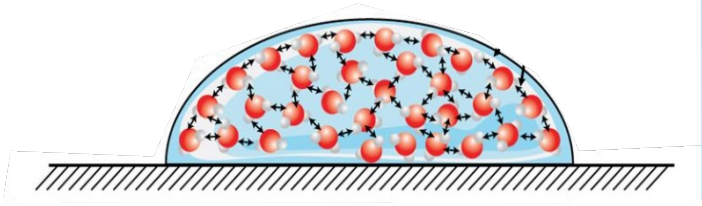
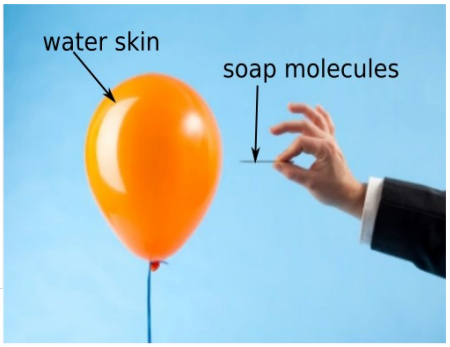
Surface Tension: Breaking Water Skins

- Molecules on the surface of a liquid pull each other to make a "skin" like a balloon.
- **Surface tension** describes the tendency of this skin to resist stretching
- Soap molecules disrupt the interactions between water molecules and decrease the surface tension. Like popping a balloon, the skin of water will pull away from a spot of soap.

water molecules on the surface pull on each other, forming a stretched "skin" of water





Part 1. Measuring Surface Tension: Giant Water Droplets

1. Put a penny flat on a lid or plate.
2. Use the dropper to slowly add clean water droplets one-by-one on top of the penny. Every student should do one.

	#1	#2	#3	#4
Number of water drops				

To find average: add all the measurements and divide by the number of measurements.

On average, how many droplets were added before the water skin broke and the dome spilled over? _____

3. In a small cup, add a couple of mL of dish soap to a half-cup of water. Mix.
4. Use the dropper to slowly add soapy water droplets one-by-one on top of the penny.

	#1	#2	#3	#4
Number of soapy water drops				

On average, how many droplets were added before the water skin broke and the dome spilled over? _____

Discuss: Was there a difference? Why?

Part 2. Disrupting Surface Tension: Pepper Chase
(work together as a group)

1. Pour some clean water into your bowl (enough to cover the bottom).

2. Sprinkle pepper over the surface.

3. Touch the tip of a clean Q-tip to the middle of the water surface.

What does the pepper do? _____

The clean Q-tip is your **control** (something with which to compare the rest of the experiment).

3. Dip the Q-tip into the hand-soap and touch the tip to the center of the surface.

What does the pepper do? _____

Discuss: Why did this happen?

Make a prediction:
What will happen if you try to repeat the experiment by sprinkling more pepper over the surface of the same bowl of water and touching it with the soapy Q-tip again? Why do you think so?

4. Try the repeat experiment. Was your prediction right? Yes / No

Note: If you want to repeat the experiment, pour out the soapy water and wipe down the bowl, then add clean water.

Part 3. Art with Surface Tension

1. Pour a little milk into a (clean, or rinsed and wiped) bowl.

2. Use a dropper to place several drops of different colors of food coloring in the center of the milk's surface.

3. Dip a Q-tip into the soap and touch it to the center of your food coloring spot in the milk.

What happens to the food coloring?

_____

Important: if you want to try this multiple times, you will need to replace the milk and rinse any soap out of the bowl

Milk contains many small balls of fat floating in water. These balls trap the even tinier molecules of food coloring so that on their own they do not spread very much. When you disrupt the surface tension of the milk with soap, you are doing the equivalent of popping a balloon. The skin of water molecules at the top pulls away from the soap spot, pulling food coloring along with it.