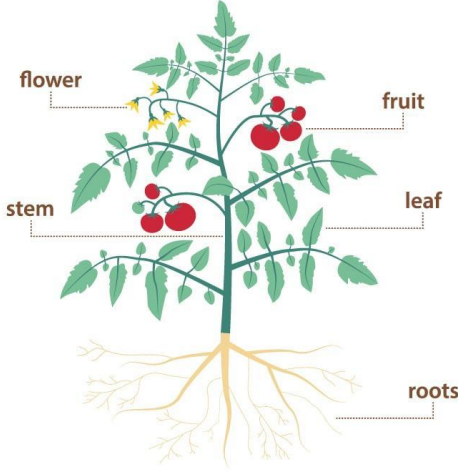
<p>10 minutes</p>	<ul style="list-style-type: none"> - Explore your surroundings and look for examples of living and nonliving things from your home or neighborhood. - Write or draw a list of 5 living and 5 non-living things. Living: dog; non-living: book. 								
<p>20 minutes</p>	<ul style="list-style-type: none"> - In what ways are living and nonliving things different? - List a few differences between living and nonliving things - Explain that everything in life can be classified as living and nonliving, and that that living things fall into either the animal kingdom (Kingdom Animalia) or the plant kingdom (Kingdom Plantae) and have certain characteristics: <ul style="list-style-type: none"> - They move - They breathe - They are sensitive, which means they respond to changes around them - They grow - They reproduce - They eat - They get rid of waste 								
<p>20 minutes</p>	<ul style="list-style-type: none"> - Create the following table in your notebooks and give examples of how living things demonstrate all these characteristics from both plantae and animalia. - Use examples from the plant kingdom. <table border="1" data-bbox="467 1157 1344 1392"> <thead> <tr> <th>Characteristic</th> <th>Living thing example</th> </tr> </thead> <tbody> <tr> <td>Moving</td> <td>e.g. sunflowers moving with the sun</td> </tr> <tr> <td>Breathing</td> <td>e.g. tree leaves breathing</td> </tr> <tr> <td></td> <td></td> </tr> </tbody> </table> <ul style="list-style-type: none"> - Reflect on how different plants adapted to their environments and list or draw some examples of these. <p>Draw some plants you are familiar with from your own surroundings, as well as examples of other plants that grow in at least 3 other different environments.</p> <p>“How are these plants different from each other?”</p>	Characteristic	Living thing example	Moving	e.g. sunflowers moving with the sun	Breathing	e.g. tree leaves breathing		
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	<p>See appendix 1 for examples of some adaptations and then identify and draw the plants that have these adaptations.</p> <p>Example:</p> <table border="1"> <thead> <tr> <th>Plant</th> <th>Environment</th> <th>Adaptation</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td>Can store water</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Plant	Environment	Adaptation			Can store water			
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15 minutes	<p>Numeracy extension:</p> <ul style="list-style-type: none"> • If there are only 2 parks in a city and each has 32 trees, how many trees does the city have in total? • A forest has 100 trees. The local furniture factory cuts down 3 trees and plants 5 trees in this forest. How many trees does the forest now have? • If you have \$40 and flowers cost \$2 each, how many flowers can you buy for your mother? 									

DAY 2

Identify the main parts of a plant and understand the functions of the different parts of the plant.

Suggested Duration	Activity and Description
20 minutes	<ul style="list-style-type: none"> • Can you draw or name the different parts of a plant? • Look for a plant outside or inside your home and pull it out gently or raise it so that they can return it to the soil after the activity. They will identify the roots, stem, leaves, flower, and fruit. • Explain that roots anchor the plant, which is why we cannot just pick plants easily. This protects plants from flying away by strong winds. They also collect water and nutrients from the

	<p>soil. The stem is responsible for transporting nutrients collected by the roots upward to the rest of the plant. The leaves are responsible for respiration or breathing. Many plants bear flowers and fruits.</p> <ul style="list-style-type: none"> ● If no plant is available, they can draw a flower, small plant or tree and label each part.  <p>Source: https://www.greenandvibrant.com/parts-of-a-plant</p>
<p>15 minutes</p>	<ul style="list-style-type: none"> ● Explore the functions of each part. Reflect on how plants, like all living things, eat and breathe. ● How do you think plants eat? Breathe? What parts do you think help them do these things? ● Plants need sunlight and water to live and eat. They use the sun's energy to make their own food, but they also eat through their roots and stem! Do the following experiment to see how plant roots absorb water: <ul style="list-style-type: none"> - Place 3 clear plastic or glass cups next to each other in a line - Add water to the first and last cup, leaving the middle cup empty - Bring two long pieces of paper towels and twist them to create a long thick piece - Place one end of the first paper towel in the first cup and the other end in the center cup. Do the same for the other paper towel so that the center cup has two ends of both

	<p>pieces of paper towels. Your setup should look like the following:</p>  <ul style="list-style-type: none"> - If you have different food coloring or colored liquids, you can pour them in the first and last cup to see a cool color change effect in the end result. You can also color or paint the two paper towels blue and yellow to see how the colors mix. - Wait for 3 hours then come back to it. What do you think will happen? - You will observe that the center cup has filled up with water from the other cups! This is how plant roots collect nutrients from the soil and deliver it to the plant for the stem to then take it upward.
<p>10 minutes</p>	<ul style="list-style-type: none"> - Think of the stability function of a root and how it allows the plant to stay firm in the ground. Draw a tree and cut it out. Then try to make it stand. - Notice that the tree falls because there is nothing attaching it to the ground. - If you tape a toothpick or small stick behind it and then stick it in a cardboard or piece of paper, it will stand. - This is what roots allow plants to do. This protects plants from flying away in the wind!
<p>15 minutes</p>	<p>How do you think plants breathe?</p> <ul style="list-style-type: none"> ● Plants breathe through their leaves. Do an experiment to observe plant respiration or breathing: <ul style="list-style-type: none"> - Place 2-3 fresh leaves of any plant in a glass bowl, preferably shallow

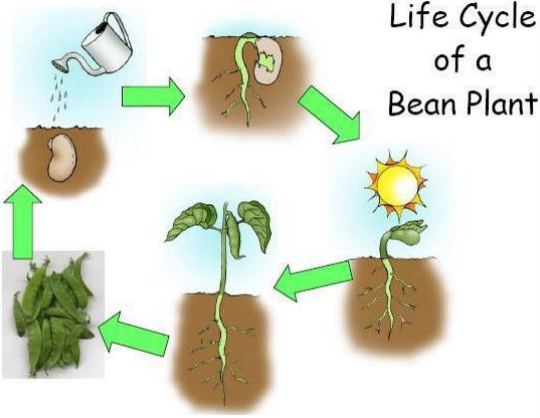

	<ul style="list-style-type: none"> - Add lukewarm or hot water to the bowl and submerge the leaves just below the surface. Make sure they stay in this position - Wait for 2-3 hours then come back to it. What happened? You should see small bubbles forming on top of the leaves. They might be too small, so get closer to the leaves. The bubbles indicate that plants produced oxygen from breathing. <p>To recap:</p> <ul style="list-style-type: none"> - Roots provide stability and collect nutrients from the soil - The stem transports nutrients upward from the root to the rest of the plant - Leaves use sunlight and the nutrients collected by the root and transported by the stem to make food for the plant (in the form of glucose, which is a type of sugar like the one we eat) 															
<p>10 minutes</p>	<ul style="list-style-type: none"> • Write down some of the functions of different plant parts and compare them to human body parts responsible for those functions. <table border="1" data-bbox="469 1052 1398 1299"> <thead> <tr> <th>Function</th> <th>Plant parts</th> <th>Human body part</th> </tr> </thead> <tbody> <tr> <td>e.g Breathing</td> <td>Leaves</td> <td>Lungs, nose</td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Function	Plant parts	Human body part	e.g Breathing	Leaves	Lungs, nose									
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DAY 3

Today you will be introduced to plant life cycles and understand some of the uses of plants for humans.

Suggested Duration	Activity and Description
<p>20 minutes</p>	<ul style="list-style-type: none"> • Imagine what the life cycle of a plant looks like. Prompts:

	<ul style="list-style-type: none"> - Where do plants come from? How do we grow plants, for example, a flower? - After a plant grows out of the soil, what happens to it? How long does it stay in that form? - How does a plant change with time? - Explain that plants start out as seeds, then grow to plants gradually over time, and then they wilt or die. We call the process of plants growing from seeds germination or sprouting. The life cycle of a flower is as follows: seed -> root comes out of seed -> seedling grows out of the ground -> stem and leaves grow -> flowers grow -> flowers make fruits/vegetables and seeds
5 minutes	<p>Enact the life cycle of any plant of your choice by lying down in a fetal position covered in a blanket or cover (to represent a seed), then coming out of the cover to represent the plant after it grows. You can extend your arms gradually to represent the stem developing branches. Finally, you can tilt forward or the side to represent wilting or the end of the life cycle.</p>
20 minutes	<ul style="list-style-type: none"> ● Create a labeled plant life cycle illustration from seed to plant: <ul style="list-style-type: none"> - Draw the stages of plant life for a flower – 1. seed, 2. rooting seed, 3. small plant with leaves, 4. adult plant with flowers and fruit/vegetables - Color and cut out these drawings using a pair of scissors - Draw four big boxes and label them 1-4. These should be big enough to put the drawings inside - Decide which drawing should go on each box. The box labeled 1 should have the seed drawing inside because that is the first stage in a flower’s life cycle. Continue placing the other drawings in the other boxes. You can glue, tape, or staple them in the boxes - Next to each box, write a sentence about this stage of a plant’s life

	 <p>Life Cycle of a Bean Plant</p> <p>Use the feedback to revise your labeled plant life cycle.</p> <p>Source: https://www.tes.com/lessons/RabEFf_WxRBnw/life-cycle-of-a-bean</p>
<p>20 minutes</p>	<p>Observe the life cycle of a plant firsthand! Try to grow your own plants by sprouting pea or bean seeds in a jar and observe growth over 2 weeks.</p> <ul style="list-style-type: none"> - Bring a glass jar, some paper towels/cotton, water and a seed of a plant like mung, beans or peas - Fill the jar with wet paper towels or tissue paper but make sure that the jar itself is not filled with too much water - Push the seeds down between the tissues and bring it to the side of the jar so you can have a clear view of how it grows - What do you think will happen? Observe how after two weeks, roots start to come out and how the seeds grow into a plant!  <p>Source: https://littlebinsforlittlehands.com/seed-jar-science-experiment-kids/</p>

20 minutes	<ul style="list-style-type: none"> Think of some of the uses of plants in our lives. Write a paragraph of poem/short story about how plants are used in daily lives – from when we wake up to when we go to bed. Walk around the house for inspiration and use the help of an adult in understanding the different ways we use plants. Some of the many uses of plants are: <ul style="list-style-type: none"> Breathing – plants make the air we breathe! Eating – we eat fruits and vegetables, which are plants Clothing – cotton in our clothes comes from plants <p>Present your poems/short story to family members/class for feedback. Feedback will include:</p> <ul style="list-style-type: none"> What they loved about about the poem/story? What could be improved? Any other suggestions for improvement <p>Use the feedback to revise your poem/short story.</p>
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DAY 4

Today you will learn about desertification and the role of plants in protecting the soil.

Suggested Duration	Activity and Description
10 minutes	<p>Did you know that green areas of land can turn into deserts? Why do you think that happens?</p> <ul style="list-style-type: none"> Desertification is the loss of green areas of land and expansion of desert area. Many factors contribute to desertification including overgrazing (when animals eat all the plants), droughts, and deforestation (when plants are cut in forests without replacing them). When these things happen, a natural process called soil erosion is accelerated. Soil erosion is the removal of the top layer of the soil.

<p>10 minutes</p>	<p>What do you think are some causes of soil erosion?</p> <p>Think of the different ways soil erodes naturally and write a list of 3-5 points. For example, soil drifting with rain, human cutting trees (deforestation), etc.</p>
<p>30 minutes</p>	<ul style="list-style-type: none"> ● Do an experiment to demonstrate deforestation and soil erosion:r <ul style="list-style-type: none"> ● Cut the side of three large plastic bottles vertically leaving the neck intact so that the bottles can serve as a horizontal container. ● Cut three smaller water bottles horizontally and set aside the bottom half or use three small lightweight plastic bowls or paper/plastic cups. Tape, staple or tie a string so that these pieces can be held like small buckets ● Place the large bottles that were cut open horizontally on a table with the cut side facing up and fill the first and second one with soil. Add a thick layer of dead or fresh leaves to one of these bottles and leave the other one with just soil. ● Place a plant with its soil in the last bottle. You can use a home potted plant or take a plant from outside your house making sure that you do not pull it by the root and make sure to take part of its soil with it. ● Now you should have three large bottles cut open from one side with only soil in one bottle, soil and leaves in another bottle, and a plant with its roots and some soil in the last. ● Hang the small bowls or buckets by their string from the neck of each bottle as shown below ● What do you think will happen when we pour water in each of these bottles? What do you think will come out? Write down your guesses ● Pour water from a container into each bottle and watch what comes out into the little buckets. Write your observations in your notebook and compare them to your guesses. ● You will notice that the water from the first bottle is filled with soil, while that from the one with leaves has very little soil, and the one with plants is clear! ● Why do you think this happened? This is because plant roots hold and protect the soil from erosion. Do you see how the roots are entangled in the soil when you lift the

plant up? When desertification happens, soil erosion happens at a very fast rate because plants are not there to protect it!



Source: <https://www.youtube.com/watch?v=im4HVXMG168>

- Note: Simplify this activity by placing a potted plant or rooted plant with soil in a container temporarily and poking a hole in the container. Then pour water through the container to see how clear water comes out, which indicates that roots hold the soil together and do not allow water to wash it away. Compare this with a container that has only soil and notice how a lot of the soil comes out with the water, which is similar to how soil erosion through rainfall occurs.

Draw a before and after image of a forest where desertification has occurred. Also write a paragraph about what should be done to reverse the damage to this area. For example, planting more trees.


20 minutes

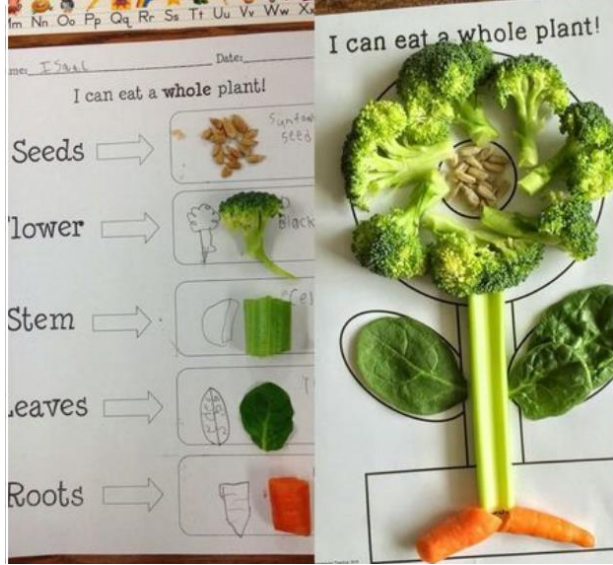
Draw a before and after image of a forest where desertification has occurred. Also write a paragraph about what should be done to reverse the damage to this area. For example, planting more trees.

Share what you think should be done to reverse the damage due to desertification with family members/class for feedback and additional input.

DAY 5

Today you will learn about how plant cells absorb water through osmosis and explore the phenomenon of desertification through two cool experiments.

Suggested Duration	Activity and Description
10 minutes	<p>You will design your own plant! You can create a typical plant like a flower or design your own imaginary plant with special characteristics! Think of the following:</p> <ul style="list-style-type: none"> • A creative name for your plant • How the plant eats • Whether the plant has a flower or just leaves • The colors of each part • The kind of environment or country the plant grows in
20-30 minutes	<p>Either draw and color the plant or create 3D models such as the following. Label the model and write 2 sentences about each part of the plant describing its function:</p>  <p>Source: https://www.pinterest.com/pin/348395721166351529/</p>

<p>30 minutes</p>	<p>Optional : did you know that some of the fruits and vegetables we eat come from different parts of plant? Carrots are actually the roots and grow under the ground! Create an edible flower model with the help of an adult to show we eat different parts of plants. Look in your kitchen for examples of vegetables and fruits that come from different parts of plants or you can purchase some of these next time they go grocery shopping. Suggestions:</p> <ul style="list-style-type: none"> ● Flower: broccoli, cauliflower, artichoke, strawberries ● Stem: celery, asparagus, spring onions ● Leaves: spinach, lettuce, kale, rocca/arugula ● Root: sweet potatoes, carrots, ginger, beetroot <p>Draw an outline of a flower and ask an adult to cut the vegetables and fruits into small parts so they can be placed on the outline as shown below. You may even include seeds such as pumpkin seeds, pistachios, walnuts, or cashew nuts:</p>  <p>Source : https://www.pinterest.com/pin/27232772726599701/</p>
<p>10 minutes</p>	<p>Present your model(s) with your families/class and quiz them on plant facts! Feedback will include:</p> <ul style="list-style-type: none"> - What they loved about about the plant model and the presentation? - What could be improved? - Any other suggestions for improvement <p>Use the feedback to revise your plant model.</p>

ASSESSMENT CRITERIA

- Accurately labeled plant parts figure
- Accurately labeled plant life cycle figure
- List of plant uses in daily life
- Creative and labeled 3D or 2D plant model

ADDITIONAL ENRICHMENT ACTIVITIES

- Learners can do an experiment to observe how the stem transports water upward. Place a lettuce leaf in a cup filled with colored liquid (or add food coloring to water). Observe how the leaf turns into the color of the liquid after a few hours.
- Learners can observe the cycle of reproduction of flowering plants by cutting open a selection of fruits and examining the seeds. They can also plant seeds and observe their germination and growth.

MODIFICATIONS FOR SIMPLIFICATION

- Learners can limit the activities to one essay containing a labeled figure of plant parts, the functions of all these parts and some different uses humans have for plants.

APPENDIX 1



Source: <https://sites.google.com/site/plantadaptations2ndgrade/>

Plant Adaptation Matching

- A. Lives in hot Deserts & stores water in its stem.
- B. Lives in areas where there is a lot of rainfall. Leaves are large to collect sunlight and have a waxy layer (cuticle) to help water drip off leaves.
- C. Lives in windy areas. Stems are soft so they can bend and not break.
- D. Lives in areas with different seasons. Some trees lose their leaves in the fall/winter to protect from freezing weather.
- E. Lives in areas with cold winters. Most of the trees have needles instead of leaves to lose less water.
- F. Lives in water so the plants have little to no roots.



Source: <https://www.thinklinc.com/scene/730790365904240642>