

Just Passing Through



The Science of Infiltration



◆ 9th-12th Grade

◆ **Common Core Objective(s)**

Earth Science, Standard 4, Objective 1.d

◆ **15 Minutes**

◆ **Key Skills**

Observing

Measuring

Interpreting data

◆ **Key Vocabulary**

Infiltration

Soil

Sand

Clay

Activity Summary

After a raindrop hits the ground there are several ways it can travel across the landscape. One direction is called infiltration. This downward movement of water is critical for the health of everything from plants to aquifers. In today's experiment, students will test soil infiltration rates and gain an understanding of soil texture and how it affects water infiltrate.

Materials

- ◆ Student worksheets
- ◆ Large (12 oz) paper cups
- ◆ Small (4 oz) paper cups
- ◆ Muslin fabric (2" x 2" squares)
- ◆ Elastic bands
- ◆ Sharpened pencils
- ◆ Sand
- ◆ Potting soil
- ◆ Clay-based kitty litter
- ◆ Water
- ◆ Stop watches
- ◆ Scale

Instructions

Preparation

1. Divide class into teams of three-to-five students.
2. Give each team: six large paper cups, three small paper cups, three muslin squares, three elastic bands, and a sharpened pencil.
3. With a sharpened pencil, have students poke five or six holes in the bottom of three large paper cups.
4. Using an elastic band, secure the muslin squares to the base of each poked paper cup.
5. Fill Cup 1 with two small paper cups of sand.
6. Fill Cup 2 with two small paper cups of kitty litter.
7. Fill Cup 3 with two small paper cups of potting soil.

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Instructions-Continued

Experiment

1. Weigh one large, unpoked paper cup and record its weight.
2. Weigh Cup 1, Cup 2, and Cup 3 and record their weights.
3. Nest Cup 1, Cup 2, and Cup 3 inside large, unpoked paper cups.
4. Add a small (4 oz) paper cup of water to Cup 1 and wait 60 seconds. Separate the two paper cups and weight each cup individually.
5. Repeat Step #4 with Cups 2 and 3.
6. Analyze and discuss results.



Sand



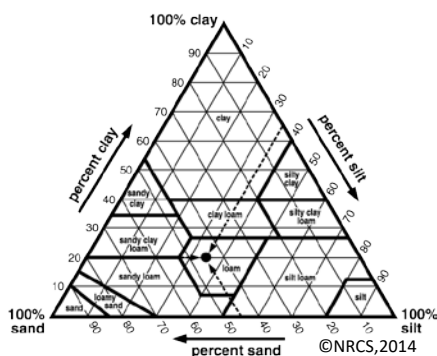
Potting Soil



Clay

Discussion Questions

1. Which of the three soil types would be best for a septic tank needing moderate infiltration? Which soil would be best for lining a settling pond? How about a groundwater recharge zone?
2. During the experiment, which soil retained the most water? Why did this happen?
3. What type(s) of soil would most likely cause flooding?



Dive Deeper

Do you have students who want to learn more about the mechanisms that drive water infiltration in soils? Head over to 'NRCS Water Movement in Soil' <https://www.youtube.com/watch?v=vmo0FRAVgkM> to get a scientist's explanation about how water moves through soil.

Additional Resources

- ◆ USGU Water Science School- <https://water.usgs.gov/edu/watercycleinfiltration.html>
- ◆ Environmental Education For Kids- <http://dnr.wi.gov/org/caer/ce/ee/earth/groundwater/infil.htm>
- ◆ Agriculture in the Classroom- <http://www.soils4kids.org/files/s4k/perkin.pdf>



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The Science of Infiltration

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1. Start by measuring all the cups before you add water.

	Weight Top Cup (one with soil)	Weight Bottom Cup (empty)
Cup 1 Sand		
Cup 2 Potting Soil		
Cup 3 Clay		

2. Now let's figure out where the water ended up. Measure how much water infiltrated the soil and ended up in the bottom cup and compare it with how much water the soil absorbed in the top cup.

	Weight Top Cup (after experiment)	Weight Bottom Cup (after experiment)
Cup 1 Sand		
Cup 2 Potting Soil		
Cup 3 Clay		

3. Which soil type allowed the **most** water to infiltrate through?

4. Which soil type allowed the **least** water to infiltrate through?
