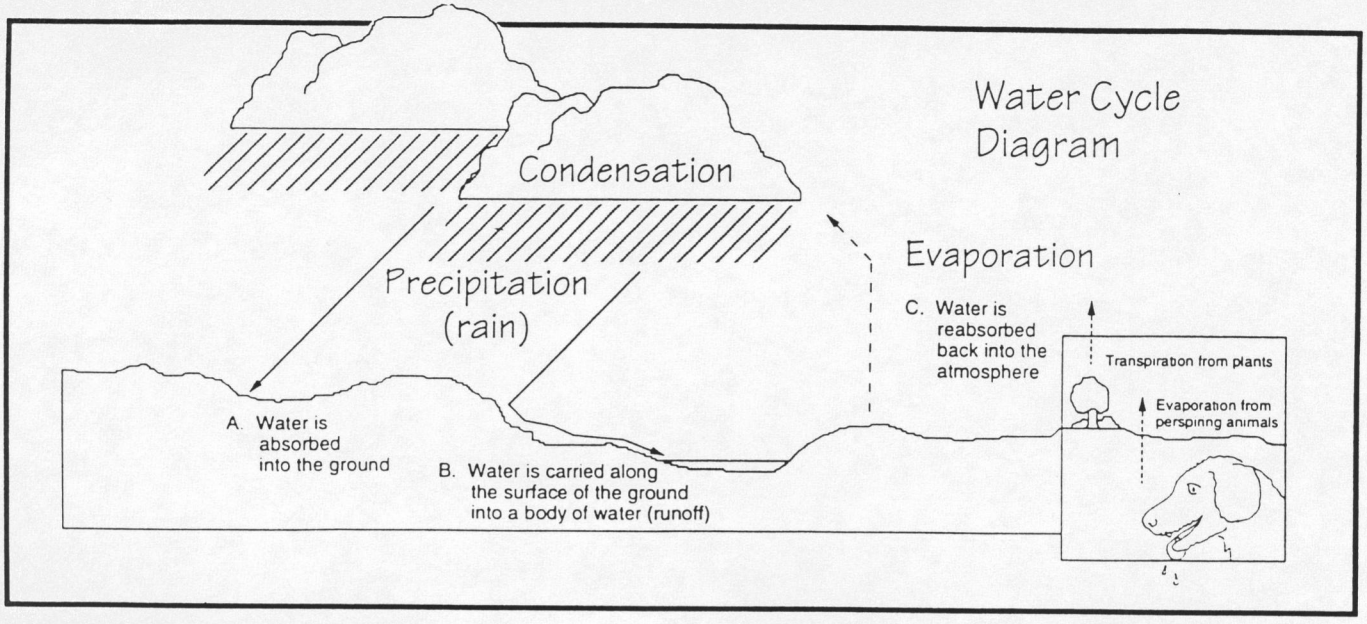
Lesson 9

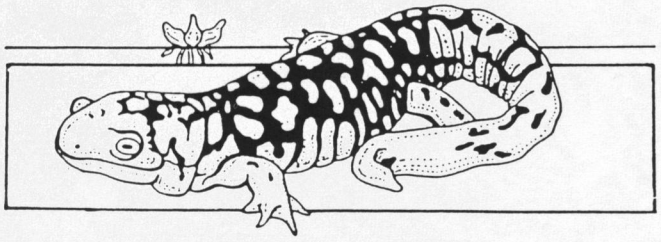
CYCLE IN A BAG



Key Question(s)

How does the water cycle work?

How does sunlight affect the water cycle?



TARGET AUDIENCE:
GRADES 3- 5, AGES 8 - 10, Suitable for visual learners. Appropriate for all academic ability levels.

SCIENCE PROCESS SKILLS USED:
Observation, Measurement, Prediction, Inference

TIME REQUIRED TO COMPLETE LESSON:
In-class: 35-50 minutes,
In-field: 10-15 minutes set up Day 1;
5 minutes per observation period Days 1-3

BEST TIME OF YEAR FOR LESSON:
All Year as long as days are warm and sunny

Behavioral Objectives

As part of this activity, students will:

- (C) 1. observe and describe the three major phases of the water cycle.
- (C) 2. explain how sunlight and temperature affect the water cycle.
- (A) 3. explain why it is important to conserve and protect available drinking water sources.

Materials

ESSENTIAL: (PER GROUP OF 4 STUDENTS)

- "Cycle in a Bag" worksheet
- Clipboard or other hard writing surface
- Quart size Zip-Lock baggie with writing label across the top
- 3.5 oz. clear plastic cup (bathroom size)
- Black permanent marker
- Measuring cup
- Masking tape

SUPPLEMENTAL:

- Marker flags or flagging tape

GETTING READY

Scan the school grounds and locate a hot, sunny wall area where students can mount their mini-water cycle bags. The bags will need to remain on the wall undisturbed for 3 days. The first phase of the activity should begin as early in the morning as possible. Bags will need to be checked each morning and afternoon for three days.

PROCEDURE

BEFORE GOING OUTSIDE (15-20 MINUTES):

1. Introduce and discuss the term "cycle." Explain that in a cycle, a complete set of events occurs in the same sequence over and over. Ask students to name examples of natural cycles. Reinforce the idea that both living and non-living components of the environment often undergo cycles. Examples include plant and animal life cycles, nutrient cycles, and cycles of elements such as nitrogen, oxygen, and carbon. Ask students to recall the three major parts of the water cycle (evaporation, condensation, and precipitation). Explain that during this activity students will be working in groups to create their own miniature water cycle in a plastic bag.

2. Divide students into groups of three to four and distribute a "Cycle in a Bag" worksheet to each group. Refer to the diagrams on the worksheet and review and demonstrate the procedure for creating a water cycle in a bag. Instruct students to pour 2 ounces of water into a small, clear plastic cup and mark the water line with a permanent marker. Next, students should tape the cup to the inside of the baggie at the lower right corner. Remind students to tightly seal their baggies before beginning the experiment. Also, remind students to tape their bags on the outside wall at an angle like a diamond and remind students to write their names at the top of their baggies. If marker flags or flagging tape are available, mark off the wall as a designated "study area."

3. Distribute all materials and assist groups with the preparation of their miniature water cycle models.

WHILE OUTSIDE - DAY 1 MORNING (10-15 MINUTES):

1. Distribute a clipboard to each group and lead students to the outdoor study wall site. Have each group securely tape its water cycle bag to the wall. Make sure students tape the bags at eye level so they are easy to observe.

2. Have each group predict what the inside of its bag will look like each morning and afternoon during the next 3 days. Groups should record their predictions on the "Cycle in a Bag" worksheet.

WHILE OUTSIDE - DAY 1 AFTERNOON; DAYS 2 & 3 MORNING AND AFTERNOON (5 MINUTES PER OBSERVATION PERIOD)

1. Have groups observe their bags each morning and afternoon for 3 consecutive days. Instruct groups to draw and describe their observations on the "Cycle in a Bag" worksheet.

AFTER GOING OUTSIDE (20-30 MINUTES):

1. Ask students to share their observations and discuss how accurate their predictions were. Conduct a whole-class discussion addressing the following questions:

- During what phase of the water cycle is water invisible? (evaporation)
- Why is the water invisible during this phase? (because it is a gas)
- What causes water to evaporate in the water cycle? (heat from the sun)
- What causes water to condense in the water cycle (cooler temperatures)
- During what time of day was evaporation in the bag the greatest?(the sunniest, hottest part of the day)
- During what time of day was condensation in the bag the greatest?(the cooler, dark night hours)
- What stage of the water cycle do the water droplets inside the baggie represent? (condensation)

• When many droplets of condensed water collect in the atmosphere, what do we see? (clouds)

• Is the total amount of water in the baggie the same after 3 days? (yes, unless the bag was not tightly sealed)

• When water droplets collect at the bottom of the baggie, what stage of the water cycle does this represent? (precipitation)

• If the baggie remained tightly sealed, how much water would be in the baggie after one month? (the same amount of water you started with - 2 ounces)

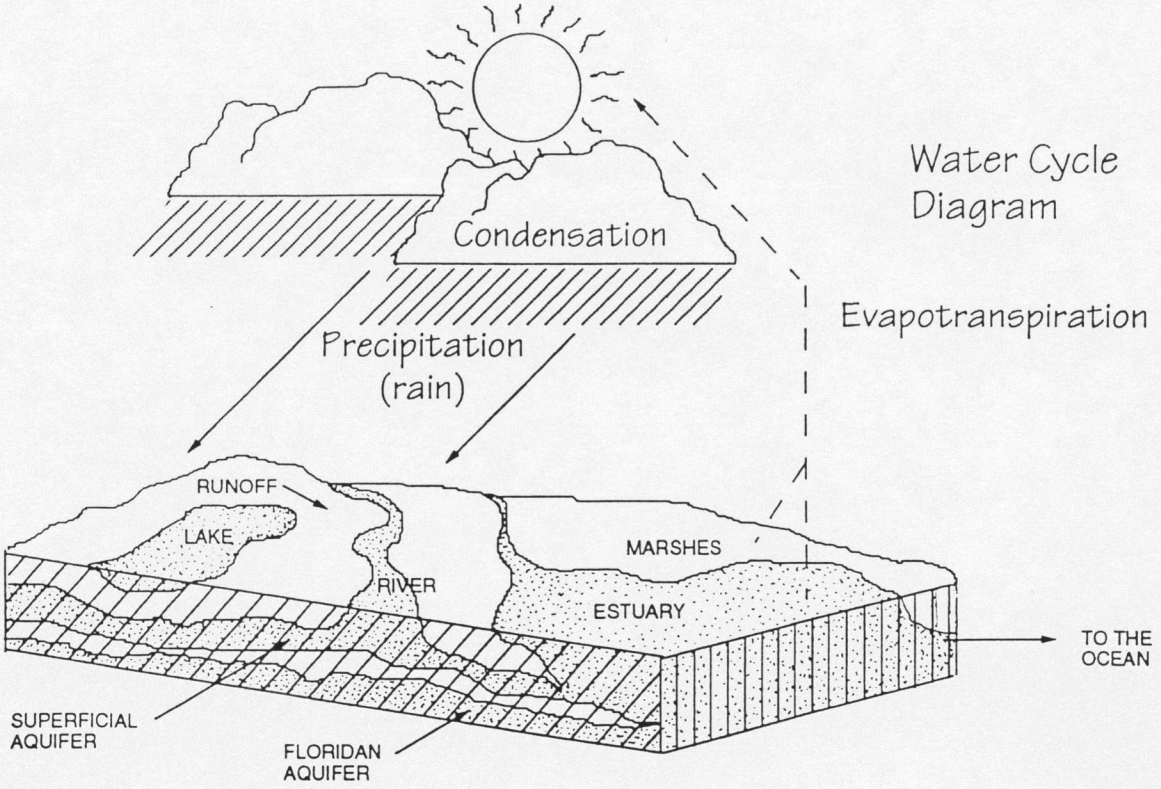
• If the baggie was left on the wall with the seal opened, what would happen to water in the bag? (it would eventually all evaporate into the surrounding atmosphere)

• How would your miniature water cycle be affected if the bag was placed in a cool, shady area instead of a hot, sunny area? (the rate of evaporation would be much lower)

• How much water was left in the cup after three days? (answers will vary)

2. Remind students that although they can't always see it happening, the water cycle is constantly occurring all around them. Emphasize the idea that the earth contains the same amount of water today that it contained millions of years ago. At different times in the earth's history, the water might be distributed differently, but the total amount of water never changes; it is constantly moving through a repeating cycle. For example, during the most recent Ice Age, more of the earth's water was frozen in glaciers, but the amount of water present during the Ice Age was the same as the amount of water present today.

3. Ask students if they think we really need to worry about running out of water since the total amount of water on earth remains constant. Develop the idea that although water on the earth is abundant overall, the vast majority of water on earth is either trapped as frozen ice or found as salt water in the oceans. Explain that 97% of the earth's water is saltwater in the ocean and 2% of the earth's water is frozen. Of all of the water available on earth, only about one gallon out of every hundred gallons can be used for drinking. As a result, we must be careful to conserve our available fresh drinking water and protect it from contamination from pollution.



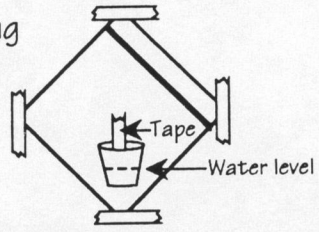
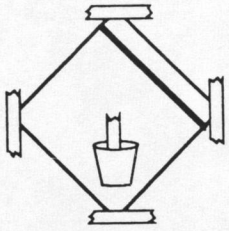
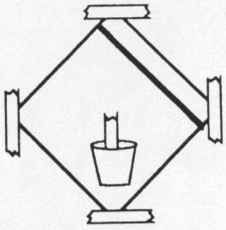
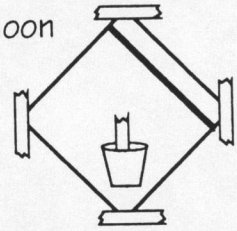
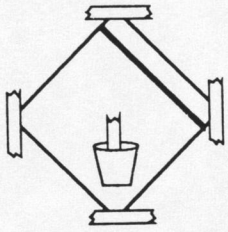
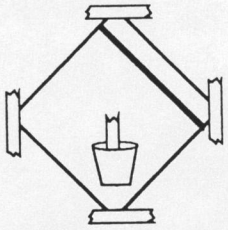
CYCLE IN A BAG

Name_____ Name_____

Name_____ Name_____

DIRECTIONS:

Use the materials provided by your teacher to make a miniature water cycle in a bag. Remember to mark the starting water level in your cup and write your names on the baggie label. Tape the baggie on the outdoor wall at an angle like a diamond with the cup of water at the bottom. Record your predictions and daily observations in the spaces below.

	DAY 1	DAY 2	DAY 3
Morning			
	Predictions _____	Predictions _____	Predictions _____
	Observations _____	Observations _____	Observations _____
Afternoon			
	Predictions _____	Predictions _____	Predictions _____
	Observations _____	Observations _____	Observations _____