**Drops on a Penny Lab**

**Problem/Purpose:** The purpose of this lab is to determine how many drops of water will fit on the top of a penny begore the surface tension breaks causing the water to leak over the sides.

**Hypothesis:** I am thinking that it may fit about 21 drops. I think this because when looking at the surface of a penny and compare it to the size of a drop I estimate roughly nine drops would cover the surface. However, I know that water has a surface tension that can cause it to “bubble” on the top so I think the water will build up before the surface tension breaks. So I am guessing that maybe the 9 drops will double plus a bit more (like two layers plus a few more for the top of the bubble. See the pic below.



 I imagine that the first 6-7 drops will start to fill up the top of the penny, then 8-10 will fill to the sides. Then the bubble will grow until the surface tension is too weak from the outward force created by the weight of the water. At that time (around 21 drops), the surface tension will weaken and the bubble will burst causing all the water to drain off the side of the penny.

**Variables:** I will need to make sure that I hold the dropper at the same height, have the same person doing all the dropping whenever possible, have a stable table (be careful not to disturb the bubble). Also, it is important to squeeze at the same pressure all the time to keep the results consistent.

**Materials:** See list below.

* Penny
* Dropper
* Water
* Stable table
* Paper
* pencil

**Procedure:** Take a clean penny, place it on the table, get the dropper half full of water. Be sure to hold the dropper about 2 cm above the penny each time in order to control the variable of the impact of the water (the higher up the dropper is the more the water will shake causing the surface tension to weaken). It is a good idea to have the same person do all the dropping, otherwise they may change the way they dropped the water (which may also change your results).

 Drop one drop at a time onto the penny. Wait 5 seconds between drops to allow the water to become still. Then drop again. Continue to do this slowly. After every few drop it is a good idea to take notes on how the water is being affected (record these in your observations).

 At one point the water’s surface tension will weaken from the weight of the water and the force of gravity causing the water to leak over the edge of the penny. Record the number of drops that it held before it burst.

 Be sure to do multiple trials. Today we will do 5 to make sure that we get consistent numbers.

**Results:** See the table below. It shows the trials number on the x axis and the number of drops on the y axis.

**Observations:**

* When putting drops on the penny
	+ The first 7-8 drops filled the top of the penny
	+ By the 11th drop the penny was full and the water was almost leaning over the edge
	+ At times I became more careful when dropping the droplets to make sure it didn’t shake too much.
	+ Sometimes, after the 13th drop it was like I could keep adding drops forever until suddenly it would fall apart.
	+ The data appears to average out at about 25 drops per trial but I think the lower numbers are outliers of data.

**Conclusion:** My hypothesis was not quite correct. If you take all the data points they average at about 25 which is not that far from my original prediction from 21 , but I think the two low numbers in my data (14 and 16 drops) are outliers. I think that they are inconsistent with the other numbers. This might be due to pressing the dropper more in those trials, shaking the table, or holding the dropper too high. These are possible variables I could have controlled better.

Overall the only real knowledge gained here was about surface tension. I witnessed that surface tension can weaken from outside forces like the velocity of the water droplet (how far it falls), the shake of the table, and maybe even the dryness of the surface of the penny. These forces likely changed my various outcomes and at times were difficult to control.