Western Engineering

Outreach

Tensile Bubbles

Grade K-2

Meet Today's ENG HERO!

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Dr. Lauren Flynn works in the Chemical & Biochemical Engineering and Anatomy & Cell Biology department at Western University. The focus of Dr. Flynn's research is on the development of cell-based regenerative therapies with adipose-derived stem/stromal cells and bioscaffolds derived from the extracellular matrix (ECM) for applications in soft connective tissue regeneration, wound healing, and therapeutic angiogenesis. To learn more about her research visit: https://www.eng.uwo.ca/chemical/faculty/flynn_l/index.html

Learning Goal:

- Explore tensile liquids
- Curriculum Connections: Grade 2- Properties of Liquids and Solids

Materials Needed:

- 1 cup of Bubble Solution
- 1 Bowl (Deep)
- Scissors
- Straws
- Pipe cleaners

What does tensile mean?

- If something is *tensile*, it means it can be drawn out or stretched!
- The bubbles we will be seeing today will look a little different compared to what we may have seen before!

Engineering and Science Connections:

Today, we will learn about the states of matter. Matter makes up everything in the world and it comes in three different states: solid, liquid, and gas.

Solids

Imagine being in a crowded room where nobody can move. Solids are made up of particles like this--they're so tightly packed together that they can't move about freely. Since they're stuck in place, their shape usually stays the same. The easiest way to identify a solid is by checking to see if it's hard and has its own shape.

Name some things that are solid!

Solids include things like TVs and ice. Don't be confused by things like sand and clay, which may not look like solids but actually are. Sand is just made up of very small pieces of solids, and when clay is left alone, it remains in its shape until molded.

Liquids

Now imagine that there were fewer people in that room and people could walk around comfortably. Liquids have particles that can move around in a similar way. Unlike solids, liquids don't have a shape of their own because the particles move around more. Instead, liquids take on the shape of the cups, jars, bowls, or other containers they're in.

Name some things that are liquid!

Liquids include many things we love, like soda, hot cocoa, and drinking water.

Gases

Now imagine we only have a few people in the room, and there is lots of room for them to move about. Gases have particles that move around in a similar way. Like liquids, gases can take the shape of their container because the particles have lots of room to move around. Sometimes you can't see gas, but it is still there.

Name some things that are gas!

Gases include things like the air we breathe, smoke from a fire or a candle, and the steam over a pot of boiling water.

Video Recommendation: *The States of Matter*

https://www.youtube.com/watch?v=JQ4WduVp9k4

Activity:

Before beginning, think about the following questions:

- What are the three states of matter?
- What are examples of each?
- Can a liquid change state? What are some examples?

States of Matter Family Game

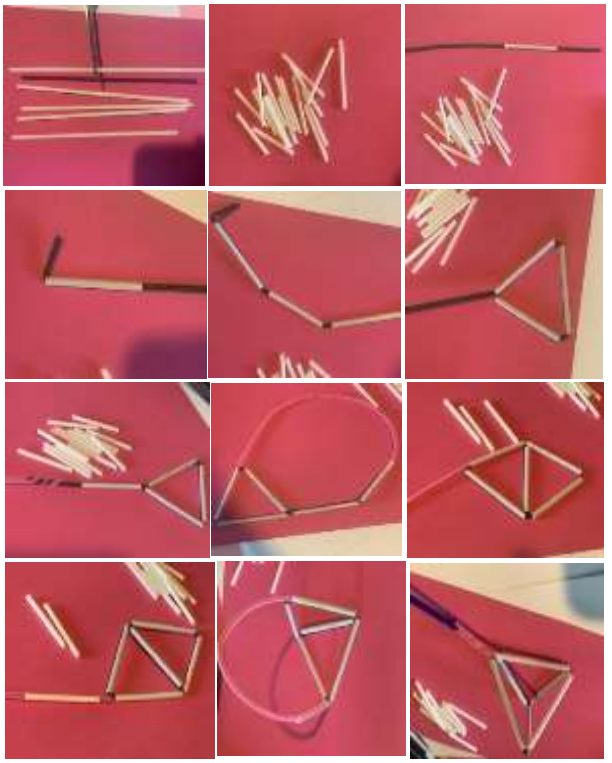
Everything (matter) is made up of tiny, tiny particles called *atoms*!
In our different states of matter, our atoms can be super close together, or more spread out
In the atom game, have your family members roam around the room. Call out a state of matter.

- Solid: the members should pack themselves close together with other people in the room, or other objects.
- Liquid: the members should be somewhat spread out, but still fairly close together with other people or things
- Gas: the members should spread out as much as possible

Play a few rounds. Head outside to play if you need some outside time!

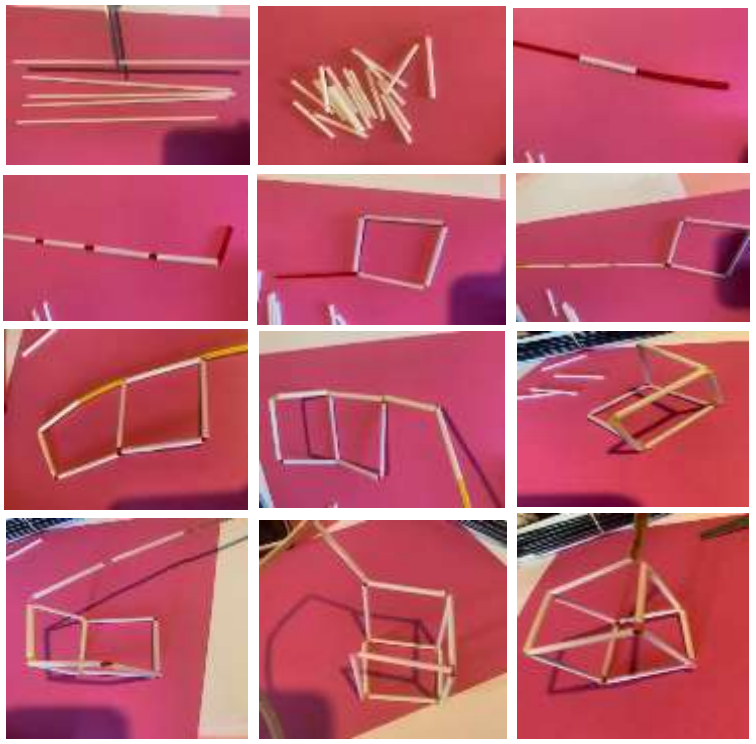
Part 1: Triangular Wand

- **Step One** Cut your straws. First cut each straw in half, then cut in half again. You will get 4 straw sections from each straw.
- **Step Two** Thread a pipe cleaner through one straw and bend the end of the pipe cleaner to secure it at the end.
- **Step Three** Thread two more straws onto the pipe cleaner.
- **Step Four** Bend the long end of the pipe cleaner back to meet the starting point and twist the two ends around each other.
- **Step Five** Add two more straw sections onto the end of the pipe cleaner.
- **Step Six** Thread the pipe cleaner through one of the adjacent straw sections.
- **Step Seven** Add one more straw section and bend it back to one of the straw joints to form a pyramid.
- **Step Eight** Thread the pipe cleaner through an adjacent straw section to secure everything in place. If desired, add a straight section of straw onto the end of the pipe cleaner to form a handle.



Part 2: Cubic Wand

- **Step One** Cut your straws. First cut each straw in half, then cut in half again. You will get 4 straw sections from each straw.
- **Step Two** Thread a pipe cleaner through one straw and bend the end of the pipe cleaner to secure it at the end.
- **Step Three** Thread three more straws onto the pipe cleaner.
- **Step Four** Bend the long end of the pipe cleaner back to meet the starting point and twist the two ends of the pipe cleaner around each other. You will now have a square shape.
- **Step Five** Add three more straw sections onto the end of the long pipe cleaner.*
- **Step Six** Thread the pipe cleaner through one of the adjacent straw sections.
- **Step Seven** Add two more straw sections.
- **Step Eight** Bend the shape to form two sides of a cube and thread the end of the pipe cleaner through one of the straw sections on the edge of the cube.
- **Step Nine** Repeat Step Eight to form another side to the cube.
- **Step Ten** Add one final straw section to complete the cube. Thread the pipe cleaner through an adjacent straw section to secure the final shape. If desired, add a straight section of straw onto the end of the pipe cleaner to form a handle.



What Did You Learn?

- What are the three states of matter?
- What state of matter are bubbles?
- What does tensile mean?

Future Learning

- Can you create more wands with different shapes?
- Results. Did the new shape wand give you a new shape of bubble?

Share your creations!

We would love to see what you made. Email as at discover@uwo.ca or tag us on social media.

Instagram: @westernueng
Twitter: @westernueng
Facebook: @westernueng

Thanks for discovering with us!