

UNIT 10:

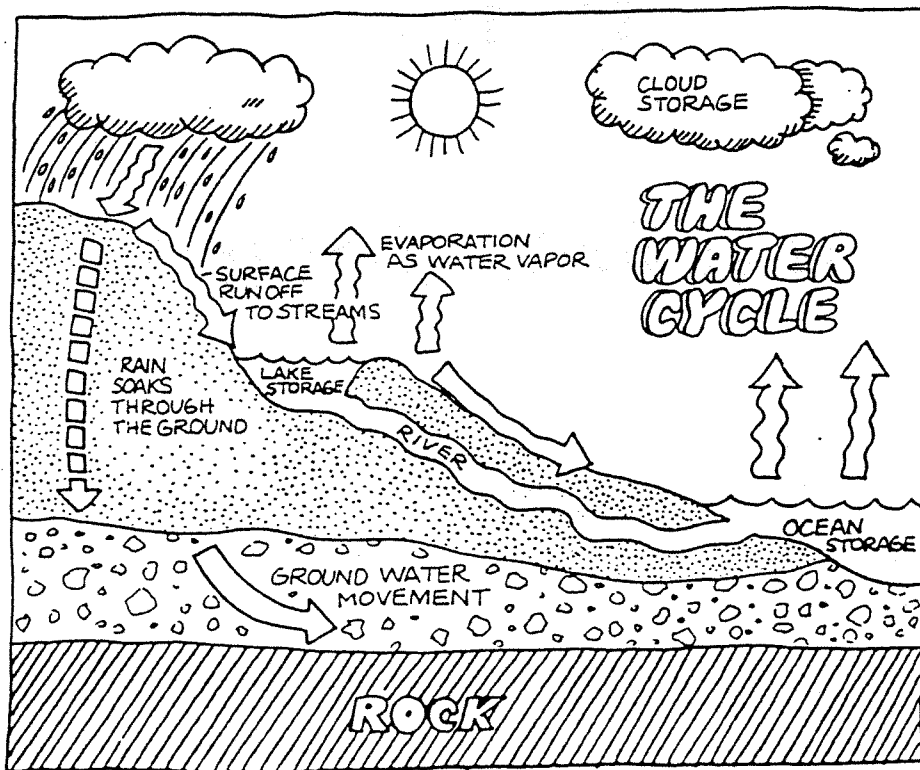
The Rain Recipe

Teacher's Notes

THE RAIN RECIPE

The Water Cycle has several parts that are linked together. The diagram explains how it works. It is an ongoing natural system that is always in motion. To move from the earth to the atmosphere, water *evaporates and transpires*. Going back to the earth again, water comes down as *precipitation* or it *condenses*. Between points on earth, water moves as *stream flow* or as *groundwater movement*. The sun supplies energy. This, in combination with the force of gravity, keeps water moving.

As a cycle, the global water system has no beginning and no end. It does not lose or gain water.



WATER CYCLE
GROUNDWATER
SURFACE WATER
EVAPORATION
CONDENSATION
PRECIPITATION
INFILTRATION

= Process that circulates, distributes, recycles water on earth.
= Water found below the surface of the earth, underground.
= Water found on the surface of the earth (lakes, rivers, oceans, etc.)
= Water changes from liquid or solid to gaseous state.
= Water changes from gaseous state to liquid.
= Water vapor that is heavy enough to fall from the sky
= Process when water seeps into the soil.

Source: Water Nature's Magician, Environmental Citizenship A-1. Environment Canada. Ottawa, 1992.
A Primer on Fresh Water, The Environmental Citizenship Series. Environment Canada. Ottawa, 1994.

Rain Recipe - The Water Cycle

Activity Sheet 2

Teacher's Notes

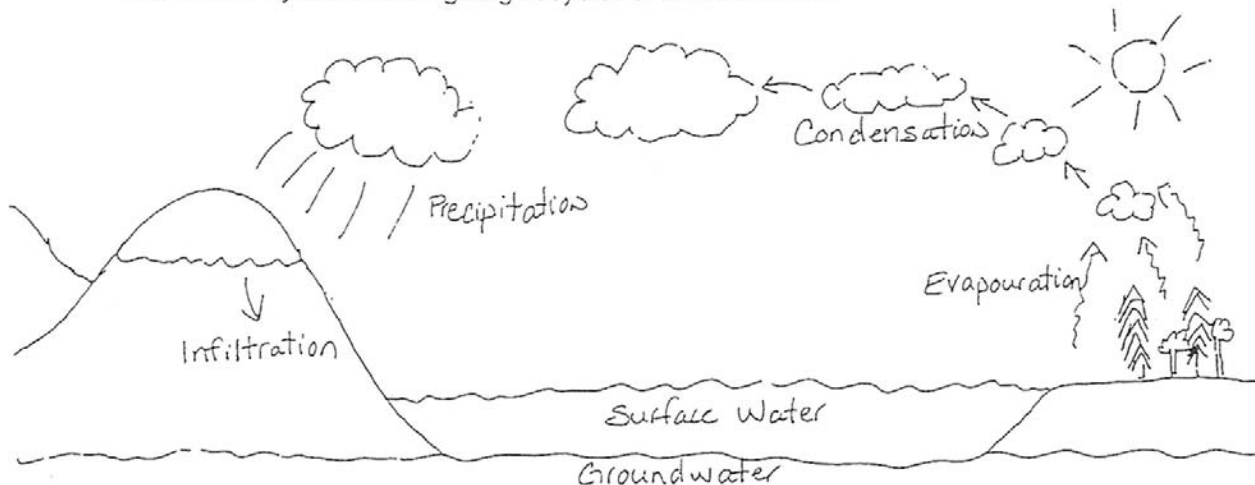
Examine the diagram of the Water Cycle below.
Fill in the blanks and review your answers with other people in your group.

Think about water on the surface of the earth. It is called *surface water*. Water that is found under the ground is called *ground water*. When the sun warms the earth, water is also warmed, causing it to evaporate. This process is called *evaporation*. When water evaporates it changes from a liquid to a gas and rises into the sky. When it rises it becomes water vapor, which forms clouds. Smaller clouds come together to make bigger *clouds*.
(clouds ; evaporation ; groundwater ; sky ; surfacewater)

The water vapor in the clouds also comes together to form water drops. The larger water droplets fall from the clouds to the earth as *rain* or snow. This is called *precipitation*.
(precipitation; rain)

Some of the water from rain and *snow* will evaporate and the whole cycle will start again. Some of the water will be soaked into the ground. This water is called *groundwater*. Groundwater fills cracks and spaces in rocks and soils underground. It travels slowly *under ground* until it finds its way to rivers, lakes, oceans, streams and seas!
(under ground ; groundwater ; snow)

The Water Cycle is an ongoing recycler of earth's water!



The Rain Recipe

Overview of Activity:

Students make rain in the classroom and discover that water continually recycles itself. Using this experiment as a guide, students identify parts of the water cycle in their daily lives. They learn that the water cycle is all around them, recycling itself all the time!

Outcomes:

- Consider implications of water changing state.
- Identify and describe cyclical occurrences of the water cycle.
- Identify the stages of the water cycle.



Purpose:

Students find out where rain comes from and how it develops. Given a "rain recipe", they observe water as it changes from a gas to a liquid state. Students observe "condensation" and "precipitation" and connect ideas from previous experiments to form an understanding of the water cycle.

ACTIVITY 1

Materials Needed:

- a large metal spoon or soup ladle
- a kettle of water (about half full)

Procedures:

1. Place the spoon into the freezer until it is ice cold.

With the spoon still in the freezer, take a kettle half full of water and boil it.

2. Observe the steam coming from the kettle. There is a small space between the kettle's spout and the cloud of vapor that is forming above the kettle.
3. In this space is steam. As water is boiled it transforms from liquid to gas, called steam.
4. The hot steam mixes with cool air outside. It cools and becomes white, visible water vapor. That is how clouds are formed.
5. Remove the ice-cold spoon from the freezer and hold it over the "cloud" above the kettle. The cold spoon cools the water vapor above the kettle, changing it from vapor into a liquid... water! As a liquid it then falls down to the ground as RAIN!

ACTIVITY 2

- Put on the overhead of the water cycle.
- Have students identify the different stages where water changes shapes and ask them to name these processes. (i.e. freezing, melting etc.)
- Fill out Activity Sheet #2.



ACTIVITY 3

Purpose:

Students create a water cycle flipbook, demonstrating water flow around the earth.

Materials:

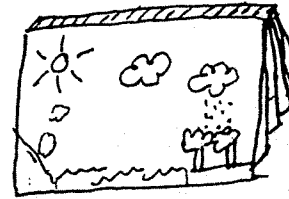
- diagram of the Water Cycle
- drawing paper with boxes
- pencil crayons, markers, crayons etc.

Procedures:

1. Students draw a series of images in boxes or on separate pieces of paper. The images are similar, however change slightly from one drawing to the next showing a progression through the water cycle.
2. When the pictures are completed they are stacked in order and fastened on the opposite side of the drawings.

3. Flip the pages rapidly upon fastening to create the magic of making a cartoon!
4. Flipbooks can also be produced using computer graphics and word processing.

Source: Science Scope Magazine. "Flip Book Fun". Karen Reynolds. February 1996, p.38.



Observations

Students should be able to identify changes that occurred in the activity using appropriate terminology (evaporation, precipitation etc.).

Discussions:

See Rain Recipe Activity Sheets 1 and 2

Conclusions:

Students become familiar with the physical properties of water and describe the interactive role that the water cycle plays in their daily lives.

Rain Recipe - The Water Cycle

Activity Sheet 1

Teacher's Notes

1. How did you know that the water in the kettle began to boil?
Water vapor and steam began coming out of the kettle. We could hear the water bubbling.
2. When were you able to see the steam that came out of the kettle?
We could not see the steam because steam is clear but when it cooled to form a water vapor cloud, then we could see a space between the kettle and the cloud. Steam was in that space.
3. What was the white cloud that formed above the kettle called?
The white cloud that formed above the kettle is called water vapor.
4. If we use this experiment to show how rain is made on earth, then what does the cloud that formed above the kettle represent? *The cloud above the kettle represents Clouds in the sky.*
5. What happened when the ice-cold spoon was placed near the cloud of water vapor?
When the ice-cold spoon was placed near the cloud of water vapor, water droplets formed on it. These water droplets then began to fall.
6. Explaining what you think would happen if the spoon was not ice cold.
The same thing would occur however it would take longer to occur.

Rain Recipe - The Water Cycle Activity Sheet 1



1. How did you know that the water in the kettle began to boil?

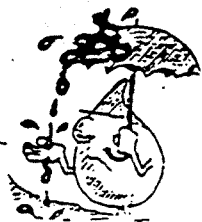
2. When were you able to see the vapor that came out of the kettle?

3. What was the white cloud that formed above the kettle called?

4. If we use this experiment to show how rain develops on earth, then what does the cloud that formed above the kettle represent?

5. What happened when the ice-cold spoon was placed near the cloud of water vapor?

6. Explain what you think would happen if the spoon was not ice-cold.



Rain Recipe - The Water Cycle Activity Sheet 2

Examine the diagram of the Water Cycle below.

Fill in the blanks and review your answers with other people in your group.

Think about water on the surface of the earth. It is called _____. Water that is found under the ground is called _____. When the sun warms the earth, water is also warmed, causing it to evaporate. This process is called _____. When water evaporates it changes from a liquid to a gas and rises into the _____. When it rises it becomes water vapor, which forms clouds. Smaller clouds come together to make bigger _____.
(clouds ; evaporation ; groundwater ; sky ; surfacewater)

The water vapor also comes together to form water drops. The larger water droplets fall from the clouds to the earth as _____ or snow. This is called _____.
(precipitation; rain)

Some of the water from rain and _____ will evaporate and the whole cycle will start again. Some of the water will soak into the ground. This water is called _____. Groundwater fills cracks and spaces in rocks and soils underground. It travels slowly _____ until it finds its way to rivers, lakes, oceans, streams and seas!
(under ground ; groundwater ; snow)

The _____ Cycle is an ongoing recycler of earth's water!

