

Water All Around Us Unit

Water Scavenger Hunt 2
Iowa Core Science 2-ESS2-3

Edible Aquifer 5
Iowa Core Science 2-ESS2-2, 2-ESS2-3, 5-ESS3-1

Water Cycle Game 10
Iowa Core Science 2-ESS2-2



LESSON: Water Scavenger Hunt

GRADE: 2nd grade

TIME: 45 minutes

SUMMARY:

Students will explore nature, or any nearby green space, looking for water – in both conspicuous and inconspicuous places. Students will use a scavenger hunt to guide their exploration and will share their results during a class discussion.

OBJECTIVES: Iowa Core

Science

Earth's Systems:

- **2-ESS2-3.** Obtain information to identify where water is found on Earth and that it can be solid or liquid.

MATERIALS & RESOURCES:

- Book: Water is Water by Miranda Paul
- One copy of Water Scavenger Hunt for each student (attached to end of this lesson)
- 4-6 small containers to collect water while on scavenger hunt
- Clipboards
- Pens/pencils

PRESENTATION / INTRODUCTION:

Read aloud Water is Water by Miranda Paul, stopping as you read to ask students to notice and identify the many places and states water can be found in the photos.

*** Prepare students for exploration:** Remind students of how scientists behave outdoors: *calm & quiet, uses five senses, asks questions, shares discoveries, investigates, respectful, happy, and full of wonder*. Also be sure to set boundaries and review instructions for the activity both indoors and outdoors.

DIRECTIONS:







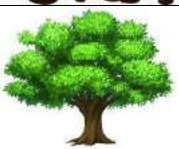

1. Distribute one copy of the attached Water Scavenger Hunt and a clipboard to each student in the class. Review each column, and allow students time to ask any questions they may have about how to complete the scavenger hunt.
2. Once students are outdoors, either complete the scavenger hunt as a large group or in small groups. Allow enough time to explore and look for all items listed on the scavenger hunt. Be sure to also allow time to make new discoveries and ask questions along the way.
3. While completing the scavenger hunt, collect a few samples of water you find (i.e. sample from pond/puddle, plant or part of a plant for students to observe *transpiration*).
4. After students have completed their scavenger hunts, and several water samples have been collected, gather in a large circle for reflection and processing time. **see below*

REFLECTION / JOURNAL PROMPT:

1. As a large group, tally how many students found each item? Tally how many total times the water was found in a solid state. Liquid state. Gas state. **can graph results if time allows*
2. Discuss why some items/states were easy to find while others were more difficult.
3. Observe the water samples – what patterns do the students notice? What factors do they think cause the water to appear the way it does? Any signs of pollution or erosion?
4. Allow students time to ask more questions and investigate other topics that are prompted by this activity.

Water Scavenger Hunt

Where can we find water and what state is it in?

		What state is it in?	Notes/Observations
<input type="checkbox"/>	Puddle 	Solid Liquid Gas	
<input type="checkbox"/>	Pond 	Solid Liquid Gas	
<input type="checkbox"/>	Plant 	Solid Liquid Gas	
<input type="checkbox"/>	Animal 	Solid Liquid Gas	
<input type="checkbox"/>	Soil 	Solid Liquid Gas	
<input type="checkbox"/>	Tree 	Solid Liquid Gas	
<input type="checkbox"/>	Clouds 	Solid Liquid Gas	
<input type="checkbox"/>	"Other"	Solid Liquid Gas	

LESSON: Edible Aquifer

GRADE: 2nd and/or 5th grade

TIME: 45 minute

SUMMARY:

ground·wa·ter

*/ˈgroundˌwɔdər/
noun*

water held underground in the soil or in pores and crevices in rock.

aq·ui·fer

*/ˈäkwəfər,ˈakwəfər/
noun*

a body of permeable rock that can contain or transmit groundwater.

In Iowa, almost 80% of our drinking water comes from groundwater, including aquifers. During this fun and edible lesson, students will construct a model of an aquifer (using edible ingredients) and then use their edible model to describe the layers of earth, how aquifers recharge and how pollution can occur. Students will also discuss ways to prevent/minimize water pollution.

OBJECTIVES: Iowa Core

Science

Earth's Systems:

- **2-ESS2-2.** Develop a model to represent the shapes and kinds of land and bodies of water in an area.
- **2-ESS2-3.** Obtain information to identify where water is found on Earth and that it can be solid or liquid
- **5-ESS3-1.** Obtain and combine information about ways individual communities use science ideas to protect the Earth's resources and environment.

MATERIALS & RESOURCES:

- **Graphic representation of layers of earth and aquifer** (both found at the end of this lesson) OR create your own **clear tube with layered rocks, sand, soil, etc.** to visually represent the layers of earth.
- Access to video about ground water and aquifers – “What is Groundwater?”
https://www.youtube.com/watch?v=oNWAerr_xEE
- Materials for edible aquifers (see next page)

Materials for Edible Aquifers

Edible Ingredient	Real-life Counterpart
Raisins or other dried fruit	Bedrock or Rocks
Lemon-lime soda or water	Groundwater
Blueberries, Chocolate chips, or nuts*	Bedrock or Rocks
Yogurt	Clay
Brown sugar	Top soil/dirt
Granola	Rocks/gravel
Animal crackers or gummy worms/bears	Animals on the surface
Red powdered drink mix (such as Kool-Aid)	Pollution (oil, sewage, trash, etc.)
Non-edible Material	Real-life Counterpart
Clear plastic cups (~8-10 oz) - 1 per student	N/A - The cups simply hold the ingredients
Drinking straw - 1 per student	Extraction well
Other supplies	
Napkins or paper towels, spoons, scoops for edible materials, powdered drink mix	

PRESENTATION / INTRODUCTION:

Ask students where their drinking water comes from. Answers might include “pipes” or “faucets.” Use guiding questions to get the answer of “from the ground” or “groundwater.”

Today we are going to learn more about groundwater and aquifers by building our own model of an aquifer and discussing causes and effects of humans behavior on our drinking water.

DIRECTIONS:

***Prior to starting:** Prepare for this lesson by creating several workstations. Equip each station with enough materials (listed above) for each student to create an Edible Aquifer. You may want to write down a maximum number of scoops on each ingredient to ensure there are enough for all students. Include a graphic of aquifer and layers of the earth at each station. Both graphics can be found at the end of this lesson.

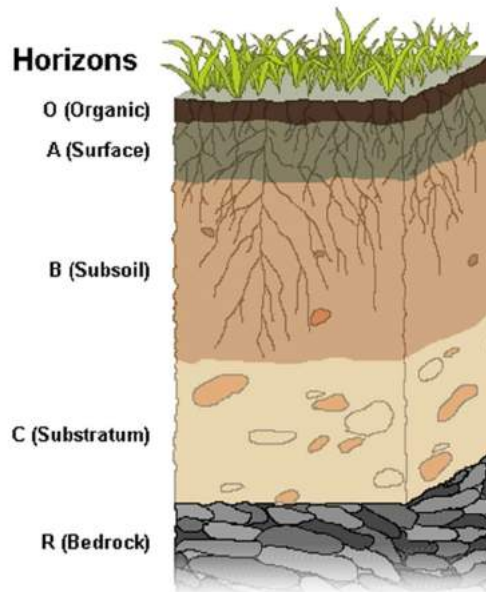
1. Share with students that nearly 80% of Iowans get their drinking water from groundwater, including aquifers. Today, they will be creating their own model of an aquifer but first we will watch a video called “What is Groundwater?” https://www.youtube.com/watch?v=oNWAerr_xEE
2. After watching the video on groundwater, discuss groundwater and its importance. Possible guiding questions might include: where does the water comes from to fill, or recharge, the aquifers? What are aquifers made of and where are they located?
3. In a minute, but not yet, we will be making our edible aquifers but first discuss the layers – show students all of the ingredients included at each station. Hold up each ingredient and discuss which layer of the earth it might represent. i.e.: yogurt = clay, granola = rocks/gravel.
4. Dismiss students to each station to begin assembling the first two layers of their aquifers. Layer 1 – Bedrock (raisins, nuts, blueberries) Layer 2 – Rocks, sand, gravel (granola, chocolate chips)
5. Pour just enough clear soda water onto the raisins, nuts and granola to cover granola. Pour just until soda comes to the top of the granola. This represents the water in the aquifer.
6. Gently add a layer of clay or dense rock (yogurt) on top of the aquifer. Now add a little more subsoil (granola) and finally, add topsoil (brown sugar).
7. Have students compare their aquifers with a neighbor and discuss: What looks the same? What looks different? What does each layer represent?
8. Add pollution to the land by pouring a little colored water on the soil. Ask students what possible causes of the pollution might be? (trash, chemicals, soil, etc.)
9. Next, drill a well by pushing a straw down to the bottom of the cup. Sometimes, just like in real life, the first attempt is not successful. It is sometimes helpful to *gently*, pull the straw out and re-drill a different well. (This helps the polluted water penetrate the confining layer of clay or rock.)
10. Pump water from the well. Turn on the faucet by *slowly* sucking on the straw, (leave the cup sitting on the table). Look to see what is happening as the water level goes down. Have small groups discuss what is happening- the aquifer level decreases and polluted water is pulled down into the aquifer.

11. Student's aquifers can be replenished by adding more clear soda water.
Explain that real aquifers take much longer to replenish. This is important in relation to water conservation.

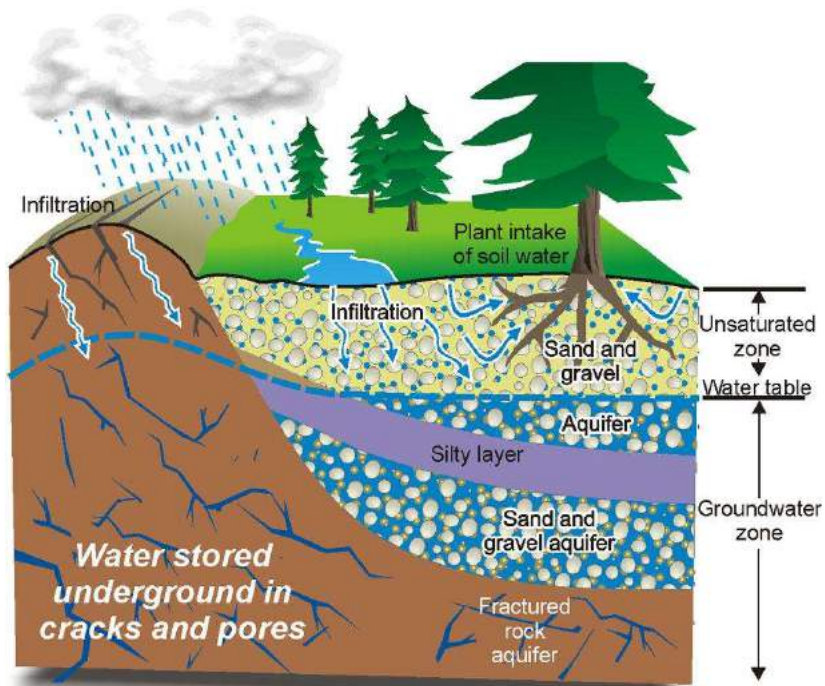
REFLECTION / JOURNAL PROMPT:

1. Ask students to discuss what patterns they noticed in the aquifers? What, in this process, was helpful and/or harmful to their aquifers? What design changes would they make the next time they build aquifers?
2. As a class, or in their science journals, have students discuss causes and effects of water pollution.
3. Create a class list of all the sources of pollution then subtract the sources which they can do something about.
4. Allow students time to ask more questions and investigate other topics that are prompted by this activity.

Layers of the Earth



Aquifer



LESSON: Water Cycle Journey

GRADE: 2nd grade

TIME: 45 minute

SUMMARY:

In this lesson, students will gain a strong understanding of the movement of water by becoming water molecules and taking a journey through the water cycle – from soil to rivers and lakes to clouds to ocean, etc.

OBJECTIVES: Iowa Core

Science

Earth's Systems:

- **2-ESS2-3.** Obtain information to identify where water is found on Earth and that it can be solid or liquid.

MATERIALS & RESOURCES:

- Video “Follow the Water”
<https://iptv.pbslearningmedia.org/resource/plum14.sci.life.followwater/follow-the-water/#.WyhfSi2ZNPO>
- Video “The Water Bodies” -
<https://www.youtube.com/watch?v=bNWuQD7QHBc>
- Video “Where does Water Come From?” -
<https://www.youtube.com/watch?v=Re1E3dhZELk>
- 9 – six-sided dice
- Water Cycle graphic – included at end of this lesson – one copy for each student plus one copy to display during large group discussion time
- 9 – Student information sheets:
Soil~Plant~River~Clouds~Ocean~Lake~Animal~Ground Water~Glacier
- Teacher Information Sheet – water cycle movement information

PRESENTATION / INTRODUCTION:

Begin by reviewing what students already know about water – where can it be found? How does it get there? Etc. Then, choose one (or two) of the videos above to show to the class.

DIRECTIONS:

***Prior to starting:** Arrange table stations in the classroom as shown in the diagram below. Place the corresponding student information sheet at each table. (i.e. Soil surface information sheet at Soil surface table)



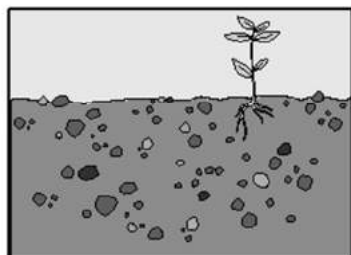
1. Show students the Water Cycle graphic that is included at the end of this lesson and explain that they will be playing a game where they become water and go on a journey around Earth, through the water cycle.
2. Next distribute one copy of the Water Cycle graphic to each student and divide them into pairs and divide the pairs evenly among the table stations.
3. Explain that when the game starts, each pair will take turns rolling the die at the station. Then read the number on the die and match it to the chart on the sheet of paper on the table, this will indicate which station they go to next.
*i.e. If a student rolls a 3 at the Soil surface table they will move to the Ground Water table next.
4. As students move from table to table, they will mark their journey with arrows at each stop. If the chart indicates that they should stay at the station, they should mark an **X** on that location and roll again. By the end of the game, they may have several **Xs** next to a particular spot.
5. Play a practice round to make sure students understand the instructions.
6. Once students feel confident with the instructions, allow them to play for 10-15 minutes.
7. After time is call, invite students back to the large group and allow them time to share their journeys – compare journeys with other students – discuss patterns in journeys - and possibly even tally how many students spent the most time in a particular location.
8. If needed, review the term “water cycle” and explain that it is something that repeats over and over. Other terms to review might include: *evaporation, condensation, transpiration, precipitation.*

REFLECTION / JOURNAL PROMPT:

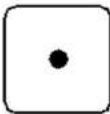

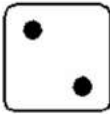


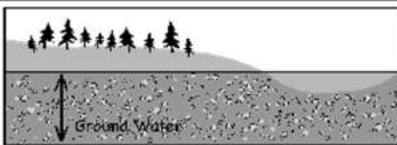



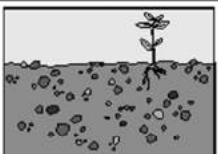

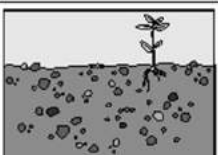
1. Ask students if any of them got “stuck” in one or two location(s)? Why do they think that happened?
2. For more critical thinking, ask students to list ways water is carried or moves from station to station? (i.e. from River to Animal when the animal drinks the water) **see teacher information sheet for more information on this*
3. Allow students time to ask more questions and investigate other topics that are prompted by this activity.

Soil Surface

Student Information Sheet



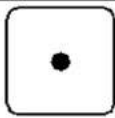
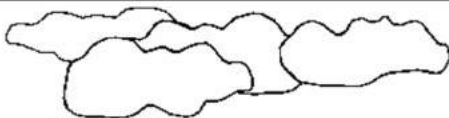

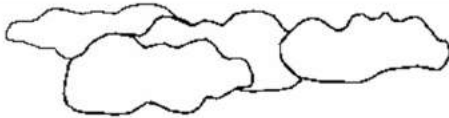

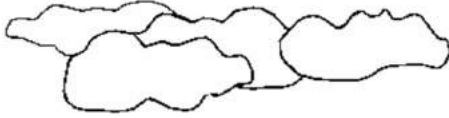
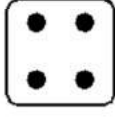
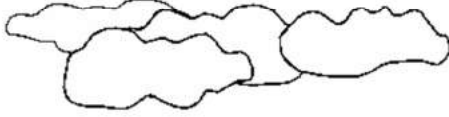




SOIL SURFACE

1		Plant	
2		River	
3		Ground Water	
4		Clouds	
5		Soil Surface	
6		Soil Surface	

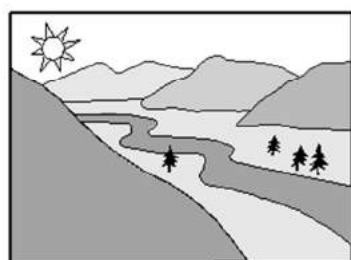
Plant Student Information Sheet



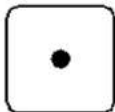

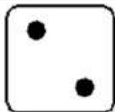
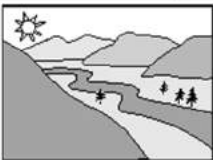

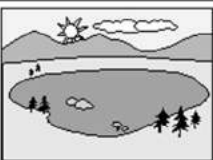

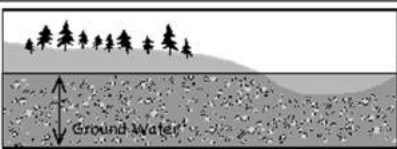




PLANT

1		Clouds	
2		Clouds	
3		Clouds	
4		Clouds	
5		Plant	
6		Plant	

River Student Information Sheet

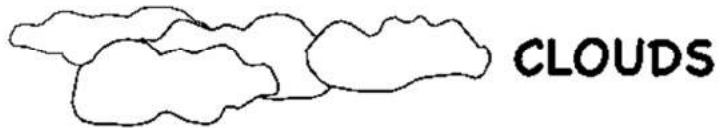


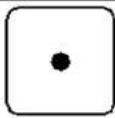
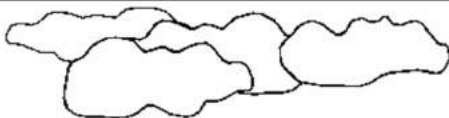
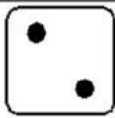

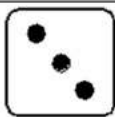
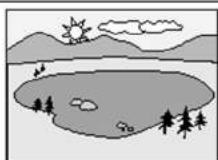
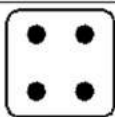
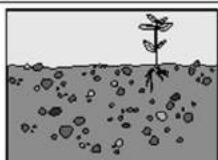


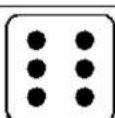
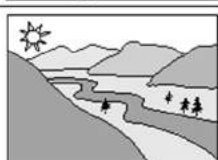
RIVER

1		Clouds	
2		River	
3		Lake	
4		Ground Water	
5		Ocean	
6		Animal	

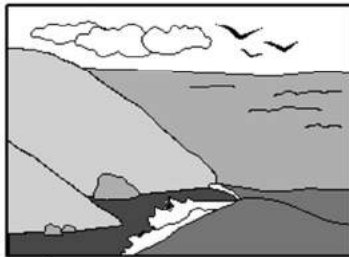
Clouds

Student Information Sheet

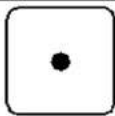

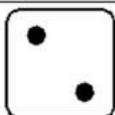

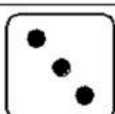
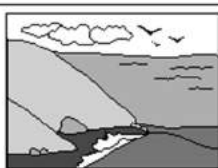
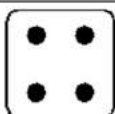
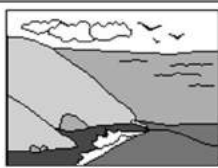

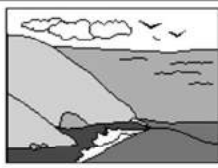




1		Clouds	
2		Glacier	
3		Lake	
4		Soil Surface	
5		Ocean	
6		River	

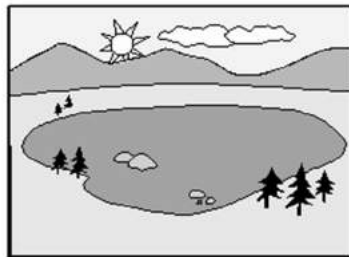
Ocean Student Information Sheet



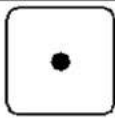
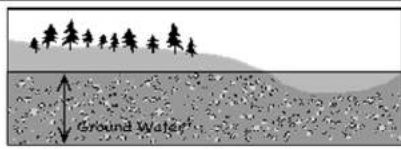
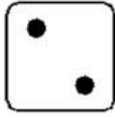
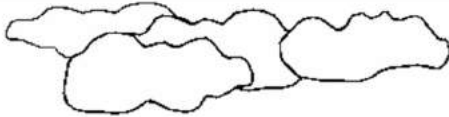



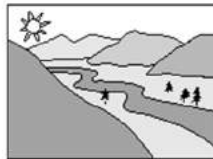

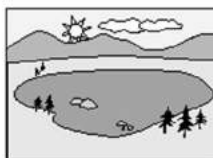

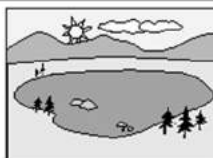
OCEAN

1		Clouds	
2		Clouds	
3		Ocean	
4		Ocean	
5		Ocean	
6		Ocean	

Lake Student Information Sheet



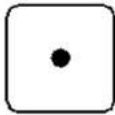
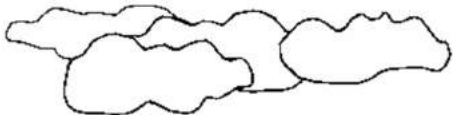
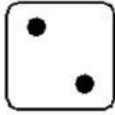
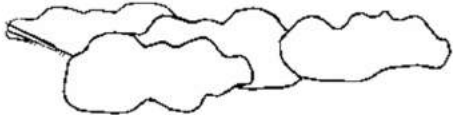

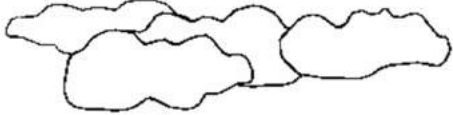
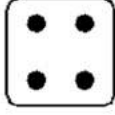




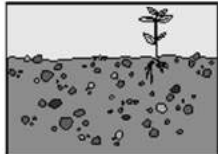
LAKE

1		Ground Water	
2		Clouds	
3		Animal	
4		River	
5		Lake	
6		Lake	

Animal Student Information Sheet

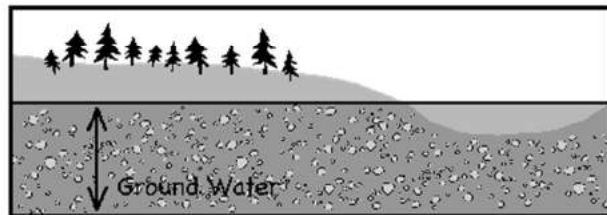


ANIMAL

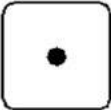
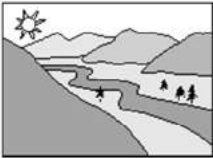

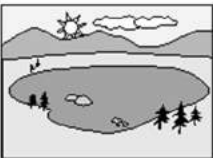

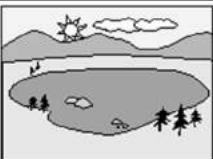

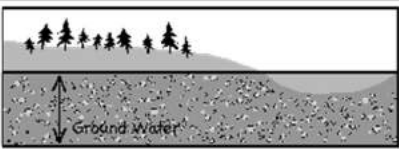

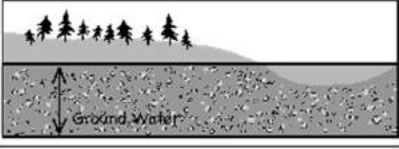

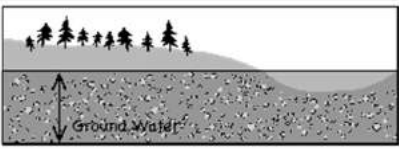
1		Clouds	
2		Clouds	
3		Clouds	
4		Animal	
5		Soil Surface	
6		Soil Surface	

Ground Water

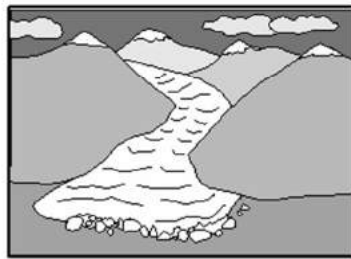
Student Information Sheet



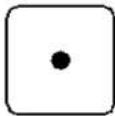

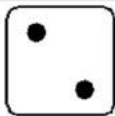

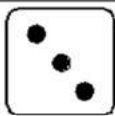


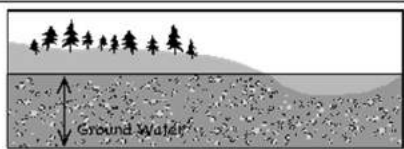




GROUND WATER

1		River	
2		Lake	
3		Lake	
4		Ground Water	
5		Ground Water	
6		Ground Water	

Glacier Student Information Sheet



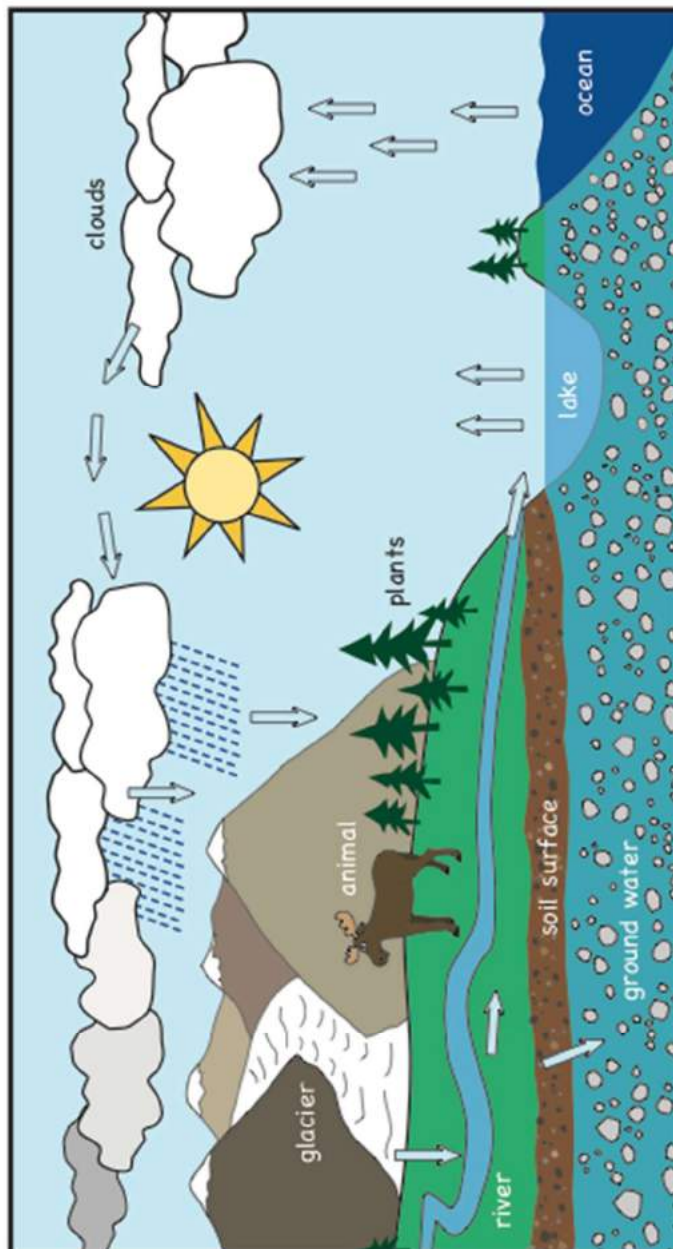
GLACIER

1		Glacier	
2		Glacier	
3		Glacier	
4		Ground Water	
5		Clouds	
6		River	

Name: _____

Water Cycle Game Student Worksheet

Levels



Directions: Chart the path you take during the game on the picture above.

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The Water Cycle Game

Water Cycle Movement

Teacher Information Sheet

Location	Moves To	Process of Movement
Soil Surface	Plant	The roots of plants absorb water.
	River	Water runs off the soil into a river.
	Ground Water	Water is filtered through the soil to the ground water.
	Clouds	Water is heated until it evaporates and forms clouds.
	Soil Surface	Water stays on the surface of the soil.
Plant	Clouds	Water leaves the plant in the form of water vapor through transpiration and forms clouds.
	Plant	The plant uses water.
River	Lake	Water flows from a river to a lake.
	Ground Water	Water is filtered through the soil to the ground water.
	Ocean	Water flows from a river to the ocean.
	Animal	An animal drinks the water.
	Clouds	Water is heated until it evaporates and forms clouds.
	River	Water remains in the current of the river.
Clouds	Soil Surface	Water condenses, precipitates, and falls onto the soil.
	Glacier	Water falls as snow onto a glacier and becomes part of the glacier.
	Lake	Water condenses, precipitates, and falls into a lake.
	Ocean	Water condenses, precipitates, and falls into the ocean.
	Clouds	Water remains as a water droplet within a cloud.
	River	Water condenses, precipitates, and falls into a river.
Ocean	Clouds	Water is heated until it evaporates and forms clouds.
	Ocean	Water remains in the ocean.
Lake	Ground Water	Water is filtered through the soil to the ground water.
	Animal	An animal drinks the water.
	River	Water flows into a river from the lake.
	Clouds	Water is heated until it evaporates and forms clouds.
	Lake	Water remains in the lake.
Animal	Soil Surface	Animals excrete water through urine and feces onto the soil.
	Clouds	Water is emitted by animals through respiration and evaporation and rises to form clouds.
	Animal	Animals use water.
Ground Water	River	Water filters through the soil to a river.
	Lake	Water filters through the soil to a lake.
	Ground Water	Water stays underground.
Glacier	Ground Water	Ice melts and the water filters underground.
	Clouds	Ice evaporates through the process of sublimation. The water vapor forms clouds.
	River	Ice melts and flows into a river.
	Glacier	Ice remains in the glacier.