

Zome System

Builds Genius!

Printing Cubes and Pyramids

Art / Mathematics Basic Concept

Lesson Objective:

Students will learn how 2-dimensional shapes can be combined to form 3-dimensional structures.

Prerequisite Skills:

Students need to have played with Zome System before, and have some knowledge of polygons (“Geometric Shapes”).

Time Needed:

One or two class periods of 45-60 minutes.

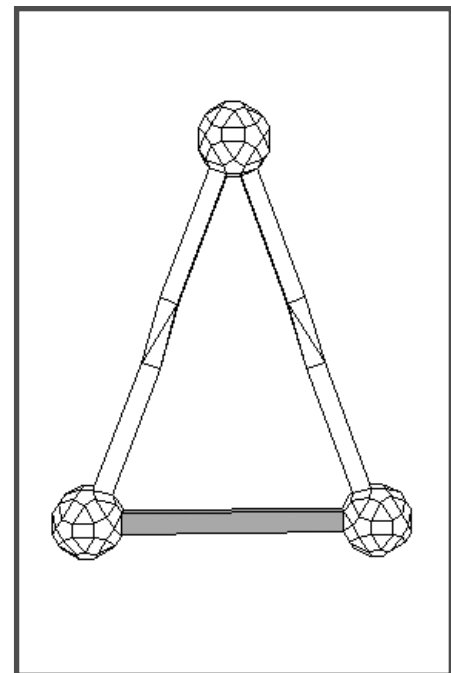
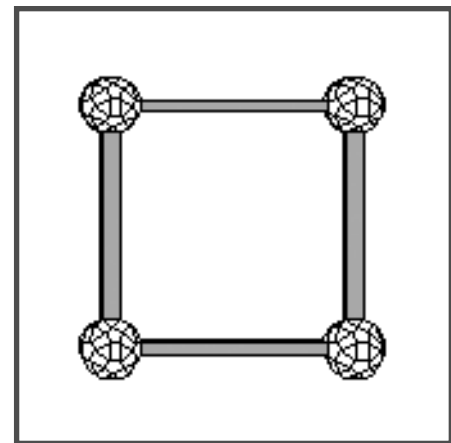
Materials Needed:

- Two Zome System Creator Kits for 25-30 students
- Trays of pre-mixed, water-based, paint
- Two sheets of large construction paper per student
- A pair of scissors per team of students
- Glue or scotch tape

Procedure:

Prepare for the class by mixing the paint, and pouring it on styrofoam meat trays or paper plates. The paint should be on the runny side, as too thick paint may take longer to dry. A small amount of liquid soap can be added to the paint, as this aids the clean up. Now build one Zome System square and an isosceles or equilateral triangle per student, using short or medium struts. The triangle should have a blue base, of the same length as the side of the square. The activity can be planned to start before lunch or recess to allow prints to dry before the activity continues.

Divide the class into teams of 3-5 students. Distribute paint, paper, and polygons to each team. Alternatively, students can build the models as an introductory exercise. Explain to the students that each of them will be dipping



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the shapes in paint and make imprints with it on the paper. The shapes should be placed flat in the tray so each node gets a small amount of paint on one side. To help students visualize how they will be printing, ask them to hold the shapes up next to each other in front of their eyes. Overlap one side of the square with a blue side of the triangle. When the students later print the two shapes, the dots from the blue side of the triangle will be placed on top of the dots from the side of the square.

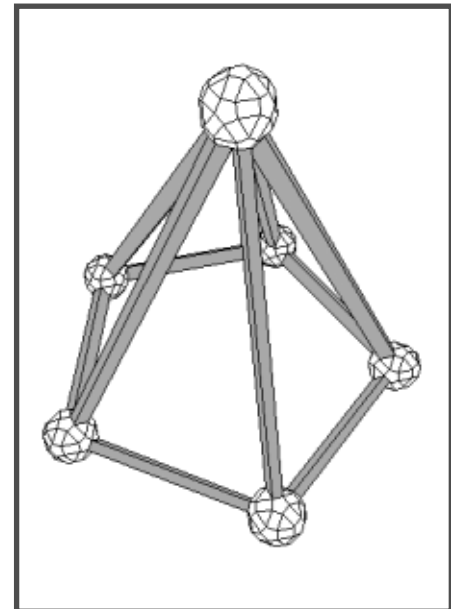
Students begin by printing a square in the center of one paper. Then, carefully overlapping the dots, they print a triangle connecting to one side of the square. They then rotate the triangle to another edge of the square and repeat until they have stamped four triangles.

While the first print dries, students can start on a second piece of paper. Again, they print a square in the center of the paper. This time, however, they print four squares around the center one, each time sharing one common side. Finally they choose one outer square and print one more square along the edge opposite the center square. Allow this to dry.

Instruct students to return to the paper with the square and triangles, and carefully connect the dots with a pencil and ruler. The students then cut out the resulting shape (following only the outer edges). The shape is folded along the original lines of the square. *Which 3-D shape will result when the shape is folded* (a pyramid)? Explain to students that the square forms the base of the pyramid. The paper pyramid can be taped or glued to maintain its shape.

The students should now return to the second paper. *Which 3-D shape will result when this paper is cut out and folded* (a cube)? Repeat the connecting of the dots, cutting, folding, and taping.

Student who finish early can be asked to think of pyramid forms with different bases. They can also build the pyramid, tetrahedron, and cube with Zome System. Close the activity with a discussion about the shapes used, and a review of the new words introduced in the class; **edge**, **face**, **base**, **point** (vertex).



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Assessment:

Observe students while they work. Question them individually and in groups to ensure that they understand how the 2-dimensional shapes change into 3 dimensions. To meet the standard students must print, cut out, and fold paper to form the pyramid and the cube. To exceed the standard they must predict another 3-D shape and that can be created by folding paper.

Standards Addressed:

- * Fine Arts standards that **identify and apply the elements of art in a variety of media.**
- * Mathematics standards addressing **geometry and spatial sense** (NCTM Standard 9).

Transfer Possibilities:

Expansion into other means of transferring patterns (“Triangle Tiles-2,” “Cubes 3A”).

