Water Properties Lab **NAME:_____ Date: _____**

Background: Water is everywhere. It makes up about 3/4ths of the surface of the earth. It makes up 50-95% of the weight of living organisms. It is in the air we breathe, the sinks we use and in every cell of the body. Water has special properties that make it unusual and complex.

Water has the ability to be a liquid, solid or gas depending on the temperature at which it is found. Each molecule of water is made up of 2 hydrogen atoms and 1 oxygen atom bonded together. Water is a **polar molecule** because the oxygen molecule has a slightly negative charge and the hydrogen has a slightly positive charge.

Objectives

- After completing this lab you should be able to explain the importance of all of water's properties.

Property Number 1

Materials:

Water Toothpick Wax Paper Pipette

Procedure:

1. On your wax paper, place 5-10 drops of water in one area.

2. Move the wax paper around.

3. What do you notice the water does on the wax paper? _____

_____

_____

4. Using your toothpick, try to separate the water drop into two drops.

5. Was the water easy to separate? Explain. _____

_____

_____

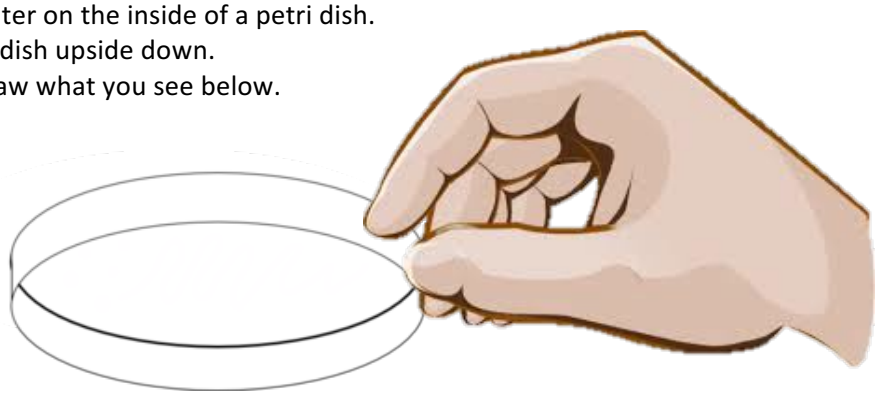
Property Number 2

Materials

Petri Dish Beaker of Water Medicine Dropper

Procedure:

1. Place a few drops of water on the inside of a petri dish.
2. Carefully turn the petri dish upside down.
3. Observe the results. Draw what you see below.



4. Describe what happened with the water and the petri dish. Why do you think this happened?

_____

_____

_____

Property Number 3

Materials

Beaker of water Ice Cube

Procedure

1. Place the ice cube in the water
2. Describe what happened. Why do you think this happened?

_____

_____

_____

3. Explain why this property is important to aquatic organisms.

_____

_____

_____

Property Number 4

Materials

2 Beakers Oil Water Salt ½ Teaspoon Stir Rod

Procedure:

1.There are 2 plastic cups:

Cup 1: Water & Salt

Cup 2: Oil & Salt

2. Stir each for about 20 seconds or until dissolved.

3. Record your observations below.

Solvent	Description of Solute after 20 Seconds of Stirring
Oil	
Water	

6. Summarize what you found in your experiment, based on your recorded observations.

_____

_____

_____

_____

7. Which liquid (water or oil) makes a better homogenous (same) solution? _____

Property Number 5

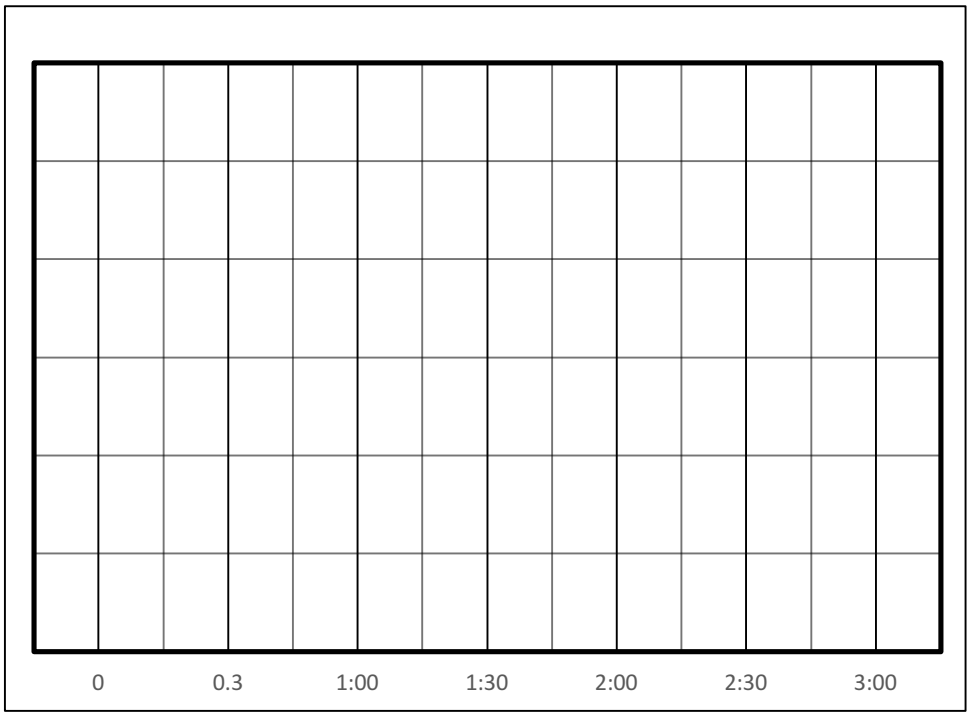
Materials:

Data Table

Procedure:

1. Take a look at the data.
2. Graph the data on the chart
3. Analyze the data

	Water		Oil	
Time	Heating	Cooling	Heating	Cooling
0	19	43	14	50
0.3	25	42	20	47
1:00	29	41	28	46
1:30	32	41	31	46
2:00	35	41	36	45
2:30	39	40	45	42
3:00	43	40	50	41



Legend

	Color
Heating Water	
Cooling Water	
Heating Oil	
Cooling Oil	

What do you notice about water in this lab?

_____

_____

Property Number 6

Materials:

Paperclips Water Petri Dish

Procedure:

1. Fill your petri dish with water as high as you can
2. Predict the number of paper clips you will be able to float: _____
3. Try to float as many paper clips on top of the water

How many paper clips were you actually able to float? _____

_____

_____

Describe what happened: _____

_____

_____

_____

Property Number 7

Materials:

Slow steady stream of water out of faucet Glass Stick Fur

Procedure

1. Take the glass stick and charge it with the fur by rubbing the fur on the stick with force for 30 seconds
2. Once the glass stick is charged, place it near the steady stream of water and observe what happens.

Describe what happens to the water: _____

_____

_____

Name: _____
Hour: _____

Analysis Questions:
Review your data and describe why each of the following characteristics are important to human life.

Property 1: Water is attracted to other water molecules like magnets. This attraction is due to the positive charge surrounding the hydrogen and negative charge oxygen has. The negative oxygen of one molecule is attracted to the positive hydrogen of another water molecule creating a **hydrogen bond**. This attraction causes **cohesion**. Cohesion occurs when one water molecule sticks to another. **Why might this particular property be important for life? Explain using complete sentences.**

_____

_____

_____

Property 2: Water not only sticks to other water molecules (cohesion) but it also sticks to substances other than water **(adhesion). Why do you think this property would be important for life? Explain using complete sentences.**

_____

_____

_____

Property 1&2 Combined: Cohesive and adhesive forces are important for the transport of water from the roots to the leaves in plants. These forces create a "pull" on the water column. This pull results from the tendency of water molecules being evaporated on the surface of the plant to stay connected to water molecules below them and so they are pulled along. **Why do you think these properties of water combined are important to sustain life?**

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_____

Property 3: Water is one of the few substances that are less **dense** as a solid than as a liquid. While most substances contract when the solidify, water expands. This property is due to the hydrogen bonding between water molecules. **Why is this property important for life?**

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_____

_____

Property 4: Because of waters high polarity, water is called the **universal solvent.** A solvent is a substance that dissolves, or breaks apart, another substance (known as the **solute**). Polar solvents dissolve polar solutes and nonpolar solvents dissolve nonpolar solutes. **Since our body is mainly made up of water, why do you think having a universal solvent is important for life?**

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Property 5: Water has a **high heat of vaporization** – the energy required to convert liquid to a gas. Water also has a **high specific heat capacity**. Specific heat is a measure of heat capacity and is the heat required to raise the temperature of one game of water degree Celsius. **With water having a high heat of vaporization and a high specific heat capacity, why do you think this is important for life?**

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Property 6: Water molecules want to cling to each other. The cohesive forces between liquid molecules are responsible for surface tension. Surface tension allows the liquids to resist an external force. **Why would surface tension be important for life?**

_____

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Property 7: Polarity means that the molecule has both a positively and negatively charged end. The polarity of water is responsible for effectively dissolving other polar molecules such as sugars. **Why is the polarity of water important for life?**

_____

_____

_____

3. Draw a molecule of water. Include the charges on the oxygen and hydrogen. (Hint: See Property 1 analysis question description)

    a. Draw two molecules of water and label the hydrogen bond.