

Discover the water table



This activity center is part of the **Water Science** theme.

What's the purpose of this activity?

To inform participants about the groundwater part of the hydrologic cycle. People will discover the water table, groundwater as it exists in sand, and that groundwater flows through this material, which will be identified as an aquifer. This form of water occurrence will be related to the rest of the hydrologic cycle: infiltration and flow to the nearby lake.

Key messages:

- Learn that water exists in the ground
- This kind of water is called groundwater.
- Groundwater flows through the ground and is part of the hydrologic cycle

Materials:

- Hand auger
- Plastic pipe for casing (eg. 1½ inch PVC)
- Bailer or pump for removing water from casing
- Water level tape (for measuring water level in casing)
- Whiteboard & markers
- Discharge/Recharge Poster

Activity Set Up:

1. This activity requires a site where participants can drill shallow holes (up to 1 m deep) with a hand auger. The beach area at Camp Kinark is suitable.
2. The holes must intersect the water table and the material be permeable enough to allow an obvious in-flow of groundwater.
3. A means for removing water from the boring and measuring the in-flow of water by noting

the rise of water level in the casing will demonstrate groundwater flow

What will I be doing?

You will be allowing participants to discover the groundwater component of the hydrologic cycle. This will be done by drilling what is really a miniature water well. You will be able to remove water from this well and observe the replacement of that water by in-flow from the surrounding aquifer.

1. When students arrive, introduce them to the idea of groundwater.

Q: What happens to water that falls on the ground or snow that melts on the ground?

A: Water infiltrates the ground, flowing through soil pores or rock pores (or cracks). The flow is generally downward until the infiltrating water reaches the water table.

Q: Where does groundwater flow?

A: Once groundwater reaches the water table, it will start to flow towards the nearest lake or stream. However the actual direction of flow will depend on how steep the terrain is and the permeability of the materials in the ground.

2. Demonstrate how to use the augers. Kids love to get their hand on implements so this may be a bit of a free-for-all for a few minutes. Shorter students may need some help to get the auger started. Show how to rotate slowly and press downward with the rotation that allows the auger to scoop soil (usually clockwise). Only go to the top of the split part of the auger. Then bring it up, empty it, and repeat this procedure to deepen the hole.

Q: When will we hit water?

A: Get them thinking about this by pointing out the proximity to the lake and the small elevation above the lake level.

3. As the hole is deepened, the sand will probably soften and water will appear. As the hole is deepened further, sand may begin to wash in (evidence of groundwater flow). The hole can be

cased with the plastic pipe and the water level measured.

Q: How high is the water in the well compared with the lake?

A: It may be possible to visually tell. However, a string can be stretched between a stake at the well and one at the lake, adjusted to be level and used as a reference for comparing water levels at the two locations. Very likely the water in the well is higher than at the lake.

Q: What does the difference in water levels mean?

A: The elevation difference is also a difference in potential energy. Because the water level in the well is higher than the water level in the lake, the flow of groundwater will be from the area of the well toward the lake. If the water level is lower than the lake surface, then that means lake water is flowing into the ground – see diagram at right.

4. Water can be removed from the well with a pump or bailer. The new level can be measured repeatedly to watch for a rise in water level as the pumped water is replaced by in-flow from groundwater.

Q: What is happening in the well? Where is the water coming from?

A: The water level will rise. The water is coming from groundwater flow into the well.

Additional Background Information:

This activity is very likely taking place in a groundwater discharge zone that is being supplied by recharge at the top of the slope that rises behind the beach area. Thus groundwater flow originates in a recharge area where water infiltrates. This water then flows downward at an angle that depends on the topography (the steeper the terrain, the greater the downward angle of flow). Near the bottom of a slope, the angle of groundwater flow will lessen and may even rise. Together, this system is known as a groundwater flow cell. It is part of the hydrological cycle because infiltrating water has come from precipitation and the discharging groundwater (could be to the roots of vegetation, into a lake or out on the surface as a spring) is being returned to the surface to be available for stream flow, filling a lake and ultimately evaporation from any water body or transpiration from plants and trees.

Clean Up Procedures:

Casings should be removed, boreholes back-filled with

sand and the area leveled with a rake.

