

Mathematics Basic Concept

Lesson Objective:

Students will learn to define and build all quadrilaterals, including: squares, rectangles, trapezoids, rhombi, parallelograms, kites, and non-convex quadrilaterals.

Prerequisite Skills:

Knowledge of basic polygons ("2-D Polygons").

Time Needed:

One class period of 45- 60 minutes.

Materials Needed:

- Two Zome System Creator Kits for 25-30 students

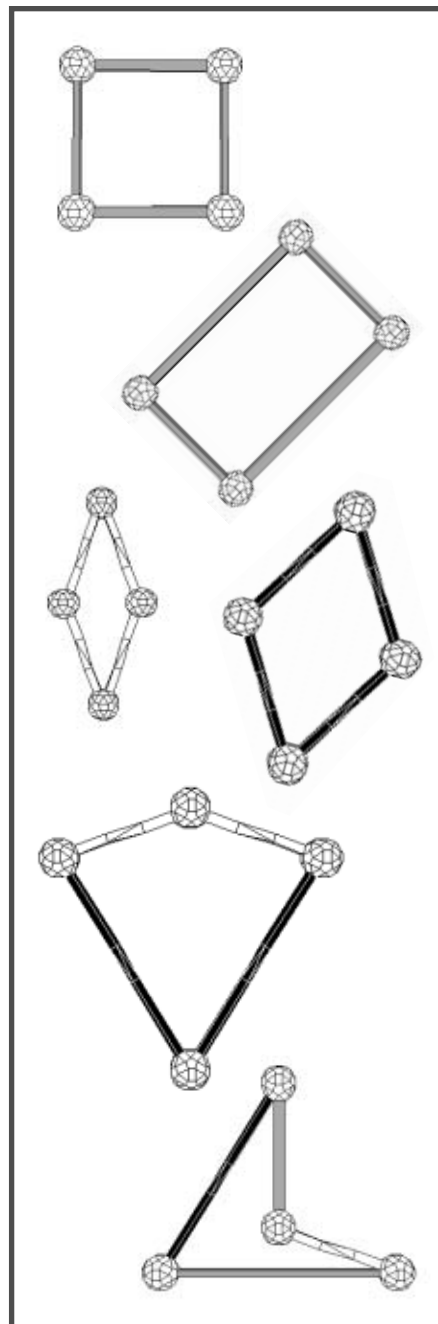
Procedure:

Briefly review the names of the basic polygons your students know. Steer the discussion to the square and the rectangle. *How are these two polygons similar?* Tell the class that any polygon that has 4 sides is called a **quadrilateral**. *Can your students name any other quadrilaterals?*

Divide the class into teams of 3-4 students, and distribute the Zome System elements. The challenge for each team is to build as many different quadrilaterals as possible in a 15 minute period. They should discuss the name of their shapes as they build. Circulate and assist the groups as necessary. *Do the quadrilaterals have to have identical angles? Do they have to have any **parallel lines**?*

Bring the class back together and ask a team representative to demonstrate the shapes they have found. Discuss the shapes as they are presented. Review any concepts the students need to make their definitions, for example: what is a **convex** versus a **non-convex** polygon. *How is each quadrilateral different from the others? What makes it unique?*

Make a table on the chalkboard naming the shapes and



What Are Quadrilaterals?

Zome System

Builds Genius!

listing definitions the students agree on. For instance: Quadrilateral: Any polygon with 4 sides; Trapezoid: At least one pair of parallel sides. All 4 sides can be of different length; Parallelogram: Two pairs of opposite sides that are parallel to each other. Opposite sides are of equal lengths; Rhombus: Two pairs of opposite sides parallel. All 4 sides are the same lengths; Square: Opposite sides are parallel. All sides are of equal length. All angles are 90° ; Rectangle: Opposite sides are parallel. Opposite sides are of equal length. All angles are 90° ; Kite: No parallel lines. Opposite angles are identical.

Draw the “family chart” outlined on this page on the board and discuss different quadrilaterals relate to each other. *Are all squares rhombi? Are all rhombi squares? Are all rectangles parallelograms? Are all parallelograms rectangles? Are all parallelograms trapezoids? Are all trapezoids parallelograms?* Continue the questioning until the students can distinguish between the various polygons.

The students should write the agreed upon definitions, and draw examples of the different quadrilaterals, in their math journals.

Assessment:

Observe students as they work, and take notes during their discussions. Review definitions and drawings in math journals. To meet the standard students must name the various quadrilaterals correctly. To exceed the standard they must also verbalize definitions that differentiate the quadrilaterals.

Standards Addressed:

* Mathematics standards addressing the study of the geometry of one, two, and three dimensions in a variety of situations (NCTM Standard 12).

Transfer Possibilities:

Work with tilings (“Tiling with Quadrilaterals”, “Symmetries in Quadrilateral Tilings,” and “Non-Periodic Tilings-II: Richert-Penrose Tilings”).

Families of 4 Sided Polygons

