

Marvelous Moroccan Mosaics: Rotations, Reflections, and Translations

Author Cheryl Wiens
Grade Level 8 and High School
Duration 1-2 class periods

National Standards

GEOGRAPHY

Element 2: Places and Regions

- 4. The physical and human characteristics of places.
- 6. How culture and experience influence people's perception of places and regions.

AZ Standards

MATHEMATICS

Geometry

- 8.G.A.1. Verify experimentally the properties of rotations, reflections, and translations. Properties include: lines are taken to lines, line segments are taken to line segments of the same length, angles are taken to angles of the same measure, parallel lines are taken to parallel lines.
- 8.G.A.2 Understand that a two-dimensional figure is congruent to another if one can be obtained from the other by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that demonstrates congruence.
- G.G-CO.A.5 Given a geometric figure and a rotation, reflection, or translation draw the transformed figure. Specify a sequence of transformations that will carry a given figure onto another.

Arizona Social Science Standards

GEOGRAPHY

Human-environment interactions are essential aspects of human life in all societies.

- 8.G2.2 Evaluate how political, social, and economic decisions throughout time have influenced cultural and environmental characteristics of various places and regions.
- HS.G2.3 Evaluate the impact of human settlement on the environment and culture of specific places and regions.
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Overview

Since ancient times, Morocco's landscape and culture have enticed visitors. Among Morocco's unique cultural customs and art forms is the tile work called zillij. Zillij mosaics decorate buildings, walls, floors, and other surfaces throughout Morocco. Its repeating patterns and richness of colors create an intriguing image associated with this northwest African country.

Purpose

In this lesson students will learn about the beauty and craft of Moroccan tile and use zillij patterns and shapes to perform tessellations.

Materials

- What is Zillij? reading
- Marvelous Moroccan Mosaics: Patterns in Zillij PowerPoint
- Practice Making Your Own Zillij and Answer Key
- Southwest Asia/North Africa map (labeled) https://geoalliance.asu.edu/sites/default/files/maps/MidEast_Labeled.pdf
- Isometric grid/graph paper <http://www.printfreegraphpaper.com/>
- Colored pencils or markers
- Assessment: Make Your Own Moroccan Mosaics and Answer Key

Objectives

The student will be able to:

1. Identify what zillij is, how it creates a regional image of Morocco, and how it effects tourism.

Marvelous Moroccan Mosaics

2. Perform elementary tessellations by illustrating reflections, rotations, and translations (tessellations) using basic zillij shapes and patterns.
3. Distinguish between symmetric and asymmetric figures.

Procedures

Students should have experience in translation, rotation, reflection, line of symmetry, and tessellations.

1. Begin the lesson by having the class create a KWL chart about their perceptions of Morocco. Using student responses, fill in the K and W sections.
2. Project the Southwest Asia/North Africa map (labeled) and point out the location of Morocco and the surrounding countries and nearby bodies of water.
3. Distribute the What is Zillij? reading and discuss the information as it is read aloud.
4. Show the Marvelous Moroccan Mosaics: Patterns in Zillij PowerPoint. Add information to the KWL chart about what was learned.
5. Distribute Practice Making Your Own Zillij, a sheet of isometric grid paper, and colored pencils or markers.
6. Have students complete the activities.
7. Distribute the Assessment: Make Your Own Moroccan Mosaics and several sheets of grid paper. Explain the assignment and how it will be graded.
8. If not completed in class, it can be homework.

Assessment

Mathematics and Geography

The Assessment: Make Your Own Moroccan Mosaics can be graded according to the points given. Mastery will be considered a score of 80% or higher.

Extensions

Students can use traditional American quilt patterns and shapes to perform transformations.

Students can use plastic manipulatives to test the use of figures in tiling patterns.

Students can examine some of M.C. Escher's tessellations.

The class can discuss how other cultures and countries decorate their homes and public buildings.

Sources

Smithsonian, August 2002 "Morocco's Mystique" pages 78-88.

"Zillij in Fez." Louis Werner. In Saudi Aramco World, 52 no. 3 May/June 2001.

"Morocco" Faces: People, Places, and Cultures. A Cobblestone Publication, February 2001, Volume 17, Number 6.

Ancient and Living Cultures: North Africa: Morocco. Published by Good Year Books. Copyright 1997 by Mira Bartok-Baratta and Christine Ronan.

PowerPoint images of zillij were from the author's Fulbright-Hays trip to Morocco in July 2002. Other people on the trip took some images, and the author acknowledges these fellow travelers who granted permission for use of their pictures: Aomar Boum, Mike Laird, and Jeannine Kuropatkin.

Multicultural Mathematics Interdisciplinary Cooperative-Learning Activities by Claudia Zaslavsky, published by Walch Publisher, Portland, Maine, 1993.

Grid paper can be downloaded from:
<http://www.printfreegraphpaper.com/>