

Module 21: Comprehension Instruction

Different Forms of Water

When you're thirsty, few things feel better than drinking a tall glass of water poured over ice. But as you're drinking, do you realize you are experiencing two very different forms of water, and that each form can be used for totally different things?

If you suddenly catch a cold, your parent may give you a cup of steaming hot tea to drink. That steam is a third form of water and has its own properties.

Water is the most common compound on Earth, covering about 70 percent of the planet's surface. Most of that water is in liquid form, sloshing around in the oceans and other bodies of water. Because it's so common, and because it's easy to use for so many different purposes, liquid water is part of our everyday lives. We use water to nourish everything from ourselves to our pets to our yards. Like all liquids, water travels faster and increases in pressure as more of it is pressed through a tighter space. We can see this principle after we brush our teeth, using water flowing from the tap to push the toothpaste down the drain. By increasing the pressure, we use water to clean glasses in a dishwasher and cars in a carwash.

Water is great at cooling things down. To cool off our bodies, we go swimming at the pool on a hot summer day. To cool off our cars and factories, we force water through pipes to keep engines from overheating.

Water can also be a great way to travel. People have used sails, paddles and oars to propel boats through water for thousands of years. In modern times, one gallon of diesel fuel can pull one ton of cargo 59 miles by truck down a highway, 202 miles by train down a railroad track, and 514 miles in a boat through water.

Another traditional use for water is generating power. When water drops quickly in elevation, as over a waterfall, special gears called turbines can be placed inside the stream. Turbines can be used either directly to spin machines like sewing looms, or indirectly to capture that momentum as electricity. America has used this property of falling water to build giant electricity plants, including the ones at Hoover Dam and Niagara Falls.

When water freezes into ice, it becomes hard. Unlike most other frozen liquids, ice is actually less dense than water in its liquid form, which is why ice cubes float. These two properties explain the Antarctic ice pier, which has been constructed at America's McMurdo research station every summer since 1973. Workers pump seawater into a contained area and let it freeze. The pier becomes so sturdy it can support semi-trucks, which transport tons of food and equipment from supply ships to the station.

Ice also cools things down. The National Seal Sanctuary in Britain uses a machine to produce ice for the sea lions, because they fight less when they're cool. Zoos around the world buy ice machines to chill areas for polar bears and penguins. Humans like ice so much that large restaurants and hotels often spend more than \$10,000 on a single ice machine.

As the temperature rises, ice melts into water, which boils into steam. Perhaps the most common use of steam is electricity; about 90 percent of all electricity generated in the U.S. comes from steam turbines. Heat to boil the water is generated by many fuels, including coal, natural gas and nuclear fuel.

For thousands of years farmers have used steam to sterilize their fields and kill weeds and bacteria. You can see steam at work in many buildings and homes, where it is forced through pipes and radiators for heat. You can also see steam at work if your parents cook vegetables in a steamer.

Because we are constantly surrounded by water, ice and steam, it's easy not to pay attention to them. But all three are really just the same chemical compound that makes life on Earth possible.