Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ #:\_\_\_\_\_\_\_\_\_\_\_

**Properties of Water Lab**

Background: Water has some peculiar properties, but because it is the most common liquid on Earth, we typically do not recognize how truly peculiar water really is. Water is everywhere. It's in the air we breathe. It's in our sink faucets, and it's in every cell of our body. Water is an unusual substance with special properties. Just think about the wonder of water:

* How does water rise from the roots of a redwood tree to the very top?
* How do insects walk on water?
* Why does ice float rather than sink?
* Why do people become seriously ill, or die, if they go without liquid for a week or so?
* How would life in a lake be affected if ice sank and lakes froze from the bottom up?

Station 1: Solubility - Water the Super Solvent – The Universal Solvent!

Solubility is the ability of one substance to dissolve another substance. (Remember: the chemical being dissolved is the solute and the chemical doing the dissolving is the solvent!). Water is a good solvent, especially for ionic compounds – salt is an ionic compound. Ions have to be able to dissolve quickly in cell fluids for cellular metabolism (the energy pathways of a cell) to work properly! As a matter of fact, water is called the UNIVERSAL SOLVENT.

1. Put a pinch of salt in the water that is already in the beaker.

2. Stir vigorously for 1 minute. Record what happens.

3. The beaker with oil already has salt in it. Stir vigorously for 1 minute. Record what happens.

4. Which is a better solvent for an ionic substance like salt, water or oil?( i.e. is it the non-polar oil?, or is it the polar water?) Why might this be?

Clean-up – Leave the oil and salt as you found it. Pour the beaker of salty water into the sink. Rinse it and dry it (and dry the lab table), and fill the beaker with the same volume of water as there is oil in the beaker. Re-set the station as you found it.

Station 2: Adhesion and Cohesion

Because each water molecule is polar, the water molecules are highly attracted to one another. This is especially true at the surface, where the water is much more attracted to itself than it is attracted to the air…It almost seems like water can form a skin on the surface. This is called surface tension.

Surface tension is really a combination of:

* the attraction between molecules of water: cohesion = water sticks to water = think: “water attracted to water”
* the molecular attraction between water molecules and other substances: adhesion = water sticking to something else…think: “adhesive tape”!

1. Pour a small amount of water on a dish, sprinkle the surface with some pepper.

2. Observe the pepper floating on the surface of the Petri dish.

3. Dip your finger in the soapy water and barely touch it to the center of the surface of the peppery water in the center of the dish.

4. Record what happened to the pepper.

5. Why do you think this happened?

\*\*\*\*As ALWAYS Clean-up - Return your station to the condition in which you found it! ...or cleaner!

Station 3: Surface Tension & Adhesion Drop Behavior - Water on Penny

Part A

1. Obtain a medicine dropper and a small (10 ml) graduated cylinder. Make sure the dropper is clean.

2. Drop water into the graduated cylinder with the dropper, counting each drop.

3. How many drops, of the size produced by your medicine dropper, are in each cubic centimeter (cc)

of water? (1 cubic centimeter = 1 milliliter)? \_\_\_\_\_\_\_\_\_\_ drops

4. Conversely, how much water is in each drop? (divide 1cc by the number of drops) \_\_\_\_\_\_\_\_\_\_ cc. per drop, average.

Station 3 Surface Tension & Adhesion Drop Behavior - Water on Penny

Part B

1 How many drops of water can pile on a penny before it overflows?

2. Now, let's see how many drops of water you can you place on the surface of a penny before it overflows. Drop water from the dropper onto a penny, keeping careful count of each drop. Draw a diagram, showing the shape of the water on the penny after one drop, when the penny is about half full, and just before it overflows.

3. How many drops were you able to place on the surface of the penny before it overflowed?

\_\_\_\_\_\_\_\_\_\_ drops

4. How is the number of drops different from your prediction, explain what accounts for any difference. Explain your results in terms of cohesion

Station 3 Surface Tension & Adhesion Drop Behavior - Water on Penny

Part C Effects of Detergent

1. With your finger, spread one small drop of detergent on the surface of a dry penny.

2. How many drops do you think this penny will hold after being smeared with detergent, more, less, or the same as before? Why?

3. Exactly how many drops do you think it will hold?

4. Using the same dropper as before, add drops of water to the penny surface. Keep careful count of the number of drops, and draw the water on the penny after one drop, about half full, and just before overflowing.

5. How many drops were you able to place on the penny before it overflowed this time?

\_\_\_\_\_\_\_\_\_\_ drops

6. Did the detergent make a difference? Describe the effect of the detergent.

\*\*\*\*\*As ALWAYS Clean-up - Return your station to the condition in which you found it! ...or cleaner!

Station 4: Surface Tension - Floating Paperclip

Using a steady hand and a piece of string, see if you can get the paper clip to rest on the surface of the water in such a way that it will not sink. After you succeed, answer the question below:

1. What property(ies) of water allows the paperclip to rest on the surface of the water?

\*\*\*\*\*As ALWAYS Clean-up - Return your station to the condition in which you found it! ...or cleaner!

Station 5: The Meniscus

Observe the graduated cylinder on the table.

1. Draw a picture of it below.

2. What does the cylinder read?

3. Why does the meniscus (curve) of the water in the cylinder occur? Explain in terms of adhesion and cohesion.