



# WATER CYCLE IN A BAG INSTRUCTIONS

(Recommended for grades 3 through 5)

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## OBJECTIVE

Students will learn how energy from the sun changes the form and location of water and distributes heat around the planet—making life for everyone sustainable.

## RECOMMENDED AUDIENCE AND SETTING

This activity is suited for students in grades third through fifth. It can be performed indoors or outdoors at water days, at fairs, or in school classrooms.

## ACTIVITY

**Time Required:** 15 to 20 minutes, depending on the depth of instruction.

## MATERIALS NEEDED (for each participant)

- ▶ 1 gallon zip lock bag
- ▶ 1 cup of clean pea gravel or small pebbles
- ▶ 1 cup of water
- ▶ Picture or poster illustrating the water cycle
- ▶ Blue dye or food coloring (optional)
- ▶ Assortment of colored permanent markers
- ▶ **OTHER SUPPLIES:** cup for dispensing pea gravel/pebbles

## PREPARATION

In a jug of water, place a few drops of blue dye or food coloring in it. Each student will need 1 cup of water (NOTE: The total amount of water needed will depend on the number of students). Place clean pea gravel in a 5 gallon bucket. Each student will need 1 cup of pea gravel (NOTE: The total amount needed will depend upon the number of students). Display a picture or poster depicting the water cycle, give each student a 1 gallon zip lock bag (Fig. 1), and provide students with an assortment of colored permanent markers.

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Figure 1. Example bag (minus gravel and water).

## GETTING STARTED

Introduce yourself and tell students that today's lesson is the *Water Cycle*, which is sometimes called the hydrologic cycle. **Ask, "do you know that the total amount of water on our planet does not change, but only changes form (or state)? Can anyone name the three forms that we find water?"** Explain that water can be a solid, liquid, or gas. **Ask, "how do we describe solid forms of water?"** Answers may include: hail, snow, sleet, and ice. **Ask, "how do we describe liquid forms of water?"** Answers may include rain and dew. **Ask, "can we see water in gas form?"** Explain that the amount of water in the air is described as humidity. The more water vapor or gas in the air, the more humid it is. Too much humidity often feels uncomfortable—meaning that human bodies can actually detect water vapor.

**Say, "the water cycle describes how water changes form and is recycled for many different purposes. However, we do not add to or take away from the**

**total amount of water on earth. In front of you is a zip lock bag. This bag represents our planet.**" While describing the water cycle, direct the students to draw essential processes, labels, and pictures on the bag.

## THE WATER CYCLE

"The water cycle really has no real starting point or ending point, but let's begin where most of earth's water exists—the oceans. About 97 percent of all water is stored in the ocean." **Have students draw an ocean at the bottom left corner of the bag.**

"The sun is the primary driver of the water cycle." **Have students draw the sun in the top left corner of the bag.**

"As the sun heats the water in the ocean, some water is changed from a liquid to a gas (or vapor) through a process called evaporation." **Have students draw arrows pointing up from the ocean and write "evaporation" above the arrows.**

"Plants also take up and release water into the atmosphere as a gas. This process is called "transpiration." Pour 1 cup of gravel into the bottom right corner of the bag (representing soil). **Have students draw a tree appearing to come out of the soil, and then draw arrows from the tree pointing upward with "transpiration" written above the arrows.**

"Rising air currents move the water vapor from evaporation and transpiration high into the atmosphere where the cooler temperature causes it to condense and form clouds. This process is called condensation." **Have students draw a cloud in the top middle of the bag and write "condensation" below the cloud.**

"As air currents move clouds around the planet, cloud particles collide, grow, and fall out of the sky as precipitation (e.g., rain, snow, ice, or hail)." **At the top right corner of the bag, have student draw another cloud with raindrops following from the cloud with "precipitation" written underneath the cloud.**

"In cold regions and high elevations, snow and ice can accumulate for thousands of years, forming ice caps and glaciers." **In the middle of the bag, have students draw a mountain with an ice cap and snow.**

"In warm climates, snowmelt and rain will percolate into underground aquifers or run off into lakes, rivers, and streams." **Have students draw a stream from the mountain to the ocean and write "surface flow" next to the stream. Have students draw an arrow pointing downward into the gravel with "infiltration" written above the arrows and "aquifer" written over the gravel or soil.**

"Some of the water that infiltrates into the soil is used by trees, grass, shrubs, and other plants. Some of the water moves into the ground where it can reappear as a spring flowing from the ground—or, water can flow in the aquifer back into the ocean, river, or stream." **Have students draw an arrow from the aquifer to the ocean and write "groundwater flow" below the arrow.**

**Pour 1 cup of water into the bag and seal it tight.**

Explain that the bag contains liquid water and water in a gas form, though they cannot see it. Direct students to place the bag near a window and that heat from the sun will start the condensation process (water will start to accumulate along the inside of the bag).