Learning on the Edge Newsletter

Issue 2

Upcoming Dates

November 15 America Recycles Day
http://atozteacherstuff.com/Themes/Recycling/

November 24 Darwin's Origin of the Species Published
http://www.pbs.org/wgbh/evolution/darwin/origin/

December 14 South Pole First Reached in 1911

December 17 Wright Brothers' Day

December 18 FREE Astronomy Everyday Workshop visit
www.cbbep.org

December 27 Louis Pasteur's Birthday

January 5 National Bird Day
http://www.nationalbirdday.com/

January 17 Benjamin Franklin's Birthday

Delta News

The Gregory Portland Nature Club will be putting in a butterfly and bird garden at the Nueces River Delta. Congradulations to Dannielle Robertson and Reagan Smith for having the winning design. They will be project managers as the Nature Club puts in the garden on October 31st. Stay tuned for pictures of the finished project in the next newsletter.

FUN FACTS

On Recycling: Recycling one aluminum can saves enough energy to run a TV for three hours -- or the equivalent of a half a gallon of gasoline.

On Darwin: For Darwin's 25th birthday on February 12, 1834, Captain FitzRoy named a mountain after him, Mount Darwin. It is the highest peak in Tierra del Fuego.

On the South Pole: When the Antarctic sea-ice begins to expand at the beginning of winter, it advances by around 40,000 square miles (100,000 square kilometres) per day, and eventually doubles the size of Antarctica, adding up to an extra 20 million square kilometres of ice around the land mass

On the Wright Brothers Plane: A Boeing 747s wingspan is longer than the Wright brother's first flight

On the telescope: Galileo is often thought to have invented the telescope because he made so many important discoveries with it. Galilei invented many other things, including the microscope but the credit for inventing the telescope goes to Holland's Hans Lippershey

On Pasteur: Pasteur could not shake people's hands, not even royalty because he was so afraid of contracting germs from them

On Birds: There are around 10,000 living species, making them the most numerous tetrapod vertebrates. They inhabit ecosystems across the globe, from the Arctic to the Antarctic. Birds range in size from the 5 cm (2 in) Bee Hummingbird to the 2.7 m (8 ft 10 in) Ostrich

On Ben Franklin: When Benjamin was sixteen, he experimented with vegetarianism in order to save money to buy more books.

Basic facts about the moon and its phases:

What causes the phases of the moon? Magic?

No, its not magic. It is the relative positions of the earth, sun, and the moon which cause moon phases you see in the sky. The phase of the moon you see depends on how much of the sunlit side of the moon faces Earth.

What are the moon phases, in order?

New Moon, Waxing Crescent, First Quarter, Waxing Gibbous, Full Moon, Waning Gibbous, Third quarter, and Waning crescent.

How long does it take for the moon to complete its set of phases?

It takes the moon around, 29 days 7 hours and 43 minutes to revolve around the earth.

Use the attached worksheet to have your students draw and follow the phases of the moon for a month.

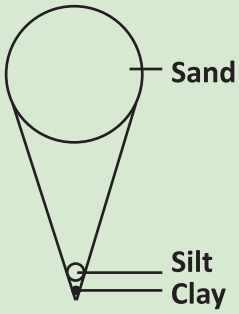
Perc Through the Pores

BACKGROUND

If a sand particle is the size of a basketball, a silt particle would be the size of a golf ball, and a clay particle the size of a dot made by chalk. Rarely made up of only one type of particle, soils consist of varying combinations of the three. The percentage of sand, silt, and clay in a particular soil determines its texture.

VOCABULARY

Absorption	Clay
Groundwater	Particle
Percolation	Pore Space
Porosity	Sand
Saturated	Silt



THE RELATIVE SIZE OF SAND, SILT, AND CLAY

All clusters of soil particles have the ability to attract and hold water. Water moves quickly through a sandy soil because of the large pore, or empty spaces between the particles. A clay-type soil, however, will actually attract water and absorb it like a sponge. Clay particles, as a clump, swell as they get wet and shrink as they dry. These particles have the ability to pull and hold onto water with 2,500 pounds of force. Water passes down, or percolates, through the soil at various rates. Over the years, some of this water may end up in the groundwater supply. The rate of water percolation, however, is reduced when all the pores are full of water, causing the soil to be saturated. This can cause water to collect.

Sand: soil particle between .05 and 2.0 mm in diameter
Silt: soil particle between .002 and .05 mm in diameter
Clay: soil particle less than .002 mm in diameter

Click to visit Session 1 - Directions for a particle size demonstration using students and string

Click to visit Session 2 - Worksheet for a particle size demonstration using different soils

Click below for the

Feel the Soil Worksheet for Perc through the Pores

Phases of the Moon Worksheet

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Perc Through the Pores - Session 1

SESSION ONE

1. Ask the students what they know about soil and why it is important. Post their comments in a visible place. Explain that they are going to learn about the different sizes of particles in soil. Explain that students are going to become soil particles. They will simulate different soil particle sizes and pore spaces between the particles. Designate three or four students as "water droplets." The rest of the students will all simulate the "particles": sand, silt, and clay. Explain that they will use arm actions to represent each soil particle.

2. Have all the "particle" students represent "sand" particle size by getting in a round group with their arms outstretched. They should stand in a random arrangement and be able to rotate 360· Without hitting another student. (You may need to arrange some of the students.) Tell students their outstretched arms represent the largeness of a sand particle. The empty space between sand particles represents pore space. These "living" spaces in nature are filled with air, water, or living organisms. Place the string in a circle on the floor around all the sand particles. Explain that this circle is a flower pot filled with soil. (Leave the string in the same position on the floor during the whole simulation.)

3. Add the "water droplet" students. Have them pass through the "sand" particles in the flower pot and out of the pot. Throughout the simulations, the "water droplets" aren't allowed to go around the "particles" but must pass through them in the easiest way possible by walking upright. (Students representing "sand" particles must allow "water droplets" to push their arms slightly to pass through the "sand" particles.)

4. Discuss briefly the relative ease with which the "water droplets" passed through the large pore spaces between the "sand" particles.

5. Next have all the "particle" students represent "silt" particles by placing hands on their hips with arms bent at the elbow. Have the students move next to each other with elbows just touching each other. They must stay within the string circle. Add the "water droplet" students. Again, "water droplets" must pass through the particles in the easiest fashion and out of the pot. They may swing the arms of the particles. Discuss the differences in water movement through the silt and the sand. Ask "Did the sand or the silt particles take up the most space in the flower pot?"

6. Finally, have all the "particle" students represent "clay" particles by standing with their arms at their sides and touching the shoulder of another" clay" particle. The particles will be bunched in together. Add the "water droplet" students. The droplets pass through the particles by moving two particles "slightly apart" and moving through them. Have the "slightly apart" particles stay apart to represent the swelling action of clay. in some cases, the droplet may be absorbed by the "clay" particles briefly and stay in place until gravity pulls the droplet down into the soil.

7. Explain to students that when water percolates through a soil in nature each dry soil particle actually holds some water. Only the extra or "free" water that the soil particles can't hold can be pulled further down by gravity. This water held by the soil particles is the water plants "drink" (suck up) with their roots.

8. Ask students to discuss the differences in particle size pore space total space occupied in the flower pot by the same number of different particles ease of "water droplets" passing through the "sand" and "silt" versus the "clay" particles. Make sure students understand that the same number of soil particles were in the flower pot each time. Ask what are the three soil particles called? (Sand, silt, and clay.)

MATERIALS
Magnifying glasses or hand lenses; one (or more) empty, clear, plastic liter soda bottle and lid; several different soil samples; water; SAND; SILT; CLAY

SESSION TWO
1. Have the "particle" students, demonstrate "clay," "silt," and then "sand" particles by adjusting their arm actions and the space between particles. Have the particles go from "sand" to "clay" to demonstrate the differences. Have individual students be the particle of their choice so that the flower pot contains a combination of particles. (Be sure that the different particles are scattered in the pot.) Let students decide, based on the arm positions of the particles, if the flower pot's soil has a sandy, silty, or a clay texture. (Is there an equal combination of particles, or is there more of one than the others?) Have students repeat this process several times to help them draw the conclusion that the size of the pore space is directly related to the proportion of particle sizes in the soil. (More clay particles means smaller total pore space while more sand means larger total pore space. You can add the "water droplet" students to the mixtures to aid in the understanding of pore space.) Ask was it easier or harder for the "water droplets" to pass through the pore spaces in the pure samples of sand, silt, and clay or in the mixtures you created? Which soil type does water move through the fastest? (Sand) The slowest? (Clay) Why? What kind of soil texture do you have at home or at school? How would you manage it to grow healthy plants? Why?

2. Add several handsful of one soil sample to the 1-liter soda bottle and fill it with water. (Break up any clumps of soil before adding the water. It sometimes helps to add a few drops of detergent to break up the clay aggregates so that they perform like individual clay particles.) Cap and shake the bottle well. Set it on a table where students can observe the soil particles settling. Ask what do you think will happen? What is happening? Why are some of the soil particles settling and some floating? Which soil particles weigh more? The ones settling or floating? How long will it take for all the soil particles to settle? The sand will settle in less than 1 minute. The silt will settle on top of the sand, followed by the clay. This process can take all day or even as long as a week. Have students observe the differences in the soil particles' sizes, colors, and amounts. Have students record and draw their findings on the sheet. (Feel the Soil worksheet.)

3. Discuss with students the fact that a typical soil sample contains all three soil particles in varying amounts. Water allowed us to separate the particles. Use the diagram showing the relative size of the particles (see Supporting Information). Did equal amounts of water drain out of both soil types? Which soil type drains more quickly?

4. Have students imagine they had three flower pots, one full of sand, one full of silt, and one full of clay. Which pot has the smallest pore space, the largest? Which soil type will hold more water?

5. Give students a handful of soil. Have them identify the sample's general texture of sand, silt, or clay, using the technique and characteristics described in the procedure below:

EXTENSIONS AND VARIATIONS

1. Have students demonstrate porosity. Porosity, the available pore space in a soil, and water-holding capacity vary from one soil type to another. Porosity determines how fast water will move through the soil. It's important for water to move through soil, but not so quickly that plants don't get enough for their needs.

Have students -

A. Assemble four clear plastic cups. Punch several drainage holes in the bottom of two cups. Line the bottom of the cup with a piece of thin cloth or paper towel so the soil is not washed out of the cup.
B. Put an equal amount of two different types of soil in the two cups with the holes in them. (Preferably a 'heavy' soil with clay content in one cup and a sandy soil in the other.)
C. Pour equal amounts of water onto the soil in each cup. Hold or place the cups over the other two cups, without holes, to catch the water draining out. Which cup will have more soil particles in it?

Have students-
Fold a piece of paper into thirds and draw lines between the sections. In the first section, have students draw "sand" particles, in the middle section, "silt" particles, and in the last "clay" particles. In all three label the sample particle types and indicate the amount of pore space between the particles.

THE FEEL OF SOIL

You and your partners are going to discover the general texture of a soil sample.

1. Place a small amount of soil from your soil sample in your hand, add drops of water slowly, and knead the soil to break up any clumps. When the soil is moist, not wet, it is ready to identify.

2. The soil texture is mostly

Sand if it
- feels gritty
- has grains (or particles) that can be seen
- will not remain in a ball when squeezed

Clay if it
- feels really sticky
- forms a long snake when rolled between hands

Silt if it
- feels smooth like flour
- is not really sticky
- forms a short snake and then breaks apart when rolled between hands

3. Our soil sample is mostly . We know this because

1.

2.

3.

THE RELATIVE SIZE OF SAND,SILT, AND CLAY

4. Using a hand lens or magnifying glass, describe your sample (draw a picture too).

5. With another group, compare your samples. How are they the same? Different?

Soil Questions

Soils in nature are usually a mixture of the three soil particles.

What might be the advantage of having a very sandy soil?

What might be the advantage of having a heavy clay soil?

The disadvantages to one or the other?

Moon Phases Calendar

Name: _____

Month: _____ **Year:** _____

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday