**NGSS Lesson Planning Template**

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| **Grade:** **First grade** | **Topic:** **Parts of a plant-roots; making a root system** | **Lesson (number/title):** **3** |
| **Brief Lesson Description: *Introduction/Foundational Lesson***Students will explore the role of roots in a plant. Students will create three different root systems and test them to discover which root system is most beneficial to the plant. |
|  **Performance Expectation(s):** 1-LS1-1 Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow , and meet their needs. |
|  **Specific Learning Outcomes:*** The students will examine the role of roots in plants.
* The students will test different root structures and explain which is most effective.
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| **Narrative / Background Information** |
| **Prior Student Knowledge:**The students should know the parts of the plant. They should also be aware of the role of the parts of the plant. |
| **Science & Engineering Practices:**Constructing Explanations and DesigningSolutions* Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.
* Use materials to design a device that solves a specific problem or a solution to a specific problem.
 | **Disciplinary Core Ideas:**LS1.A: Structure and FunctionAll organisms have external parts. Differentanimals use their body parts in different ways tosee, hear, grasp objects, protect themselves,move from place to place, and seek, find, andtake in food, water and air. Plants also havedifferent parts (roots, stems, leaves, flowers,fruits) that help them survive and grow.LS1.D: Information ProcessingAnimals have body parts that capture and conveydifferent kinds of information needed for growthand survival. Animals respond to these inputswith behaviors that help them survive. Plants alsorespond to some external inputs. | **Crosscutting Concepts:**Structure and FunctionThe shape and stability of structures of naturaland designed objects are related to theirfunction(s).- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -Connections to Engineering, Technology, andApplications of ScienceInfluence of Science, Engineering andTechnology on Society and the Natural WorldEvery human-made product is designed byapplying some knowledge of the natural worldand is built using materials derived from thenatural world. |
| **Possible Preconceptions/Misconceptions** |
| **LESSON PLAN – 5-E Model** |
| **ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions*** Show the students two “potted” plants: one with a cutting (stem and flower without the roots) stuck in the soil and one with roots. Show the two plants to students. Discuss the parts of plants lessons that was done in the previously. Ask students to identify the parts of the plant in both of the pots and ask them which part is missing in one of the plants. Discuss:
1. What is the job of the root?
2. What will happen if the root is missing?
3. What do you think is important for a strong root system?
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| **EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions**This can be done during a science period with students or could be put on Blackboard for students to do independently on Blackboard. Go to <https://www.curiositymachine.org/challenges/61/>If you would like to register and add your students you may do so. It is a free site. Another option is for students to watch the video (click on the “guide” button) and it will show you exactly what to do during the activity. Students should be encouraged that they may not be successful the first time!**Materials needed:**One cup of sandPipe cleanersLarge plastic cupsEmpty half gallon milk jugStringMarkerEmpty canIf you are unable to watch the video, the following are the steps you will need to follow:**Step 1:** Have students design three different “plants” with the pipe cleaners. One with no roots. The second with small roots and the third with an extensive root system. Twisting the pipe cleaners together to make the plant and root system.**Step 2:** Have student put each of the pipe cleaner plants in large plastic cup. Pour sand in the cup. Make sure that each cup has the same amount of sand in the cup.**Step 3:** Attach a string to both the pipe cleaner stem and the milk jug with the string over the can. Pour water into the jug until the pipe cleaner plant is pulled out of the sand. Mark the water level with a marker.**Step 4:** Continue with the other pipe cleaner plants. Mark each water level after each plant is pulled out of the sand. Students should record their findings after each experiment. Students can either record their findings on [www.curiousitymachine.org](http://www.curiousitymachine.org) or on Blackboard on paper. |
| **EXPLAIN: Concepts Explained and Vocabulary Defined****Roots** collect water and nutrients from the soil and stabilize the plant in the soil.**Stems** carry water and food from the roots to the leaves. They also hold the leaves up to get the energy from the sun**Leaves** are the food factory for the plant. They take the water and food from the soil and combine it with the sunlight to make food for the plant. |
| **ELABORATE: Applications and Extensions** |
| **EVALUATE:** **Formative Monitoring (Questioning / Discussion):*** Which “root” system held the plant the best?
* What would cause a plant to be pulled out by its roots?

**Summative Assessment (Quiz / Project / Report):*** Students complete the process of testing different “roots”. Students are able to explain what happened with their activity
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| **Elaborate Further / Reflect:**What would you do differently next time? Would you use different materials?  |

**Materials Required for This Lesson/Activity**

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| **Quantity** | **Description** | **Potential Supplier (item #)** | **Estimated Price** |
| **Large cup** | **Sand** | **IRC** |  |
| **20 per group** | **Pipe cleaners** | **IRC** |  |
| **1** | **Large plastic cup** | **IRC** |  |
| **1** | **Empty half gallon milk jug** | **IRC** |  |
| **1** | **String, marker, empty can** | **IRC** |  |