

Water Works

Environmental Education Lesson
EDWARDS CAMP AND CONFERENCE CENTER

SUMMARY

Students will learn the basics about the water cycle. They will learn about the water on Earth, how much there is, what we use it for, and how to conserve it.

USAGE

Grade levels: 3rd-6th

OBJECTIVES

Upon completion of this lesson students will...

- Be able to explain the water cycle
- Be able to state how much usable water is on the Earth
- Be able to explain ways to conserve water

In addition students could...

- Gain a better understanding of how the water cycle really works
- Gain a better understanding of how much water we use on a daily basis

MATERIALS

- “Traveling Raindrop” sheets
- Station Cards and spinners(8)
- Dry erase markers
- Water bottle, cup, spoon
- Water Cycle Signs
- Water Relay blocks
- Water Relay fact sheet (Attached at the end of the lesson plan)

BACKGROUND INFORMATION

Water is very important to our everyday life. Earth’s water is the same water that was here since the beginning of time. We never get new water; it is just recycled through what is called the water cycle. No one can say where the water cycle actually starts. What happens is the sun evaporates water from oceans, lake, and seas. To help the evaporation plants transpire. Basically it’s the plants version of sweating. After evaporation condensation happens, essentially the water is cooled down in the atmosphere and forms clouds. When the clouds get too heavy precipitation (rain, snow, sleet) starts.

However, the water cycle isn’t a continual circular motion, it can vary. The water goes to rivers, oceans, plants, animals and other places; therefore it may not directly evaporate into the atmosphere.

There is plenty of water on the Earth to keep the water cycle going for a long time. Actually 75% of the Earth’s surface is covered in water. However, 97% of the water is at the moment unusable saltwater. There are desalination plants that can remove excess salt from water to change into fresh water; it is very popular in the Middle East where fresh water is scarce. The leaves only 3% of water that is fresh. Glacier and ice

caps take 2% of the world's water. That leaves 1% of water left and more than half of that is underground, and unattainable by us. As a result, less than half of 1% of the world's water is usable by humans.

People use a lot of water in many different ways on a regular basis. We use water for lawns, dishes, clothes, toilets, hygiene, drinking, and the production of food and materials to name a few.

Because there is limited amount of water for us to use and we have many ways of using it we need to learn how to reduce the waste of water. There are many ways for us to do that. Most of them are common sense. Don't leave the water running while doing the dishes, brushing your teeth, or to get cold when getting a glass. Only use machines such as the washing machine or dishwasher when it is full. Take shorter showers. These are just a few ways to be conscientious about your water waste.

WARM-UP ACTIVITIES (The Water Cycle) 10 minutes Materials needed-Possibly a chalk or dry erase board.

Start a discussion with the group to start them thinking about water. You can write the answers on a board. What are some essential things we need to survival? Food, water, and shelter. You can go three weeks without food, three days without water, and three hours without shelter. Today we are going to talk about water. Obviously, water is very important to our everyday life. How long do you think the water that you drank today has been around on the Earth? We never get new water. The water is just recycled through what is called the water cycle. Can anyone tell me the beginning of the Water Cycle? That is a trick question; the water cycle doesn't really have a starting point. What happens is the sun evaporates water from oceans, lake, and seas. Assign students to represent the sun, water, and evaporation, give them the 'Sun', 'Water' and 'Evaporation' signs. In addition to the sign a sound or action can also be assigned. Has anyone seen water boiling for tea? The water that is coming out of the tea pot is evaporating. The water evaporates into the atmosphere, cools down and turns into water, forming clouds. That process is called condensation. Assign two more student to represent clouds and condensation, giving them the 'Cloud' and 'Condensation' signs. These students may also be given a sound or action in addition to the sign. When you are relaxing on a hot day drinking a cold glass of Coke, how many people have ever had water on the outside of your glass? The water from the air is cooling down and condensation is happening on your glass. After condensation happens the air and clouds will get too heavy and it will start raining (or snowing or sleet depending on the weather). That is called precipitation. Assign another student should be chosen to represent precipitation. He/she will be given the sign. A noise or action is also optional. Take that same glass of cold Coke on a hot summer's day, when the water starts to drip; there is too much water on the cup for the outside to hold, so it starts dripping. Make sure after explaining every stage you are going back and repeating what each student is representing and having them do their movement/sound if one is assigned. .

Transition: Precipitation comes down on the Earth in many different forms. One form is rain.

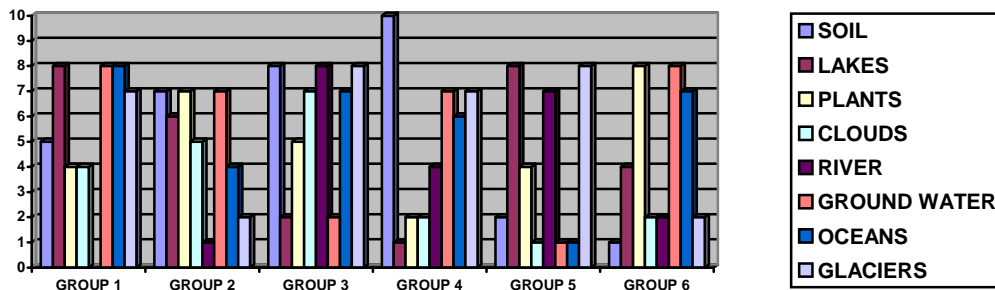
ACTIVITIES

Traveling Rain Drop 40 min Materials- 'Traveling Raindrop Sheet', Spinners, Station Cards, Dry Erase Markers

Start activity by asking the students a couple of questions to start them thinking about where rain goes. Can anyone tell me where the water might be able to go when it starts to rain? It is in the soil, underground, marshes, swamps, ponds, streams, rivers, lakes, glaciers, and ocean to name a few. The water cycle isn't a predictable cycle. Rain doesn't come down on the ocean get heated back up to the clouds and then come right back down again. There are many factors that come into play during the cycle, and the water may stay on earth for a long time.

The students are going to act as rain drops simulating the water cycle. Before class starts set up the station cards with spinners. Make sure that the cards are spread out (if you want to play outside attach them to trees). Divide the students up so there are eight groups. Give each group a "Traveling Rain Drop" sheet. Assign each group a starting point. At each station there is a spinner with different outcomes. Have the students spin the arrow, and make a tally mark on their sheet by the corresponding word. Then have the student go to that station. Tell the students to make sure they make a tally every time they spin the arrow. For example, if group A is starting at the lake station they will make a tally by the word lake on their Traveling Rain Drop sheet. They will then spin the arrow at their station. If the arrow lands on glaciers they will run over to the glacier station, make a tally next to the word glacier and spin again at the glacier station. If the spinner lands on 'stay' then the group will stay at that station. Tell the students their goal is to get to as many stations as possible; they want to be the group with the most tallies.

After about 20 minutes gather the students and collect data. Ask the students how many times they went to the different stations; get a total for each station. If there is a board available make a bar graph showing how many people went to the different groups. Example of the bar graph you can make is below. Basically you want the students to start thinking about the different places and the order in which each rain drop may go. Each group or rain drop went to different places a different amount of time and in a different order. That is exactly how real rain drops are. They don't have a specific place they go or specific time to stay, every drop is different.



Transition- We now know that the water that is on the Earth has been here since the beginning. But have you ever stopped to think how much of the water on Earth is usable by us?

How Much Do We Have To Use? 10 Min Materials-Water bottle, plastic cup, spoon

There is a lot of water on the Earth. In fact 75% of the Earth surface is made up by water. We are going to simulate how much water we can actually use. Get the gallon water jug and fill it with water. Pretend the water in the water bottle represents all the water in the world. What is the biggest source of water on Earth? Oceans, can we drink ocean water? No, why? Because it is salty. Around 97% of the water comes from oceans (pour a little bit of water from the water bottle into a plastic cup representing the 3% of freshwater we have left). That leaves about 3% of water that is fresh. Where do you think that fresh water is? Glaciers and ice caps, ground water, and bodies of water like lakes. Glaciers and ice caps take up 2% of that water. Can we get to that water? No, it's frozen (Now scoop out a spoonful of water. The spoonful of water represents the 1% of water that is left). We have 1% of water left from all the water on the earth. Another place for fresh water is in the ground where people can't get at it. Why can't we get at it? Because it is so deep in the ground. Actually over half of the water we have left is in the ground. (Pour off a little more than half of the spoon full of water, leaving less than half a spoonful on the spoon. The water left on the spoon represents the .4% of water that is left for us to use.) If this water bottle represented all the water in the world this is how much water we have on the Earth that can be used and obtain by us, about .4%. With this water we need to be able to get drinking water, bathe in it, wash dishes in it etc.

Transition- Of all the water on the Earth we only have a small percentage of water that we can use. We use a lot of water.

Water Relay 15 min Materials-Percentage blocks, fact sheet

What are ways we use water? Let the group answer the question. We are going to play a game trying to figure out how much water is used in everyday activities. Divide the group into two teams. Have them line up in two single file lines with the blocks set up 20-50 ft away from the starting point. Explain to the students that you are going to read a question such as 'How many gallons of water do we use to take a shower?' The first person on your team will run down and get what they think is the correct answer block and hand it to the teacher so the group can discuss it. It takes 15-32 gallons of water to take a shower. If you have four people in your household wanting to take a shower that is 60-128 gallons of water just on showers. Use the Water Relay sheet attached at the end of the packet to finish the game. At the end of the game it doesn't matter how many points each team has, the point is to get the kids thinking and learning about how much water we use.

Tell the group because we use so much water and there is a limited supply of water. What are some ways that we can save water? There are examples of ways to save water on the same sheet as the Water Relay sheet.

WRAP-UP: 10 min

Water comes down, condenses, and disperses in lakes, oceans, rivers, plants and animals. Eventually the water goes back into the atmosphere, and evaporates. The water cools down in the atmosphere and forms clouds, this is condensation. When those clouds get too heavy and it starts raining or snowing, precipitation, the water comes to the Earth as

precipitation and the process starts all over again. We need to take care of the water that is on the Earth. Even though it covers 75% of the Earth, we can only use .4%. We use water for many different activities. What are some ways we can be more mindful of water waste? Turn off water when brushing your teeth or lathering up soap on your hands. Make sure the dishwasher or washing machine is full before starting it. Keep water in the fridge for cold drinking water instead of letting the water run to get cold.

Resources:

<http://www.math.montana.edu/~nmp/materials/ess/hydrosphere/novice/water-cycle.html>

<http://www.kidzone.ws/water/>

http://www.epa.gov/safewater/kids/water_trivia_facts.htm completed

<http://www.wateruseitwisely.com/100ways/index.shtml>

WATER RELAY LIST

- Watering the lawn: 180 gallons
- Washing the dishes: 9-20 gallons
- Washing clothes: 30 gallons
- Flushing the toilet: 4-7 gallons
- Brushing teeth: 2 gallons
- Drinking water: ½ gallon
- Needed to produce one ton of steel: 62,000 gallons
- Needed to process one can of fruit or vegetables: 9.3 gallons
- Needed to manufacture a new car and it's four tires: 39,090 gallons

WAYS TO SAVE WATER

- Run your washing machine and dishwasher only when they are full and you could save 1000 gallons a month.
- Keep a pitcher of water in the refrigerator instead of running the tap for cold drinks, so that every drop goes down you not the drain.
- Use a broom instead of a hose to clean your driveway or sidewalk and save 80 gallons of water every time.
- Time your shower to keep it under 5 minutes. You'll save up to 1000 gallons a month.
- Collect the water you use for rinsing produce and reuse it to water houseplants.
- Time your shower to keep it under 5 minutes. You'll save up to 1000 gallons a month.
- Designate one glass for your drinking water each day. This will cut down on the number of times you run your dishwasher.
- When you clean your fish tank, use the water you've drained on your plants. The water is rich in nitrogen and phosphorus, providing you with a free and effective fertilizer.
- Turn off the water while you brush your teeth and save 4 gallons a minute. That's 200 gallons a week for a family of four.
- Make sure your toilet flapper doesn't stick open after flushing.
- Do one thing each day that will save water. Even if savings are small, every drop counts.