THEME:	**The Water Cycle**
SCOPE & SEQUENCE UNIT:	**Infiltration/percolation**
OBJECTIVE:	**Different land surfaces = different rates of infiltration**
ACTIVITY 2.:	**Measuring rates of infiltration/percolation**

Notes:	Outside in school yard
Teacher Prep:	Prior to the activity, prepare and gather the materials needed.
Time:	~ 40 minutes (15 minutes inside, 25 minutes outside)

Skills:

- Math
- Critical and creative thinking
- Collaboration, teamwork, leadership

Objectives:

- To predict different infiltration/percolation rates with different ground surface types
- To test, measure, record and compare different rates of infiltration/percolation with different surface types
- To understand the influence of different land surfaces in the water cycle

Background Information:

Rainfall is a source of recharge for groundwater. For recharge to happen, the rainfall must infiltrate through the ground. The soil serves to clean or filter water that passes through it. Different permeable ground surfaces and conditions influence how quickly, or the rate at which, water enters and flows downward. If there is a lot of clay in the soil, or the soil is compacted, or if the soil is super-saturated with water, water may be shed from the land as run-off or pond on top of the surface in places of no slope. (If the soil is hard-packed and dry it may not be able to absorb rainfall).

Vocabulary:

Run-off: rainwater that is not able to flow into the soil (infiltrate) or other surface material and flows over the surface
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)

Permeable: having openings that allow the passage of a liquid (i.e. water)
Unsaturated soil: flow is initially very fast
Saturated soil: the ground is wet and water moving through has a steady flow rate
Ponding: when the ground is totally saturated and can no longer take any more water
Groundwater recharge: a process where water moves downward from surface water to groundwater.

Materials:

Coffee cans – 4 (if 4 groups) with both ends opened (and duct taped around the edges)
Water container – 4 (big enough to hold enough water for 4 coffee can tests (big plastic milk jugs) (these can likely be filled outside by the students, otherwise fill inside before hand)
Plastic 2 cup measuring cup – 4 (could be 4 plastic mugs – just be standard with size)
Stopwatch (or timing device)- 4
Ruler - 4
Clipboard – 1 for each student
Pencil and student page – 1 each
Hammer & 2X4 (short length to cover across wide of can)

Introductory Discussion:

Review the map of the schoolyard (Run-off Unit). While that activity considered impervious surfaces, this activity investigates permeable surfaces. What might be a permeable surface in the schoolyard? As a class, brainstorm a list of at least 4 locations of different permeable surfaces in the school yard. (playing fields, area under trees or shrubs in playground, garden, gravel under play area, sand box). Have students complete the "predictions" on their data sheet. Organize students into 4 groups, each with their compliment of measuring equipment. (If you have >4 different locations and surface types then assign locations to the groups, otherwise each group should field test percolation at each site). Assign a different start site to each group. They can then proceed to their three other sites as they are ready. Review the sampling procedure before heading outside.

Place the can on top of the surface and grind it down into the surface to prevent water from escaping out the bottom. One student pours from the big water container while another student holds the plastic measuring cup for filling. Another student works the timing device. All other students are observers to note when all the water has drained out. The student with the measuring cup says, start, as she/he pours the water into the can. Observers say, stop, when all the water is gone. Time is recorded on the data sheet. If the water has not drained out in 5 minutes, measure the depth of water left and record on data sheet. Proceed to next site.

Student Page:

Infiltration rates at different surface types

Reflection Discussion:

Students write up their own reflections on their data sheet and compare their findings with their predictions. As a class, dialogue on the findings. How do the findings compare with the predictions? Where was infiltration the fastest? What might be some reasons for this? Where was the infiltration the slowest? Reasons why? How is this information useful with regard to rains pathways?

Resources:

Gulf Islands Waterscape-poster.pdf

Name: _____ Date: _____
(mm/dd/yyyy)

Infiltration Rates At Different Surface Types

Surface types:

1. _____ 3. _____
2. _____ 4. _____

Predictions:

The fastest rate of infiltration will be: _____

The slowest rate of infiltration will be: _____

Findings:

1. Surface type _____

Time of infiltration: _____ (min,sec)

Depth of water left: _____ (cm)

2. Surface type _____

Time of infiltration: _____ (min,sec)

Depth of water left: _____ (cm)

3. Surface type _____

Time of infiltration: _____ (min,sec)

Depth of water left: _____ (cm)

4. Surface type _____

Time of infiltration: _____ (min,sec)

Depth of water left: _____ (cm)

Reflection Notes:

The surface type with the fastest infiltration rate:

The surface type with the slowest infiltration rate:

Comparing these findings to my predictions,

Reasons for these findings could be:

Something else I wonder about infiltration: