Troubleshooting

1. Check that the long combined rods of the large base tetrahedron are made of four single rods each, while the long combined side rods (the ones that connect at the top) are made of three single rods each.

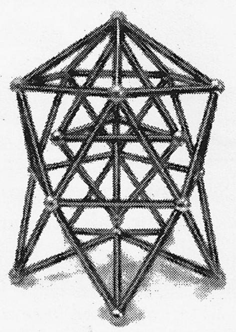
2. Check that the extra ball between the top balls of the large and small tetrahedrons is present, or there won't be enough clearance.

3. Check that the three rod-ends at the top of the small tetrahedron are all the same polarity. The three rod-ends at the top of the big tetrahedron should also be the same, but different than those of the small tetrahedron.

Other Kinetic Designs

Much fancier kinetic designs are possible using more parts from additional kits. Here is a design with a spinning tetrahedral dipyramid (2 tetrahedrons that share 3 rods) inside of an icosahedral dome with legs. The dome sits on five triangular legs attached to one another by way of a pentpod. The central ball of the pentpod and the top ball of the dome must be magnetically polarized. The dipyramid is connected by a magnetic bearing both at the top and at the bottom. The bottom pentpod attached to the legs is actually held up by its magnetic attraction to the oppositely polarized ball of the dipyramid. This design uses 54 rods and is a little reminiscent of an old-style rotating pendulum clock. It is easier to build if you make a whole icosahedron instead of a dome and then remove the five bottom rods from the icosahedron. A simpler version that you can build with one set is made from a dome with a triangle spinning inside. See if you can figure it out.

Top three rods of the dipyramid must be the same polarity as one another and different from the five rods of the top pentpod



Bottom three rods of the dipyramid must be the same polarity as one another and different from the five rods of the bottom pentpod.

Roger's Connection and Universal Design Principles

By learning to build with Roger's Connection, you can spontaneously experience some of the most important design principles found in the natural world. Using these principles, you can learn how shape and structure work together to create sound designs.

The study of structure leads naturally to geometry - the study of shapes. For something to exist, it must have a shape. That shape is the result of the internal and external forces that created it. For example, the internal molecular and atomic forces of a snowflake limit its overall shape to one having six sides, while the external forces resulting from temperature, humidity, wind speed, and atmospheric pressure determine its actual pattern. But shapes are not merely a result of static internal and external forces - the influence works in the other direction as well. As a shape changes its form, this changes its structure and thus the underlying forces that maintain it. This reciprocal influence is one of nature's fundamental design principles.

When flexibility is needed, nature can use shapes which can distort, like squares, pentagons, and hexagons. Nature also uses different types of atomic bonds to achieve differing degrees of flexibility, ranging from quite rigid, with preferred angles of connection, to completely flexible, like the connections formed with Roger's Connection. Even though atomic bonds are often flexible, nature uses them to build large and complex yet stable designs, like rocks, plants, and people. While molecules and larger structures gain part of their strength from preferred connection angles of atomic bonds, they also gain a great portion of their strength from the arrangement of their atoms. A diamond, for example, is extremely hard because each carbon atom connects to the four surrounding carbon atoms in a very strong tetrahedral shape. When something must be as rigid as possible, triangles work best. A triangle is inherently very strong, and 3-dimensional designs based on the triangle, like the tetrahedron, octahedron, and the icosahedron, are also very strong. More complicated designs that incorporate these shapes can also inherit this fundamental strength.

Another principle of nature is the coexistence of attraction and repulsion. Everything in the universe is a dance between forces that push and forces that pull, although one or the other may be more dominant in a given situation. The four recognized fundamental forces - electrical, gravitational, and the nuclear strong and weak forces demonstrate an astounding variety of subtle (and not so subtle) behaviors as they perform this dance.

Electrical attraction between dissimilar charges, magnetic attraction between dissimilar poles, gravitation, and the nuclear strong and weak forces are examples of attractive forces which draw things together. Gravity keeps the planets in their orbits around the sun, and electrical attraction holds the atoms and molecules of our bodies together. Without electrical attraction, atoms would disintegrate as electrons fled their orbits around the atomic nuclei, and without the nuclear forces, the atomic nuclei would disintegrate.

Electrical repulsion between similar charges, magnetic repulsion between similar poles, and some kinds of radiation are examples of repulsive, pushing forces. Without these balancing repulsive forces, all structures - galaxies, solar systems, molecules, atoms, and even our own bodies - would collapse inward on themselves.

Structures that you make with Roger's Connection are held together by the magnet's attractive force while the rods, mimicking the repulsive force, push outward. Without both components, your efforts would result either in a clump of magnets or a loose pile of rods. Structure is achieved through a balance of forces that result from sound geometric design.

Most construction toys have rigid connections between their parts. This is an advantage at times, but it teaches fundamentally flawed lessons about what makes structures stable. Building with rigid connections obscures the important role that shape plays in stabilizing a design. Connections made with Roger's Connection are inherently flexible in their angle of attachment due to the lack of a "locking-in" mechanism common in most construction toys. Building and learning with Roger's Connection provides a more realistic view of the fundamental design principles found in the natural world.

When architects, engineers, and other designers design structures such as bridges, space stations, or even furniture, those designs which most closely follow the design principles of nature, often turn out to be the most beautiful, successful, lasting, and safest designs. That's why it's important for people who enter these and related fields to receive correct reinforcement from an early age about how nature really works.

This kind of reinforcement also enhances effective problem solving and creative thinking, and can be important, useful, and interesting, even for people who have no intentions of ever building any space stations!

The best part of Roger's Connection is that these deep lessons begin to be learned spontaneously and joyfully, as different designs are created and changed. Most people tend to find that they already have a knack for it, and find that building with Roger's Connection is a natural and satisfying experience. That's not surprising, given that these design principles are found in the construction of our bodies, brains, and molecules. How interesting it will be to observe the creations of future designers who as children today, had an opportunity to take these lessons effortlessly to heart in this new way.

Synergetics and Design Science

What we have begun to describe is the tip of a very large and fascinating iceberg. The name of the iceberg is Synergetics! As it turns out, the simple triangle is really a doorway to understanding about many things ranging from the design of the universe to solving problems like pollution and food shortages. The preeminent individual who developed much of this work is R. Buckminster Fuller (1895-1983), best known as the inventor of the geodesic dome. His accomplishments range far beyond this invention. Among his many writings are "Critical Path" (1981), and a two volume set "Synergetics, Explorations in the Geometry of Thinking (1975).

Synergetics was his word for a comprehensive system within which the structure of the universe could be appreciated in a natural and rational way. He demonstrated that using our usual cubic-based x, y, and z coordinate system to understand the universe often gives rise to a very confused point of view, which obscures the underlying truth and simplicity of the natural organization and design of the universe. Synergetics provides a unique and profound viewpoint of geometry and mathematics, as well as a framework for appreciating any structure or system more comprehensively.

The term "Design Science" is often found in writings concerning Synergetics. Design Science refers to a coherent methodology for the design of structures and systems that is based on fundamental design principles. If you are interested in pursuing this field more deeply, there are many books and other resources available to you. If you have an Internet connection, then searching for terms like Synergetics, Design Science, and the geometric terms mentioned in these instructions, will provide a wealth of information at hundreds of different sites on the World Wide Web. We hope that you enjoy your explorations in this fascinating field, and we are pleased that we could play a small part by introducing you to Roger's Connection!

Roger's Connection provides you with extensive support on the Internet at www.RogersConnection.com. Here you will find additional instructional and scientific information, a gallery of designs submitted by users, design ideas, useful links, and much more. We invite you to visit, participate, make suggestions, and invite your friends to take a look!

RogersConnection.com

customerservice@RogersConnection.com