

Zome System

Builds Genius!

Mathematics / Art Basic Concept

Lesson Objective:

Students will learn the basic concept of tessellation and repeating patterns.

Prerequisite Skills:

Knowledge of basic geometric shapes.

Time Needed:

Two to three class periods of 45-60 minutes.

Materials Needed:

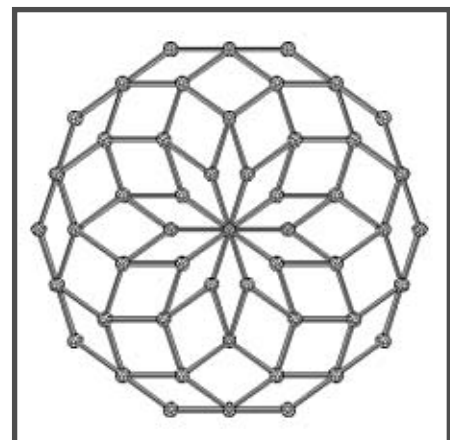
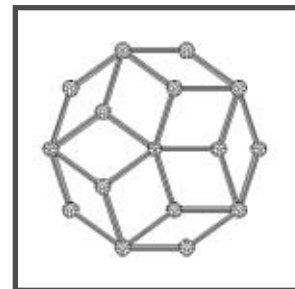
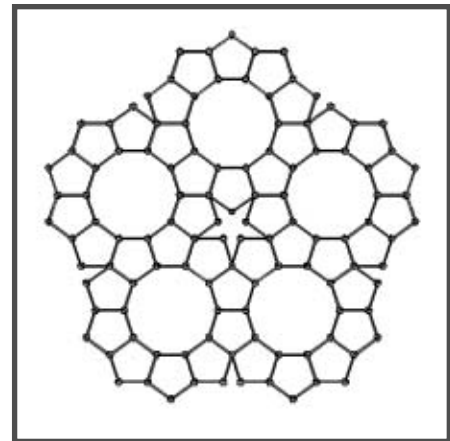
- Two Zome System Creator Kits for 25 - 30 students
- Eight Hands Round by Ann Whitford Paul
- Overhead projector if available

Procedure:

Start the class with a brief review of the concepts of shapes, angles, triangles, and cubes. As a group, brainstorm all the different shapes they can remember.

Then, read the book to the class. As you read, have students notice the various geometric shapes on each page. *What do you notice about the patterns on the quilts? Which geometric shapes are used? Is there just one shape used in the quilt, or are there combinations of several shapes?* Introduce the term **tessellation** and have students look around the room for examples (i.e. ceiling tiles, calendars squares, etc.)

Tell students that they have been commissioned by the US Commission for Modern Art to make a unique patchwork quilt. A transparency of a “letter” from the Commission can be shown on the overhead. Unlike the quilts in the book, which are made from material, these quilts will be made out of Zome System. The quilt should have a repeating pattern using geometric designs. All



quilts must be assembled for public viewing by a specified deadline. Require the quilts to a certain size (i.e. 3 ft x 3 ft.). The teams will receive an imaginary salary based on cooperation, problem solving, and completing the piece on time. The salary will be decreased if the students fail to meet the above expectations.

After reading the letter as a class, your students should discuss how they might go about planning for this project. Some teams may decide to plan their quilt on paper before beginning with the Zome System, while others may use geoboards.

Once the planning is completed each team should be assigned a large flat surface. A section of the class room floor is appropriate. Remember that the quilts will have to be stored between class periods. Students should be periodically reminded about their due date as they work on their project.

Once quilts are completed, the class can have a special viewing party. The atmosphere of simulate a fancy art exhibit can be invoked by serving popcorn or other snacks and playing a tape of classical music. Each group should be asked to present their creation. *Which geometric shapes did they use? How did they arrive at their final quilt? Did they learn what shapes tessellate on their own, and which must be combined with other shapes?*

The teams should also write about the experience in their math journals, and possibly compose a letter to the Commission discussing their final product. The letter should include a picture and a description of their piece. Likewise, they can reflect on their group skills and discuss if they were deserving of the full project salary.

Assessment:

Observe students as they work, and question them about their designs and what they are learning about tessellation. Review their math journals, and their reports to the Commission. To meet the standard the students must complete a 3' X 3' Zome System tiling, and be able to describe which geometric shapes in contains. To exceed the standard they must also attempt to formulate a general rule about which geometric shapes tessellate on their own, and which ones do not.

Standards Addressed:

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

Transfer Possibilities:

Exploration of more advanced tessellations (“Plane Patterns”, “Kepler Tilings”, and “Richert-Penrose Tilings”). Use of tessellations and mosaics in art and design.