

## Zome System

Builds Genius!

### Mathematics Basic Concept

#### Time Needed:

One class period of 45-60 minutes.

#### Lesson Objective:

Students will learn about rhombi ("diamonds") in relation to the square, and will review the idea of similarity.

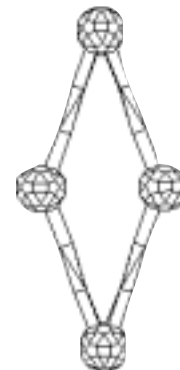
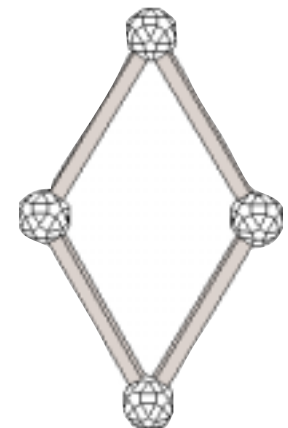
#### Materials Needed:

- One Zome System Creator Kit for class of 25-30 students
- Overhead projector
- Double-sided tape

#### Procedure:

Prepare for the lesson by cleaning a space on the chalkboard where diamonds built with Zome System can be attached with double-sided tape. The diamonds may be rearranged several time, so it is important that the chalk dust is removed.

Divide the class into teams of 4 students each, and distribute the Zome System elements evenly. The challenge for the teams is to create as many flat "diamond" shapes as possible in 20 minutes. They should also find a method of classifying all the diamonds they discover. If students ask what is meant by "diamond," encourage them to try to come up with a definition on their own. Suggest that the students build their best guess. They can then compare it with other diamonds being built by their team members. The teams should discuss all the shapes, agree on the definition of a diamond, and classify them



into a system that makes sense to them. Students must make notes of their findings and definitions in their math journals.

When the work is completed, one representative from one of the teams should present to the class, all the diamonds her/his team discovered. The presenter may use the overhead projector so everyone can see the outline of each diamond. She/he should also classify the diamonds according to the system agreed to by the team. The teacher or other students should attach the diamonds to the chalkboard using double-sided tape.

Allow a representative for each of the other teams to compare their findings to the display on the board. Did they find any additional diamonds? Are all the displayed shapes really diamonds? Are there other ways of classifying the diamonds (fattest to skinniest, biggest to smallest, by color)? Ask teams with "missing" diamonds to bring them up and incorporate them into the classification system. When the class is convinced that all possible diamonds have been classified in the best possible system, they should discuss their findings. What is the definition of a "diamond"? Do all diamonds have the same number of struts? Nodes? How many of each? Are they always made of just one color strut? Why, or why not? How many different blue diamonds can be built? Yellow ones? Red ones? What's the difference between a small red diamond and a large red diamond? What's the same? Is a square a diamond?

What do squares have in common with other diamonds? How can you turn a square into a diamond? Can a square cast a diamond shadow? Can a diamond cast a square shadow?

You may wish to introduce new vocabulary. A 2-dimensional figure with four sides of equal length is a rhombus. Two rhombi of different sizes with equal angles are similar. A square is a special type of rhombus with  $90^\circ$  angles. A kite has sides of two different lengths. Kites are not rhombi.

### Assessment:

Observe students while they work, and review their individual and group notes. To meet the standard, students must define a "diamond," and be able to organize these shapes into a consistent classification system. To exceed the standard they must distinguish between rhombi, squares, parallelograms, and kites.

### Standards Addressed:

- \* Mathematics standards addressing geometry and spatial sense (NCTM Standard 9).
- \* Mathematics standards addressing measurement (NCTM Standard 10).

### Prerequisite Skills: