

Sink hole! Demonstrate sink hole processes in action

Set up your own sink hole demonstration:

- take a plastic container like those used for takeaway food;
- skewer or drill two holes into one end of the container without splitting it;
- take the cardboard centre of a toilet roll and cut it down to make a tube the height of the food container and around 2 cm in diameter
- place the tube upright in the container and pack gravel around it, filling the container around two-thirds full (Figure 1);



Figure 1. Preparing the sink hole model.
(Photos in Figures 1 to 4, Suzy Allen and Gwyn Jones).

- fill the tube with table salt to around the same level as the gravel, and then carefully lift out the cardboard tube, twisting it slightly as it is removed;
- cover the whole container, including the salt, with a thin layer of gravel;
- cover the gravel with a 0.5 cm thick layer of dry sand;
- stand small items to represent buildings or cars in different places on the sand, including over the salt.

Carry out the demonstration as follows.

- place the food container with the holes overlapping a sink or other container to catch water (Figure 2);



Figure 2. The sink hole model ready to run.

- place a small funnel in the end of the container away from the holes;
- connect a tap to the rubber tubing and place the other end in the funnel;
- turn on the tap until the container fills with water, then reduce the flow to a steady drip;
- observe the results – the ‘sink hole’ usually begins forming and the ‘building’ begins to sink after around five minutes;
- continue until the results seen in Figures 3 and 4.



Figure 3. Going!



Figure 4. Gone!

Discuss the demonstration with the pupils.

- Ask how close the model is to what actually happens in the ‘real world’ (A. Sink holes can form unexpectedly, and without any previous sign at the surface, as seen here; they do form when underground materials are dissolved by flowing groundwater and the surface collapses; they can form as fast as in the demonstration, or faster or more slowly; whole houses or cars can disappear down sinkholes).
- Ask how the demonstration is different from ‘real world’ sink hole events (A. The scale is much smaller than the ‘real world’; although rocksalt can be one of the underground materials that dissolves to form sink holes, sink holes in limestone are a lot more common than over salt deposits; sink holes can also form over other soluble underground materials, such as gypsum).
- Ask what it would be like to live in an area where sinkholes often suddenly appear (A. Scary!)

The back up

Title: Sink hole!

Subtitle: Demonstrate sink hole processes in action

Topic: A classroom demonstration of sink hole processes and their effects.

Age range of pupils: 5-20 years

Time needed to complete activity: 20 minutes to set up, 30 minutes to run.

Pupil learning outcomes: Pupils can:

- explain how sink holes can develop by the dissolving of underground materials;
- describe the potential impacts of sink holes.

Context:

Sink holes commonly form over limestone bedrock, but also develop where the underlying materials are even more soluble, such as rock salt and gypsum deposits. This classroom activity models the dissolving of underground materials and the impacts this can have at the surface (Figure 5).



Figure 5. Sink hole in a parking lot at Yellowstone National Park, USA.

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Following up the activity:

Pupils could undertake an internet search for examples of devastating sink hole activity.

Underlying principles:

- Sink holes are caused by the removal, usually by dissolving, of materials below the Earth's surface; the most common materials removed are limestone, rock salt and gypsum deposits.
- Since surface materials can be relatively strong and brittle, sink holes can cause the surface to subside quickly, sometimes with devastating results.

Thinking skill development:

Linking the effects seen in the model to reality is a bridging activity. Discussion of the match between the model and reality can involve construction and cognitive conflict.

Resource list:

- plastic container, like those used for takeaway food
- skewer or drill to make small holes at one end of the container
- small filter funnel
- water supply and container to catch the draining water
- length of tubing connected to the water supply
- cardboard tube
- scissors
- gravel, sand
- table salt
- small items to represent buildings or cars

Useful links:

Try putting "sink hole" into a search engine like Google™ and clicking on 'images' to see a wide variety of sink hole situations.

Source: The original sink hole model was developed on a larger scale and demonstrated at an Earth Science Education Unit facilitator meeting by Roger Mitchell of Ripple Primary School, London. The smaller version described here was developed by Suzy Allen and Gwyn Jones, of the Education Department at Keele University, UK.

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