



Sinkholes: Getting to the Bottom of the Problem

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Purpose

- In this lesson students will plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. (NGSS – HS-ESS2-5)
 - See the attached NGSS Spreadsheet.
- Determine central ideas or themes of a text and analyze their development; summarize the key supporting details and ideas. (CC ELA – College and Career Readiness Anchor Standards for Reading - 2)

Overview

This activity provides an opportunity for students to investigate the relationship of water and Earth materials in the formation of sinkholes. Through reading and experimental testing students will design and create a model to show how a sink home might occur. Students will present their findings to the class and discuss their successes and failures.

Student Learning Targets

NGSS

- Students will be able to define a sinkhole and explain how it occurs.
- Students will be able to create a model of a sinkhole using lab materials.
- Students will be able to use a computational model to determine the feasibility of their model.
- Students will create and test a model that represents water’s ability to transform the earth through dissolving limestone bedrock.to form sinkholes.
- Students will be able to explain the chemical reaction between acid rain and limestone.

Computational Thinking

- **Data & Information** (Manipulating Data, Analyzing Data, Visualizing Data)
- **Computational Modeling** (Using a model to identify/test solutions)



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Time

3-5 42 minute periods.

Level

High School Basic Chemistry – Differentiated for different readiness levels.

Materials and Tools

- Computer with internet and **NetLogo** (<https://ccl.northwestern.edu/netlogo/>)
- Worksheets and NetLogo model found [here](#).
(<https://northwestern.box.com/s/7qn0i21p71mrwzt7mql7yeff7ijhmma2>)
- Sugar cubes
- Sugar
- Salt
- Mini boxes for earth simulation
- Clay
- Bread
- Water and water droppers
- Weights to simulate buildings
- Any other materials you would like to provide your students so they can maximize their own scientific reasoning.

Preparation

Students will need instructions on how to access NetLogo in your computer environment.

Prerequisites

None

Background

All background is located in the student's packet.

Teaching Notes

You will need to decide how much guidance you provide your students in their model building. My belief is they don't need much. They have amazing problem solving skills, as long as you don't expect only one answer. The goal is to make a sinkhole.

Assessment

Reference the NGSS Worksheet.