

### Mathematics Basic Concept

#### Lesson Objective:

Students will learn to build, record, and define different types of polygons.

#### Prerequisite Skills:

Students need to have played with Zome System before.

#### Time Needed:

One class period of 45-60 minutes.

#### Materials Needed:

- One Zome System Creator Kit for 25-30 students
- One recording chart per student

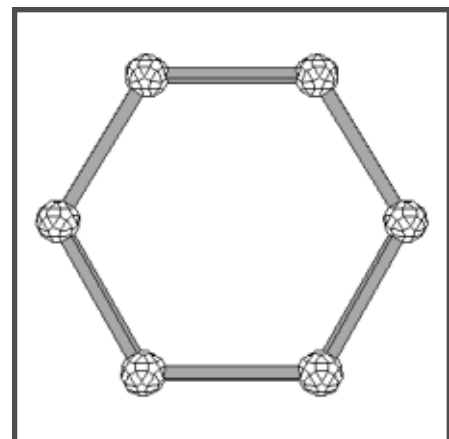
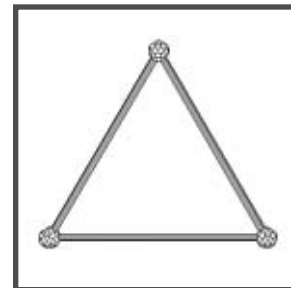
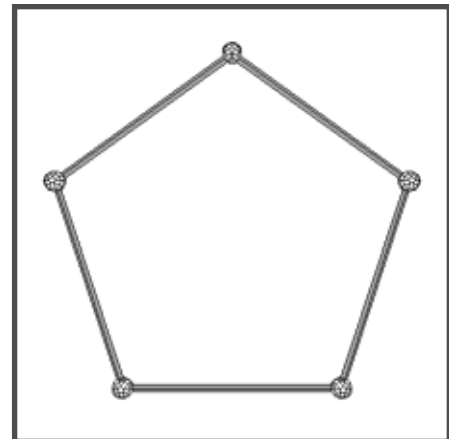
#### Procedure:

Prepare for the class by making charts where the students can record their findings about polygons. A suggested layout is presented below.

| Polygon       | Number of Nodes Used | Number of Struts Used |
|---------------|----------------------|-----------------------|
| triangle      | 3                    | 3                     |
| quadrilateral | 4                    | 4                     |

The column headed “polygon” is for your students to draw and name the shapes they create. The two narrow ones will contain the number of Zome System elements used to build each shape.

Begin the lesson with a discussion about geometry. *Which shapes do you know the names of? What does that shape look like?* (Draw the shapes the students name on the board). *How do you know that this shape is called a square?* Continue questioning how they define each shape on the board until they establish that the number of sides determines the name.



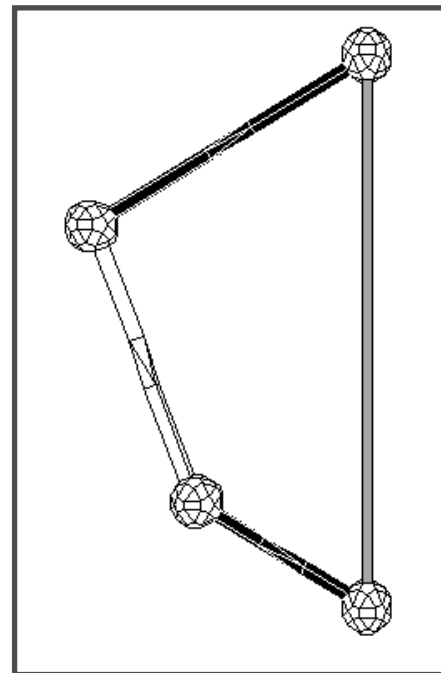
# 2-D Polygons

## Zome System

*Builds Genius!*

Introduce the word “polygon”. *Does anyone know what a polygon is?* Explain that all the shapes previously named are polygons. *What do all the shapes on the board have in common?* Discuss this idea until it is established that polygons are closed shapes with two or more sides which can lie flat on the table (two dimensional space or plane).

Students will work in pairs, with their challenge being to create as many polygons as they can with the Zome System elements and record information about their work in the chart. Model how to record the number and color of struts used for each polygon. Red struts can be recorded as “R”, blue as “B”, and yellow as “Y”. Different triangles can thus be recorded as 3B, or 2R, 1B. Students must also draw pictures for each shape in the polygon column and name the shape if they can. If they are able to record the name for any of the polygons, do that as well. Encourage the students to build as many different polygons as possible - **rectangle, triangle, pentagon, square, hexagon, and decagon**. Students may not know the names for all shapes, particularly the hexagon and decagon. You may introduce the names for special triangles, such as **obtuse angle, equilateral, acute angle, and right angle**, during the discussion.



Find an example where two pairs of students made the same shape in different sizes. *Does this big blue shape have the same name as this little one?* Discuss how this can be so, to reinforce the concepts learned.

### Assessment:

Observe students while they work. Question students individually and in groups to ensure that they can identify the different polygons by counting the sides of each shape. To meet the standard, students should understand the concept of polygon as related to the specific names for each shape. To exceed the standard they must build and positively identify squares, rectangles, triangles, pentagons, and hexagons.

### 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 shapes and 3-dimensional forms.