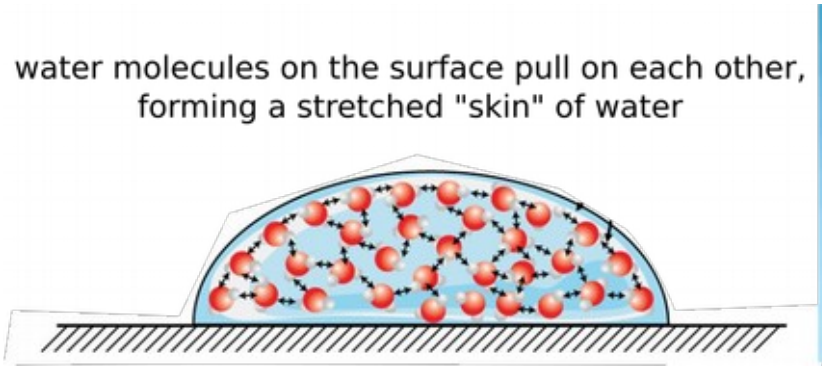
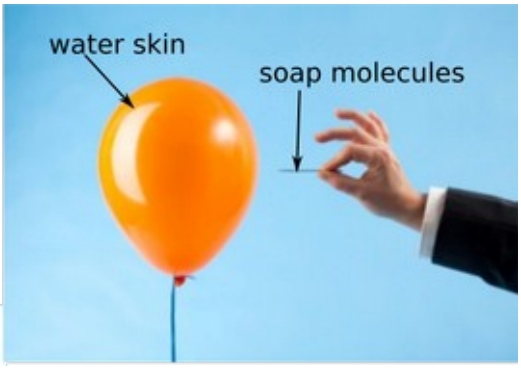
Surface Tension: Breaking Water Skins

- Molecules on the surface of water pull tightly on each other forming a "skin" like a balloon.
- **Surface tension** describes the tendency of this skin to resist stretching
- Surface tension makes water form into droplets, trying to keep the surface as small as possible
- 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.





Measuring Surface Tension: Giant Water Droplets

1. Pour some water into your bowl.
2. Put a penny flat on a cup lid.
3. Use the dropper to slowly add <u>clean water droplets</u> one-by-one on top of the penny.

How many droplets can you add before it spills over? _____

4. In a small cup, mix soap and water together.
5. Use the dropper to slowly add <u>soapy water droplets</u> one-by-one on top of the penny.

Now how many droplets can you add before it spills over? _____

Was there a difference? Why?

Disrupting Surface Tension: Pepper Chase

1. Pour some clean water into each of 4 bowls (enough to cover the bottom). Sprinkle pepper over the surface.

2. Touch the tip of a clean Q-tip to the middle of the surface. Record how much the pepper moves, on a scale of 0 (no motion at all) to 5 (moved fast and far). The clean Q-tip is your **control** (something with which to compare the rest of the experiment).

3. Dip a Q-tip into each of the 4 fluids provided and touch the tip to the center of the surface. Score roughly how much the pepper moved. (0 for no motion, 5 for lots of motion). **Do not reuse the same side of Q-tip.**

Important: This will only work once for each batch of water. If you reuse the same bowl, you need to rinse it out and refill it first.

Substance	How much did pepper move? (0 - 5)
Clean Q-tip (control)	
Shampoo	
Vegetable oil	
Dish-washing fluid	

Which substance had the greatest effect on the surface tension of the water?

Just for Fun: Art with Surface Tension

1. Pour a little milk into a clean, rinsed-out, bowl.

2. Place several drops of one or more colors of food coloring in the center of the milk's surface.

3. Select a substance from the previous section (which one had the greatest effect on the pepper?). Dip a Q-tip in the substance 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 the balloon. The skin of water molecules at the top pulls away from the soap spot, pulling food coloring along with it.