

#### **Curriculum topics**

- Earth Systems
- Human Impacts
- Model Building
- Structure & Properties of Matter
- Weather & Climate

#### Subjects

Earth & Space Science

#### Grade range: 3 – 8

Who we are: Resource Area for Teaching (RAFT) helps transform the learning experience by inspiring joy through hands-on learning.

# WATER CYCLE IN 3D

Create a 3D Model of the Water Cycle



A circular model/diorama of the water cycle

One of the ways that people share their ideas with others is by creating models. **Models** are representations of a concept or idea. Models can be flat, 2D representations like drawings, flow charts, or other diagrams, or they can be 3D objects (e.g. scale models of cars or airplanes). **Dioramas** are a type of model that depicts a scene to convey a much larger idea. They usually contain several miniature models of different objects, landscapes, living things, or phenomena (see example above). Dioramas can be made of various materials and are usually portable, with some exceptions.

Water is a crucial resource for survival. Seventy one percent (71%) of the Earth is covered by water. A very small percentage is freshwater that animals and humans can drink and use for various purposes. Not all the water used by terrestrial plants and animals is available as freshwater. In fact, most of the water on Earth exists in our oceans and frozen in glaciers. Fortunately, water moves through a series of changes from sloid ice to liquid water and then to water vapor. These are important steps in the water cycle. This activity provides students an opportunity to learn the steps in the water cycle and represent them in a 3D model/diorama. They build the model using a variety of recyclable materials and then discuss the model with their peers.



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# Materials

Materials in the kit may vary but generally, this kit contains the following:

- Paper plate, 7-8" diameter (2)
- Cotton balls (8)
- Construction paper, blue and green (2)
- Pipe cleaners, blue (8)
- String, 3 ft. (1)
- Paper cups, 2-4 oz. (1)
- Clear plastic sheet (1)
- To Do and Notice

- Binder clips, small or medium (4)
- Paper clips (3)
- Water cycle stage labels, accessible at <u>https://bit.ly/3Xbb95u</u>
- Not included: Scissors, tape, glue, stapler, paint, images of terrain/vegetation

- 1. **The Earth's Surface:** Draw lines dividing the plate into 4 equal parts. Draw or cut and glue images (not included) of land, bodies of water (lakes, rivers, etc.), and vegetation (trees, fields, forests) and mountains/valleys anywhere on the plate. Make sure the dividing lines remain visible.
- 2. **The Atmosphere:** Measure and cut a 4" x 24" strip of blue construction paper. Glue cotton balls ("clouds") anywhere on one side of the strip. Overlap the short ends of the strip and staple them together, forming a paper ring (see top picture on title page).
- 3. **Model Assembly:** Cut four (4) 8" lengths of string. Use paper clips to fasten the ends of the strings to the edge of the plate where the dividing lines reach the edge. Fasten the opposite ends of the strings to the paper ring. The decorated plate should dangle from the blue ring ("atmosphere").
- 4. Cut 4 more lengths of string about 12" each. Use binder clips to attach them to the paper ring. Pull upward on the strings and tie a single knot.
- 5. Cut out the water cycle stage labels, accessible at <u>https://bit.ly/3Xbb95u</u>.
- 6. 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 ring in the correct phase. Up arrows for evaporation, down arrows for precipitation. Small pieces of greenery can be used to show transpiration, with arrows coming out from the plants.
- 7. **Optional:** Research the percentage of water and land on the Earth's surface.
- 8. **Discussion:** 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? How could your model reflect the correct percentage for the Earth or for your state or location? Does logging or clearing land have an impact on the water cycle? How does energy transfer in the atmosphere influence weather?
- 9. **Share** your learning with RAFT! Submit photos/video via email at <u>education@raft.net</u> or on social media (<u>Facebook</u>, <u>Twitter</u>, <u>Instagram</u>).

#### **Core Content Skills:**

#### Science & Engineering (NGSS)

Developing and Using Models, Engaging in Argument from Evidence, Systems and System Models, Natural Resources, Earth Materials & Systems, Human Impacts on Environment, Properties of Materials, Cause and Effect

#### Social Emotional Learning

- Self-awareness
- Self-management
- Responsible decisionmaking

# 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 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 can 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.

### Reuse

This kit uses 100% reusable materials designed for other uses. To continue making a positive impact in reducing waste, reuse these materials in other projects. Additionally, any unused materials can be collected and delivered back to RAFT.

### Feedback

Please comment on this kit by taking this short survey: <u>http://bit.ly/RAFTkitsurvey.</u> Let us know of any material concerns (missing, broken, or poorly fitting parts) as well as any suggestions for improvement.

Visit https://raft.net to view related activities!

- As the Clouds Go "Bye"
- Electric Wind Generator
- Wind-O-Meter

### Resources

- Water cycle animation <u>https://gpm.nasa.gov/education/videos/water-cycle-animation</u>
- Water cycle overview video <u>https://www.youtube.com/watch?v=al-do-HGulk</u>