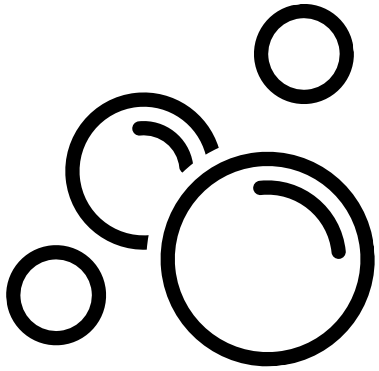
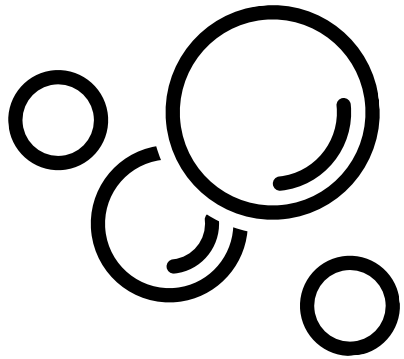
STEM SPARK

Presents

Bubble-ology!



Bubble-ology



Bubbles are an incredibly important part of the natural world. Bubbles help scientists understand complex topics important to daily life such as space, aviation engineering, light refraction, medical sciences, mathematics, and marine biology. Bubbles are even being investigated as a possible source of clean, alternative energy! Understanding how bubbles form and burst is critical to many S.T.E.M. fields.

In this experiment, we will explore bubble chemistry and engineering.

Bubble-ology

We are going to compare three bubble solutions

1. Store-bought bubbles
2. Water + dish soap solution
3. Water + dish soap + corn syrup

Which bubble solution do you think will make the best bubbles?

Experiment # 1 hypothesis:

I think the **store-bought/ dish soap/ corn syrup** bubbles will be the best!

Bubble-ology

Materials:

- Store-bought bubbles
- Water
- Dish soap (Dawn works best!)
- Corn syrup
- 3 Paper cups

Science Best Practices:

It's important to perform experiments without knowing which solution is which. This practice is called blinding. Blinding is important because if you have a belief about which solution will produce the best bubbles, you might change the way you test each solution, introducing bias.

Directions

Prepare Solutions

1. Fill a large bowl with 6 cups of water
2. Add a cup of dish soap and stir gently
3. Pour half of the dish soap solution into a second bowl
4. Add 1/8 a cup of corn syrup to one bowl and stir

Prepare Experiment

1. On the bottom of the paper cups, label each cup as "Store-bought," "Dish soap," and "Corn Syrup"
2. On the side of the cup, label them 1-3
3. Fill each cup with the corresponding solution

Bubble-ology

Experiment #1

You are going to observe how well the three solutions perform on 3 tests:

1. **The number of bubbles produced with a single blow**
2. **How big of a bubble you can make with a single blow**
3. **How long a single bubble does not burst**

After recording your observations in the chart below, rank each of the solutions to decide which one is the best. Once you have selected a solution, check the bottom of the cup to reveal which solution is the best.

Bubble-ology

Store-bought • Water • Dish soap • Corn Syrup

	# Bubbles	How Big?	How Long?	Rank
1 				
2 				
3 				

Bubble-ology

Activity #2: Human Bubble!

In this activity, you are going to make a bubble big enough to capture a whole person!

Materials:

- Store-bought bubbles
- Water
- Dish soap (Dawn works best!)
- Corn syrup
- 3 Paper cups

Directions

1. Fill a kids pool with 4 gallons of warm water, an entire bottle of dish soap and half a bottle of corn syrup. Allow it to rest for at least an hour, however best results if left alone for 24 hours
2. Place a hula-hoop inside the pool
3. Have a child stand in the pool (be sure to take their shoes and socks off first!)
4. Submerge the hoop and slowly lift the hula hoop up

Bubble-ology

Q: Why do bubbles pop?

Bubbles pop for a bunch of reasons.

1. Bubbles pop because its thin wall **s t r e t c h e s** too far. When this happens, the bubble pops!
2. When the bubble comes in contact with the dirt on our skin, the soap in the bubble starts to get weak and **BURSTS!**
3. In warm temperatures, bubbles pop more quickly. That is because the water in the bubble disappears, **BREAKING** the bubble apart!

Bubble-ology

Experiment #3

You are going to figure out how to keep your bubbles from popping. Using the solution that had bubbles that lasted the longest, you are going to test the following:

1. **Holding the bubble in just your hand**
2. **Holding the bubble after washing your hands thoroughly washed and still wet**
3. **Holding the bubble while wearing the bubble**

Science Best Practices:

In this experiment, you start the activity by testing to see if you can hold a bubble in just your hand. This is called the control condition. This allows us to see how well the bubble performs without doing anything special like wearing a glove or washing your hand. In order to say something we did worked better, we need to know where we started!

Bubble-ology

Directions:

1. Using the bubble solution that had the best bubbles, blow a single bubble and try to hold it in your hand. Try cupping your hand, or laying it flat. If you can hold your bubble, try to bounce it without it popping. Try each step three times and tally the number of times you hold and bounce it without it popping.
2. Now, wash your hands thoroughly and leave them wet and repeat step one. Record your results
3. Now, put on a glove and repeat step one. Record your results.

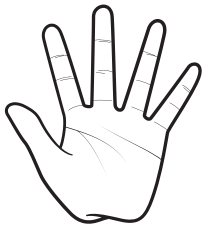
Which of these ways do you think will work best?

Experiment #3 hypothesis:

I think the **hand/ wet hand/ gloved hand** will be the best!

Bubble-ology

Bubble Solution • Glove

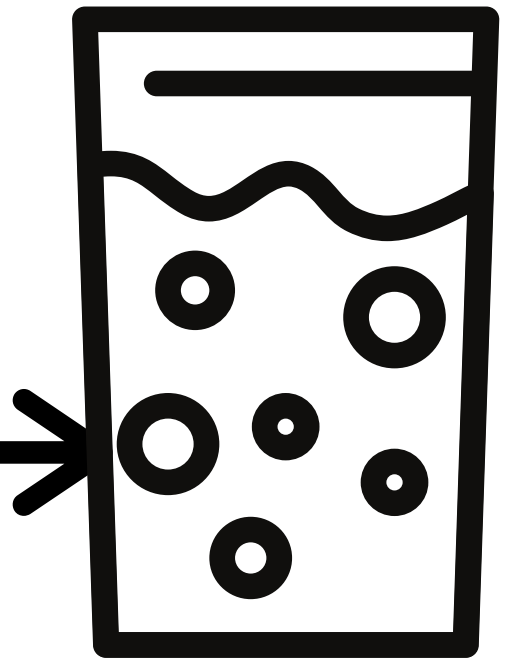
	Hold it?	Bounce it?
1 		
2 		
3 		

Bubble-ology

Activity #4: Science Extension

In this activity, you are going to make anti-bubbles! Anti-bubbles are the opposite of regular bubbles. Instead of capturing air in a bubble of water and soap, you will be trapping water in a bubble of air!

Anti-bubbles



Bubble-ology

Activity #4: Anti-bubbles

Materials:

- A clear glass
- 3 cups of water
- 1/2 cup dish soap
- 2 tablespoons corn syrup
- Pipette
- Food Coloring

Directions:

1. Combine water, dish soap in a clear glass and stir well
2. Pour a quarter of the solution into a second glass
3. Add food coloring to the second solution
4. Draw colored water solution into pipette
5. Hover pipette over the surface of the clear solution and expel the water quickly to see anti-bubbles. Draw where the anti-bubbles hover in the worksheet below
6. Add 1 tbsp of corn syrup to the clear cup and stir. Repeat step 5
7. Add a second tbsp of corn syrup and stir. Repeat step 5

Bubble-ology

Water • Dish Soap • Corn Syrup • Pipette • Food Coloring

No Corn Syrup

1 tbsp Corn Syrup

2 tbsp Corn Syrup

Bubble-ology

Activity #4: Anti-bubbles

In this activity, you made anti-bubbles. By adding corn syrup, you changed how thick the clear solution was. The thicker the solution, the more difficult it is for anti-bubbles to travel to the surface.

Without any corn syrup, the anti-bubbles should have risen to the top of the water and popped.

When you added 1 tbsp of corn syrup, the anti-bubbles should have been suspended in the middle of the glass, and when you added the second tbsp, the anti-bubbles should have rested somewhere near the bottom of the glass.

Bubble-ology

Activity #5: STEMSpark Stumper!

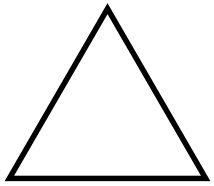
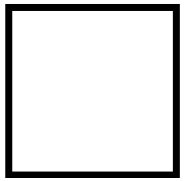
Have you noticed all bubbles are spheres? In this STEMSpark Stumper, you are going to try to produce bubbles of different shapes by engineering bubble wands!

Directions:

1. Using pipe cleaners and straws, make several shapes like squares and triangles, and your own design
2. Dip your bubble wand in the bubble solution
3. Blow a bubble
4. If the bubble was any shape besides a sphere, you did it! If not, make small adjustments to your bubble wand and try again!
5. You can also use common household items such as slotted spoons, whisks, forks, and toys to meet this STEMSpark challenge
6. Draw the shape of your bubble in the worksheet below.

Bubble-ology

Bubble Solution • Pipe Cleaners • Straws

	Trial 1	Trial 2	Trial 3
1 			
2 			
Your Own Design 3			