**NGSS Lesson Planning Template**

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| **Grade:** **5th** | **Topic:** **Structure and Properties of Matter** | **Lesson (number/title):** **1** |
| **Brief Lesson Description: *Introduction/Foundational Lesson**** Students bury various objects in the ground and dig them up weekly to observe changes. The objects will include compostable items to connect basic garden topics.
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|  **Performance Expectation(s):** 5-PS1-3: Make observations and measurements to identify materials based on their properties |
|  **Specific Learning Outcomes:*** Students will be able to measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, compost abilities.
* Students will be able to compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.
* Students will be able to keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.
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| **Narrative / Background Information** |
| **Prior Student Knowledge:**In K-2 students learn that matter exists as different substances that have observable different properties. Different properties are suited to different purposes. Objects can be built up from smaller parts. |
| **Science & Engineering Practices:**Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon | **Disciplinary Core Ideas:**Measurements of a variety of properties can be used to identify materials. (Boundary: At this grade level, mass and weight are not distinguished, and no attempt is made to define the unseen particles or explain the atomic-scale mechanism of evaporation and condensation.) | **Crosscutting Concepts:**Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume. |
| **Possible Preconceptions/Misconceptions**Students may not be aware that not all types of objects that are the same (food, cups) are made of the same material. There are lot’s of materials used to make many different items and depending on their properties, we choose which one will work best for certain reasons. Some general knowledge of measuring tools and what they measure might be known. Students may not know that some items are biodegradable and some are not. Composting can provide nutrient rich soil for gardening. |
| **LESSON PLAN – 5-E Model** |
| **ENGAGE: Opening Activity – Access Prior Learning / Stimulate Interest / Generate Questions (20 minutes)****(teachers can substitute the items below for any food and plastic item-see materials list at the bottom)**1. Ask students to write the key questions (below) in their science notebook, write any preliminary thoughts, and to discuss the key questions with a partner or their group.* What observations can you make about the lettuce, cucumber, styrofoam cup, and plastic cup?
* What properties are measurable for these four items?
* What are the similarities and differences between the properties of these four items?

2. Regroup and host a brief discussion on students’ current ideas to help identify misconceptions and preliminary knowledge.  3. Before distributing the four items, ask students what they know about the four items. Record their responses on a Circle Map on the board.  4. Tell students that they will be using their senses and scientific tools to make observations about four items. Share this video (<https://youtu.be/wCkv_aoC7M8?list=PL-OlJZ2hunTIq-hmT6wdVGA6XbPxkb-Ge>), Measuring Tools, and ask students to think about which of the tools mentioned might be useful when observing these items. (see materials list) |
| **EXPLORE: Lesson Description – Materials Needed / Probing or Clarifying Questions (Initially 45 minutes, check back on buried objects every week for 2 weeks)**1. Have students form several groups of 4. Each group will be assigned one of the four items.2. Ask: Using your senses and scientific tools (e.g., balance, measuring tape, ruler), what observations can you make about these 4 items? 3. Demonstrate how to use the balance/scale first. 4. Demonstrate how to use the measuring tape to measure the round nature of some of the objects.5. Connect math skills acquired up to 5th grade level that you can reinforce here (length, perimeter, beginning ideas on volume) 6. Distribute all materials, including the student lab sheet attached below to each student. 7. Students should observe and record their observations and measurements for their assigned item 8. Tell students they will have time now to observe their item using their senses, as well as other appropriate tools. 9. Monitor students as they observe, measure, and record. 10. When observations are complete, groups will share their findings with the class.11. Students will take their items and bury them in the garden beds to observe properties that they couldn’t notice during their first initial observation/measuring time12. Every 2 weeks students should dig up their objects and record their findings. See this video here on an experiment similar to ours (<https://youtu.be/K4tEbAm3cCA>). Make sure students wear gloves when digging materials back up and wash hands properly. |
| **EXPLAIN: Concepts Explained and Vocabulary Defined (45 minutes)**Discuss the following questions with students and include this work in their interactive notebooks:* **What happened to the plastic items compared to the food items? What observations did they write down?** Have a class discussion and use this video to help explain what was happening to the items buried. Introduce the term biodegradable to help them explain what was happening to the items that were not plastic. (<https://youtu.be/eiTTcZqMkqQ>)
* **How can we categorize the materials we’ve been exploring?** Work with students to lump the four items into different categories based off of the properties you have noticed over the 2-week period referencing their lab sheets (examples can include plastic, non-biodegradable, biodegradable, food, etc.). Students can start to include other items not explored that they can put in the same categories. See example here of a categorizing chart (<https://www.pinterest.com/pin/195765915027879698/>**)**
* **What units of measurement did we use to measure the items in class?** Have students create a mind map of each of the tools and include the units/items measured under each tool (this can be done as a class or individual groups) (here is an online mapping tool that is great: <https://bubbl.us>**)**
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| **ELABORATE: Applications and Extensions*** Now that students have the basic ideas on how to identify materials based on their properties and how this can be connected back to the gardens, let’s learn about composting
* Play this video for students (<https://vimeo.com/84748263>**)** and have students create a plan on how their school could start composting, what would be the necessary steps involved?
* Have students take those ideas and create a 1-pager ([glogster](http://edu.glogster.com/?ref=com) digital poster making is a good alternative to paper and pen)(<http://www.lausd.k12.ca.us/King_Drew_Medical_Magnet/Summer%20Reading%20Program/One-pager.pdf>**)** over their ideas about how to compost, the biodegradable properties we learned about in this activity. Here is an example of a 1-pager (<http://www.ectorcountyisd.org/cms/lib/tx01000975/centricity/Domain/3227/onepager.JPG>**)**
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| **EVALUATE:** **Formative Monitoring (Questioning / Discussion):*** The lab sheet form the explore piece can be used to evaluate student input on really expanding their ideas on observations and measurements. You’re checking to see if they can explore more ways to observe and measure.
* The categorization chart and mind map of the tools from the explain portion can be used to evaluate students to see if they are able to identify materials based off their properties

**Summative Assessment:*** A summative way to evaluate students is to have them create KIM charts based off of the new words/key ideas they learned (properties, measurement tool, biodegradable, non-biodegradable, compost).

Find a blank template in this link (<http://www.somersetcentral.org/ourpages/auto/2014/10/6/46346091/KIM%20Chart%20for%20Vocabulary%20Words.doc>**)*** Another way to assess summatively is the 1-pager from the elaborate piece. You’re looking to see if students can connect all of the ideas and express those ideas creatively.
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**Materials Required for This Lesson/Activity**

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| **Quantity** | **Description** | **Potential Supplier (item #)** | **Estimated Price** |
| **Class Set for groups of 4** | **2 food items (preferably vegetables because of composting reasons)** | **Cafeteria Leftovers** | **NA** |
| **Class set for groups of 4** | **2 plastic items that look the same but the plastics are not quite the same (Styrofoam cup and plastic solo cup)** | **In Classroom/Cafeteria** | **NA** |
| **Class set for groups of 4** | **Measuring Tools: Thermometers, measuring tape, rulers, scales, clock** | **IRC Request** | **NA** |
| **Class set for groups of 4** | **Gloves to wear when digging up items from dirt**  | **IRC Request** | **NA** |

**NAME** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **DATE\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

Part 1

Directions: Using scientific tools and your five senses observe your assigned item and record your observations.

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| --- | --- |
| **COLOR** |  |
| **SHAPE** |  |
| **OTHER****CHARACTERISTICS** |  |
| **MASS** |  |
| **OTHER MEASUREMENT****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  |
| **OTHER MEASUREMENT****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** |  |

Part 2

Bury your item in the garden bed under soil, check back every week for 2-3 weeks total checking on the properties of the objects. Write down your observations on the next page.

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| Class Objects Buried\_\_\_\_\_\_\_\_\_\_\_ | Week One Observations/Measurements |
| **Class Objects Buried****\_\_\_\_\_\_\_\_\_\_\_\_** | Week One Observations/Measurements |
| **Class Objects Buried****\_\_\_\_\_\_\_\_\_\_\_\_** | **Week One Observations/Measurements** |
| **Class Objects Buried****\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_** | **Week Two Observations/Measurements** |
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