

The Wonderful World of Water

Advanced Water Cycle Activity

Overview

Students will learn about states of matter and how water flows through earth's surface and atmosphere. They will also learn about how water cycles within human uses.

Background

- What forms does water come in?
 - Solid, liquid, gas
- What is a water cycle?
 - The 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. Then starts the process again
 - Evaporation- the process of a liquid turning into a vapor or gas
 - Condensation- the process of a liquid turning into a vapor or gas
- What influences the movement of water?
 - Temperature- the colder the water the slower it goes and vice versa
 - Gravity- gravity helps determine the direction of water (water runs downhill)
 - Obstacles- physical objects may block the path of water
- How is rain/snow made?
 - Water is evaporated from the earth's surface and it condenses in the clouds. When it gets too heavy, gravity pulls it back towards Earth's surface.
- Where does water collect on earth?
 - Clouds, animals, lakes, rivers, oceans, groundwater, soil, glaciers, and plants.
 - Humans are made up of about 60% water.
 - 71% of the earth's surface is covered by water.
- How do animals help in the transportation of water?
 - The animal or human consumes the water and it leaves the body through sweat, respiration, and digestion.
- How do plants help with the movement of water?
 - Plants take up water from the soil and use it to convert nutrients into food. Then the water is evaporated from the leaves when it is exposed to air and sunlight. This is called **transpiration**.
- What are some ways that humans use water in a rural setting?
 - Septic system, well, irrigation, desalination (ocean)
- What are some ways that humans use water in an urban setting?
 - Waste water, water treatment, industrial uses, recreation (can also be rural)
- How do these uses affect the movement of water?
- Is there just one path that water takes during the water cycle? Or are there many places that it can go? Let's find out!

Supplies

- 19 Station signs
- 19 types of colored beads
- Pipe cleaners (enough for each person)
- Tags with color key (enough for each person)

Set up

Label **nineteen** stations with the included signs (soil, lake, plant, ground water, rivers, animals, ocean, clouds, glaciers, rural, water treatment, septic system, well, irrigation, waste water, desalination, urban, industry, and recreation). At each station set up corresponding beads with the signs. Each sign should have a container of matching beads (black, blue, green, orange, purple, red, turquoise, white, and yellow and the clear version of each of these colors). At each station there should be a corresponding spinner (labeled on the back).

Directions

- Explain to the students that they are going to represent water molecules as they move through the earth's surface and atmosphere.
- Give each student a tag and pipe cleaner
- Attach the tag to one end of the pipe cleaner
- Disperse students among the stations in equal numbers (or close to)
- Students stand in a single line
- When a student reaches the beginning of the line, they collect 1 bead from that station and spin the spinner
- Whatever the spinner lands on that is where the student will move to next. If they spin the same station they go to the end of the line at the same station.
 - Example: student starts at plant station and spins animal, the student moves to animal station
 - Example: Student starts at cloud and spins stay at cloud, the student goes to the end of the line at the same cloud station
- Once student has moved to the next station they may begin the process again.

(All of this may be a timed activity or you may tell the students to collect a certain amount of beads.)

- Once the time has run out or the students have collected their maximum number of beads, the game is over.
- Students may then reflect on how and where they moved through the activity. You can use the activity reflection worksheet and the *Water Cycle Table* to help discussion along. The Explanation Table can help guide through the process with explanations for each movement.

Explanation Table

Station	Spinner option	Explanation
Soil	<ul style="list-style-type: none"> ● One plant ● One river ● One groundwater ● Two clouds ● One stay 	<ul style="list-style-type: none"> ● Water is absorbed by plant roots ● The soil is saturated, so water runs off into a river ● Water is pulled by gravity; it filters into the soil ● Heat energy is added to the water so the water evaporates and goes to the clouds ● Water remains on the surface (perhaps in a puddle or adhering to a soil particle)
Plant	<ul style="list-style-type: none"> ● Four clouds ● Two stay 	<ul style="list-style-type: none"> ● Water leaves the plant through the process of transpiration ● Water is used by the plant and stays in the cells
River	<ul style="list-style-type: none"> ● One lake ● One groundwater ● One ocean ● One animal ● One clouds ● One stay 	<ul style="list-style-type: none"> ● Water flows into a lake ● Water is pulled by gravity; it filters into the soil ● Water flows into the ocean ● An animal drinks water ● Water evaporates and goes to the clouds ● Water remains in the current of the river
Clouds	<ul style="list-style-type: none"> ● One soil ● One glacier ● One lake ● Two ocean ● One stay 	<ul style="list-style-type: none"> ● Water condenses and falls on soil ● Water condenses and falls as snow onto a glacier ● Water condenses and into a lake ● Water condenses and falls into the ocean ● Water remains as a water droplet clinging to a dust particle

<p>Ocean</p>	<ul style="list-style-type: none"> • Two clouds • Four stay 	<ul style="list-style-type: none"> • Heat energy is added to the water, so the water evaporates and goes to the clouds • Water remains in the ocean
<p>Lake</p>	<ul style="list-style-type: none"> • One groundwater • One animal • One river • One clouds • Two stay 	<ul style="list-style-type: none"> • Water is pulled by gravity; it filters into the soil • An animal drinks water • Water flows into a river • Heat energy is added to the water; so the water evaporates and goes to the clouds • Water remains within the lake or estuary
<p>Animal</p>	<ul style="list-style-type: none"> • Two soil • Three clouds • One stay 	<ul style="list-style-type: none"> • Water is excreted through feces and urine • Water is respired or evaporated from the body • Water is incorporated into the body
<p>Ground Water</p>	<ul style="list-style-type: none"> • One river • Two lake • Three stay 	<ul style="list-style-type: none"> • Water filters into a river • Water filters into a lake • Water stays underground
<p>Glacier</p>	<ul style="list-style-type: none"> • One groundwater • One clouds • One river • Three stay 	<ul style="list-style-type: none"> • Ice melts and water filters into the ground • Ice evaporates and water goes to the clouds (sublimation) • Ice melts and water flows into a river • Ice stays frozen in the glacier

<p>Rural</p>	<ul style="list-style-type: none"> ● Three septic system ● One clouds ● One irrigation ● One animals 	<ul style="list-style-type: none"> ● Water is used in wastewater/septic systems ● Water evaporates and goes to the clouds ● Water is used to water crops ● Water is used to water animals
<p>Water treatment</p>	<ul style="list-style-type: none"> ● Two stay ● One industry ● Two urban ● One groundwater 	<ul style="list-style-type: none"> ● Water stays in the treatment facility ● Water is used for industrial purposes ● Water is filtered and used in the urban setting ● Water is infiltrated into the ground
<p>Septic System</p>	<ul style="list-style-type: none"> ● Four soil ● Two stay 	<ul style="list-style-type: none"> ● Water is filtered through the septic system and goes directly into the soil ● Water stays in septic system to be filtered
<p>Well</p>	<ul style="list-style-type: none"> ● One irrigation ● One animals ● Two rural ● One stay ● One industry 	<ul style="list-style-type: none"> ● Water is used to water crops ● Water is used to water animals ● Water is used for houses ● Water stays in the well ● Water is used for industrial purposes
<p>Irrigation</p>	<ul style="list-style-type: none"> ● One soil ● Two plant ● One animals ● One river ● One clouds 	<ul style="list-style-type: none"> ● Water infiltrates into the soil ● Water is absorbed by plants ● Animals drink the water ● Water runs off into river ● Water evaporates and goes to the clouds

<p>Waste Water</p>	<ul style="list-style-type: none"> ● One river ● One urban ● One irrigation ● One clouds ● One industry ● One groundwater 	<ul style="list-style-type: none"> ● Water is dumped directly into the river ● Water flows through urban sewers ● Water is sprayed onto fields ● Water evaporates and goes to the clouds ● Water is reused for industrial purposes ● Water infiltrates into the ground
<p>Desalination</p>	<ul style="list-style-type: none"> ● Two urban ● One stay ● One irrigation ● One clouds ● One industry 	<ul style="list-style-type: none"> ● Water from the ocean is used in urban setting ● Not all water is used ● Water is used for watering crops ● Water evaporates and goes to the clouds ● Water is used in factories and construction
<p>Urban</p>	<ul style="list-style-type: none"> ● One clouds ● One plants ● Two wastewater ● One river ● One soil 	<ul style="list-style-type: none"> ● Water evaporates and goes into the clouds ● Water is used to water plants ● Water is used in a house (laundry, toilet, shower, etc.) ● Water runs off into river ● Water is infiltrated into soil
<p>Industry</p>	<ul style="list-style-type: none"> ● Two industry ● Two wastewater ● Two clouds 	<ul style="list-style-type: none"> ● Water stays where it is or is recycled for the same purpose ● Water is used and transported as waste ● Water evaporates and goes to the clouds

Recreation	<ul style="list-style-type: none">• One plants• Two river• One lake• One animals• One ocean	<ul style="list-style-type: none">• Water is used to water plants• Water is in the river we use• Water is in the lake that we use• Water is used to water animals/pets• Water is in the ocean we visit
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Activity Reflection Worksheet

1. Fill in the *Water Cycle Table* to explore how water moves from place to place.
2. Is the water cycle a straight path or are there many different directions and places that water can go? Why?
3. Did you have to repeat a station more than once? Why would water get stuck in one cycle for a long time?
4. Did you stay in the same state the whole time? (liquid, solid, or gas) Why or why not?
5. How do the uses of water affect the way it moves through the cycle? Does it hold it back?

