Name- Date- Period-

**Water Cycle Webquest: Student Capture Sheet**

**Go to** [**http://pmm.nasa.gov/education/interactive/water-cycle-webquest**](http://pmm.nasa.gov/education/interactive/water-cycle-webquest) **to find this webquest. Use this student capture sheet to provide your answers to the questions.**

*Before you begin this webquest, answer these questions using your background knowledge.*

* How much of Earth’s surface is covered by water?
* How much of the water on Earth’s surface is actually freshwater?
* Where does most of the water that we use to meet our everyday needs come from?

Did you know that NASA has Earth-observing satellites that are able to measure precipitation as it falls from the clouds? In 2014, NASA launched a satellite called GPM (Global Precipitation Measurement) that has been measuring how much rain and snow are falling from the clouds. You will begin by taking a look at last week’s global precipitation data. Click [here](https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4285) (or go to <https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=4285> ) and watch the animation a few times. As you watch, pay attention to the general movement of the clouds in the northern hemisphere, at the equator, and in the southern hemisphere. Use your observations to answer the questions below:

* In which direction are the winds blowing in the northern and southern hemispheres?
* Which direction do the winds blow at the equator?
* Which color indicates the heaviest amount of rainfall?
* Which color indicates very light snow is falling?

We will learn why GPM is measuring global precipitation. Watch [this video](https://pmm.nasa.gov/education/videos/gpm-freshwater-connection) ( or go to <http://pmm.nasa.gov/education/videos/gpm-freshwater-connection> ) and use the information to answer the questions below.

* Where does the water that we drink come from?
* Why is it important for scientists to measure how much precipitation is falling across the world?
* How could that information be used to help society?

After watching “[The Anatomy of a Raindrop](https://pmm.nasa.gov/education/videos/anatomy-raindrop)” ( or go to <https://pmm.nasa.gov/education/videos/anatomy-raindrop> ) and answer these questions:

* Draw a diagram of the raindrop that you see at 01:28- including the arrows
* Describe what your diagram is showing, and be sure to explain what the arrows signify. Be sure to explain why raindrops are actually this shape in your response.
* Why is knowing the actual shape of raindrops important?

Now we will follow a molecule of water as it makes its way through the water cycle in [this](http://pmm.nasa.gov/education/videos/tour-water-cycle) short animation. <http://pmm.nasa.gov/education/videos/tour-water-cycle>

* Is there a specific beginning or end in the water cycle? Why or why not?
* What “powers” the water cycle?

Scan the article titled, “[The Water Cycle](https://earthobservatory.nasa.gov/Features/Water/)” to answer the questions below: <http://earthobservatory.nasa.gov/Features/Water/>

* How much of Earth’s water is found in our oceans?
* How much water is stored in polar icecaps, glaciers, and permanent snow?
* How much water is stored in groundwater, lakes, rivers, soil, and streams?
* Why is the amount of freshwater on Earth important for human needs?

Look closely at the diagram titled “*A Multi-Phased Journey*” at the bottom of the page, and use that information to do the following:

* Look at the diagram of the hydrologic cycle. Use it to help you to write a paragraph that explains how a droplet of water that falls as rain can move through the atmosphere, the biosphere, the geosphere, and the hydrosphere. Be specific as you explain the processes (evaporation, condensation, transpiration) that occur because of interaction between Earth’s spheres.

 *In your response, be sure to*

* *Give the state of matter that water is in as it moves through Earth’s systems*
* *Describe what processes occur to change water from one state of matter to another*
* *Explain how interactions between Earth’s spheres keep water cycling between them*

We will earn more about how our water cycle is able to distribute both water and [heat](http://pmm.nasa.gov/education/glossary#heat) as it moves through the water cycle by watching the video titled “[Earth’s Water Cycle](https://pmm.nasa.gov/education/videos/earths-water-cycle)”. (<http://pmm.nasa.gov/education/videos/earths-water-cycle>) Use what you learn to answer these questions:

* Where is more than two-thirds of Earth’s freshwater stored?
* Why is there more evaporation in the tropics?
* Why do you think that clouds and water vapor act like “insulators” from the sun”?
* What are three things that water variability affects for us?

We know that everything needs freshwater to survive. Go to [this site](http://www.epa.gov/WaterSense/our_water/water_use_today.html) (<http://www.epa.gov/WaterSense/our_water/water_use_today.html> )and find the answers to these questions:

* Where does the freshwater that you use in your home come from?
* About how much water does the average American family of four use per day in their home?
* What percentage of water do we use for washing our clothing?
* What percentage of water do we use for flushing our toilets?

Look at the pie graph depicting how freshwater is used for industrial, agricultural, and electric water use, and use that information to answer these questions.

* What percentage more of water is used to provide us with electricity versus for irrigation?
* Do we use more freshwater in our homes or to provide us with electricity?

The video “[Show Me the Water](https://pmm.nasa.gov/education/videos/show-me-water)” (<https://pmm.nasa.gov/education/videos/show-me-water>) gives a summary about the uses of freshwater and why a satellite such as GPM is vital to our being able to ensure that we know how much water is available for our survival. Use the information in this video to answer these questions:

* Why do you think that we use about 49% of our freshwater resources for thermoelectric power production in the US?
* Why do you think that about 70% of freshwater usage in developing countries goes to agricultural irrigation?
* How can GPM data help farmers, ranchers, and policy makers?

We will finish with [this video](https://pmm.nasa.gov/education/videos/water-water-everywhere) ( <http://pmm.nasa.gov/education/videos/water-water-everywhere> ) about the water cycle and the importance of water to life on Earth. Use the information to answer these questions-

* What is special about water as a compound?
* How does water regulate climate?
* What drives water evaporation?
* Why is the water vapor fresh water when it rises from the ocean?
* Why might freshwater in the form of snow take longer to enter the water cycle again than liquid precipitation?
* What is an aquifer?
* What role do people play in the water cycle?