

The Water Cycle

Age: Elementary School

Objective

- To educate kids on the water cycle and why it is important to the ocean environment.
- To demonstrate the scientific processes that make the water cycle possible.

Background Lesson

The water that makes up our oceans, rivers, lakes and streams is part of an amazing dynamic process known as the water cycle (or hydrologic cycle). The water that makes up our oceans today has been around since the formation of the Earth, but is constantly rejuvenated and recycled through the processes of evaporation, condensation and precipitation.

Evaporation occurs when solar radiation heats water bodies. The energy from the sun is transferred to these molecules, causing them to move faster and faster until they eventually break free from the water body. This is what makes up water vapour, or steam. The water vapour will then rise into the atmosphere where the second stage of the water cycle takes place.

Condensation occurs when the water vapour in the atmosphere gets cooler and turns back into liquid. These tiny water droplets are small enough to remain suspended, but congregate together forming clouds. In order for clouds to form, tiny suspended solid particles known as aerosols must be present.

Eventually, when enough water droplets have congregated together, the air can no longer keep them suspended. The water will then fall from the atmosphere in a process known as precipitation. This precipitation can occur in many forms including rain, snow, and hail.

Once the water falls to the Earth there are many paths it may take. If the ground is dry enough as well as sufficiently permeable, water will travel downwards into it. This is known as infiltration. If water cannot infiltrate into the ground surface, it may flow on top of the ground and become known as surface flow or runoff. Regardless of the path the water takes, it will eventually make its way back into an open water body where the water cycle will begin all over again. The following experiments are useful in demonstrating to students how these processes occur.

Experiment #1 - Disappearing Water

Materials

- Two small dishes
- Tablespoon
- Water
- Light Source (Sun)

Preparation

Split the students into groups of 2. Ensure that each group has two small dishes and access to a tablespoon and water.

Procedure

1. Pour one tablespoon of water in each dish.
2. Place one dish in the sun (if the sun is shining) or under a light source if it is not.
3. Place the second dish in the shade.
4. Have students observe what happens to the water in each dish over a period of time.

Post Activity Discussion #1

What stage of the water cycle does this experiment demonstrate?

Which dish evaporated faster?

Where does the water go?

How did the light source cause the water to evaporate?

Experiment #2 - Cloud Formation

Materials

- Empty 2L Pop Bottle (Clear)
- Warm Water
- Match

Procedure

1. Pour about an inch of warm water into the bottom of the clear 2L pop bottle.
2. Light a match, wait a few seconds, then blow it out.
3. Turn the pop bottle on its side and hold the match close to the opening so smoke from the match will enter the bottle. This smoke will make up the aerosols around which the clouds will form.
4. Put the lid onto the pop bottle and swish the water around inside of the bottle.
5. Swish water around inside the bottle and squeeze the bottle a few times. Hold it up to a window or a light source so that you can better see the "cloud".

Post Activity Discussion #2

What stage of the water cycle did this experiment demonstrate?

What is necessary for clouds to form?

What is the difference between clouds and fog?

Experiment #3 - Making Rain

Materials

- Kettle
- Sauce Pan
- Shallow Pan
- Water
- Ice Cubes

Preparation

Set up the workstation. Lay out some newspaper to make for an easier cleanup. Place the kettle on the table, ensuring it is within reach of a plug. Fill the Sauce pan with cold water and ice. Place the shallow pan on the newspaper beside the kettle.

Procedure

1. Put some water in the kettle and bring it to a boil.

2. Once the kettle water is boiling, hold the saucepan full of cold water and ice directly into the steam.
3. Hold the sauce pan in place long enough that water begins to condense on the bottom of the pan. Eventually, the water droplets will become big enough that they fall off of the pan. This means it's raining!
CAUTION: Steam can cause severe burns. Ensure that you keep your hands out of the steam when conducting this experiment.

Post Activity Discussion #3

Which stage of the water cycle does this experiment demonstrate?

Where does the water come from on the bottom of the sauce pan?

What are some possibilities for where the rain water would go once it hits the ground?

Possible Assignments

Have students draw the water cycle in its entirety. Alternatively, there are many water cycle diagrams online that could be used as a template for students to label.

Have students describe the journey of a water droplet through the water cycle from the droplet's point of view.

One Fish at a Time