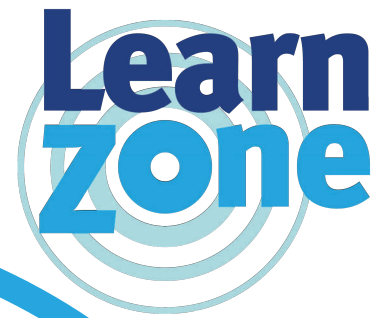


**WaterAid Water Wise**  
Key stage 2/3 activities



# Pumping it up (how pumps work)



WaterAid transforms lives by improving access to safe water, hygiene and sanitation in the world's poorest communities.

Registered charity numbers 288701 (England and Wales) and SC039479 (Scotland)

## Pumping it up

Everyone needs clean water. Without it, we couldn't survive. But if you don't live on the shore of an unpolluted lake, pond, river, or stream, where can you get it? The answer may surprise you!

The ground below you is solid, right? Well think again. In most places, the earth material under your feet isn't completely solid. It's made up of layers that can have all sorts of tiny spaces. Liquids such as water can flow through these gaps and collect in these spaces, forming an underground store of water.

In order to access this source of water, people need to drill down into the ground. When the drilling is finished, a pipe is inserted into the hole. A pump attached to the pipe brings the underground water to the surface.

In this activity, you'll build a model that shows the underground storage of water. Then, you'll "drill" into this water-soaked layer and use a mechanical pump to transport water.

## Materials

- ⇒ Large, clear plastic container
- ⇒ Small pebbles
- ⇒ Potting soil
- ⇒ Spoon
- ⇒ Measuring cup
- ⇒ Plastic cup
- ⇒ Pump mechanism (from a plastic spray bottle)
- ⇒ Access to water

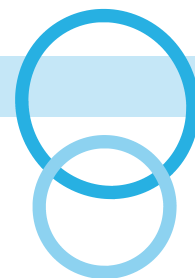


## Steps

1. Use your spoon to carefully add pebbles to the container forming a layer that's about one and a half inches (about 4 cm) deep. Make sure to spread the pebbles evenly.
2. Use the spoon to cover the pebbles with a layer of potting soil that is about  $\frac{3}{4}$  inch (about 2 cm) deep.
3. Fill a cup two thirds (about 160 ml) full with tap water.
4. Gently pour a stream of water across the soil's surface. Make sure to keep moving the cup so that the water is spread evenly over the surface.
5. Observe how the water collects in the pebble layer. Continue adding water to the soil, until most of the pebble layer is soaked in water.
6. Insert the tube from a pump mechanism through the soil into the water soaked layer.
7. Use a clean cup to collect the pumped water. When the cup is in place, press down on the pump plunger. What happens?
8. Describe the appearance of the water that is pumped to the surface.
9. Remove as much water as you can from the pebble layer. Measure it. How does this amount of water compare to the total amount of water that was poured onto the soil?

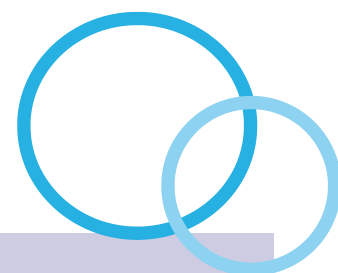


## Pumping it up: Questions



Name:

1. Compare and contrast the appearance of soil with pebbles.
2. What happens to the water that is poured onto the soil's surface in step 4? How can you tell?
3. What role does gravity play in the behaviour of water in this activity?
4. What did the spray pump represent?
5. Why did you need to press the pump's plunger?



## Water facts

- ⇒ 97.5% of the earth's water is saltwater. **If the world's water fit into a bucket, only one teaspoonful would be drinkable.** (HDR)
- ⇒ The average person in the UK uses **160 litres of water** every day.
- ⇒ The average person in the developing world uses **10 litres of water** every day for their drinking, washing and cooking. (WSSCC)

Find out more water facts and download more worksheets at [www.wateraid.org/learnzone](http://www.wateraid.org/learnzone).



## Teacher notes

This activity offers students the opportunity to model the percolation of water through earth materials. Students can observe the effects of gravity as the water seeps into the deeper layers below. The formation of a sub surface water storage is also observed.

Students will also relate this hands-on experience to the use and technology of pump devices. They will observe how the well depth is associated with reaching water stores. They'll also construct an understanding how a mechanical pump is used to produce a source of surface water.

Make sure that all materials used in this activity including the pebbles and pump have been thoroughly cleaned. Do not collect soil for this activity, but instead use clean packaged potting soil. If pebbles are not available, substitute aquarium gravel, but be aware that their smaller size might result in plugging up the pump. If this is a problem, have students propose and introduce engineering solutions that addresses this challenge.

## Answers

1. Soil is a mix of materials and has finer particle size. Pebbles are small rocks.
2. It soaks through the soil. You can see it accumulate in the spaces between the pebbles.
3. It causes the water to seep and flow downward through the soil and pebble layers.
4. A water pump that can transport water from beneath the ground to the surface.
5. You needed to add energy in order for the pump to lift the water.



Photo: WaterAid/Jon Spaul

