Name

The water cycle

Do you know . . .

The hydrologic (water) cycle is an endless process of water being exchanged among clouds, land and oceans. The amount of water circulating remains about the same but can follow many different routes.

Water molecules from ocean and land surfaces are warmed by the sun and evaporate into the atmosphere as water vapor. At the lower temperature and pressure of high altitudes, the water vapor condenses to produce precipitation (rain, snow, sleet, hail). About seven-eighths of the precipitation falls directly into the oceans.

On land, the precipitation may run off surfaces into lakes, rivers and streams, or infiltrate into the soil or be absorbed by plants. Water not absorbed by plants becomes groundwater that is often pumped back to the surface or may eventually emerge from springs. Through transpiration—evaporation of water through plant processes—water is also recycled into the atmosphere.

Weather, climate and geographic features continuously affect the rate and amounts of water circulated between land, ocean and sky. Rain falls more frequently in latitudes closer to the equator and in areas near large bodies of water. Mountain slopes help produce rain clouds by blocking wind currents and causing warm air to be lifted and cooled.

The hydrologic cycle does not distribute water evenly around the earth. When precipitation is low in a certain area and groundwater levels drop, the condition is called a **drought**. When large amounts of water fall in a short time, the land cannot absorb all of it and rivers cannot hold it within their banks. Water pours over the land, causing a **flood**.

The location and availability of fresh water often influence where people settle and populations prosper. Major cities are often located on or near large bodies of fresh water. This provides easy access to the water supply for drinking, industry, transportation, recreation, and agriculture.

Today, population growth and industrialization throughout the world continue to increase the demand for water. As a result of the great demand and human usage, water can become polluted in several ways—sewage, nutrient chemicals, toxic substances, sediment, and heat. Wise management of this natural resource will determine if we will have the quality (condition of the water) and quantity (amount available for use) to meet future demands.

Now it's your turn . . .

How does the water cycle function? In this exercise you will construct the "water cycle" apparatus as shown in the diagram (p. 22), or design your own version. Using the completed model you will then simulate the steps in a natural water cycle to demonstrate how the process occurs. Note the following items as you create the model:

- Sterno needs to fit between the wood base and the bottom of the can
- Coffee can needs to sit level on four nails attached to the base
- Hot glue seals and coffee can lid need to be airtight around the base of the funnel and the tube

Vocabulary

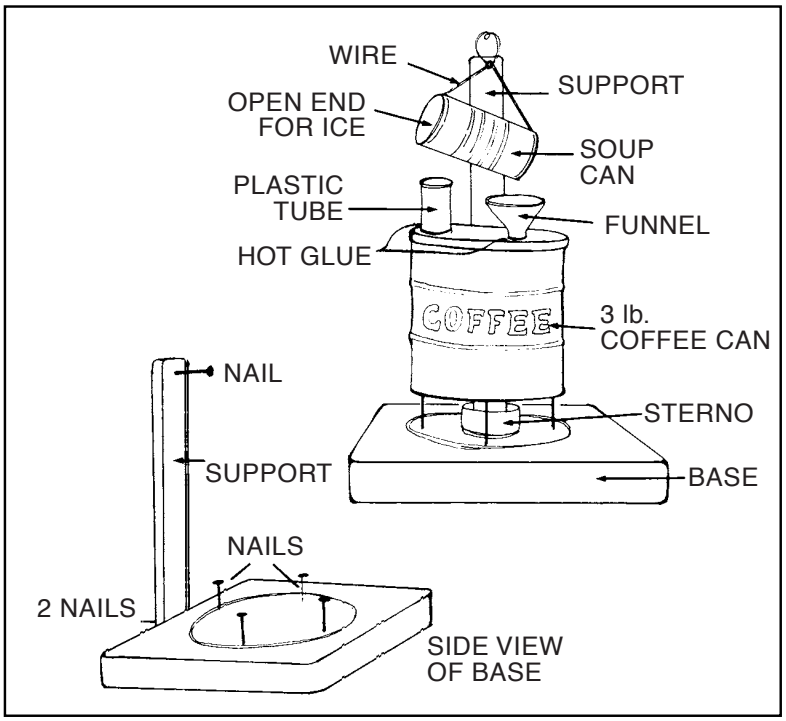
drought
flood

Adapted from Southern Willamette Energy Action Team (SWEAT), Eugene, Ore., and used with permission.

Student sheet

Water cycle simulation

1. Place ½" of water in the base of the coffee can.
2. Put one cup of ice cubes in tilted soup can.
3. Light Sterno and place under coffee can.
4. Allow water in coffee can to boil rapidly until steam escapes through chimney (tube). Align the coffee can so the rising steam strikes the soup can just under the opening.
5. Adjust angle of soup can so condensing water runs down the length of the can and drips into the funnel.
6. Relate the phase changes of water you have observed to the steps of the water cycle. Label the accompanying diagram and explain what occurs in each step of the water cycle.

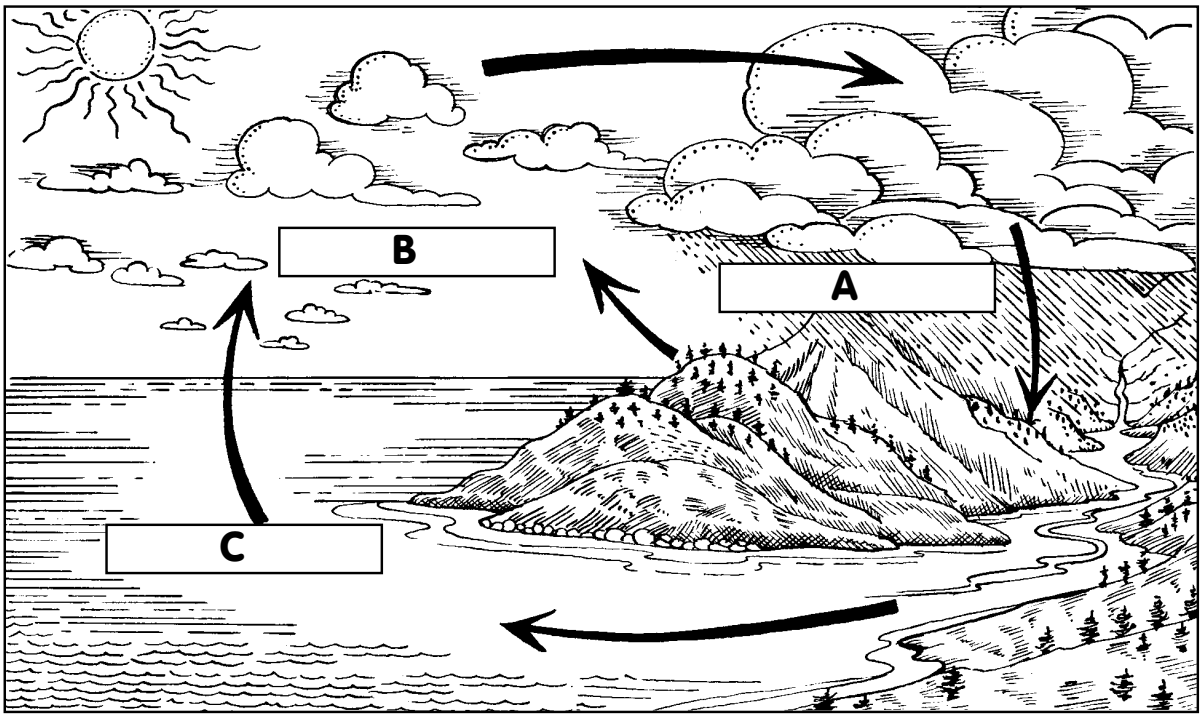


Questions

1. Using letters from the diagram below, label the steps of the water cycle in the blanks provided. Explain what occurs during each step.

   _____ evaporation _____ transpiration _____ precipitation

Water Cycle



2. What physical parts of the model correspond to the steps of the water cycle shown in the diagram above? Does your model demonstrate the entire water cycle? If not, what is missing?

3. How did the model increase your understanding of the water cycle?

4. How many gallons of water are you?

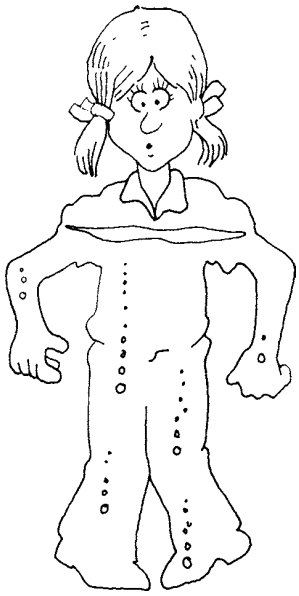
   a. Weigh yourself. _____ pounds

   b. Multiply your weight by 2.

   c. Divide your answer by 3. This answer is the approximate number of pounds of water in your body.

   d. A quart of water weighs about 2 pounds, so divide your last answer by 2.

   e. There are 4 quarts in a gallon, so divide again by 4. Therefore, there are _____ gallons of water in your body.



5. What is the average yearly rainfall in your area or community?

6. List twenty ways you use water. Underline the ten most important uses to you. Circle the uses that you could not live without.

7. Why do people use more water today per person than was used 50 years ago?

8. Scientists have determined it takes about 1,400 gallons of water to make a meal of a hamburger, french fries and a soft drink. List at least four ways that water is used to produce this meal.

9. Suppose your town is experiencing a water shortage. You are a member of the town council and the mayor asks you to write an emergency plan to save water. List four rules you might make to help your town save water.