

GROUNDWATER 101

K-
2ND

OBJECTIVES

- Recognize the difference between groundwater and surface water.
- Understand the role of precipitation for groundwater capture.

BACKGROUND INFORMATION

Groundwater is water that has flowed underground through cracks and holes in the earth's surface. Water will continue to flow underground through holes and cracks until it hits a solid rock layer. Water that is trapped between two underground rock layers creates what is called an aquifer. If the rock layer above the water has holes and cracks in it, this will allow water to flow upwards until it reaches earth's surface through a well or spring!

MATERIALS (PER GROUP OF 4)

- Clay
- Pea-sized Gravel
- 1 Large Glass Jar
- Large Piece of Paper
- Pen or Pencil
- Rocks (Smaller than fist sized)
- 1 Sponge
- Sand
- Water

ANTICIPATORY SET

Ask your students to brainstorm locations on earth where water can be found. Take several answers, then remind them that there is a lot of water stored underground! Groundwater is the focus of the activities within this lesson.

After brainstorming as a class, watch the following videos.

Links found under Resources.

- YouTube - What is Groundwater?
- YouTube - Groundwater Animation

MODELING GROUNDWATER

"Today we are going to make a model of the physical earth in a jar!"

1. Distribute the following materials to each group of 4 students: 1 Large Glass Jar, 1 Sponge, Water, Sand, Gravel, and Rocks.
2. Ask each group to pack 1/3 of the jar as tightly as possible with the earthen materials to fill in all possible spaces.
 - Note: your students may layer the materials in whichever order they choose. They must use each type of material.
3. Ask the students to use the sponge as a rain cloud and squeeze to simulate rain coming down on the earth materials. They will need to give their sponge a few good soaks to make it rain sufficiently.

QUESTION TIME!

- Did the water stay on top of the jar, or did the water soak through to the bottom? As the water settles, explain that this is known as "groundwater."
- Explain that the topmost line where the water reaches is called the water table.

ACTIVITY CONTINUED

4. Have your students continue to squeeze the sponge to simulate rain until the water reaches above the surface of the rock material. This creates "surface water."
 - This also shows what a high water table might look like. You can find high water tables at the coast, beaches, etc.

HOW DOES ROCK TYPE IMPACT GROUNDWATER?

Let's take this a step further!

1. Each group will take a new jar and fill it 1/3 with only one rock material type. Assign each group with one of the rock types to experiment with.
2. Ask your class for predictions on which earth materials will allow rain to flow underground, and which will not. Write these predictions on the board.
3. Using the sponge, each group should rain on their land surface jar three times.
4. Compare the differences in water table and surface water.
5. Look back at the predictions to see if they were correct.

GAME: MOVING WATER MOLECULES

Let's demonstrate why it is easy for water to move through rock, gravel, and sand, but not through clay. Split your class into two teams: Team Water and Team Earth.

Round #1: have the Team Earth students stand in a mass in the center of the room with their arm stretched out to their sides, not touching a partner and not within one foot of any other fingertips. Team Water will act as water molecules, walking through the spaces between "large rocks."

Round #2: Team Earth will be "gravel," with arms extended but fingertips touching. Team Water will walk through the spaces between the "gravel."

Round #3: Team Earth will be "sand," with hands on hips and elbows lightly grazing. Team Water will walk through the spaces between grains of "sand."

Round #4: Team Earth will be "clay," with hands down at their sides and shoulders lightly grazing. Team Water will try to walk between the "clay".

Have your students rank the rock types from most difficult for water to travel through to easiest. Ask: Which types of rock would it be easier to retrieve groundwater from?

PONDER

Ask your students, "Where do you think your drinking water comes from?"

Believe it or not, most of us get our drinking water from groundwater found in an aquifer!

- Use the Texas Water Development Board's Major Aquifer 3D Viewer (link is located under "Resources") to find an aquifer near your school.
- What do you think happens to the groundwater levels during a drought?
 - What about during a flood?
 - What will happen if we use too much water in our daily life?
- What do you think happens to the organisms that depends on groundwater during these times?

RESOURCES

- Aquifer in a Cup, Retrieved from <https://groundwater.org/wp-content/uploads/2022/10/Aquifer-In-A-Cup.pdf>
- Groundwater Animation. Retrieved from <http://www.youtube.com/watch?v=uQRvN6MUajE>
- Texas Water Development Board, Major Aquifer 3D Viewer Retrieved from <https://www3.twdb.texas.gov/apps/waterdatainteractive/gamsdataviewer>
- What is Groundwater? Retrieved from https://www.youtube.com/watch?time_continue=128&v=oNWAerr_xEE&feature=emb_logo

TEKS ALIGNMENT

Science (Adopted 2021):

- Kinder: (a) 1Ai, 1B, 5. (b) 1A, 1B, 1C, 1D, 1E, 1G, 2A, 2B, 3B, 3C, 5C, 5D, 10A, 11.
- 1st: (a) 1Ai, 1D, 5. (b) 1A, 1B, 1C, 1D, 1E, 1G, 2A, 2B, 3B, 3C, 5A, 5C, 5D, 10A, 10B, 11A.
- 2nd: (a) 1Ai, 1D, 5. (b) 1A, 1B, 1C, 1D, 1E, 1G, 2A, 2B, 3A, 3B, 3C, 5A, 5B, 5C, 5D, 5F, 5G



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