# TAKE & MAKE KIT Geology & Water

TIME: 45 minutes + 5 days to watch your plant grow CONTAINS SMALL PIECES

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# What's in this kit?

There is water all around the earth but did you know that right below our feet, there is groundwater that plays an important role in our daily lives?

#### You will learn:

- Geology science
- The water cycle
- Growing plants
- Effects of water pollution

# Let's Get Started!

## Materials Tools

Clear plastic bottle

2 oz sand

1 color tablet

2 oz pebbles x2

1 square of black mesh fabric

5.5 oz garden soil

1 oz grass feed

Cup of water

Scissors Pipette

# Vocabulary

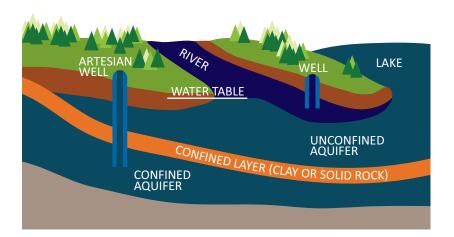
**Aquifer**: An aquifer is a body of porous rock or sediment saturated with groundwater (Nat Geo)

**Water table**: The upper level of an underground surface in which the soil or rocks are permanently saturated with water (Britannica.com)

**Permeability**: Measure of how easy liquids or gases can pass through geologic material (Encyclopedia.com)

**Porosity**: Measure of how much room there is available in geologic material (Encyclopedia.com)

**Water cycle**: Describes how water evaporates from the surface of the earth, rises into the atmosphere, cools and condenses into rain or snow in clouds, and falls again to the surface as precipitation (NASA)



#### Step 1 - Prepare the bottle

Take a clear plastic bottle and remove any labeling. Use a pair of scissors and cut the bottle in half.





#### Step 2 - Create the aquifer

Pour the sand into the bottom half of the bottle. Take one container of pebbles and pour it on top of the sand. Pour some clean water on top of these layers until you see the water at the surface of the pebbles.

You've created an aquifer with groundwater!





#### Step 3 - Create the water table

Take the top half of the bottle and place it with the twisting lid facing down on top of the aquifer you just created.

Take the fabric mesh and lay it down along the bottom of the bottle. You can think of this as a layer of permeable sediment in the water table.





Pour the second container of pebbles on top of the mesh. Lightly pack the rest of the bottle with garden soil leaving an inch of room from the top.

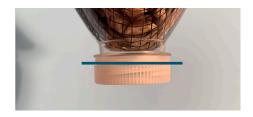
You've created an underground surface model with an **unsaturated** water table!



#### Confined VS Unconfined Layers

Right now if you were to add water to your **unsaturated** water table, there would be nowhere for the water to go except back up into the atmosphere. This is because the plastic bottle acts like a **confined layer** that would keep all the water from moving through it. In nature different types of sediment have different levels of permeability due to **porosity**. You can think of the plastic bottle like a layer of clay because it is the least permeable, meaning water cannot pass through it.

Step 4 - Create an unconfined layer







Carefully lift your water table model off the aquifer model and twist off the bottle cap just enough so that it is loose but won't fall off. Set it back on top of the aquifer model and begin to saturate your water table.

Watch carefully as you add water. You don't want any water to overflow!

It may take some time but you want to slowly saturate all the layers until some water begins to leak out of the cap into the aquifer. If you can see that all the garden soil is saturated but no water is coming out of the cap then you may want to VERY carefully loosen the cap a little bit more.

#### Step 5 - Clean ground water

Pour the grass feed over the garden soil. Gently press into the garden soil. You do not need to cover the grass feed with more soil.

#### You did it!

You made a fantastic science model. Over the next few days a lot of amazing things will happen! First, your grass will grow! Once it gets a few inches tall you can trim it with a pair of scissors. Next, watch the **water cycle** happen! The water cycle is the continuous cycle that water moves in from the earth to the atmosphere.

The water cycle happens in three stages: precipitation, condensation and evaporation. The water in the aquifer model will evaporate and through condensation it will build up on the bottom of the groundwater model. Every time you water the grass, count it as precipitation, like rain!

# Did you know?

Keeping our groundwater clean is important! Did you know that 51% of our drinking water comes from groundwater? It also makes up 64% of irrigation for our crops! (Groundwater.org)

Think of the grass you planted like it is the food that you eat. Clean groundwater means there are less harmful things in the food that we eat and the water that we drink.

### **Growth tracker**

Place your model in a warm, sunny spot. In 5-8 days your grass should sprout. Water it with the pipette every few days. Use this space here to record how long it takes for your plant to grow.

Length (cm)	Trim Y/N
0 cm	No

# Go Beyond - Pollution





A dissolvable color tablet was included in your kit. Drop this tablet into one cup of water and use half of it to water your grass. This dyed water will show you what it looks like to have pollutants in our groundwater. What do you think will happen to your model?

Can you observe any changes in the aquifer (the bottom half)?

Keep the second half of the dyed water and continue to use it every couple of days. Can you observe any changes to your science model?

# Challenge





A pipette was included in your kit. The pipette acts like a well that can extract water from below the surface. How much water can you extract from the water table using only your pipette?

If you completed the pollution activity, how would you extract the polluted groundwater and how would you replenish it with clean groundwater?

Aquifers only contain groundwater that come directly from precipitation and what we add to it. How will you help keep our aquifers and groundwater clean?

# HANGC



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