

Science Benchmark: 04:01

Matter on Earth cycles from one form to another. The cycling of matter on Earth requires energy. The cycling of water is an example of this process. The sun is the source of energy for the water cycle. Water changes state as it cycles between the atmosphere, land, and bodies of water on Earth.

Standard I:

Students will understand that water changes state as it moves through the water cycle.

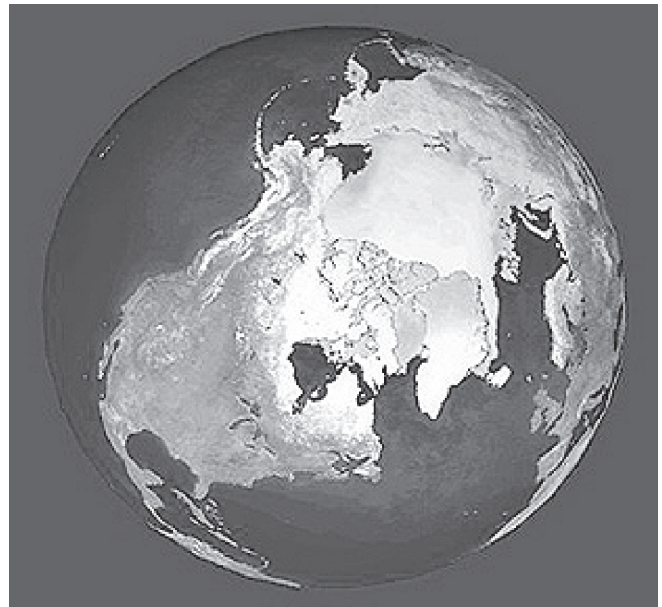
Shared Reading

Water - More Precious than Gold

My grandpa used to tell me wonderful stories as I trudged behind him through the fields of our farm. I found he was very wise and knew just about everything. I remember one summer day, we saw a beautiful rainbow after a soaking rain. The rainbow glimmered with all the beautiful colors of an artist's palette. My grandpa said there might not be a pot of leprechaun gold at the end of a rainbow, but that rainbows hold another secret that most people do not know. He said when we see a rainbow, we are seeing evidence that air contains water. Water droplets in the air break up sunlight into different colors. That is why we see a rainbow.

We live in a desert. Utah is the second driest state in the USA. The driest state is Nevada. Our state receives only eleven inches of moisture each year. Most of this moisture falls in the mountains in the form of snow.

When I look at a world globe, it seems as though much of our planet is covered with water. Grandpa explained that three-fourths of Earth is covered with water. But the amount of water we can use is small. Most of Earth's water is in the ocean or frozen in the polar ice caps. Just one percent of the water on Earth is fresh. Two percent is frozen in the ice caps and 97 percent is salty. When we think about Earth's water supply in those amounts, that's not much fresh, useable water for all the six billion people living on Earth.

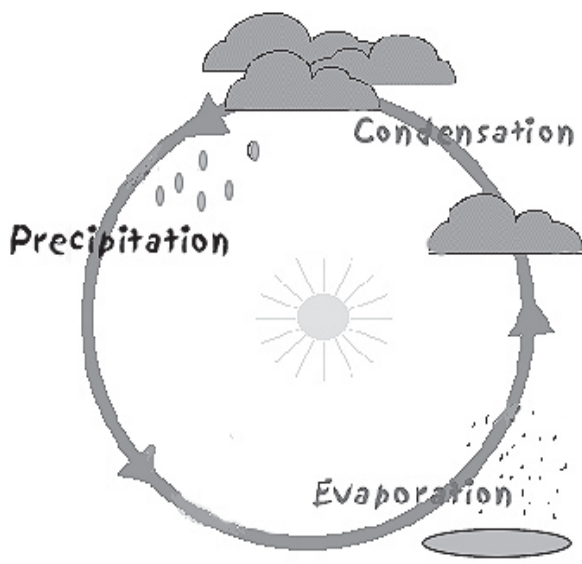


Earth's Ice Cap

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Grandpa said water is more precious than gold. Most of my friends think all they have to do to get water is turn on the tap. They don't know where water really comes from or where it goes. We need to understand that we have the same amount of water on Earth today as when the dinosaurs were stomping around millions of years ago. We might be drinking the same water that a dinosaur drank long ago. You might be asking yourself, "How can that be?" Let me explain.

Grandpa said all the water that has been on Earth since the planet existed has been traveling around and around on an incredible journey called the *water cycle*. A cycle is a process that is like a circle. At the end of the cycle, you find that you are back at the beginning.



The Water Cycle

Water is a special substance. It is one of the few materials on Earth that exists naturally as a solid, liquid or gas. Water can be in a solid form like ice or snow. It can be in liquid form so we can drink it or use it for other reasons. It can also be in the form of a gas in the air where we can't even see it. This is called water *vapor*. But conditions need to be just right for water to change from one form to another. These changes are caused by changes in heat energy. When it is really cold, water becomes a solid. When it is cool or warm, water becomes a liquid. When it is hot, water becomes a gas. These energy changes are measured by changes in the *temperature*. You have probably experienced these temperature changes when you were playing outside.

All of these forms of water are considered part of the water cycle. The sun is the energy source for these changes. Without the sun, the water cycle wouldn't work. Now let's see how the water cycle works.

temperature : a measurement of how hot or cold something is

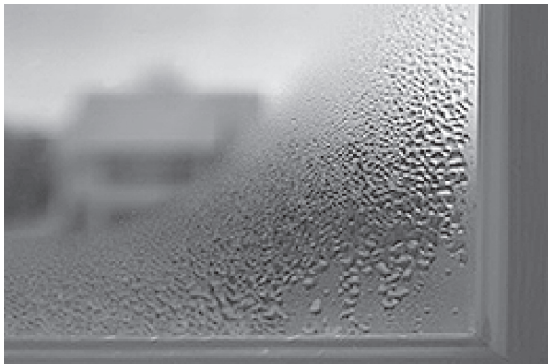
vapor : liquid in the air in the form of a gas

water cycle : continuous movement of water into the air and ground, onto and over land, and back

During the water cycle, we can find water in oceans, lakes, streams, snowcapped mountains, glaciers and groundwater. Water from these locations enters the water cycle through *evaporation*. This makes water vapor. Activities like sprinkling our lawns on sunny days and splashing water at the swimming pool also add water vapor to the air. Can you think of other water activities you do in the summer where water evaporates?

When water evaporates into water vapor, it is pure water. All the things that were in the water on the ground, stay on the ground. This means that the mud in puddles, the salt in the oceans (and the Great Salt Lake), and any pollutants in water stay on the surface of Earth.

Condensation can be observed on a cloudy bathroom mirror. Taking a bath or shower puts a lot of water vapor into the air. When water vapor hits the cold surface of the mirror, the little particles in the air collect on the surface of the mirror and turn back to liquid as tiny water droplets. Think about a tall glass filled with ice cubes and frosty lemonade. In a little while water vapor in the air will condense on the outside of the glass because the glass is very cold. This means there is water vapor in the air. When this water vapor hits any cold surface, water particles will form water droplets on the object. You have probably seen *dew* on your lawns on some mornings. The ground was cold enough to condense the water vapor on the grass to create dew.



Condensation on a window



Condensation forms *clouds*. As water vapor cools high in the air, it condenses into a cloud. Grandpa said when the temperature in the clouds is cold enough and there is a lot of moisture in the clouds, the water droplets will connect to each other and get so heavy they will fall down to Earth's surface. This

clouds : a collection of millions of tiny water droplets or ice crystals

condensation : water vapor that cools and changes back into liquid

dew : condensation that occurs outdoors due to warmer air striking a colder surface

evaporation : the change of a substance from a liquid to a gas (vapor)

is called *precipitation*. Precipitation can be in the form of rain, snow, sleet, or hail. Once the precipitation lands on the surface of our planet, things can really get complicated! Just imagine, precipitation could land on an iceberg near the North Pole. It could stay ice for hundreds of years. It might land on top of a volcano in Hawaii. The intense heat from the volcano would cause the water droplets to quickly form water vapor. Before you knew it, the water vapor would be back as clouds, starting the water cycle over again.

The water cycle is important to all living things. Without the continuous return of fresh water to the land, plants and animals couldn't exist. If you have been in the desert without water for a couple of days, and someone offers you gold or a nice cool drink, which would you choose? Like Gramps said, "Water is much more precious than gold!" If we don't use it wisely we won't have enough to go around. We can't create more water. The water that was here for the dinosaurs is all that's available for the people on our planet today. We always need to be thinking of ways to save our precious "liquid gold: water." "Waste not, want not!" Grandpa said.



precipitation : *any form of water that falls from clouds onto Earth's surface*

Science Language That Students Should Know and Use

1. **clouds:** a collection of millions of tiny water droplets or ice crystals
2. **condensation:** water vapor that cools and changes back into a liquid
3. **dew:** condensation that occurs outdoors due to warmer air striking a colder surface
4. **evaporation:** the change of a substance from a liquid to a gas (vapor)
5. **precipitation:** any form of water that falls from clouds onto Earth's surface
6. **temperature:** a measurement of how hot or cold something is
7. **water cycle:** continuous movement of water into the air and ground, onto and over land, and back
8. **vapor:** liquid in the air in the form of a gas