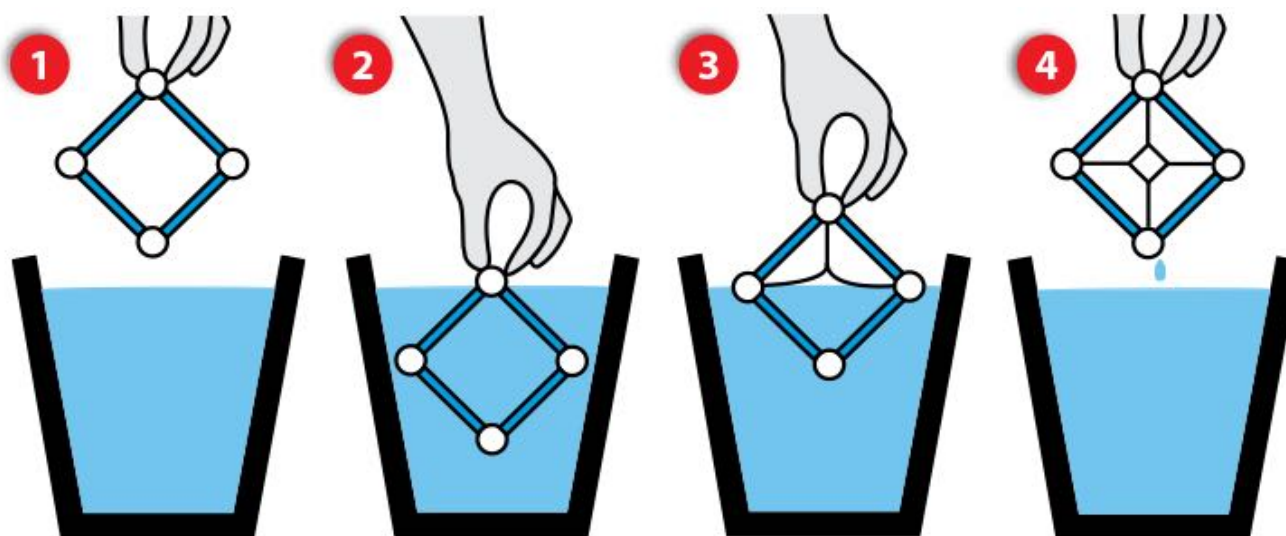


Make Geometric Bubbles!



Step 1: Gently hold the Zometool model by one of the white balls.

** If the model comes apart, give it to the activity leader to fix!*

Step 2: Dip it into the bubble solution completely. (Doing it at an angle works best!)

Step 3: Gently lift the model out of the solution so that the bubble solution clings to every side.

Step 4: PRESTO! You should have an interesting geometric bubble!

Advanced Bubble Tips

Try to stay out of the wind!

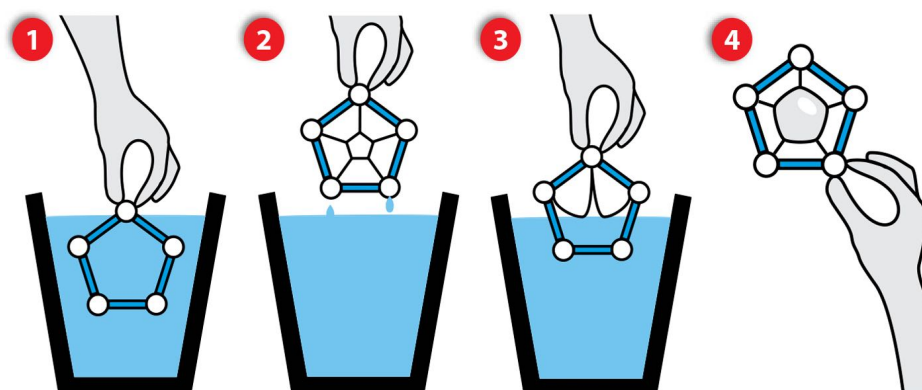
Clear the surface of excess foam regularly.

Use a wet finger (dipped in bubble solution) to try to rearrange your bubble!

Use a dry finger to pop certain parts of the bubble and get crazy curves!

Create a bubble inside a bubble!

- Completely submerge your model in the bubble solution, and gently pull it back out.
- Dip one side again, about 1/3 to halfway back into the solution. You've trapped a bubble of air inside!



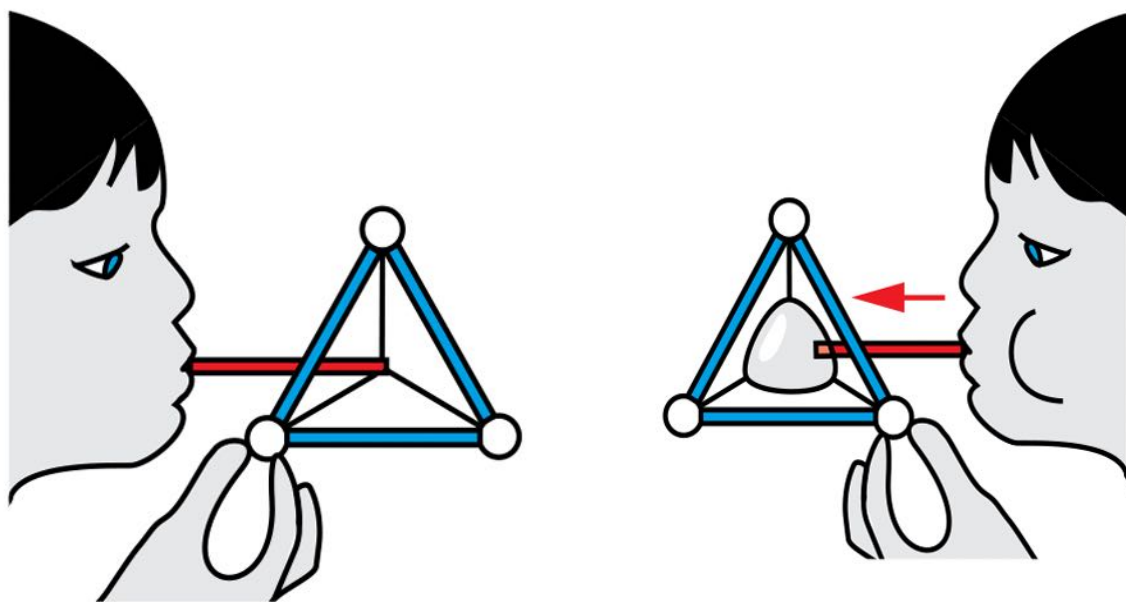
Use the Straw!

Gently dip your model completely into the solution, holding it by one ball.

Dip your straw into the bubble solution partway.

Gently touch the wet end of the straw to the bubble intersections.

Blow air into the bubble with your straw — **but don't breathe in soap!** You'll get a bubble within a bubble.



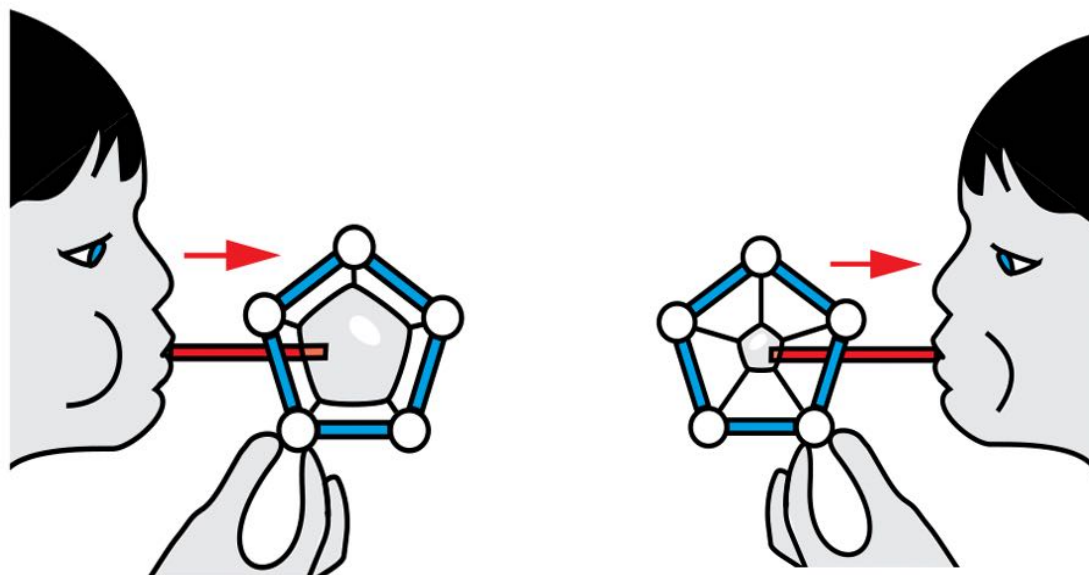
Change the Bubble Size

Wet your straw with the bubble solution. (If your straw is not wet, the bubble will burst!)

Next, put your straw into the bubble.

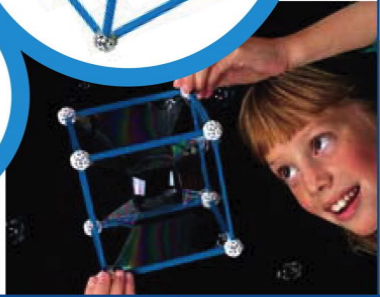
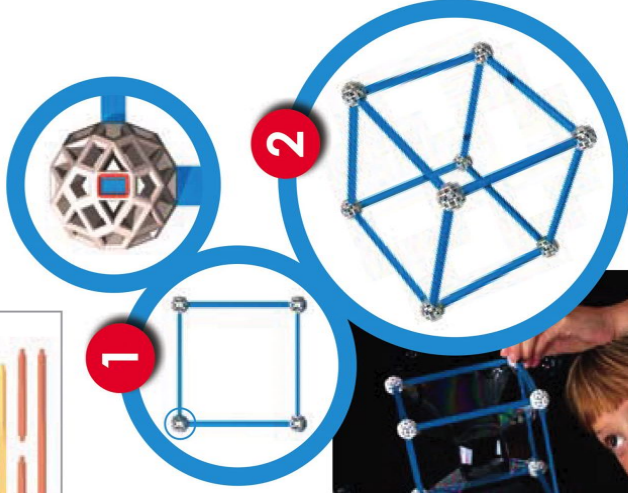
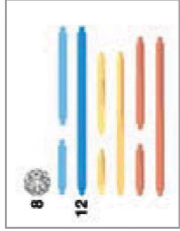
If you want the bubble to be bigger, gently blow air into the shape.

To make the bubble smaller, blow out any excess soap suds from the end of the straw, then gently breathe in to pull air from the bubble.



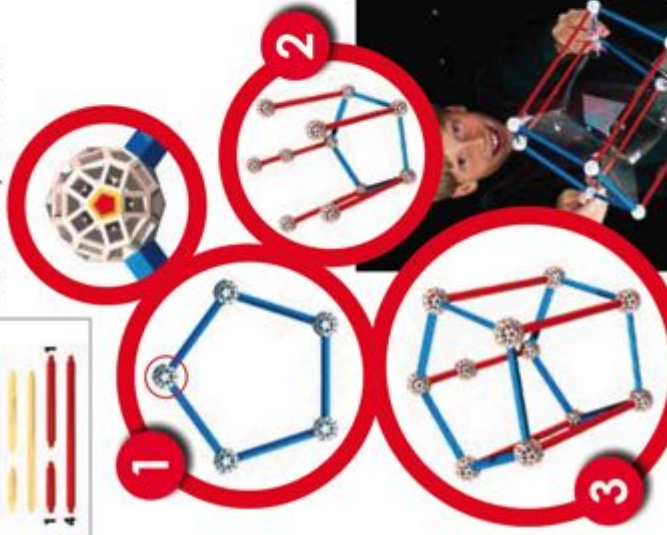
Hypercube

When you make a square bubble in the middle of the cube, you get a perspective shadow of a 4-dimensional cube. In mathematics, higher dimensions are just as real as our 3-D world!



Pumpkin

A pumpkin encloses the maximum volume of seeds within the smallest skin surface using 5-fold symmetry. When a "pumpkin" bubble appears inside this 3-D pentagon, it is also constrained by the number 5.



Here Are a Few Fun Factoids about Soap Bubbles!

- **WHAT IS A BUBBLE?**
A thin skin of liquid surrounding a gas.
- **WATCH THE COLOR** on top of a bubble! It's a clue as to when the bubble will pop: As your bubble becomes thinner, the **INTERFERENCE** caused when light waves collide changes the color of your bubble. Scientists found a special sequence of colors: first **green**, then **blue**, **magenta**, **yellow**, **green**, white, white with black spots, black... **POP!**
- **HOW THIN CAN A BUBBLE GET?**
Just before it pops, a bubble is only **ONE MILLIONTH OF AN INCH THICK!**
- **WHAT'S THE LIFE SPAN OF A BUBBLE?**
The longest-living bubble lasted for **340 DAYS!** Eiffel Plaster made the bubble and holds the record.
- **WHEN 3 BUBBLES COME TOGETHER**, they always join to form a **120-DEGREE** angle—the same way honeycomb cells are packed together. It's nature's way of finding the most efficient way to fill space!

4D Triangle

When you dip this shape, bubble-lines are formed that automatically meet at the very center of the 4-D triangle. In chemistry, this shape is known as a tetrahedral bond, and it is the secret of a diamond's strength.

