



## Cloverbud Investigators: Taking the Adventure Outside



# Traveling Sand

### Objective:

In this investigation we will look at soil particles under a microscope to compare shape, size, and color. We will discover where we can find sand in nature and how that sand traveled there. We will see if we can separate sand particles from soil, and we will also use sand to make a take home art project.

**Background:** Sand can be found in nature at the beach, the desert, around lakes, and on creek banks. Sand is defined by geologists as any rock that is less than 2mm in diameter and greater than .05mm diameter. Because of the size of sand particles, they are prone to traveling. When the wind is strong enough and there is little vegetative cover to keep the sand particles in place, it can be blown great distances. When sand or soil is being blown from one location to another it is called a “sandstorm” or “dust storm.” The speed of the wind determines the size of the particles of soils which move. Hence, a strong wind will pick up the larger sand particles, as well as the smaller silt and clay particles while a lesser wind may only pick up the smaller silt and clay particles leaving the sand behind. Deserts are made up of great expansions of sandy soil; their dry arid conditions and lack of vegetation have allowed the wind to carry off the silt and clay particles of the soil leaving only the sand behind. This is called “wind erosion.”

Water can also cause soil erosion. As water flows across the surface of the soil, it can pick up and transport different soil particles. Just like the wind, the faster the water is moving the larger particles it can carry. As the water slows down, the larger rocks, pebbles, and grains of sand will fall out of suspension, while the smaller particles of silt and clay will be carried on downstream. If you look at the bottom of a stream you can see this. Most streams will have a streambed filled with rocks, pebbles, and sand. During heavy rains or flooding, the water picks up the soil and washes it into the stream. There it is carried downstream until it eventually falls out of suspension.

**Month’s Mystery: Finding Sand in Nature:** This investigation will help explain how the processes of water and wind erosion happen in nature. Why do we find sand at the beach, along rivers, lakes, creeks and in deserts? We will begin to explore how deserts are formed and the importance of plants and vegetation in keeping our soil in place. Investigators will also begin to understand that not all soil is the same and why it is important to protect and conserve our soil.

June



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**Supplies:**

- 3 Different types of sand (craft sand, beach sand, sandbox sand, etc.)
- Mason jar with lid
- Spade type shovel
- Soil sample
- Water
- Microscope

**Activity 1. What is sand?**

**Do ahead:** Collect different types of sand or ask the children to bring different types of sand. *Sand can be collected along creek banks, lake shores, rivers, and oceans. This could also be an optional field trip. (Please observe proper safety precautions and adult supervision when around water.) Sand can also be found in sandboxes, purchased at lawn and garden stores, or craft stores. Try to gather at least three different samples to examine.*

**Procedure:**

**Step 1.** Look at the different sand samples under a microscope.

- Ask investigators to compare color, size, and shape of the sand particles.
- Ask, “Why do you think the sand looks the same or different?” Talk about possible the “parent rock” from which the sand could have originated.



Not all sand is equal. Just like humans, sand resembles its parent. In the case of sand, particles have broken off from what we call the “parent rock.” The mechanical and chemical breakdown of igneous, metamorphic, and sedimentary rock is called weathering. The different parent material gives sand grains their different color and chemical makeup.

*\* See the attached handout for examples of different kinds of sand found around the world.*

**Activity 2. Can we find sand in soil?****Introduction:**

- Look at a small sample of soil under the microscope. Can you see any difference in the particle sizes? Discuss the size classifications of sand, silt, and clay. Explain that soil is made up of all three with sand being the largest. The fact that a grain of sand is large enough for us to see and feel is important to how sand travels or does not travel.
- Next, ask the investigators, “Is there sand in all soil? Let’s become soil scientists and conduct a soil sample test to find out.”



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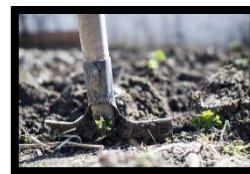
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**Procedure:**

**Step 1:** Obtain a soil sample: Do this by digging with a pointed shovel about 12" or the length of the shovelhead into the ground. Cut out a thin slice of soil approximately 12" by 2."



**Step 2:** Remove all grass or plant roots from the soil slice by trimming off the topsoil layer.

**Step 3:** Place the remainder of the soil into a mason jar with a lid. Only a small amount of soil is needed. The jar should be about half full of soil.

**Step 4:** Fill the rest of jar with water, leaving about a half inch of space between the lip of the jar and the water.

**Step 5:** Place the lid on the jar. Shake it until the soil and water are mixed well. There should be no clumps remaining; the sample should look like a jar of muddy water.



**Step 6:** Allow the jar to sit undisturbed for 24 hours, have a second jar of the same soil already prepared ahead of time, that has completely settled.

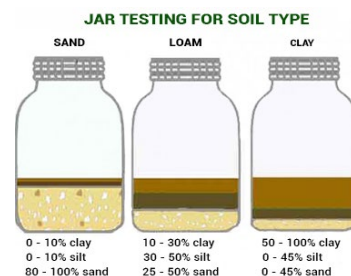
**Step 7:** Once the soil has settled out of suspension, you will see various soil layers. It is these layers we will examine.

**Background:**

Show the children the jar with the soil settled out of the water. The soil will settle out of suspension at different rates, based on weight and size of the soil particles.

- The first to settle out is rocks or pebbles due to their larger mass. These can be seen at the bottom of the jar within the first minutes.
- Next are the sand particles. As we stated at the beginning of this lesson, sand is defined as particles between 2mm and .05mm. Even though this is quite small these are the larger particles in the soil.
- Next the silt particles will settle out. Silt measures between .05mm and .002mm in size. It can take several hours for silt to settle out.
- The last particles to settle out are clay. Clay is made of particles anything less than .002mm in size. It can take up to 24 hours for the clay to fall out of suspension.

*\*Most soils have some sand in them. Soils with a lot of sand are called sandy and are well drained. Soils with very little sand are clay soils and hold water. The third type of soil has equal parts of sand, silt, and clay and is called loam.*

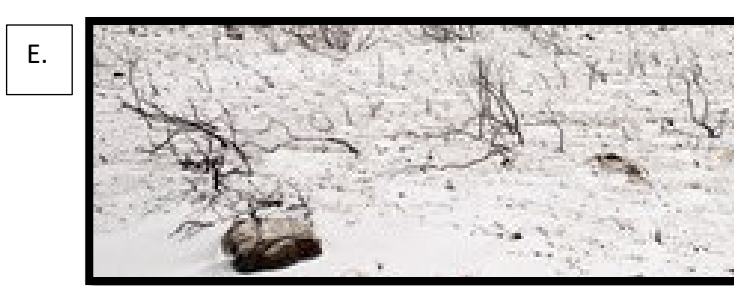


**Making Scientific Connections to nature:**

1. What did the jar of soil look like after we shook it up? What color was the water?
2. Was the water moving inside the jar after shaking it?
3. What happened to the soil in the water when we set the jar down?
4. What did the contents of the jar look like once the soil had settled?
5. In picture A below, we see a stream that is flooded. What color is the water?
6. Why do you think the water looks muddy in picture A?
7. Based on our jar experiment, what do you think will happen when the water slows down in the stream?
8. What will we find on the bank and in the bottom of the stream?
9. Looking at picture B, does soil erosion happen along lake shores?
10. Picture C is a sandstorm. Knowing what we now know about sand moving in water, can you make a guess about how sand moves in wind?

***Taking the Adventure Outside:***

- Visit a stream, lake, pond, or river to look for evidence of sand. Discuss how the sand ended up there. Do you see any signs of other rocks or particles that may have been deposited by water?
- Remember that when soil is moved by water or wind it is called erosion. Look for signs of soil erosion?
- Based on what we have learned about the movement of soil, what is one way to help soil resist erosion? Pictures D and E are clues.

***Career***

***Connections:*** *Soil Scientists and Erosion Control Specialists are two careers that work with soil and erosion issues.*

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**Optional activities:** Making sand art using glue, decorative sand, and drinking straws.

1. On a large sheet of paper, draw a picture or design using a bottle of white craft glue.
2. Select different colors of decorative sand and sprinkle small amounts close to the glue on the paper.
3. Using the drinking straws, gently blow the sand into the glue.
4. Repeat with each color of sand, then allow the paper to dry before moving.

**Discussion:**

Where does sand come from?

What is it called when sand moves from one place to another?

Is all sand the same color? Why or why not?

Where are some places we can go to see or find sand?

What are the names of the three particles that make up soil and list them from smallest to largest?

**Investigate, Create, & Take**

- ✓ Look at the sand under a microscope, check out the colors and sizes.
- ✓ Take a soil sample and measure the amount of sand, silt and clay found in the sample.
- ✓ Take a field trip outside to see where we can find sand and signs of soil erosion.
- ✓ Make sand art to remind us of what we have learned.

**Sources:**

Great Sand Dunes- National Park & Preserve Colorado: <https://www.nps.gov/grsa/index.htm>

Pictures provided from <https://geology.com/stories/13/sand/>

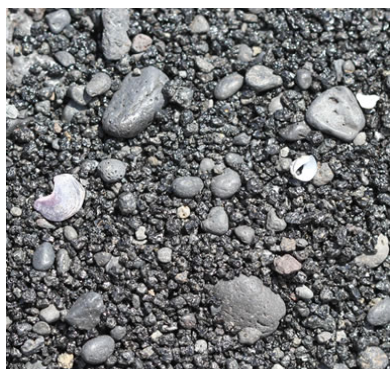
Information about soil erosion and control <https://www.toppr.com/guides/science/soil/soil-erosion/>

*Developed by Tracy Winters, OSU Extension, Gallia County Extension Educator, 4-H Youth Development, [winters.5@osu.edu](mailto:winters.5@osu.edu). Tiffany Sanders Riehm, Gallia County 4-H Program Assistant, 4-H Youth Development, [riehm.11@osu.edu](mailto:riehm.11@osu.edu). Edited by Sandy Forgey.*





## Sand Color from Around the World



Black Volcanic Sand

Punaluu Beach Hawaii



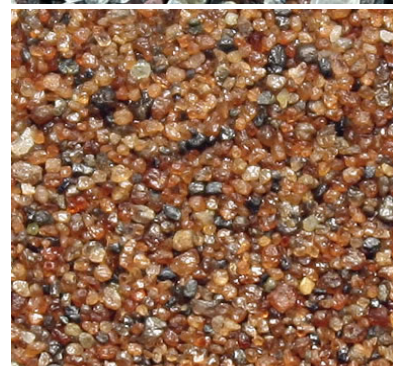
Garnet and Magnetite

Fire Island New Mexico



Coral Sand

Aruba



Garnet Sand

Cape Nome, Alaska



Foraminifera  
Sand

Torres Strait



Gypsum Sand

White Sands New Mexico



Frac Sand

Wisconsin



Pink Sand Dunes State Park

Utah

Pictures provided from Sand Grains from Around the World <https://geology.com/stories/13/sand>



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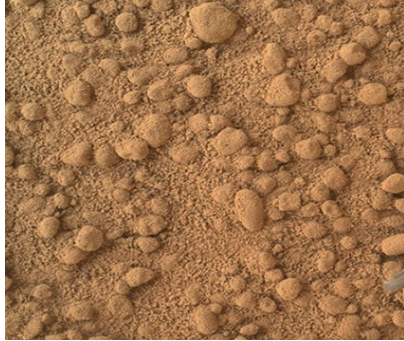
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Lunar Spherules

Moon Sand



Mars sand



Volcanic Sand

Christmas Lake

Oregon



Olivine Sand

Papakolea Beach



Ooid Sand

Joulter's Cay

The Bahamas

Pink Coral Sand

Bermuda



Pismo Beach

California



Radiolarian Sand

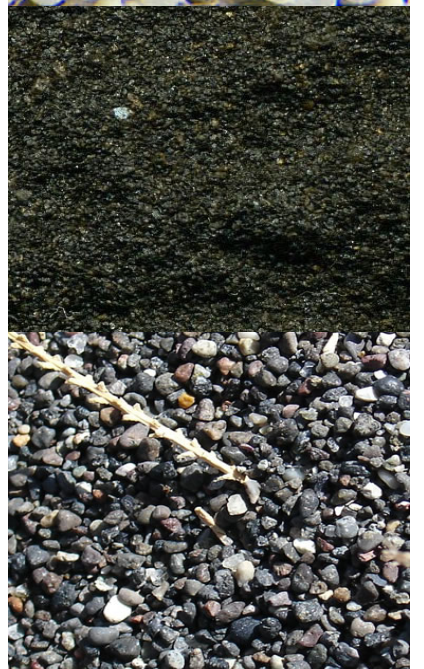
Weddell Sea

Antarctica



Tar Sand

Monterey Formation



Volcanic Sand

Santorini Greece



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