

The Mini Water Cycle

Topic

Water cycle

Key Question

What water cycle processes can we observe in a sealed plastic bag?

Learning Goal

Students will observe the processes of a miniature water cycle inside a plastic bag.

Guiding Documents

Project 2061 Benchmarks

- *When liquid water disappears, it turns into a gas (vapor) in the air and can reappear as a liquid when cooled, or as a solid if cooled below the freezing point of water. Clouds and fog are made of tiny droplets of water.*
- *Water evaporates from the surface of the earth, rises and cools, condenses into rain or snow, and falls again to the surface. The water falling on land collects in rivers and lakes, soil, and porous layers of rock, and much of it flows back into the ocean.*

NRC Standards

- *Water, which covers the majority of the earth's surface, circulates through the crust, oceans, and atmosphere in what is known as the "water cycle." Water evaporates from the earth's surface, rises and cools as it moves to higher elevations, condenses as rain or snow, and falls to the surface where it collects in lakes, oceans, soil, and in rocks underground.*
- *Materials can exist in different states—solid, liquid, and gas. Some common materials, such as water, can be changed from one state to another by heating or cooling.*

Science

Earth science

weather

water cycle

Integrated Processes

Observing

Recording

Relating

Generalizing

Materials

For each student:

zipper-type plastic bag, pint size

clear plastic cup, 3.5 oz

permanent marker

masking tape

Background Information

The water cycle can briefly be described as the continuous movement of the Earth's water from its surface, to the air, and back to its surface. The heat from the sun *evaporates* the water on the Earth's surface. Cool air *condenses* the water vapor into water droplets or ice crystals. They fall back to the Earth as *precipitation*.

Around 75% of the precipitation falls directly into the oceans. The rest evaporates immediately or may soak into the Earth and become part of the ground water supply. Much of the surface and ground water eventually returns to the oceans (*accumulation*), beginning the entire process over again.

A sealed plastic bag containing water models the water cycle. Warmth causes the motion of water molecules to quicken; some escape their bonds, *evaporating* into the air and becoming invisible vapor. As the water vapor cools, the molecules slow down and *condense* again into a visible liquid. Water droplets may form at the top and sides and slowly drip or slide (*precipitate*), *accumulating* at the bottom of the bag.

Management

1. Be sure to tape the bag on an angle, like a diamond, so that the droplets will slide down and collect in the bottom corner.
2. The bags will need to be placed in a warm, sunny spot.

Procedure

1. Review with the students the natural water cycle, stressing the processes of evaporation, condensation, precipitation, and accumulation.
2. Tell students they will create a very simple water cycle in a closed bag and observe how water invisibly *evaporates* from the cup, like it does from oceans, *condenses* on the sides of the bag, like it does in the clouds, falls back to Earth as *precipitation*, and *accumulates* in the bottom of the bag like it does in oceans, lakes, rivers, and ground water.

3. Hand out a bag and cup to each student or group of students. Have students fill the cup approximately half full with water and mark the water line with a permanent marker.
4. Instruct the students to carefully nest the cup in one of the bottom corners of the bag. (See illustration on student page.)
5. Have students close the bag tightly and tape it in a warm place, tilted on an angle like a diamond.
6. Hand out the activity page and have students record what happens over a four-day period.

Connecting Learning

1. What do you think will happen to the water in the cup over the four days?
2. What are the drops that have condensed on the side of the bag similar to in the real water cycle? [clouds]
3. What is the water that has collected at the bottom of the bag similar to in the real water cycle? [rivers, lakes, ground water, etc.]
4. How does the location where you placed your bag affect the amount of water that is collected in the bottom? [The sun provides the heat that causes the water to evaporate, so the bags hung in direct sunlight will show results faster than those not exposed to so much heat.]
5. What would happen if you left your mini water cycle in a warm place for one month? Why?
6. What are you wondering now?

Extensions

1. Perform the same experiment again with salt water instead of plain water. The water that collects in the bottom of the bag will be fresh water, not salt water. This is one method of desalination, that is, separating salt from salt water by evaporation.
2. Perform the same experiment varying the light, color of bag, amount of water, size of bag, etc.
3. Add food coloring to the water to represent contaminants. Observe whether or not the food coloring evaporates.

Curriculum Correlation

Language Arts

Write a story of how someone could survive with minimal water using the “water cycle in a bag” concept.

Critical thinking

Design a self-watering plant container based on the “mini water cycle.”

Math

Measure the number of milliliters of water that evaporated from the cup over a four-day period.

The Mini Water Cycle

Key Question

What water cycle processes can we observe in a sealed plastic bag?

Learning Goal

Students will:

observe the processes of a miniature water cycle inside a plastic bag.

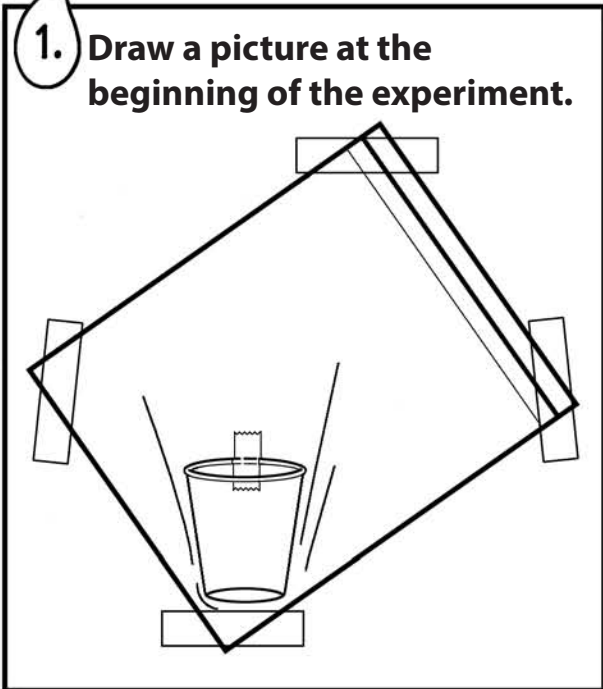


The Mini Water Cycle

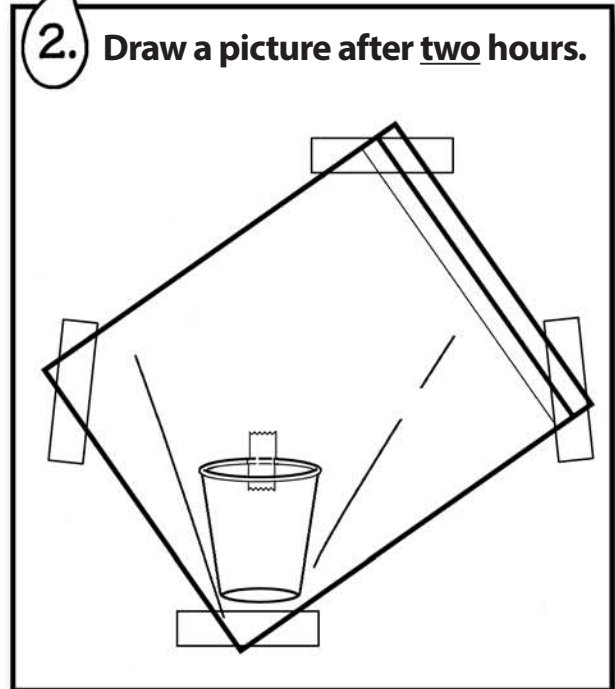
- ☼ Place your mini water cycle in a warm or sunny place.



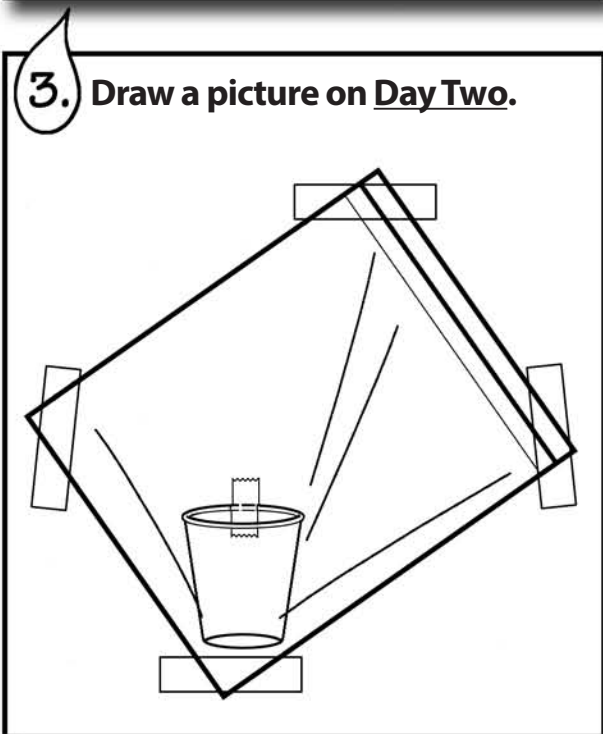
1. Draw a picture at the beginning of the experiment.



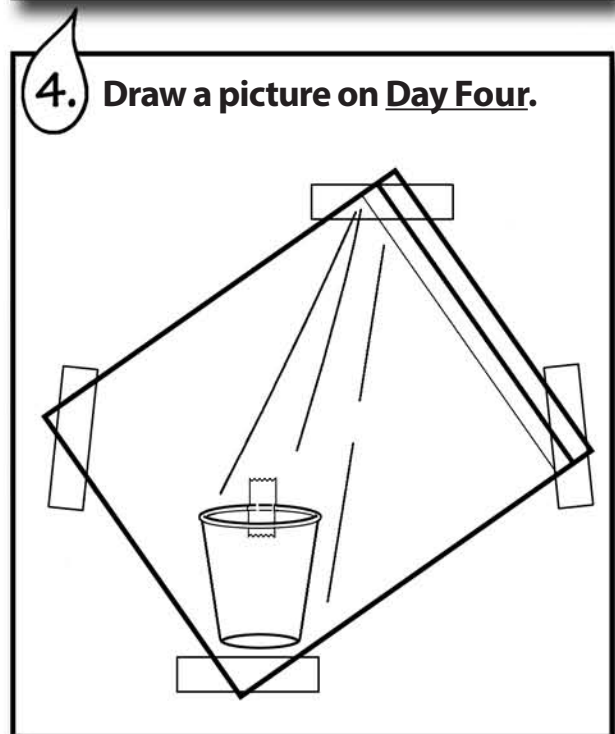
2. Draw a picture after two hours.



3. Draw a picture on Day Two.

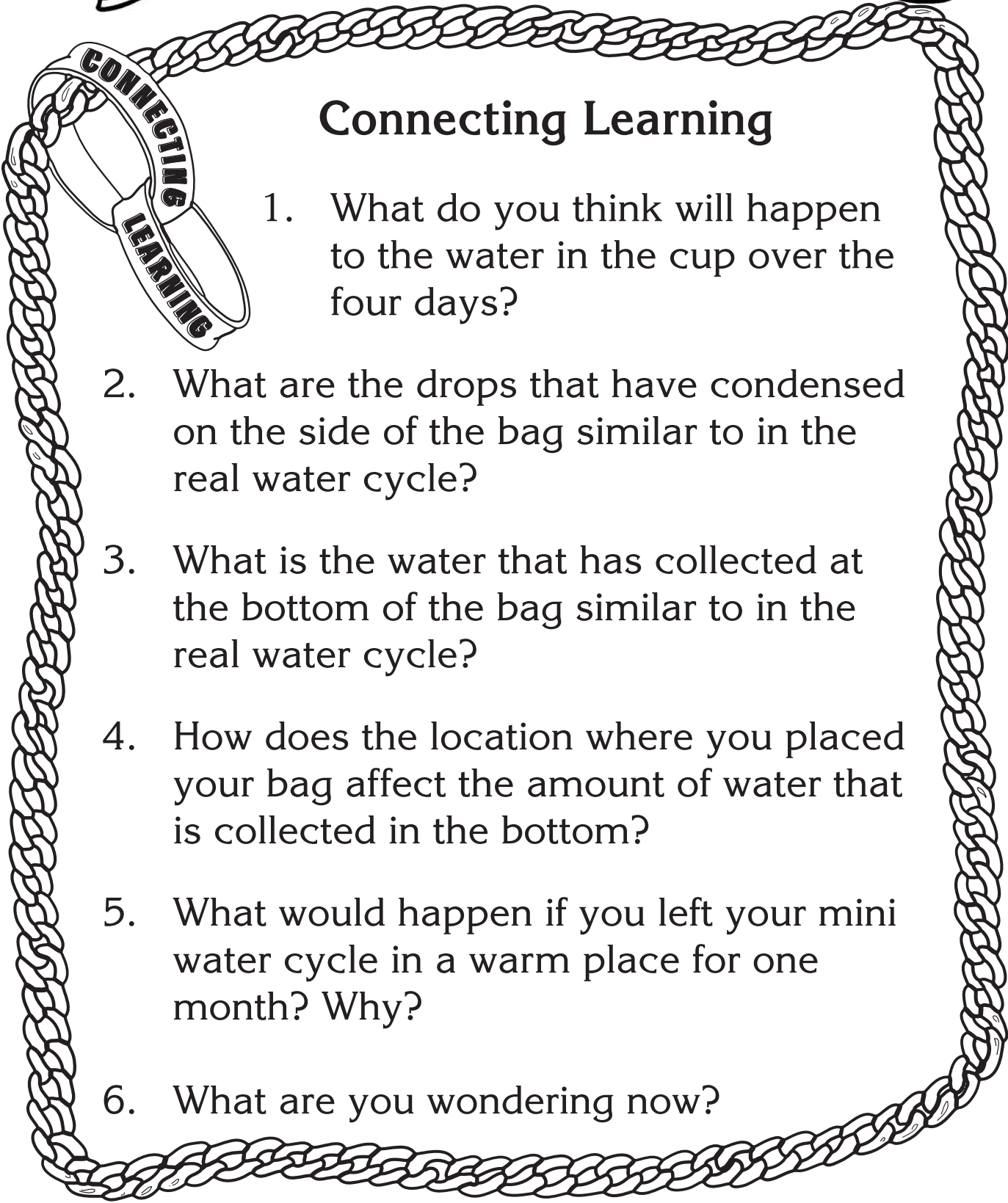


4. Draw a picture on Day Four.



The Mini Water Cycle

Connecting Learning

- 
1. What do you think will happen to the water in the cup over the four days?
 2. What are the drops that have condensed on the side of the bag similar to in the real water cycle?
 3. What is the water that has collected at the bottom of the bag similar to in the real water cycle?
 4. How does the location where you placed your bag affect the amount of water that is collected in the bottom?
 5. What would happen if you left your mini water cycle in a warm place for one month? Why?
 6. What are you wondering now?



Thank you for your purchase!

Please be sure to save a copy of this file to your local computer.

This file contains materials developed by the AIMS Education Foundation. **AIMS** (Activities Integrating Mathematics and Science) began in 1981 with a grant from the National Science Foundation. The non-profit AIMS Education Foundation publishes hands-on instructional materials that build conceptual understanding. The foundation also sponsors a national program of professional development through which educators may gain expertise in teaching math and science.

Copyright © 2013 by the AIMS Education Foundation

All rights reserved. No part of this work may be reproduced or transmitted in any form or by any means—except as noted below.

- A person purchasing this AIMS activity is hereby granted permission to make unlimited copies of any portion of it, provided these copies will be used only in his or her own classroom. Sharing the activity or making copies for additional classrooms or schools or for other individuals is a violation of AIMS copyright.
- For a workshop or conference session, presenters may make one copy of any portion of a purchased activity for each participant, with a limit of five activities or up to one-third of a book, whichever is less.
- All copies must bear the AIMS Education Foundation copyright information.
- Modifications to AIMS pages (e.g., separating page elements for use on an interactive white board) are permitted only for use within the classroom for which the pages were purchased, or by presenters at conferences or workshops. Interactive white board files may not be uploaded to any third-party website or otherwise distributed. AIMS artwork and content may not be used on non-AIMS materials.

Digital distribution rights may be purchased for users who wish to place AIMS materials on secure servers for school- or district-wide use. Contact us or visit the AIMS website for complete details.

AIMS Education Foundation
1595 S. Chestnut Ave., Fresno, CA 93702-4706
permissions@aimsedu.org
888.733.2467 • aimsedu.org