

TEACHER PAGE

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New Arizona Math Strand 4 Geometry and Measurement

Grades 4, 5, 6, 7

Articulated Math 4M41-01 Identify the properties of two-dimensional figures using appropriate terminology; **4M51-01** Recognize regular polygons; **4M61-01** Classify polygons by their attributes. e.g., number of sides, length of sides, angles, parallelism, perpendicularity; **4M71-02** Classify three-dimensional solids by their configuration and properties; **4M61-04** Classify three-dimensional figures by their attributes; **4M51-04** Identify the properties of two- and three-dimensional geometric figures using appropriate terminology and vocabulary; **4M51-13** Identify the lines of symmetry in a two-dimensional shape.

Old Arizona Math Standard 4:Geometry Essentials 1 - 3

Grades 4-8

4ME1-PO1A,B Grades 4-5, 6-8, Classify 2-dimensional shapes and 3-dimensional figures by their properties A. by sight, B. by properties; **PO 2A,B** Grades 4-5, 6-8, Identify the [properties of geometric figures using appropriate terminology and vocabulary, A. 2-dimensional shapes, B. 3-dimensional figures **PO 3** Grades 4-5, 6-8 Draw or build 2-dimensional shapes or 3-dimensional figures by applying significant properties of each. **4ME3-PO3A,B** Grades 4-5, 6-8, **A.** Build a shape that has symmetry, **B** has 2 or more lines of symmetry.

Arizona Social Studies Standard 3: Geography, Essentials 1

Grades 4-5

3SSE1-PO5 The location and significance of the important human features of AZ.

3SSE2-PO4 How people have depended on the physical environment and its natural resources to satisfy their basic needs.

Materials: Colored printer; or, with a b/w printer, colored markers, pencils, or crayons will be needed, plus scissors and glue stick. To speed up the final activity, prepare enough printed hogan models for the whole class. **Entry knowledge:** recognize and use triangles.

Learning Objectives: The student will be able to:

- name and classify the different shapes of hogans.
- identify and build parallel and symmetry in octagonal shapes
- demonstrate and explain the relationship of parallel to symmetry
- explain the appropriate materials and construction procedure of a hogan relative to the environment and as a natural resource
- demonstrate the special placement of a hogan in its environment (e.g. door facing the morning sun) and their location as important to human features of Arizona

Special notes: The hogan construction activity should take 30-45 minutes.

Encourage students to add authentic features to their hogans, such as adding a chimney, figures of people, and interior furnishings, opening the door, placing the structure in a simulated outdoor environment. Social Studies Standards may be attached with more objectives and activities. The current DIG DEEPER is based on AZ 3SSE1 PO 5 the location and significance of important human features of Arizona and AZ 3SSE2 PO 4 how people have depended on the physical environment for natural resources to satisfy their basic needs. The photos of the hogans, displayed in the Dig Deeper section of the lesson, were taken and provided by Karina Roessel of Kayenta, AZ.

Content: This lesson about hogans is a wonderful opportunity to integrate math and social studies. Beyond octagons and their symmetry and parallelism, many more topics are implied: for instance, the topics of 2 and 3 dimensional objects, perpendicular, triangular shapes. Take advantage of the rich cultural environment for meaningful instructional opportunities. This lesson has English, Navajo and Spanish narrations and scripts.

Follow-up, extensions: The following web sites would be valuable for expanding this lesson.

1. <http://www.earthmeasure.com> Geometry and art.
2. <http://numa.niti.org/users/tushka/windowrock/vbenally/victor.htm>
3. <http://www.navajopage.com> "Clan Finder" located in the left column of the first page.
4. <http://teams.lacoe.edu/documentation/classrooms/amy/geometry/projects/geoanimals/geoanimals.html> Site for students who love to draw animals. Explore this web site for further activities in geometry, teacher discussion and student discussion.
5. Promote authentic research of implied lesson topics to enhance rich cultural learning.

Assessment: Students will select the correct example of symmetry in the "Try" module. Students will demonstrate and explain the construction of a hogan. Students prepare and present a portfolio of their own hogan picture gallery and Navajo rug pictures.

