

Mathematics Basic Concept

Lesson Objective:

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

Prerequisite Skills:

Some background on exploring polygons (“Geometric Shapes,” “Shape and Number,” and “Similar Triangles”).

Time Needed:

One class period of 45-60 minutes.

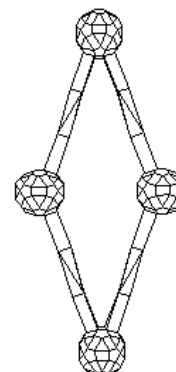
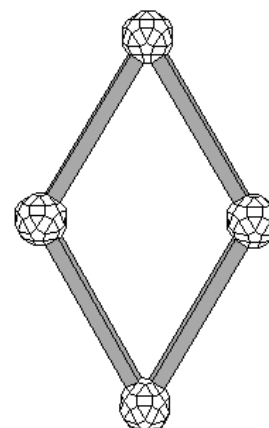
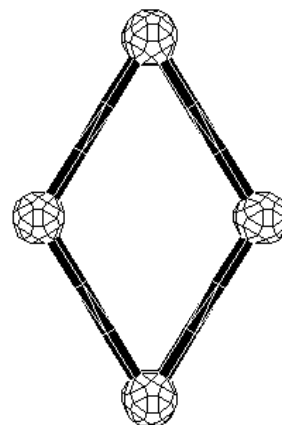
Materials Needed:

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

Procedure:

Prepare for the lesson by cleaning a space on the chalkboard where rhombi built with Zome System can be attached with double-sided tape. The rhombi 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 rhombus (or diamond) shapes as possible in 20 minutes. They should also find a method of classifying all the rhombi they discover. If students ask what is meant by “rhombus,” 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 rhombi being built by their team members. The teams should discuss all the shapes, agree on the definition of a rhombus, 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 rhombi her/his team discovered. The presenter may use the overhead projector so everyone can see the outline of each rhombus. She/he should also classify the rhombi according to the system agreed to by the team. The teacher or other students should attach the rhombi 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 rhombi? Are all the displayed shapes really rhombi? Are there other ways of classifying the rhombi (fattest to skinniest, biggest to smallest, by color)?* Ask teams with “missing” rhombi to bring them up and incorporate them into the classification system. When the class is convinced that all possible rhombi have been classified in the best possible system, they should discuss their findings. *What is the definition of a “rhombus”? Do all rhombi 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 rhombi can be built? Yellow ones? Red ones? What’s the difference between a small red rhombus and a large red rhombus? What’s the same? Is a square a rhombus?*

What do squares have in common with other rhombi? How can you turn a square into a rhombus? Can a square cast a rhombus shadow? Can a rhombus 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° 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 “rhombus,” 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).

Transfer Possibilities:

Expansion into more advanced 2-, and 3-dimensional forms, and their nomenclature (“2-D and 3-D Shapes,” “What are Quadrilaterals?” and “Naming 2-D and 3-D Shapes”). Exploration of the characteristics of specific rhombi (“Non-Periodic Tilings-II: Richert - Penrose Tilings”).