

<b>THEME:</b>	<b>The Water Cycle</b>
<b>SCOPE &amp; SEQUENCE UNIT:</b>	<b>Infiltration/percolation</b>
<b>OBJECTIVE:</b>	<b>Water through soil – it's not all the same</b>
<b>ACTIVITY 1:</b>	<b>Just Passing Through (The GLOBE Program)</b>

Notes:	In-class activity
Teacher Prep.:	<p>Before the lesson, prepare the set-up of materials to run <b><i>Just Passing Through</i></b> – details are provided below in Materials and can be found online at The GLOBE Program at:  <a href="http://www.globe.gov/documents/352961/353899/passthrough_beg.pdf">http://www.globe.gov/documents/352961/353899/passthrough_beg.pdf</a></p> <p>Our activity is slightly modified from the GLOBE activity in that we do the experiment with 3 samples and have the students divided into 3 groups, each with one sample (the GLOBE activity suggests groups of students doing their own experiments).</p>
Time:	~30 – 45 minutes

### **Skills:**

- ◆ Math
- ◆ Ecological literacy

### **Objectives:**

- ◆ To make predictions and test them
- ◆ To observe the passage of water through 3 different soil types

### **Background Information:**

Water passing through soil changes the properties of both the soil and the water. Different soil types influence how rain passes through the ground. Soils are composed of 4 components: mineral particles (< 2mm), organics, water that fills open spaces, and air that fills open spaces. Mineral particles include: sand, clay, and silt. With this experiment we are looking at soils of different mineral types. Sand, represented by the biggest mineral particle size, allows water to pass through quickly. This is contrasted by clay, the smallest mineral particle in soil, and through which water passes more slowly. Loams, which may be a blend of clay, sand and silt, offer a rate of infiltration in between sand and clay.

## Vocabulary:

**Infiltration:** the passage of water through soil (soil can act as a filter to water moving through, notice that parts of the word “filter” can be found in “infiltration”) (similar to percolation)

**Sand:** a type of mineral particle found in soil; sand particles though small, are the largest mineral particles of soil

**Clay:** a type of mineral particle found in soil; clay particles are the smallest mineral particles of soil

**Silt:** a type of mineral particle found in soil; much smaller than sand, bigger than clay

**Loam:** is soil composed of sand, silt and clay in generally even amounts, and is considered ideal for growing garden plants and farming.

## Materials:

6 2-litre plastic pop bottles; cut the tops off 3 (at the widest part before the narrowing starts) and sit them upright; with the other 3 cut their bottoms off - they will be placed upside down and fit into the top of the other 3; 3 pieces of window screening or bug netting fit into the neck of the 3 cut bottles; place a thin layer of fine gravel on top of the screen, then place the soil sample on top of the fine gravel; 1.2 L each of sand, clay or loam (garden soil); (BE SURE THE SAND IS WASHED, i.e. from the sandbox); 3 500 ml beakers or jars filled with 300 ml of water, using a black marker to mark the height of the water in the jar; (and 3 timing devices – optional)

## Introductory Discussion:

One of the pathways of rainwater is into the ground. This is called infiltration. But not all soils are alike and their differences influence the rate of infiltration as well as how well the water is cleaned or filtered as it passes through the soil. Use three different soils: sand, clay, and garden soil (loam). Look closely at the different soils, consider differences in colour, texture, and presence of organic materials (like leaves, roots, etc.)

- ◆ Using observation skills and making predictions, complete the ***Look and Guess Worksheet***.
- ◆ Have a class comparison of predictions. Create a quick class graph on the board, as to how many students think the water will travel fastest through: sand, clay or loam. Remind them there are 3 observations they will be making during the water challenge: speed of infiltration, amount of water retrieved, colour of water on exit.

## Summary of Instructions for Science Experiment:

Assign a student timer for each soil type, also a water pourer for each soil. When everyone is ready, count 1,2,3, go, and have the timer start and the water pourer immediately pour all the water into the respective container. Empty all the water at once into the upside down pop bottles. Observe what happens. Record the

time when all the water has come out of the soil and into the upright pop bottle. (The clay soil may require a long time for the water to pass through, if so, go ahead with discussions but have someone keep a close eye on it). Observe the colour of the final water. Measure the amount of the final water.

Students complete their worksheet, *Experiment and Report*.

#### **Reflection Discussion:**

1. Have students discuss their findings, relative to their predictions – time, colour, and amount of water. Discuss explanations for findings and comparisons.
2. Discuss results relative to nature. How is soil moisture part of the water cycle? Could a soil ever become so dry and hard the water can't pass through? What happens to the rainfall when the soil is already full of water? Once the water has infiltrated (seeped down into the soil) what happens to it next? (it may move upward and be used by plants – evapo-transpiration; or it may go down further into the groundwater; or it may move up to the surface and evaporate)

#### **Resources:**

The GLOBE Program

[http://www.globe.gov/documents/352961/353899/passthrough\\_beg.pdf](http://www.globe.gov/documents/352961/353899/passthrough_beg.pdf)

#### **Taking it Further:**

- 1) Brainstorm with students some possible future tests with the same procedure. What would they want to test? How would they set up the experiment to test their idea or hypothesis? What outcome or results might they expect or guess?
- 2) Make a soil filter to purify dirty water
- 3) Refer to The GLOBE Program for taking it further

# Just Passing Through – Beginners

## Work Sheet

### Look and Guess

My soil is \_\_\_\_\_ color



My soil looks granular blocky

My soil has \_\_\_\_\_ leaves. YES NO



Time \_\_\_\_\_



How much water will come out? Make your line RED.

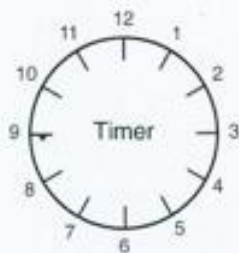


What will the water look like? (CIRCLE)



## Experiment and Report

Time \_\_\_\_\_



How much water came out?



What did the water look like?



My Report

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