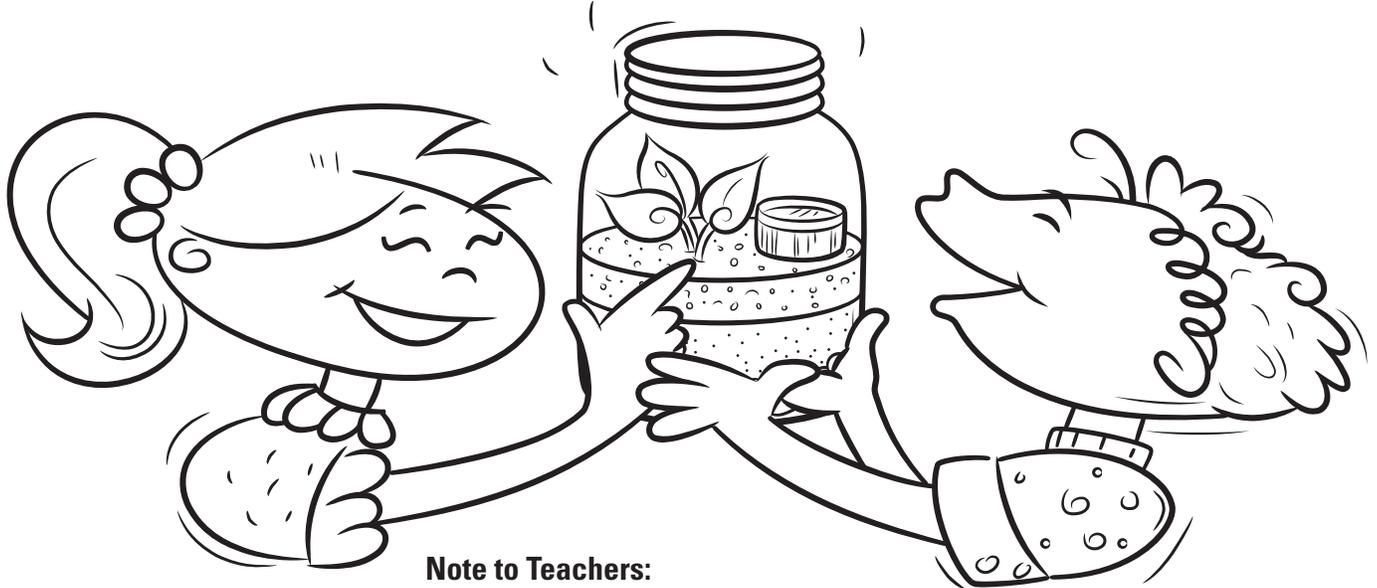




Quick and Easy Water Science



Note to Teachers:

Here are some simple, fun (and in one case delicious) experiments to do with your class which will demonstrate:

- the value of water
- the science of water
- the need for conservation
- the importance of caring for our environment

Each one has the appropriate grade level listed at the top. These exercises make for excellent group discussion afterward – either on the specific experiment, or on the broader topics listed above. Enjoy!



Region of Waterloo

WATER Ours to
Protect & Conserve

How to Make an Aquifer That's Good Enough to Eat

Appropriate for Grades 2 to 6

An aquifer is an underground area that holds large amounts of water in tiny spaces between rocks and sediment. Get students involved in constructing a fun and easy model of this important source of drinking water.

Instructions:

In a glass cup:

- Create a layer of crushed ice, gummy bears and chocolate chips on the bottom. This represents the sand and gravel that make up an aquifer.
- Cover the first layer with lemon-lime soda, which replicates rain water. Your aquifer is now filled with “water” that can be brought to the surface for your demonstration below.
- Add ice cream, which will act as a “confining layer”, just like clay.
- Optional: Add a layer of crushed ice to represent the “unsaturated zone” where both water and air exist.
- Finally, scatter chocolate sprinkles on top. This represents the layer of soil at the surface.

To demonstrate how easily groundwater can become contaminated, pour a different coloured soda (representing contaminants) over the top and watch it make its way through the layers. Then, **using a straw, “drill” a well into the centre of your aquifer.** “Pump the well” by slowly sucking on the straw. Have students observe the movement of the coloured soda (contaminants) through the layers towards the opening of the straw. This simulates what happens in real life when contaminants seep into the ground.

Question to ask students:

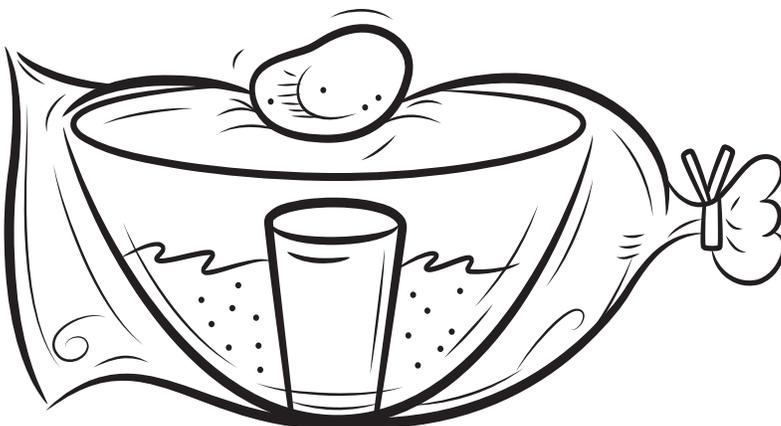
How hard do you think it is to remove contaminants from an aquifer? Why?



Clean Water for Life

Appropriate for Grades 2 to 6

Learn how the sun assists in cleaning water through the process of evaporation.



In Canada, we're lucky to have clean, safe drinking water. However, in many parts of the world clean water is not available. Where that's the case, people can make their water clean with the help of the sun. To demonstrate how this works:

1. Mix a small amount of dirt with one litre of water.
2. Pour the dirty water into a large bowl.
3. Put a small glass in the centre of the large bowl.
4. Put the large bowl into a plastic bag and seal it shut with a twist tie or a piece of string.
5. Put a rock on the plastic over the glass.
6. Leave the water experiment in the sun all day.
7. Remove the plastic. What do you see?

Water Cycle – The States of Matter

Appropriate for Grades 3 to 6

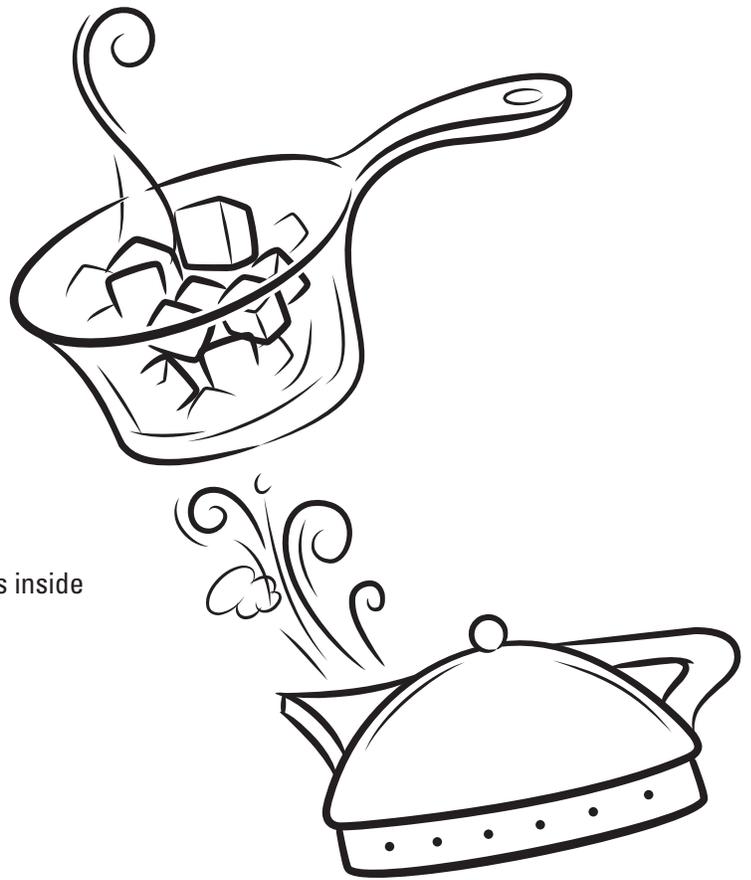
Teacher/adult should perform this experiment while children observe.

Identify the three states of matter: solid, liquid, and gas using this simple experiment.

- Boil water in a kettle and keep it boiling.
- Place ice cubes in a clear glass pot.
- While the water is boiling, hold the pot over the kettle and encourage children to make observations on what happens inside and outside the pot.

Questions to ask during the demonstration:

1. What happens to the ice cubes in the pot?
2. What happens to the water in the kettle?
3. What happens when the steam hits the bottom of the pot?



The Water Cycle in Action

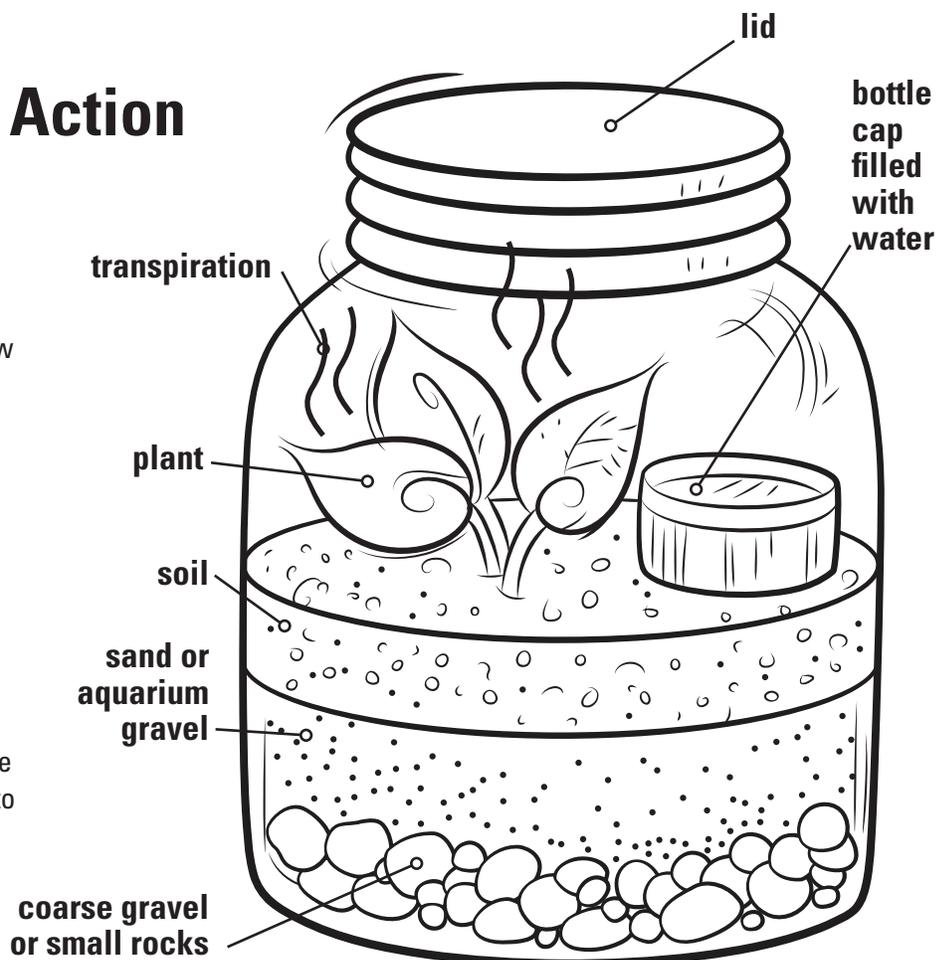
Appropriate for Grades 4 to 6

Water is constantly moving through the “hydrologic” or water cycle, changing form as it moves through various stages. Create your own mini-version of the cycle with a few common items.

You will need:

- A clear plastic or glass jar
- Small plants (such as ivy)
- A bottle cap filled with water
- Topsoil or potting soil
- Sand or aquarium gravel
- Small rocks or coarse gravel for drainage

Fill the jar as in the picture. Water plants as needed. When plants are established, put the lid on the jar and put on a sunny windowsill to see how the water cycle works.



Experiments Discussion Guide

How to Make an Aquifer That's Good Enough to Eat

The coloured soda represents harmful contaminants (e.g. fuels, chemicals, nitrates) that can affect the safety of our drinking water. Once in the water, contaminants are very difficult to remove. They can get into the groundwater supply by being sucked into a well or leaking through layers of soil and rock. That's why it's important to protect our water from harmful substances so that they don't have a chance to hurt us.

Clean Water for Life

After a day in the sun, the water in the small glass should be clean and clear. When water evaporates, it leaves behind all of its impurities. Therefore, only pure water evaporates and condenses on the plastic, which then ends up in the glass.

Water Cycle – The States of Matter

In this experiment, water exists in all three states: solid (ice), liquid (water) and gas (steam).

1. When they are exposed to heat, the ice cubes will melt, changing from a solid to a liquid. This demonstrates that adding heat is one way to change the state of a substance.
2. By adding heat to cold water using a kettle, it changes the water from a liquid to a gas. This is called "water vapour".
3. When the rising steam from the kettle comes in contact with the cold pot, it condenses into water droplets which will form on the outside of the pot. This simulates what happens when water in a cloud condenses, comes into contact with cool air, and then falls as rain.

The Water Cycle In Action

By adding an open container of water, you're simulating evaporation from surface water. The sun will heat up the water, causing it to evaporate. Water will then condense and fall as precipitation. The plants will also give off water which will rise – this demonstrates the process of "transpiration".



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