

The Incredible Journey

Revised December 2011

SUMMARY:

Students become water molecules as they simulate the movement of water through the water cycle.

BACKGROUND:

While water does circulate from one point or state to another in the water cycle, the paths it can take are variable.

Heat energy directly influences the rate of motion of water molecules. When the motion of the molecule increases because of an increase in heat energy, water will change from solid to liquid to gas. With each change in state, physical movement from one location to another usually follows. Glaciers melt to pools which overflow to streams, where water may evaporate into the atmosphere.

Gravity further influences the ability of water to travel over, under, and above the surface of the earth. Water as a solid, liquid or gas has mass and is subject to gravitational force. Snow on mountaintops melts and descends through watersheds to the oceans of the world.

One of the most visible states in which water moves is the liquid form. Water is seen flowing in streams and rivers and tumbling in ocean waves. Water travels slowly underground, seeping and filtering through particles of soil and pores within rocks.

Although unseen, water's most dramatic movements take place during its gaseous phase. Water is constantly evaporating, changing from a liquid to a gas. Evaporation occurs when water from the ground or bodies of water move into the atmosphere. Plants give off water vapor through transpiration. The combination of evaporation and transpiration is referred to as evapotranspiration. As a vapor, water can travel through the atmosphere over the earth's surface. In fact, water vapor surrounds us all the time. Where it condenses and returns to earth depends upon loss of heat energy, gravity, and the structure of the earth's surface.

Water condensation can be seen as dew on plants or water droplets on the outside of a glass of cold water. In clouds, water molecules collect on tiny dust particles. Eventually, the water droplets become too heavy and gravity pulls the water to the earth.

Living organisms also help move water. Humans and other animals carry water within their bodies, transporting it from one location to another. Water is either directly consumed by animals or is removed from foods during digestion. Water is excreted as a liquid or leaves as a gas, usually through respiration. When water is present on the skin of an animal (for example, as perspiration), evaporation may occur.

Grade Level
K-6th Grade

Subject Areas
Science
English

Duration
30-45 minutes

Setting
Classroom
Outdoors



MATERIALS:

- 7 large pieces of paper labeled with each station name (see appendix pages 42-48)
- Marking pens
- 7 boxes, about 6 inches on each side (Boxes are used to make dice for the game. Gift boxes used for coffee mugs are a good size or inquire at your local mailing outlet). There will be one die [or box] per station of the water cycle. For labels for the dice see appendix pages 35-41. These labels represent the options for pathways that water can follow.
- Copies of student worksheet (see appendix pages 33 and 34)
- A bell, whistle, buzzer, or some sound maker.

CONNECTIONS TO “DROP IN A BUCKET”:

Ask students to recall where water is located on the earth (oceans, rivers, ground, etc.). Ask if they recall where the most water is located (Oceans). Ask students if they know how water moves from one location to the next. Tell them this lesson will discuss how water moves between each location.

PROCEDURE:

1. Place the station labels around the room in different locations.
2. Ask students to identify the different places water can go as it moves through and around the earth. Write their responses on the board.
3. Tell students that they are going to become water molecules moving through the water cycle.
4. Categorize the places water can move through into seven stations: Mountain, Groundwater, Stream, Ocean, Animal, Cloud, and Plant.
5. Assign an even number of students to each station. (The cloud station can have an uneven number.) Have students identify the different places water can go from their station in the water cycle. Discuss the conditions that cause the water to move. Explain that water movement depends on energy from the sun, electromagnetic energy, and gravity. Sometimes water will not go anywhere. After students have come up with lists, have each group share their work. The die for each station can be handed to that group and they can check to see if they covered all the places water can go. The die labels provides an explanation of water movements from each station.
6. Students should discuss the form in which water moves from one location to another. Most of the movement from one station to another will take place when water is in its liquid form. However, any time water moves to the clouds, it is in the form of water vapor, with molecules moving rapidly and apart from each other.
7. Tell the students they will be demonstrating water’s movement from one location to another. When they move as liquid water, they will move in pairs, representing many water molecules together in a water drop. When they move to the clouds (evaporate), they

will separate from their partners and move alone as individual water molecules. When water rains from the clouds (condenses), the students will grab a partner and move to the next location.

8. In this game, a roll of the die determines where water will go. Students line up behind the die at their station. (At the cloud station they will line up in single file; at the rest of the stations they should line up in pairs.) 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. When students arrive at the next station, they get in line. When they reach the front of the line, they roll the die and move to the next station (or proceed to the back of the line if they roll stay). In the clouds, students roll the die individually, but if they leave the clouds they grab a partner (the person immediately behind them) and move to the next station; the partner does not roll the die.
9. Students should keep track of their movements. This can be done using the Incredible Journey Worksheet. Having them keep a journal or notepad to record each move they make, including stays, can also do it. (See extensions for other ideas) Another approach is to have half the class play the game while the other half watches. Onlookers can be assigned to track the movements of their classmates. In the next round the onlookers will play the game, and the other half of the class can record their movements).
10. Tell students the game will begin and end with the sound of a bell (or buzzer or whistle). Begin the game! (Approximately 10 minutes for a class of 25 students is sufficient for students to understand the concepts of the water cycle)

WRAP UP:

Ask students about their journey. Did anyone get frustrated because they spent most of their time at one or two stations? Do you think that water molecules often get trapped in one location (oceans or atmosphere)? Discuss the water cycle with students and help them understand that it is not a well defined cycle, but a series of pathways. Water does not always complete the full cycle, but can follow a multitude of pathways.

EXTENSIONS:

- Remind students about how pollutants or contaminants would affect our water supply and ask students how they think pollution affects the water cycle. Does pollution travel through the water cycle? Is there any point where pollution would be deposited or left behind?
- Discuss with students how water becomes polluted and is cleaned as it travels through the water cycle.
- Have the students make bracelets as they travel through the water cycle. Fill seven small containers with beads (one container for each station). Each station should have a specific color of bead. Give the students thread or a cord long enough for a bracelet and have them collect one bead every time they visit a station.
- Have students use their bracelets or travel records to write a story about their journey through the water cycle. If a water molecule could think and talk, how would it tell its story?

*Adapted from the “The Incredible Journey” lesson found in Project WET
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Animal – Incredible Journey Dice Label

After using you to process food, the animal pees and you end up on the ground. **Go to Mountain.**



After using you to process food, the animal pees and you end up on the ground. **Go to Mountain.**



You are exhaled from the animal's lungs into the air as vapor. **Go to Cloud.**



You are exhaled from the animal's lungs into the air as vapor. **Go to Cloud.**



After using you to process food, the animal pees and you end up on the ground near a stream. **Go to Stream.**



Roll again.

Cloud – Incredible Journey Dice Label

You fall as rain onto a mountain. **Go to Mountain.**



You fall as snow onto a mountain. **Go to Mountain.**



You fall as rain into a stream. **Go to Stream.**



You fall as rain onto a parking lot and make your way to a stream. **Go to stream.**



You fall as rain into the ocean. **Go to ocean.**



You fall as snow into the ocean. **Go to ocean.**



Groundwater – Incredible Journey Dice Label

You move slowly underground and eventually flow into the ocean. **Go to Ocean.**



You move slowly underground and eventually flow into the ocean. **Go to Ocean.**



You move slowly underground between grains of sediment and eventually flow downward into a wetland and from there into a stream.

Go to Stream.

You move slowly underground between grains of sediment and eventually flow downward into a wetland and from there into a stream.

Go to Stream.

A plant takes you in through its roots. **Go to plant.**



You are pumped out of the ground from a well to irrigate a farmer's corn. **Go to plant.**

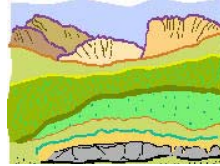


Mountain – Incredible Journey Dice Label

You evaporate into the air. **Go to Cloud.**



You soak into the ground and become part of the groundwater. **Go to Groundwater.**



You soak into the ground and get absorbed by a plant's roots. **Go to Plant.**



You roll downhill and become part of a stream. **Go to stream.**



You roll downhill and become part of a stream. **Go to stream.**



You get frozen in ice and trapped until you thaw. **Stay at Mountain.**



Ocean – Incredible Journey Dice Label

You are one of the countless water molecules in the ocean and you stay there. **Stay at ocean.**



You are one of the countless water molecules in the ocean and you stay there. **Stay at ocean.**



You evaporate into the air. **Go to Cloud.**



You evaporate into the air. **Go to Cloud.**



A kelp plant takes you in, releases you through its leaf, and transpires you into the air. **Go to Cloud.**



A kelp plant takes you in. **Go to Plant.**



Plant – Incredible Journey Dice Label

The plant uses you to grow. **Stay at Plant.**



The plant transpires you through its leaves and you evaporate into the air. **Go to Cloud.**



The plant transpires you through its leaves into the air as vapor. **Go to Cloud.**



The plant transpires you through its leaves and you evaporate into the air. **Go to Cloud.**



The plant stores you in its edible fruit, and a bear eats you. **Go to Animal.**



Roll again.

Stream – Incredible Journey Dice Label

An animal comes to the stream and licks you up. **Go to Animal**



You continue rolling downhill and become part of the ocean. **Go to Ocean.**



You evaporate into the air. **Go to Cloud.**



You evaporate into the air. **Go to Cloud.**



You continue rolling downhill and become part of the ocean. **Go to Ocean.**



Roll again.

MOUNTAIN

GROUND WATER

STREAM

OCEAN

ANIMAL

CLOUD

PLANT