Miniature Water Cycles

Summary

Students construct a model of the water cycle in action using two-liter pop bottles to build a terrarium.

Time Frame

5 class periods of 15 minutes each

Group Size

Small Groups

Life Skills

Social & Civic Responsibility

Materials

For the Teacher:

- Chart of water cycle to display to students

For the each group of 2-4 students:

- Two-liter bottle with plastic base removed. The two-liter bottle MUST be the kind that has the exterior, hard plastic base at the bottom of the bottle.
- Gravel
- Peat moss
- Potting soil
- African violets or seeds from a small flower (less than 6") such as a dwarf marigold.
- Cacti or small pine seedlings
- Sand

(Students could have the option of bringing in their own materials.)

Background for Teachers

The water cycle has three components: evaporation, condensation, and precipitation. Energy from the sun causes the water on the surface of the Earth to change to a vapor. This process is called evaporation .After water evaporates, it condenses. Condensation is the process by which vapor changes back into a liquid. This occurs when the water vapor is cooled. This water vapor condenses into droplets of water that form clouds. When the water droplets become too heavy to remain in the air, the water falls in the form of precipitation. Precipitation is rain, snow, sleet, and hail. This continuous process keeps the Earth supplied with fresh water and is called the hydrologic cycle, or water cycle.

Creating these miniature terrariums allows students to explore the necessary requirements to make the water cycle work successfully

Student Prior Knowledge

Students should have a working knowledge of the water cycle and the three parts: precipitation, evaporation, and condensation.

Intended Learning Outcomes

Conduct a simple investigation.

Pose questions about objects, events and processes.

Use available reference sources to obtain information.

Instructional Procedures

Step 1. Before giving to students, cut the two-liter bottles just above the top curve; the shoulder of the bottle where it starts to narrow into the neck. The bottle can be easily cut by using a razor blade, utility knife, or sharp scissors. Also, remove the plastic base of bottle. The base can easily be removed by placing the bottle in hot water for 15-30 seconds. Remove the base by sliding a butter knife between the base and bottle and pushing. Glue can be removed with a sharp knife. Do not cut the bottom of the bottle. Simply remove the base.
Step 2.Review the three parts of the water cycle with students. Tell students they will be building their own miniature water cycle in a bottle.
Step 3. In small groups, research and plan what will be necessary for a healthy start for a small ecosystem that students can add water to. They will be trying to make a small version of a place on earth that relies on the water cycle for survival.
Step 4. Some groups may choose to try a desert in a bottle. This may give them some interesting results as they observe the water cycle in action. Their observations and results will vary from one that uses peat moss and potting soil.
Step 5. Once groups have researched their materials, have them begin making a small terrarium. They should use the exterior, hard plastic base of their two liter bottle for this. Layer the materials they need, and plant their plant in the soil in the hard plastic base that was removed from the two liter bottle.
Step 6.Water the terrarium lightly. Invert the plastic bottle (that you cut the top off of) and insert it, shoulder area first, into the base making a sealed terrarium. You should not have to add more water.
Step 7. The violet or seeds or chosen plants should take up the moisture from the soil and release (transpire) it through the leaves. The water molecules will condense on the sides of the plastic bottle and "rain" into the soil.
Step 8.Record observations for two weeks. Observe the results daily and record finding in science journals. Ask them questions such as
What is happening inside the bottle?
How does the plant look?
How is this an example of the water cycle?
What would happen if the top of the bottle was taken off?

Extensions

If the terrariums are left in the classroom and not taken home, try changing something with a few and observe the results on the water cycle. For example, in one, take out all the green plants. In another place a piece of lemon. Ask questions about what might occur. Record changes through written or drawn explanations.

Assessment Plan

Students illustrate the water cycle with appropriate labels for each step.
They will then write two sentences that explain what occurs. They will need to use appropriate vocabulary, including the words evaporation, condensation, and precipitation.

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