



Groundwater

Materials

- 6 Student groundwater models, with 2 syringes with tubes
- 12 magnifying glasses
- 12 earth material tubes, 6 gravel and 6 sand
- 12 (100ml) graduated cylinders
- 1 Bucket for extra water
- 1 Bucket of fresh sand
- 1 Bucket for wet sand
- 1 Food coloring dropper
- 12 small pitchers for students

Supporting Information:

- **Water Use:** 41% of Arizona's water comes from groundwater
 - 82% of the water use in Arizona is Agriculture
- **Aquifers:** Groundwater is found in the spaces between rocks and sand, called an aquifer.
 - They are filled by precipitation and snowmelt, as water percolates into the ground, and as humans pump groundwater out, they drain
- **Pumping Effects:** If we pump groundwater irresponsibly, we will eventually run out.
 - Over pumping of groundwater can cause subsidence, sinkholes, and erosion
 - Once this water is gone, the spaces between the rocks collapse--reducing ground permeability and aquifer capacity, and increasing the risk of floods
- **Pollution:** Human activities like mining, agriculture, industry, and not cleaning up after pets introduces pollutants into the watershed
 - Pollution does not remain where it is introduced--it spreads throughout the watershed as groundwater moved by gravity

Set the Stage for Success:

- Model excitement with your expressions and encourage engagement by asking open-ended questions to get the students sharing their own ideas and thoughts.
- Introduce expectations about how to interact with the materials at the start. Remind students these are not toys, but scientific models we will be using to conduct experiments, and to please treat them gently so other kids can use them in the future.
- Make sure students are dividing responsibilities equitably in their group and sharing materials. Every kid should do something at least once.
- At the end of the activity, take each wet sand earth material tube and empty it into the wet sand bucket. Use cup to refill with dry sand up to the level of artificial grass.
- Kids can help reset your station whenever there is time!



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ARIZONA
project WET
WATER EDUCATION TODAY



THE UNIVERSITY OF ARIZONA
Cooperative Extension

Narrative

Min.	Directions:	What You Say:	Big Ideas:
4	<p>Gather students on blue tarp and divide into 6 groups</p> <p>Prompt each group gather around a model</p> <p>Introduce yourself and begin the lesson</p>	<ul style="list-style-type: none"> • Look at your model, tell me what do you see? • What is groundwater? • Where does groundwater come from? • Where is the water underground? • Why should we care about groundwater? 	<ul style="list-style-type: none"> • Model is a representation of the real world. • Groundwater is water that is underground. • Rain and snow that falls to ground (precipitation) and goes into the ground (percolation) • Water travels through and collects in the spaces between the grains of earth materials (rocks & sand) • We use groundwater every day. 41% of Arizona's water comes from groundwater
10	<p>Lead discussion and then direct students through investigation steps—gravel 1st, sand 2nd</p> <p>Different student per "task". One student holds tube up, while another pours 100 ml water through</p> <p>Each group counts "Colorado" seconds until the first water drop exits tube.</p>	<ul style="list-style-type: none"> • Take turns with the magnifying glass to look at the sand and gravel. What do you see? • Does groundwater move or does it stay in one place? • Will the water flow faster through the gravel or the sand? <p>[Direct groups pour water into material tubes]</p> <ul style="list-style-type: none"> • Which tube did the water flow through faster? • Why do you think the water flowed faster through the gravel? 	<ul style="list-style-type: none"> • Sand is tiny rock and there are spaces/pores between the rocks and grains of sand • Gravity causes water to move underground just like it does on the surface • Water flows between these spaces/pores • Sand does not absorb water • The larger the spaces the faster the water will flow

Min.	Directions:	What You Say:	Big Ideas:
10	<p>Direct students to fill up 1L containers with water</p> <p>Students pour 1L of water into the model</p> <p>Two new students pump water from the model into the 1L containers</p> <p>Make sure to pump from the blue tubes (wells)</p>	<p>[Instruct students to get water and pour water into model]</p> <ul style="list-style-type: none"> Look at the side of the model. Do you see the groundwater? We know what groundwater is, so what is surface water? Do you see any in our model? <p>[Have students pump water out]</p> <ul style="list-style-type: none"> What happens as we pump water out? What happened to the lake? What happens if we keep pumping and don't add water? Are groundwater and surface water connected? 	<ul style="list-style-type: none"> The height of groundwater is called the water table. Surface water is water above ground. There is a lake in our model The water percolated through the grass because of gravity, in turn the water table went up. Ground and surface water rise when water is added and lower when we pump groundwater If we keep pumping groundwater without any being added, ground and surface water decrease Groundwater & surface water are connected.
4	<p>Direct 2 students to pour water back into the model</p> <p>Volunteers add a few drops of food dye into the lake</p> <p>Students pump ALL the water out of the model</p>	<ul style="list-style-type: none"> What do you think the syringes and blue tubes represent in our model? How does water get from underground to our homes and businesses? <p>[Add food dye. Students pour water into the model and students pump ALL water out]</p> <ul style="list-style-type: none"> What does the food coloring represent? What happened after we added the pollution? Why was the water you pumped out green? 	<ul style="list-style-type: none"> Syringe represents pumps and blue tube represents wells We use technology (wells, pipes, plumbing, and canals) to access groundwater Pollution spread through the groundwater and got pumped out by our wells Any pollutants that might get added to our groundwater supply get pumped
2	<p>Review big ideas</p> <p>Begin to reset your station and pour dyed water into dye container</p>	<ul style="list-style-type: none"> What is groundwater? Does groundwater move underground? How? Is groundwater connected to surface water? Why do we care about groundwater? 	<ul style="list-style-type: none"> Groundwater is water that is underground. Groundwater does move underground because of gravity Yes, groundwater is connected to surface water We use it for our everyday needs, and don't want to pump it out before it can replenish