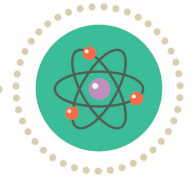


WINTER SCIENCE



The Freeze Thaw Effect



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Objectives

- Make observations of water expansion when frozen, and impact on moist soils.
- Explain process and impact of frost heaves on weathering and erosion.

Materials

- Wide mouth paper cups
- Rulers
- Water
- Sediment/soil
- Freezer
- Pencil or Sharpie
- Paper or worksheet to record measurements



Lesson Plan

- 1 Have students each fill three sample cups to the same level, about half full. The first should contain dry soil, the second should contain water and the third should be filled with soil and water mixed to create a moist, packable mud. The mixture should not be too wet and soupy. Soil and mud cup contents should be packed down and leveled.
- 2 Have students record their observations of how their samples look once they are prepared.
- 3 They will then carefully mark the top of the water or soil levels in each sample cup with a pencil or Sharpie before placing the cups in the freezer overnight (if it is cold enough, these could also be placed outside).
- 4 When they are removed from the freezer, students will again mark the top of the soil or water in the cups. Students should record observations of the frozen surfaces, then remove and

discard the contents of the cups and measure any change in the height of the contents between room temperature and frozen states.

- 5 Students construct an explanation of their results based on evidence of observed changes in the surfaces, the role of water in this experiment, and how the movement and presence of water could impact the natural environment in winter.
- 6 Can students relate their observations to the frequency of potholes in roads throughout winter and into spring?



What's Going On?

Water plays a significant role in weathering and erosion of Earth's surface. As water freezes, it expands, producing frost heaving of natural and manmade surfaces. Repeated cycles of freezing and thawing throughout the winter increase the amount of weathering, breaking up some surfaces.

To learn more about how matter changes, consider booking the Liberty Science Center Traveling Science Program, *The States of Matter!*