Name: _____

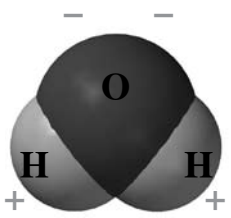
Think about it

Water, water, everywhere…

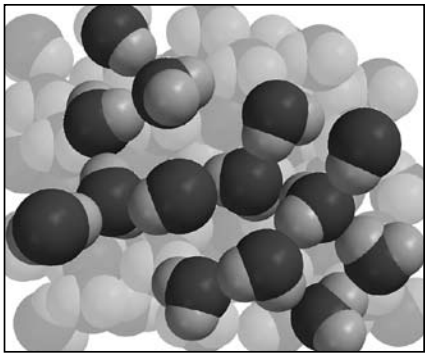
It's just about everywhere! It covers almost ¾ of the Earth's surface. It makes up about ⅔ of your body's weight! Every living thing needs it to survive. It's amazing! It's incredible! It's the one and only, your friend and mine, that multi-talented substance we know and love—**water**!

Vocabulary

atom	capillary action
molecule	dissolve
density	absorb
evaporation	adaptation
surface tension	



To understand what makes water so special, it helps to look at the smallest amount of water possible—the water molecule. You may already know that everything in the world is made up of atoms. When two or more atoms join together, they make a molecule. A molecule of water is made up of three atoms: one oxygen atom and two hydrogen atoms. That's why scientists call water "H_2O". A water molecule is shaped kind of like a "V" and has a negative area at one end and a positive area at the other. You can see, in the close-up model of water molecules at right, that the negative end of one water molecule is attracted to the positive end of another water molecule. Also, the positive end of one water molecule is attracted to the negative end of another. These attractions among water molecules give water some of its unique characteristics.



The surface with a purpose

One characteristic of water that we often notice is the way water can bead up or stay together as a drop. You may also have seen a water strider standing on the surface of water, causing the water's surface to "bend" where each leg touches the water. Both these phenomena are caused by water's *surface tension*.

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Think about it (*continued*)

The water molecules at the top or surface are attracted to each other and are also pulled down by the molecules beneath them. Because they don't have any water molecules above them, these surface water molecules are attracted only down and in. This results in a tighter, stronger layer of molecules at the surface. Surface tension is what allows water to be poured into a cup until the water level is actually above the rim!

The cold hard facts about ice

Water molecules also act in a special way when water freezes. When most liquids freeze, their molecules get closer together and the substance shrinks or contracts. But when water freezes, water molecules move farther apart as they arrange themselves to form ice. Because water molecules in ice take up more space than they do as liquid water, ice is less dense than water and floats. This is very helpful in nature. When lakes freeze, ice forms on the surface and the water underneath stays liquid. This helps living things in the water survive during the winter.

Making it to the top

The unique characteristics of water molecules also help water move into the roots, stems, and leaves of plants. One of the processes that helps water move up and into the very thin and tiny tube-like cells of plants is called *capillary action*. Water molecules attract each other and are also attracted to the sides of the tube. These attractions help cause the capillary action that plants depend on. Water moving into roots and up the stem to the leaves brings plants the water and nutrients they need to live.

You can't live without it

Water is also an excellent dissolver. The positive and negative areas on water molecules help them attract and eventually dissolve many substances. When we eat, water and other chemicals in our digestive juices help break down and eventually dissolve the food into the nutrient molecules our bodies can use. Water is also a big part of the blood that transports nutrients to the cells of your body. Water is inside and outside the cells helping to regulate the concentration of substances in the cell. In fact, water is involved in many of the chemical reactions that happen in our cells to keep us alive. Water also plays an important role in maintaining the body's temperature within a normal range.

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Think about it (*continued*)

Living in the desert

Animals and plants have different adaptations to help them survive when there is little or no water. One of the most amazing survivors is the kangaroo rat found in the desert. This tiny rodent eats only dry seeds, and is never seen drinking water. How does it survive?

When the kangaroo rat, or any animal, breaks down food in its cells to get energy, some water is produced. The kangaroo rat has special structures in its kidneys which help it to conserve more of this water than any other mammal. The kangaroo rat also has other ways of conserving water. During the day, when the temperature is hot, it seals the entrance to its burrow so the cooler moist air stays in. The kangaroo rat also has no sweat glands and has fur that is covered in an oily substance which reduces moisture lost from its skin.

Plants compete for water

The creosote bush competes with other plants for water in the desert. Mature creosote bushes release a nasty chemical and use their extensive roots so that other plants are not able to sprout around them.

Some seeds also rely on chemicals to help them when there is very little water. A covering on the outside seed coat prevents a false start after a single, light rainfall. To make sure there is enough moisture for the young plants' survival, sprouting happens only when there is enough rainfall to wash away these layers of chemicals.

Cacti have another adaptation to help them get and keep water. They develop lots of tiny roots that are shallow in the ground. Cacti are able to quickly absorb water, which they store in their waxy, thick stems. They also have prickly spines instead of leaves to help reduce the amount of water lost due to evaporation.

Water is so important to so many different aspects of life that it is the main substance scientists look for in an environment to see if life itself is possible.

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Think about it (*continued*)

1. Look at the picture of water dripping off a leaf. Why does the water droplet hold together?
   a. Water is a molecule.
   b. Water is an atom and atoms are round.
   c. Water molecules are attracted to each other and cling together.
   d. Water molecules have two atoms of hydrogen and one atom of oxygen.

2. According to the details in the reading, what does *capillary action* do for a plant?
   a. Capillary action helps turn the plant towards sunshine.
   b. Capillary action helps make leaves green.
   c. Capillary action helps move water and nutrients into the stems, leaves, and roots.
   d. Capillary action helps bring the plant carbon dioxide.

3. *Surface tension* is a term used to describe…
   a. the number of water molecules on the surface of water.
   b. a water strider or other insect that can stand on the surface of water.
   c. the strength and flexibility of the top layer of water.
   d. the evaporation of water from the surface.

4. What happens to water molecules when they freeze?
   a. Molecules get closer together and the water shrinks when it becomes ice.
   b. Molecules move further apart, and the water expands when it becomes ice.
   c. Molecules slow down but water neither shrinks nor expands when it becomes ice.
   d. Molecules spread out but then get closer together at the end.

5. Which sentence is the best summary of the entire passage about water?
   a. Water is found everywhere.
   b. Water has many unique characteristics that help it cling to itself, be a good dissolver, and keep organisms alive.
   c. Water is a great dissolver.
   d. Water helps keep things alive in the winter.

6. Which detail in the story supports the idea that water is essential to living things?
   a. The kangaroo rat makes its own metabolic water and seals off its home to keep from losing water.
   b. Creosote bushes release a nasty chemical to keep other plants from sprouting around them.
   c. Plants use the characteristics of water to help them move nutrients to their stems and roots.
   d. All of the above.

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Review and apply worksheet

Name: _____

7. Water molecules tend to cling together. What is it about water molecules that makes them do this?

_____

_____

_____

8. How is frozen water (ice) different from most other liquids when they freeze?

_____

_____

_____

9. What are two ways that water is important in keeping people alive and healthy?

_____

_____

_____

10. Describe one strategy an animal uses and one strategy a plant uses to survive where there is very little water.

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_____

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