Name _____

Water Properties Investigation

Activity 1: Drops on a Penny

Question: How will different additives affect hydrogen bonds between water molecules?

Materials: Penny, distilled water, pipettes, paper towel, various solutions

Null hypothesis:

Alternative hypothesis:

Prediction:

Procedure:
1. Obtain a dry penny and place it on a dry paper towel.
2. Using a clean pipette, add distilled water to the penny drop by drop until it overflows. **Be sure to count the drops!**
3. Record the number of drops for Trial 1 in Data Table 1 below.
4. Repeat steps 1-2 for a total of five trials with distilled water.
5. Repeat procedure with the other solutions (as shown in the data table below).

Data:

Data Table 1: Number of Drops of Distilled Water Contained on the Surface of a Penny

Trial	# Drops: Distilled Water	# Drops: Distilled Water + Soap	# Drops: Distilled Water + Sugar	# Drops: Oil
1				
2				
3				
4				
5				
Average				

Observations: Side of penny with water _____

Side of penny with soap solution _____ Side of penny with sugar solution _____ Side of penny with oil _____

Activity 2: Water on Glass vs. Wax

Materials: wax paper, glass slide, pipette, tap water

Procedure: Drop two drops of water on the glass slide and on the wax paper and compare what happens.

Data: Draw what happened: glass slide wax paper

Name _____

Activity 3: Dancing Milk

Materials: petri dish, whole milk, graduated cylinder, dish detergent, food coloring, Q-tips

Procedure:
1. Measure as close to 50 ml of whole milk as possible into the petri dish.
2. Place one drop of three different colors of food coloring in three separate areas of the petri dish. DO NOT BUMP THE PETRI DISH OR THE MILK.
3. Smother one end of the Q-tip in dish detergent.
4. Put the soapy end of the Q-tip in the middle of one of the drops of food coloring. Then pick up the Q-tip and move it to another drop.

Observations:

Activity 4: Lava Lamp Cylinders

Materials: 10 ml graduated cylinder, water, oil, food coloring, stirring rod

Procedure:
1. Pour 8 ml of oil into the graduated cylinder.
2. Drop 2 ml of water on top of the oil.
3. Add 2 drops of food coloring to the water.
4. Use a stirring rod to push the food coloring into the oil by moving the rod up and down throughout the whole of the graduated cylinder.

Observations:

Analysis:

Activity 1: Drops on a Penny

$$s = \sqrt{\frac{\sum(x - \bar{x})^2}{n - 1}}$$

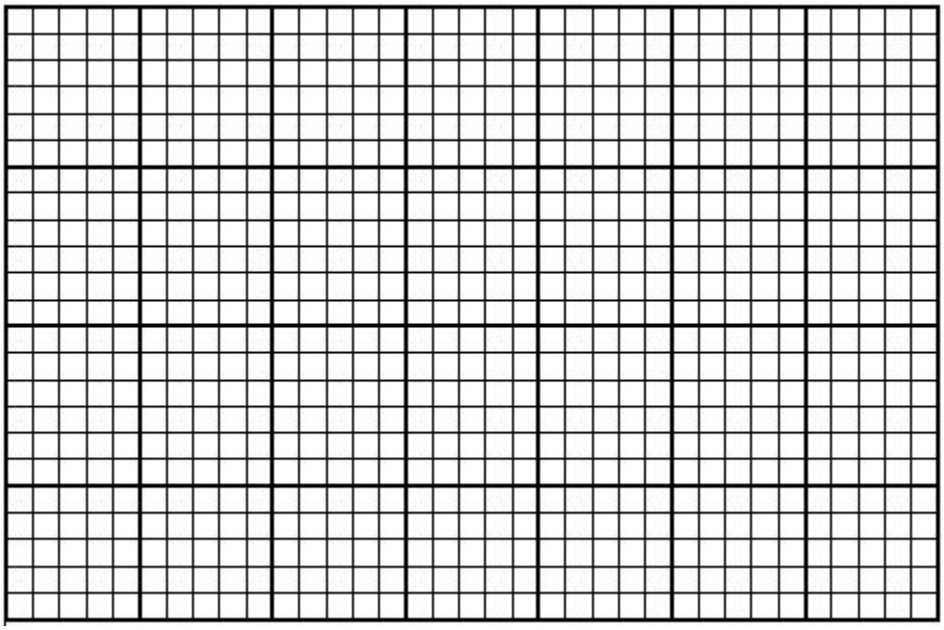
$$SE_{\bar{x}} = \frac{s}{\sqrt{n}}$$

Data Table 2: Statistical Analysis of the Number of Drops of Distilled Water Contained on the Surface of a Penny

Calculation	Distilled Water	Distilled Water + Soap	Distilled Water + Sugar	Oil
Mean				
Standard Deviation				
Standard Error				
+/- 2 SEM				

Name _____

Create an appropriately labeled bar graph to illustrate the sample means for the penny within 95% confidence (+/- 2 SEM). **Don't forget a title that includes the independent and dependent variables and axes labels with units.**



Make a CLAIM about how additives affect hydrogen bonds between water molecules.

Using data from activity #1, provide EVIDENCE that supports the claim.

Using background knowledge and data from this lab, provide REASONING that uses the evidence to justify the claim.

Explain your results in Activity 2 in terms of adhesion and hydrogen bonding.

Explain your results in Activity 3 and 4 in terms of amphipathic molecules and hydrophobic and hydrophilic and/or polar and nonpolar.