

INCREDIBLE JOURNEY

Description:

Students learn how water moves through the water cycle in this interactive simulation. Students also explore where pollution gets picked up in the water cycle.

Objective:

- Students will model the water cycle.
- Students will understand how Omaha's local watershed contributes to regional, national, and worldwide water bodies.
- Students will comprehend how communities contribute to water pollution and actions they can take to reduce their impact.

Standards:

2nd Grade

- SC.2.13.3.D Obtain information to identify where water is found on Earth and that it can be solid or liquid.
- SS.2.3.2.b Describe local places and regions.
- SS.2.3.3.a Identify examples of Earth's physical processes.

3rd Grade

- SS.3.3.3.a Describe how the environment influences human activities and how humans alter the environment to suit their needs.
- SS 3.3.3.c Explain the importance of Earth's natural resources.

4th Grade

- SC.4.13.4 Gather and analyze data to communicate an understanding of Earth's systems and processes that shape the Earth.
- SS 4.3.1.d Differentiate between classifications of bodies of water, cities, and land masses.
- SS 4.3.5 Use geographic skills to make connections to issues and events.

5th Grade

- SC.5.13.4.A Develop a model using an example to describe ways the geosphere, biosphere, hydrosphere, and/or atmosphere interact.
- SC.5.13.4.C Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.
- SS.5.3.3.a Identify examples of ecosystems and analyze issues related to the natural setting in the United States.
- SS 5.3.3.c Examine patterns of resource distribution and utilization in the United States.

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Materials:

- 9 game dice
- 9 water cycle station signs
- scratch paper for each student
- 9 bins of colored beads
- yarn - 1 piece per student
- scissors (to cut the yarn)

Background Info:

On their website, NOAA states:

The water cycle is often taught as a simple circular cycle of evaporation, condensation, and precipitation. Although this can be a useful model, the reality is much more complicated. The paths and influences of water through Earth's ecosystems are extremely complex. Water is essential to life on Earth. In its three phases (solid, liquid, and gas), water ties together the major parts of the Earth's climate system — air, clouds, the ocean, lakes, vegetation, snowpack, and glaciers.

The water cycle shows the continuous movement of water within the Earth and atmosphere. It is a complex system that includes many different processes. Liquid water evaporates into water vapor, condenses to form clouds, and precipitates back to earth in the form of rain and snow. Water in different phases moves through the atmosphere (transportation). Liquid water flows across land (runoff), into the ground (infiltration and percolation), and through the ground (groundwater). Groundwater moves into plants (plant uptake) and evaporates from plants into the atmosphere (transpiration). Solid ice and snow can turn directly into gas (sublimation). The opposite can also take place when water vapor becomes solid (deposition).

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Activity:

1. Set up the 9 stations:

- Place the 9 water cycle station signs around the room.
- Place the dice at the matching station signs – be sure to put the correct die at the correct location. The location will be written in tiny letters in the bottom right corner of the dice.
- Place a bin of colored beads at each station. The bin containers are labeled to match the stations. (OPTIONAL ADAPTATION: teachers can choose to wait to give students beads until the end of this activity. For some students, it might be easier if the teacher distributes the appropriate beads at the end of the activity based on each student's written record of their journey as a water molecule rather than have students carry their partially completed bracelet with them throughout the activity.)

2. Tell students that they will become water molecules for this activity. They will be moving through the water cycle. Ask students to list where, out in nature, we find water (most responses should fit into the station locations already set up).

3. Discuss each station location. This may be done briefly for older students or in more depth for younger students.

- Soil – water is found in the soil, which is why we have mud and why plants can absorb water through their roots
- Plants – water moves within the plants through the roots, stem, leaves, etc; if you break some plant stems, such as a dandelion stem, you can feel the liquid inside them
- River – a large, natural stream of water flowing towards another river, a sea, an ocean, or another body of water
- Clouds - a visible mass of condensed water vapor floating in the atmosphere, typically high above the ground
- Ocean – very large body of salt water; there are 5 oceans on Earth: Pacific, Atlantic, Indian, Arctic, and Southern (Antarctic)
- Lake - any relatively large body of slowly moving or standing water that occupies an inland basin of appreciable size
- Animal - Animals need fresh water for their bodies to function - they gain water not only through the action of drinking but also from the food they eat
- Ground water - water in the ground that fully saturates pores or cracks in soils and rocks. Water underlies the Earth's surface almost everywhere – beneath oceans, hills, valleys, mountains, lakes, and deserts. It is not always easy to get to or clean enough for use without treatment, but it exists essentially everywhere if you dig deep enough
- Stormdrains - A stormdrain is designed to drain excess rain and snowmelt from impervious surfaces such as paved streets, car parks, parking lots, footpaths, sidewalks, and roofs

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Activity Cont:

4. Give each student a piece of scrap paper. This will be where they record their water journey. Students should list the number 1-10 on the left side of their paper.
5. Give each student a piece of yarn, long enough to tie around their wrist.
6. Have all the students line up at the Cloud station. On any given day there is a lot of water up in our atmosphere, so it makes sense for all our water molecules to begin their journey this way. Students should each receive one white bead and put it on their bracelet. Each student should write down "cloud" as the first stop on their recorded water journey list (scrap paper) and then roll the die at the cloud station and proceed to the station they roll.
7. When they arrive at a new station, students should write down the name of the station where they are. They should then collect one bead from the container at the station and add it to their bracelet. Then they should roll the die to see where they go from there.
8. Students should continue the process until they visit a total of 10 stops. There may be times where some stations have a line – that is fine, and actually expected. Students may get stuck at some spots like ocean or cloud. Stations like plant and water are not likely to develop a line because there will be fewer water molecules at those stations. The dice are designed to be weighted appropriately to mimic the actual process of water on earth.
9. If students roll a "repeat" of a station, they should write the name of the station down on their list for as many times as they are there. For example, a student's sheet may say: "Clouds, clouds, clouds, soil, river, lake, animal, clouds, ocean, ocean"
10. After students have their 10 beads on their bracelet, they should tie their bracelet ends securely.
11. After all students have completed their 10 stops, discuss the following questions with the students. This is best done as a whole class so students can learn from one another's experiences in the activity.
 - Did any of you get stuck at a station for more than one or two rolls of the dice? Which stations? Why do you think you, as a water molecule, got stuck there?
 - Which station did we, as a group, visit the fewest number of times? (You can count colored beads to determine this?) Why do you think that is?
 - In which of these stations might pollution get into our water cycle? (storm drains, soil)
 - In which of these stations might pollution be eliminated from our water cycle? (plants, or through the process of evaporation to clouds)
 - What did you learn while doing this activity?

Assessment:

Class Discussion