**3rd Grade - Science Connections in Elementary**

*Sand and Soil: What are the earth materials made of?*

*Do they hold water? Do they matter for different reasons?*

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**Third grade Interdisciplinary Lesson**

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**Interdisciplinary Standards**

* Science Standards -

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| **3-5-ETS1-3.** | **Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.** |

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| **3-5-ETS1-1.** | **Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.** |



**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.\*

* CCSS ELA Standards -

[CCSS.ELA-LITERACY.L.2.3](http://www.corestandards.org/ELA-Literacy/L/2/3/); [CCSS.ELA-LITERACY.L.2.4.A](http://www.corestandards.org/ELA-Literacy/L/2/4/a/) ; [CCSS.ELA-LITERACY.L.2.5.A](http://www.corestandards.org/ELA-Literacy/L/2/5/a/) ;[CCSS.ELA-LITERACY.L.2.6](http://www.corestandards.org/ELA-Literacy/L/2/6/)

Materials:

1. [https://docs.google.com/presentation/d/1qGS448DUIiW71kUV2iaNnSH7d8b0Yq5uLADGilhurWE/edit#slide=id.g2198a11f6d\_0\_1](https://docs.google.com/presentation/d/1EIhT85G7MNHG0Y0jth1byMMfrvvQg_N21ezFMWDQANE/edit#slide=id.p)
2. Bucket of sand
3. Bucket of rich (brown) soil
4. Hand lenses
5. Coffee filters
6. Paper towels or paper plates
7. Funnels
8. 2 Clear jars
9. Pitcher of Water
10. Measuring cup
11. Scale (the more precise the better)

Literacy Materials:

**Background Knowledge**

[**https://www.livescience.com/34748-what-is-sand-beach-sand.html**](https://www.livescience.com/34748-what-is-sand-beach-sand.html)

[**https://www.soil-net.com/legacy/schools/what\_is\_soil1.htm**](https://www.soil-net.com/legacy/schools/what_is_soil1.htm)

**Description of What the Class Does**

**Lesson** (takes TWO class periods)

**Introduction**:

1. Introduce the Driving Questions on Slide 1. Begin with the questions and discuss one by one. Practice requesting the use of evidence (what you see or someone else has seen that backs up what you say) and reasoning (an experience that you have that connects to your claim, or specific science knowledge that connects with your claim).
   * Ask students how a scientists might gather evidence about what sand is and what soil is and how they are different. Support students in suggesting “observation”.
   * Go to slides 2 and 3. The students are learning two important vocabulary words “abiotic” and “Biotic”. Ask students what they predict about if sand or soil will have more biotic material. Ask students to explain why they make the prediction.
2. Have students go to their desks and pass out the sand and the soil on the paper plates. They are looking for differences between the composition of these two earth materials. They can use their pencils to divide the sand and the soil into groups of materials they find.
3. When the students have completed the task, gather them together to share findings and methods for diving the sand and soil into groups. Slide 4 has questions that help guide the discussion.

*Math connection:* Slide 6 describes the components of soil. Students may use fractions to help understand this pie chart.

1. Watch Deep Look. This wonderful video describes how sand is created over a long period of time.
   * Discuss what was surprising about the video, or about the activity.

**Lesson**

1. Driving questions for the second class period are on 8 and 9. Spend time on the DQ, soliciting background knowledge and helping students listen to each other’s ideas.

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| Teacher Prompt: *Can you say more about why you think the soil would hold more water? What is your evidence?*  *Why do you think a scientist or an engineer would care about this question?* |

1. Have each student predict whether soil or sand would hold (absorb) more water. Ask the students to 1. draw a sketch that supports their prediction and, 2. explain what experience they had that makes them think the way they do. Share out some of the predictions.
2. Emphasize that scientists are as excited about a prediction that is working as a prediction that is correct, because they both help them understand the phenomenon.

**Investigation**: slide 11: (Help students help you plan this investigation.)

Put the same amount of soil and sand in each funnel. Use a coffee filter in each funnel. (Students may need help understanding why the amounts of sand and soil need to be the same --go over ideas about Fair Tests)

Pour the same amount of water in the sand and the soil (you may want to measure with a ruler or a scale) at the same speed.

Measure (using a ruler or scale) **how much water** passes through the Earth Material and goes into the jar. The water has been absorbed by the material with less water in the jar under the funnel. Note the differences in color of the water in the jar. See if students have ideas of what happened to the water during the two processes.

Explanation: Have students make claims for absorption and use reasoning and/ or evidence to back their claim. Accept all ideas as plausible and then emphasize what makes sense about each idea, and then use evidence to check the claims. (For example, soil had more organic material so the claim that organic material is absorbing the water is backed by evidence.) You need to ask how a scientist would check the claim. (e.g., a scientists might remove organic material from soil and see if the rate of absorption changes.)

**Engineering model** (Slides 12 and 13):

Discuss with students why a scientists or an engineer would care about this question. Consider an engineer who needs to decide where to put a building, or a foundation of a building, or design for an area that has flooding.

--An engineer may need to keep in mind the need for organic material and absorbed water in soil when planning a garden or where plant trees.

--An engineer would need to consider how well materials help recharge the water supply by filtering impurities out of the water as it collects in water tables.

--An engineer would need to plan for material that absorbs water if there is a flood zone.

-- An engineer would need to figure out which animals are supported by the type of soil that is in the area. This involves not only plants, but also the function of decomposition provided by the earth materials.

*Ask students how an engineer might need to work with a scientist to make some of the decisions.*

**Wrap up**: Ask each student to work with a partner to write down 1 or 2 new questions that they would investigate next through texts.

Literacy Connections/ Extensions:

1. Rocks and Minerals by Glen Phelan; 2004, National Geographic Society, 1145 17th Street NW, Washington, DC 20036.
2. Remarkable Rocks by Ron Cole; 1996, Newbridge Educational Publishing, 11 E. 26th Street, New York, NY 10010.

Media

1. Interesting and interactive music video about biotic and abiotic (Mr. Parr abiotic biotic) https://www.youtube.com/watch?v=nQO5x8Q3e8g