

INCREDIBLE JOURNEY

THE WATER CYCLE GAME

Imagining themselves as a water molecule, students will travel through the water cycle in an interactive dice game that moves them between states of matter. Along the way, students will collect colored beads creating a story bracelet of their incredible journey.

Science + Engineering	Disciplinary Core Ideas	Crosscutting Concepts
<p>Developing and Using Models Modeling builds on K-3 experiences and progresses to building and revising simple models using models (4-ESS2-3)</p>	<p>Roles of Water in Earth’s Surface Processes Water continually cycles among ocean, atmosphere, and land via transpiration, evaporation, condensation, precipitation, and accumulation (4-ESS2-3)</p>	<p>Energy Matter Within a system, the transfer of energy drives the motion and cycling of the matter</p> <p>Systems and System Models A system can be described in terms of its components and their interactions</p>

Objectives: After this activity, students will be able to 1) describe the movement of water molecules within the water cycle and 2) identify changes in states of matter as water molecules move through the water cycle. This activity meets NGSS standard 4-ESS2-3: Use a model to describe the cycling of water through Earth’s systems driven by energy and different processes.

ACTIVITY SET-UP:

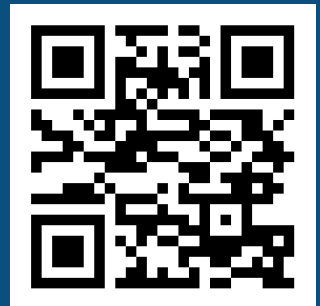
This activity can be played in an open room, gym, or flat outdoor space.

- Place the nine station posters (Clouds, Plants, Animals, River, Oceans, Lakes, Ground Water, Soil, and Glaciers) in different locations around the activity area.
- Place the corresponding bead color at each station poster. Refer to the Bead Color Key.
- The Activity Leader should have the dice to pass out after activity step #3.

INTRODUCTION + KEY VOCABULARY: (5-10 minutes)

1. Provide an overview of the water cycle using the diagram or slides included in kit.
2. Introduce the vocabulary words alongside the water cycle overview. Ask students to help define or describe the vocabulary words.
 - **Transpiration:** the evaporation of water from plants
 - **Evaporation:** the process of water turning from a liquid to a gas
 - **Condensation:** the process of water turning from a gas to a liquid through cooling
 - **Precipitation:** water in the form of rain, hail, or snow that falls from the atmosphere to Earth’s surface
 - **Accumulation:** the collection of precipitation into bodies of water (rivers, oceans, lakes)

DEMO VIDEO



<https://vimeo.com/5852533>

Stop the video at 2 min. 10 sec. Disregard remaining part of the video.

KIT MATERIALS

- ✓ Pipe Cleaners
 - ✓ Beads (9 colors)
 - ✓ Tempera/Acrylic Paint
 - ✓ Water Stage Posters
 - ✓ Water Cycle Dice
 - ✓ Bead Color Key
 - ✓ Water Cycle Diagram
- Kit includes all needed supplies.

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HOW TO PLAY THE GAME:

(15 minutes)

1 STUDENTS ARE WATER MOLECULES

- Explain that the students will be water molecules moving through the water cycle.
- Introduce the nine stations that water can move through: clouds, oceans, ground water, animals, soil, glaciers, plants, rivers, and lakes.

2 DIVIDE INTO GROUPS

- Divide the students among the nine different stations and ask students to brainstorm the different places water could go to from their station (Ex: From "Oceans," water could evaporate into clouds, seep into soil, freeze into a glacier, or stay in the ocean.) Emphasize that there are multiple places that each station could lead to.

3 PASS OUT DICE + PIPE CLEANERS

- Pass out the corresponding die to each station. Have students check to see if they thought of all the places water can go after their station.
- Give each student a pipe cleaner. Explain that each time they roll a die, they will add a bead to their pipe cleaner.

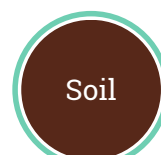
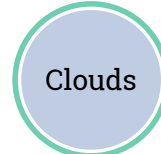
5 ROLL THE DICE TO KNOW WHERE TO GO

- Students line up behind at each station and take a bead from the container, stringing it on their pipe cleaner. Tell them to bend one end to hold the bead. Students roll the die and go to the location indicated by the label facing up. If they roll STAY, they move to the back of the line.

6 ROTATE TO END OF THE LINE

- When students arrive at the next station, they get in line. When they reach the front of the line, they take a bead, roll the die and move to the next station (or proceed to the back of the line again if they roll STAY).
- Allow students to rotate until the allotted activity time ends. Provide a 1-2 minute warning before finishing the activity.

Bead Color Key



CONCLUSION:

(5-10 minutes)

Pause the game + gather the students back together.

Discussion Questions:

Ask for volunteers to share the story of their journey through the water cycle by "reading" their pipe cleaner. Use the Bead Color Key to remind the students which water cycle stations and colors correspond. Encourage students to use the vocabulary works and name when changes in states of matter occurred.

1. What was your journey as a water molecule?
2. Did you travel to some water cycle stations more than others?
3. Were there water cycle stations that you didn't make it to?

Example: I started in the clouds and then became rain (liquid) and fell into the ocean. Then I evaporated (gas) back to the clouds. Then I fell as rain into the lake where an animal drank me. I never accumulated as ground water.

Main Message:

The water cycle is often thought of as a circle cycle. However, in reality the water cycle is not linear. Water molecules can have very different journeys through the water cycle.

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BACKGROUND INFO FOR ACTIVITY LEADERS:

On Earth, water is constantly moving through lakes, rivers, oceans, the atmosphere, plants, animals, and the ground. This journey is known as the water cycle. Although the water cycle is often thought of as a linear process, in reality it is more dynamic than this. As water molecules move, they change form into solids, liquids, and gases.

Heat from the sun influences the rate of motion of water molecules. Water will change states with increased motion of the molecule because of increased energy. When water is in liquid form, its movement is easiest to see. As glaciers melt, water **accumulates** into streams, and if heated enough water molecules will **evaporate** into the atmosphere and create clouds.

Gravity influences the ability of water to travel over, under, and above the Earth's surfaces. Water has mass and is subject to gravitational force as a solid, liquid, or gas. Water may travel slowly underground, seeping and filtering through particles of soil and porous rocks.

Although invisible, the most dramatic movements occur when the water is in the form of gas. Water changes from liquid to water vapor as it evaporates. Water can travel through Earth's atmosphere as gas.

Condensation can be seen as water droplets on plants or the outside of a glass of a cold drink. In clouds, water molecules collect dust particles. When they eventually become too heavy gravity pulls them down to Earth in the form of rain, as known as **precipitation**.

Humans and animals also move water by carrying it in their bodies. Water is directly consumed by animals while drinking + extracted from food during digestion.

Plants are the greatest water transporters among living organisms. Plant roots absorb water, and most of it travels through the plant to the leaf surface. When the water reaches the leaves, it is exposed to the air and the sun's energy and evaporates. This process is called **transpiration**. All these processes work together to move water around, through, and over Earth.

