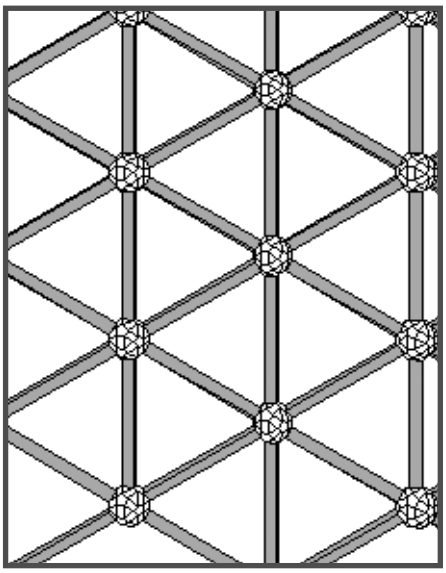
Triangle Tiles - I

Mathematics
Basic Concept

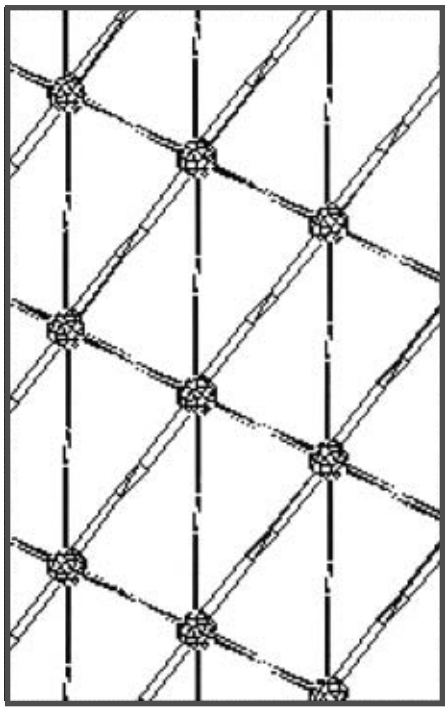


Lesson Objective:
Students will learn simple building economics and the concept of translation symmetry.

Prerequisite skills:
Familiarity with the concept of planes (“2-D Polygons”), and knowledge of tilings (“Trying Tessellation”, and “Plane Patterns”).

Time Needed:
One class periods of 45-60 minutes.

Materials Needed:
• One or two Zome System Creator Kits for 25-30 students



Procedure:
Divide your class into teams of 4 students each and distribute Zome System components evenly among the teams. In this exploration, it’s important that each team starts with the same number of each Zome System component. Set aside any remainders.

Based on their earlier work with triangles (“Similar Triangles”) and of tilings (“Trying Tessellation” and “Plane Patterns”), challenge each team to build a “flat pattern” based on one unique Zome System triangle repeated many times.

Allow 10-15 minutes for this exploration, during which time you can offer guidance to teams an individual basis. If teams are not sure how to begin, you may can suggest that they first agree on a “seed” triangle. They should then make a few exact copies of the seed triangle, and experiment on how their triangles could together to form a repeating pattern.

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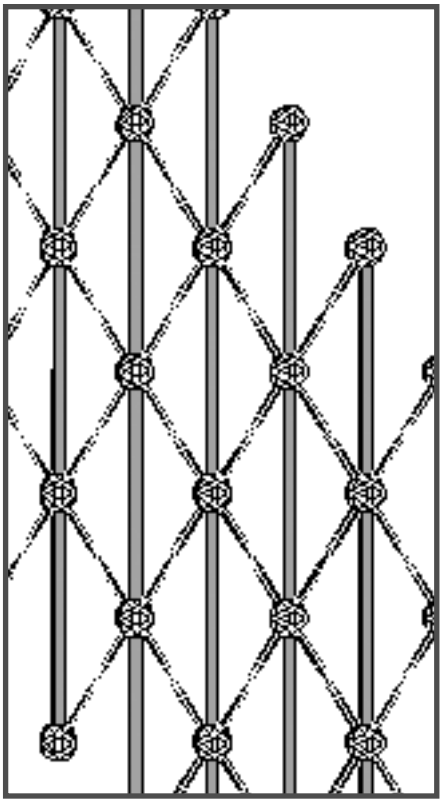
Zome System

Builds Genius!



At this point, expand the challenge: "*Which team can build the pattern containing the largest number of triangles?*" To add an economic dimension to the challenge, mention that inter-team trading of Zome System parts is OK.

When the allotted building time expires, the class should discuss the "market" aspect of the exploration. *Did any team run out of parts? Which kind? Why did (or didn't) they trade with other teams? Did one team offer a better "price" for parts than another? Were some parts more valuable than others? Why? What was the "exchange rate" between blue and yellow struts? Blues and reds? Yellows and reds? Why? Which would result in more total triangle "production:" if all teams made the exact same kind of triangle or if each team produced a different type of triangle? Could you go on building the pattern forever? In "real life," do all "teams" start out with the "same number of parts?" Why do people use money instead of just trading one kind of thing for another?*

The discussion will lead to a comparison with money transactions. Parallels can be drawn with your students' money experiences, such as how they get money, how they spend it, how they base their economic decisions, etc. It can also lead in philosophical or moral directions, depending on your comfort level. Returning to math, it may be interesting to have your class agree upon and write up a "price list" for Zome System components based on this exploration. Each team needs to save their completed pattern structures for the "Triangle Tiles - II" session.

Assessment:

Observe the building work of each team, as well as the interaction between teams. Take notes during the group discussion. To meet the standard students must build a continuous tiling of one triangle shape. To exceed the standard they must make observations about the perceived value of different Zome System part.

Standards Addressed:

* Mathematics standards addressing mathematical connections (NCTM Standard 4).
* Mathematics standards addressing geometry and spatial sense (NCTM Standard 9).

Transfer Possibilities:

Exploration of more advanced tessellations ("Kepler Tilings", and "Richert-Penrose Tilings"). Use of tessellations and mosaics in art and design. The lesson is also a useful preparation for sessions on space frames and other architectural structures ("Tallest Tower in the World", "Bridge Building Unit", and 3-D Triangle Tiles").