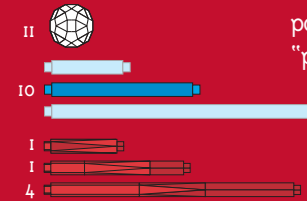
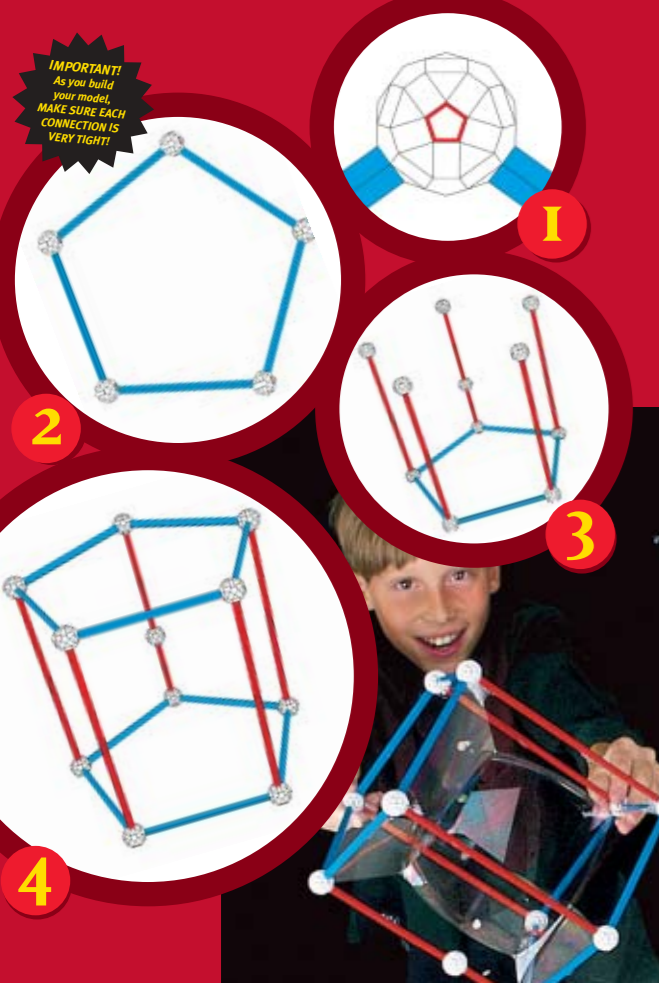


Pumpkin

Nature's building system makes a real pumpkin in **5-fold symmetry**, with a skin stretched as tight as possible over the insides. When a "pumpkin" bubble appears inside this 3-D pentagon, it is also built around the number 5.

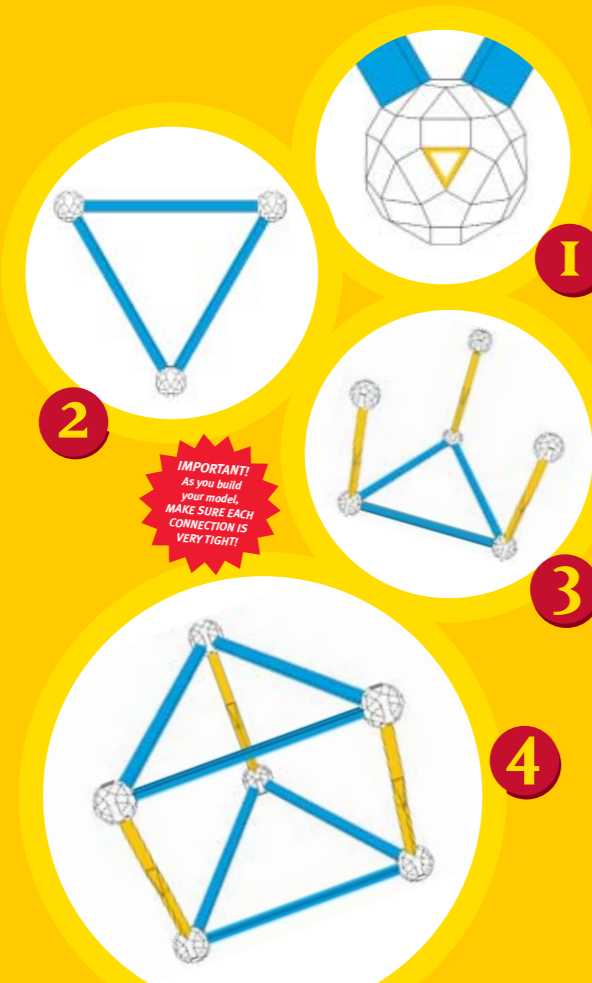
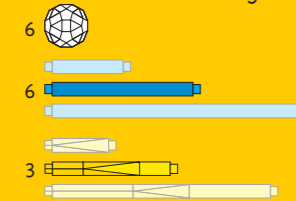


IMPORTANT!
As you build your model, MAKE SURE EACH CONNECTION IS VERY TIGHT!



Prism

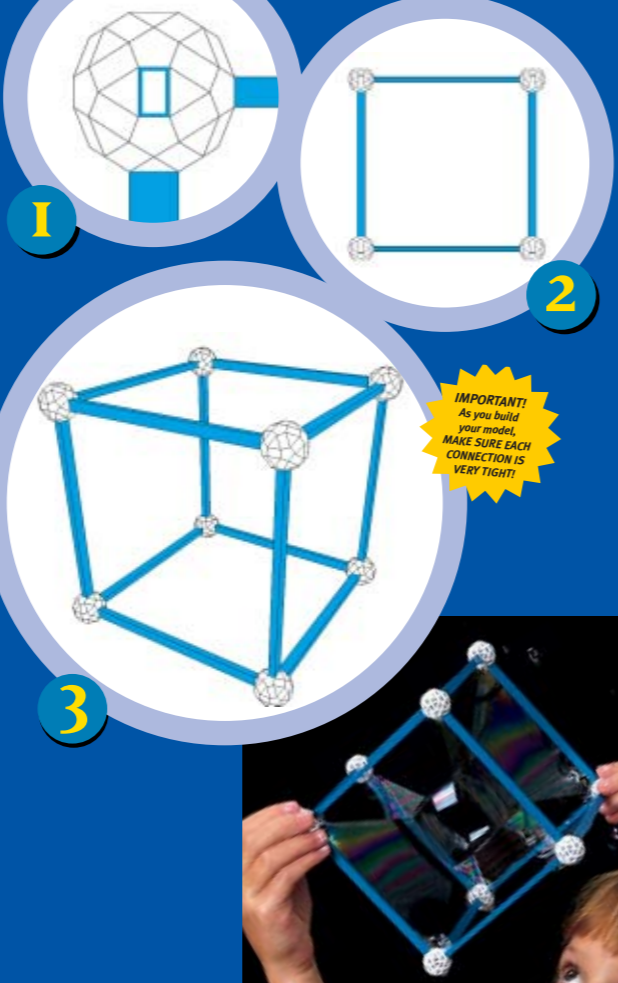
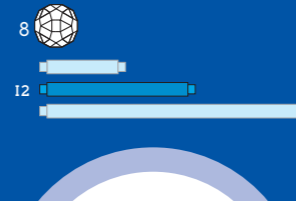
When you dip this prism, the lines that appear in the bubble reveal the shortest length of a network that connects each of the corners. In the field of **communications**, bubbles have been used to identify ideal routes for television cables!



IMPORTANT!
As you build your model, MAKE SURE EACH CONNECTION IS VERY TIGHT!

Hypercube

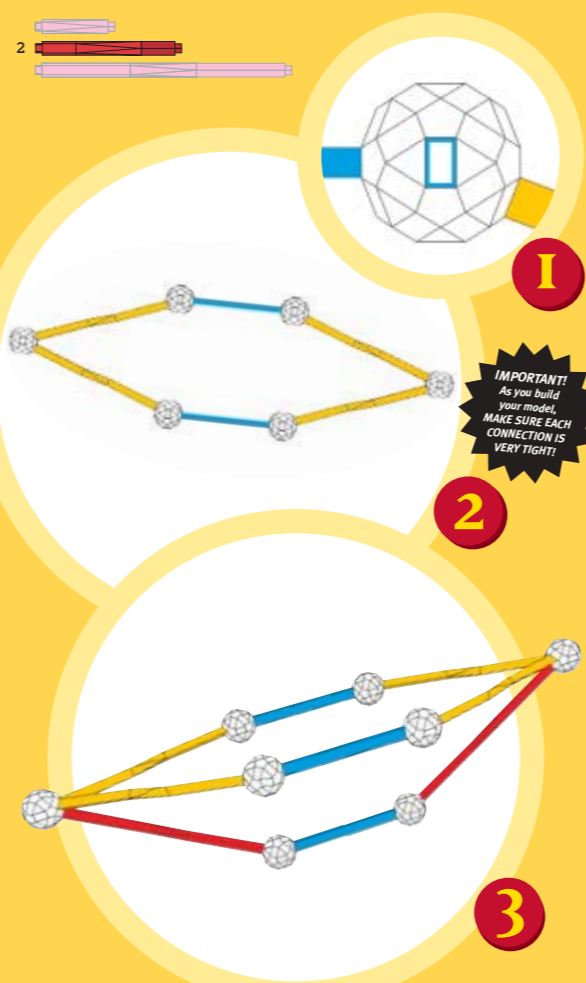
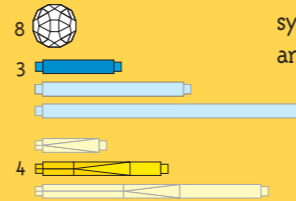
When you make a square bubble in the middle of the cube, you get a perspective shadow of a 4-dimensional cube. In **mathematics**, higher dimensions become just as real as our 3-D world!



IMPORTANT!
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Banana

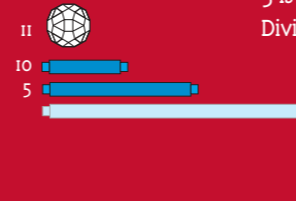
The banana is a minimum curve divided into 3 sections. **Nature** uses 2-fold, 3-fold and 5-fold symmetries in designing plants and animals. You'll find 2, 3 and 5 in the shapes of Zome parts (rectangle, triangle and pentagon)!



IMPORTANT!
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Flower

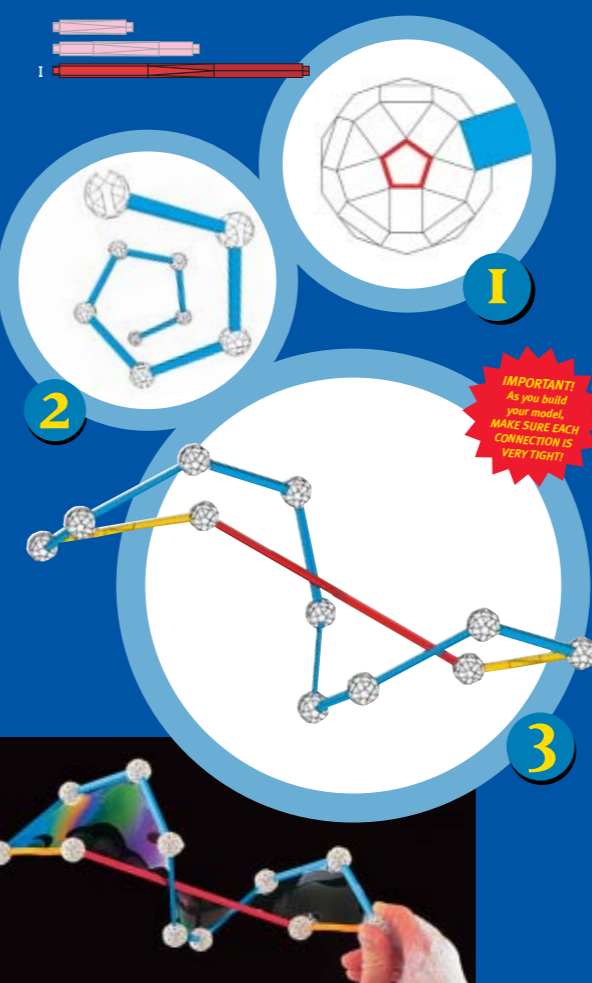
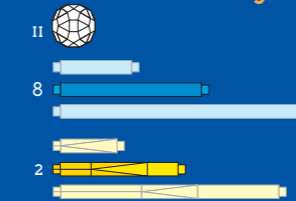
The petals of this flower are 5 saddle-curves joined. The number 5 is the mathematical seed of the Divine Proportion, found in **art** as well as nature. Some struts come in Divine Proportion lengths!



IMPORTANT!
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Spiral

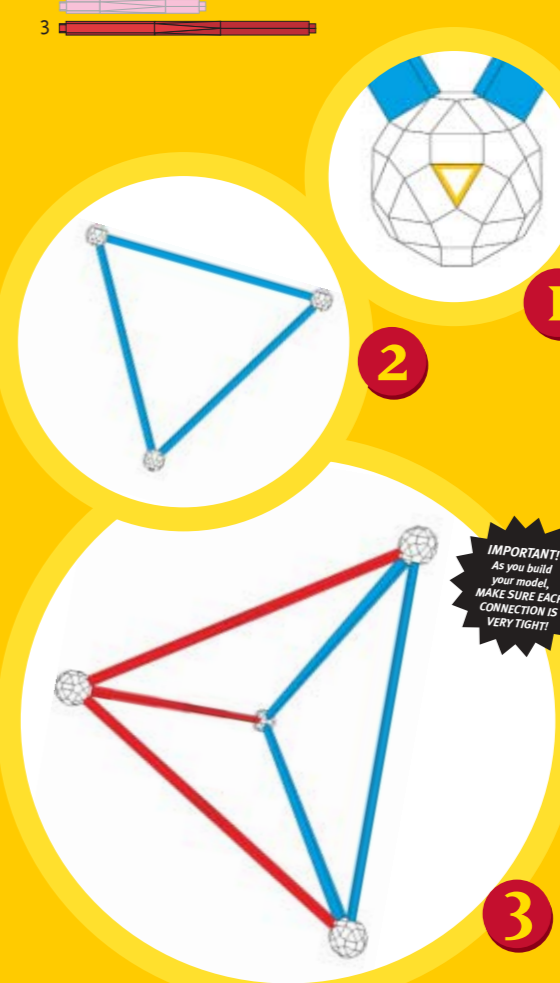
The spiral is related to the shape of DNA. Scientists in the field of **genetics** know that the DNA molecule is the blueprint of all life on earth.



IMPORTANT!
As you build your model, MAKE SURE EACH CONNECTION IS VERY TIGHT!

The 3-D Triangle

When you dip this triangle, bubble-lines are formed that automatically meet at the very center of the 3-D triangle. In **chemistry**, this shape is known as a tetrahedral bond, and it is the secret of a diamond's strength.



IMPORTANT!
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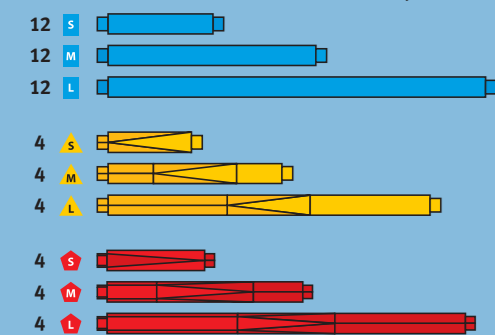
Here Are a Few Fun Facts about Soap Bubbles!

- **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!

Crazy Bubbles!

PARTS LIST:

The Zome Crazy Bubbles! Kit contains 72 Zome Pieces, with 12 Zome Balls and 60 Struts in the indicated lengths (short, medium or long) and colors shown below, and a Bubble Straw. Kit can be expanded with additional parts at any time.



AVOID ACCIDENTS: Keep bubble solution out of the reach of children. If it gets in the eyes, rinse thoroughly with water. If swallowed, dilute with a glass of water.

Bibliography

Zome recommends Bubble-ology!

- Bubblemania**
Durant, Penny Raife.
New York: Avon Books, 1994.
Secrets to making spectacular bubbles!
- Soap Bubble Magic**
Simon, Seymour.
New York: Lothrop, Lee & Shepard, 1985.
Learn everything about soap bubbles.
- Bubbles**
Zubrowski, Bernie.
Boston: Little, Brown, 1979.
Fun with gigantic soap bubbles, sculptures and unusual bubble shapes.
- Lawrence Hall of Science, GEMS, Berkeley, CA: The Regents of the University of California, 1986.
A BOOK SO FUN, WE SELL IT ON OUR OWN SITE AT www.zomesystem.com!
A teaching guide to loads of bubble experiments. Kids measure, classify, draw conclusions, adjust, average — even graph results!
- Soap Science: A Science Book Bubbling with 36 Experiments.**
Bell, J. L.
Reading, MA: Addison-Wesley, 1993.
Investigate soap bubbles to test water, soap and aspects of electricity, light and other science topics.

Start with this Secret Sticky-Bubble Recipe:

1. Find a container to hold 2 GALLONS of WARM WATER. We found that a deep sink or a rectangular file box works well.
2. Add 2 CUPS LIQUID DISHWASHING DETERGENT. (Any dishwashing liquid works, although generic and antibacterial products are not recommended.)
3. Mix the bubble solution gently with your hand. For crystal-clear bubbles, be sure that you always KEEP THE SURFACE FREE OF FOAM. If the water is hard in your area, add extra detergent.

Optional: Add a tablespoon of glycerin (from any drugstore) for tougher, longer-lasting bubbles.

Tip: Bubble solution improves with age. If you can, leave the mixture in an open container for at least one day before use.

Visit www.zomesystem.com for more information and more Zome parts!
To speak to us, call 1-888-ZOMEFUN.

Zome System is a product of Zometool, Inc.
1526 South Pearl Street, Denver, Colorado 80210 USA

Now, Create 7 Simple ZOME Bubbles (see the other side)

While you're making bubbles, REMEMBER:

1. TIGHTEN THE CONNECTIONS on your model, then dip it into the bubble solution.
2. Always HOLD THE MODEL BY A BALL. (Dipping at an angle works best.)
3. Be sure that the model is submerged completely, so that all sides are covered.
4. Gently lift the model out of the bubble solution, and PRESTO! — you should have an exciting geometric bubble!
5. Clear the surface regularly of excess foam.
6. When it's windy — add more glycerin (or detergent) for TOUGHER BUBBLES!
7. Simpler structures make the best bubbles. TRY OUR 7 SIMPLE ONES FIRST! Below, two more that you can build with additional Zome Parts added from other Zome kits:

- Back-to-back pyramids (an Octahedron — this requires the Zome Pioneer Kit)
- 12-sided polygon (a Dodecahedron — this requires the Zome Adventurer Kit)



Extreme Bubblecraft. Catch Some Air; Dude!

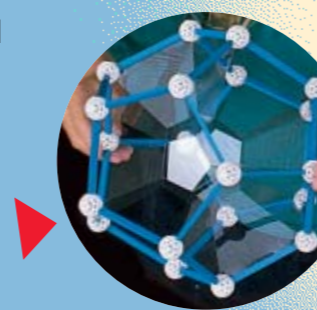
- After creating a bubble, DIP ONE SIDE IN AGAIN about one third of the way. This will TRAP a new bubble of air.
- USE A DRY FINGER to pop parts of the geometric bubble. What kinds of curves do you see?

23,680 people blew bubbles at the same time on May 16, 1999, in Upton Park, London, UK!

National Bubble Week begins the 1st day of Spring — the unofficial start of bubble-blowing season!

The Way of the Zome Bubble

Bubbles form because of the SURFACE TENSION of water. Hydrogen atoms in one water molecule are attracted to oxygen atoms in other water molecules. They like each other so much, they cling together. Normal bubbles enclose the MAXIMUM VOLUME OF AIR with THE MINIMUM AMOUNT OF BUBBLE SOLUTION, so they are always round. In fact, all Zome bubbles are "MINIMUM" surfaces. When stretched between Zome struts, bubbles cling to the Zome model as you dip into the solution. The surface tension of water, alone, is TOO STRONG to make good bubbles, ADDING SOAP REDUCES THE SURFACE TENSION. It also adds oily film that slows down the evaporation process, so you get longer-lasting bubbles! For more fun factoids on bubbles, visit www.exploratorium.com.



Create a "Bubble Inside a Bubble" Using the Straw.

1. Follow the instructions at left for dipping a model again into soapy water, then gently pull out.
2. Dip the straw into the bubble solution.
3. Gently touch the wet end of the straw to the bubble intersections.
4. Blow air into the bubble with your straw. You should see a wild, 3-D geometric bubble within a bubble.

Changing the Size of Your Bubble:

1. Wet your straw in the bubble solution. (If the straw is not wet, the bubble will burst.)
2. Next, put your straw into the bubble.
3. If you want the bubble to be bigger, gently blow air into the shape.
4. To make it smaller, first blow out any excess soap suds from the end of the straw, then gently breathe in to withdraw the air in the bubble.

Crazy Bubbles!

The Science of Weird Bubble-ology

Have You Ever Seen a Square Bubble?

AWARD WINNING

- Oppenheim Toy Portfolio Gold Seal Award — 2000
- Dr. Toy Best Vacation Children's Products — 1999
- Family Life Magazine 20 Great Toys For Under \$20 — 1999
- Child Magazine Year's Top Toys — 1999

Ages 6 to Adult

Create the Wildest Bubbles You've Ever Seen!

You Can Create:

- Bubbles shaped like a CUBE!
- BANANA bubbles!
- Bubble-faceted JEWELS!
- Even SPIRAL bubbles!

Discover a world of bubbles you never knew existed! Learn all about bubbles — for BUBBLY SCIENCE PROJECTS — or just plain Zome fun!

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Warning: Swallowing Danger
CONTAINS SMALL PARTS that are NOT suitable for children under 3 years of age.