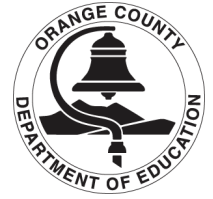




Exploring Properties of Water Family Activity



INTRODUCTION

All living things require four abiotic, or non-living, factors in order to sustain life. These four factors are land, air, water, and sunlight, which we like to call the L.A.W.S. In this activity, we will take a look at four properties of water and why these properties are important to life.

MATERIALS

- Paper
- Writing tool
- Disposable plastic cups
- Waterproof permanent marker
- Water
- Access to a freezer
- Eye dropper or a straw to drip water
- Penny
- 2 Thermometers (one for the air and one for water)
- Timer
- 3 different items to try to dissolve (i.e. different types of candy, like Lifesavers or M&M's, sugar cubes)

INSTRUCTIONS - FREEZING WATER

1. Mark the inside of two disposable plastic cups with your permanent marker about halfway up the cup.
2. Fill the cups with water up to the line.
3. Place them in the freezer, one for 1 hour and the other for about 24 hours.
4. Make a prediction: When the water freezes, do you think it will rise above the line or shrink underneath it?
Which part of the water will freeze first: bottom, middle, or top?
5. Record your observations for the two different cups.

QUESTIONS

- What was the difference between the two cups?
- What did you see happen to the water level after it was in the freezer for 24 hours?
- How could these results explain how water is so important to sustaining life?

INSTRUCTIONS - SURFACE TENSION

1. Make a prediction: How many drops of water can you fit on a penny?
2. Fill the eye dropper/straw up with water.
3. Slowly drop water on top of the penny as it rests on a flat surface.
4. Count how many drops it takes until the water runs off the penny.

QUESTIONS

- How many drops did your penny hold before the water spilled off of it?
- How could these results explain how water is so important to sustaining life?

INSTRUCTIONS - EVAPORATION

1. Fill your cup with cool water and place it outside in the sunlight.
2. Read the temperature of both the outside air and the water inside of the cup.
3. Write both of these temperatures down along with your starting time.
4. Every five minutes, read the temperature of both the air and the water.
5. Make a prediction: How long will it take for the water to reach the same temperature as the surrounding air?

QUESTIONS

- How many minutes did it take for the water to reach the same temperature as the air surrounding it?
- How could these results explain how water is so important to sustaining life?

INSTRUCTIONS - DISSOLVING

1. Fill three cups with water.
2. Drop a different item (like different candy, sugar cube, salt, etc.) into each cup.
3. Time how long it takes the water to dissolve the items.
4. Make a prediction: Which do you think will dissolve the fastest? Which do you think will dissolve the slowest?

QUESTIONS

- Which dissolved faster?
- What other objects do you think will dissolve in water? What other objects won't dissolve in water.
- How could these results explain how water is so important to sustaining life?

How do the unique properties of water help sustain life?

Water is one of the only substances that will expand rather than shrink when it freezes. This means that it takes more water in liquid form to fill up the same amount of space as it would in its ice form. When water is frozen it is much lighter in weight compared to the same volume of liquid water, thus allowing ice to float on top of water. This is important for any ecosystem that consists of large bodies of waters that freeze over during the winter time. The ice in the water will freeze over and float, creating a barrier on the top of the water. This insulates the rest of the water underneath, allowing for life to survive during harsh winters!

A very high surface tension is another unique feature of water. This simply means that the water molecules at the surface would rather stick to each other than they would like to stick to the air surrounding them. This attraction to itself can support small living things such as insects that might stand on top of a water surface. Similarly, water has very cohesive and adhesive properties. Cohesion describes water molecules sticking to itself, which is why we learned it has such high surface tension. Adhesion describes water molecules sticking to other molecules that are not water. This adhesion allows water to stick to other substances, and along with cohesion, gives water the ability to do some very interesting things! One of the most important uses of both cohesion and adhesion of water is within the process of water traveling through plants. Plants get their water through their roots underground and for some plants, such as trees, the water has a long way to go up to reach the very top leaves. Water can use adhesion to stick to the inside of the plants and also use cohesion to bring more water molecules up towards the top, similar to an assembly line!

Water has a very high heat capacity. It takes a lot of heat, or energy, in order to change water temperature. This is useful for anything that lives in water because the habitat is usually at a constant temperature compared to living on land where the air temperature can change within minutes due to cloud cover and wind speed. Water can also help living things to regulate their temperatures. Evaporation plays a key role in this, which is when water turns from a liquid to a gas. The water on the inside of our body takes the heat from within and releases it through sweat to the external environment in order to keep us cool!

Water is capable of dissolving many substances, which is why we often call it the universal solvent. This means that water is able to break down and separate other substances when it is mixed or combined with them. The dissolving property of water allows it to pick up many minerals, nutrients, and gases that are valuable to living things. It also means that it can be easily polluted because of its ability to pick up various chemicals that make it unclean.