

# RAFT IDEAS

**Topics:** Water Cycle,  
Weather, Atmosphere

## Materials List

- ✓ Cardboard cylinder, (12"-18" diameter by 4-8" high)
- ✓ Foam core board or cardboard the same width as the cylinder
- ✓ 12 yards VHS tape, string, or yarn
- ✓ Glue
- ✓ Scissors
- ✓ Poly batting / cotton
- ✓ Blue & white tempera paint (optional)
- ✓ Clear plastic strips
- ✓ Map or construction paper
- ✓ Artificial greenery
- ✓ 4 pony beads

This activity can be used to teach:

CO Science Standard 3:  
Earth Systems Science

- Atmosphere
- Building Scientific Knowledge/Models

Grades: 5, 6, 8, HS



# Water Cycle in 3D

Create a 3D Model of the Water Cycle



Students use a circular format to create a realistic model of all phases of the water cycle including evaporation, transpiration, condensation, and precipitation.

## Assembly

1. Trace around the tube on the foam core or cardboard and on a piece of paper. Cut out both. Divide the paper pattern into 1/4 by folding it in half and then in half again. Use the pattern to mark the center of the cardboard circle on the bottom and to make a small slit on the edge of the cardboard at each fold.
2. Glue a map or use construction paper to make land, water and other details representing the Earth's surface on the top of the cardboard circle.
3. Paint or cover the outside of the cardboard cylinder to represent the atmosphere. (optional)
4. Glue the poly batting and labels on the cylinder to represent clouds/condensation and to identify phases of the cycle in the correct order, evaporation, condensation, transpiration, precipitation.
5. Cut 4 pieces of VHS tape measuring 3 yards each.
6. Hold all 4 strips together evenly at one end, measure 54" from that end and tie a single knot with all of the strips together.
7. Place the VHS tape on a table or floor with the knot at the center and make a plus with 2 strips coming out in 4 directions  $\perp$ .
8. Hold 2 strips together, away from the knot, and thread through a pony bead. (Wrap a small piece of tape on the ends to make it easier to thread.) Tie the pony bead in place 15" from the center knot. Repeat for each set of strips. It is important that the bead be same distance from the center knot on each pair of strips.
9. Place the center knot of the strips over the center mark on the cardboard and use a tack to hold it in place. Turn it over and bring one set of strips out at each slit. Set the tube over the circle, and sandwich it between the two strips of VHS tape and tie. The pony bead will keep the tube suspended over the circle.
10. Bring all ends of the strips above the tube, suspend and adjust the tape until it hangs evenly and tie all strips together.
11. Cut narrow strips of plastic to represent moisture. Use a marker to draw arrows up or down to show movement. Glue the strips to hang below the tube in the correct phase. Up arrows for evaporation, down arrows for precipitation. Small pieces of greenery can be used to show transpiration, with arrows out from the plant.

## **To Do and Notice**

1. Discuss each phase of the water cycle and ask where the process begins. Do the phases of the cycle have an order? Why is this important? Students should discover that each phase is dependent upon the previous phase and that the water cycle has no beginning, but the order of the phases is important.
2. Research the percentage of water and land on the Earth's surface. Is this percentage the same for Colorado? How could your model reflect the correct percentage for the Earth or for Colorado?
3. Does logging or the clearing land have an impact on the water cycle? How does energy transfer in the atmosphere influence weather? Does ocean temperature impact weather?

## **The Science Behind the Activity**

The air around us holds moisture in the form of a gas called water vapor. About 90% of the water in the air comes from the oceans, lakes, and rivers through the process of evaporation by which the heat of the sun helps break the bonds of water molecules apart in order to change liquid water into the gas state of water vapor. The remaining water vapor in the atmosphere comes from plant transpiration, the evaporation of water from plant leaves, and an even smaller amount from the sublimation of ice and snow. Sublimation is the process where water changes from the solid state of ice or snow directly into water vapor without becoming a liquid first. A good example of sublimation occurs in Colorado and other western states, when warm Chinook winds vaporize snow before it has a chance to melt.

Condensation is the opposite of evaporation and is the process where water vapor changes back into liquid water. You can see condensation in the form of water drops on the outside of a cold beverage container in the summer, fog, or moisture on the bathroom mirror after a hot shower. In the atmosphere, clouds result when water vapor condenses and combines with tiny dust or smoke particles. These tiny droplets combine with other droplets to form clouds which grow and develop into larger clouds. Eventually the air becomes saturated and precipitation forms. Precipitation is a liquid or solid form of water that falls from the base of clouds as rain, snow, or hail and is the way that water returns to the Earth to continue the cycle.

## **Taking it Further**

What happens to precipitation when it reaches the ground? Some may be held in lakes and rivers, but what happens to water that soaks into the ground? What could be added to the model to show the area below the surface of the Earth?

## **Assessment Opportunities**

There are several observational assessment opportunities during the building of the model. Were students able to correctly measure the lengths of VHS tape? Do students apply cause and effect thinking when ordering the phases around the model? Do students engage in real-world problem solving around the topics of human impact on natural cycles, e.g. global warming?

## **Environmental Responsibility / RAFT Repurposes Materials for Learning**

This activity provides an opportunity to discuss human impact on naturally occurring cycles. This Idea Sheet repurposes cardboard, VHS tape, and other materials that might have otherwise gone to a landfill.

## **Reflective Practice**

How does this instructional strategy compare to other strategies for teaching the same content? How would you change this activity to better meet the learning needs of your students?

## **Web Resources**

- Water Cycle - <http://ga.water.usgs.gov/edu/watercyclehi.html>
- Colorado Foundation for Water Education - <http://www.cfwe.org/SchoolPrograms/>
- Project WET, Worldwide Water Education - <http://projectwet.org/water-education-project-wet/water-education-project-wet/>

Evaporation

Condensation

Precipitation

Transpiration

Collection

Infiltration

Sublimation