

Math and Design of Monticello

General

Grade Level

Middle School

Author Info

Dan Pulskamp

dpulskamp@hotmail.com

Colonial Heights High School

Chesterfield, VA 23832

Type of Lesson

Hands-on

Duration

45-55 minutes

Interdisciplinary Connections

This shares subject matter that is relevant in both math and history.

Objectives

Overview

Thomas Jefferson was widely known as an architect and a man who took a keen interest in science. His home, Monticello, demonstrates a number of lessons that students of math and architecture can appreciate. Among these are his use of parquet flooring and decorative friezes.

State Standards

Virginia 8.8b. The student will identify practical applications of transformations.

Objectives/Learning Outcomes

By the end of the lesson the students will be able to explain what a parquet floor is, explain the similarity to tessellations and draw one using grid paper.

Procedures

1. 5 minutes

Introduction

1. Have students think about their home or a building they're familiar with. What sorts of shapes or patterns are used to decorate these buildings? If possible, have them sketch any notable examples and share with the class. Ask them to list how math is used in these buildings.

2. 5 minutes

Lesson

1. Show students a picture of Monticello's parlor. Explain to them about Thomas Jefferson's love of architecture, science and math.

2. Give students 5 minutes to write down observations in the picture of Jefferson's parlor that would require math or are examples of math. Students may work in groups.

3. 5 minutes

1. Now have students share what they have found in the picture. Students may mention many things such as the piano, clock and paintings. Make sure that they mention two items in particular: the parquet floor and the friezes.

4. 10 minutes

Today, students are going to focus on two items in particular: Friezes and Parquet. The first things we will discuss are the friezes.

1. Friezes- Friezes can be found on the interior and exterior of a structure. On the exterior of the building, a frieze is often found in between a pillar and the top. Have students think of modern day buildings that have friezes (non-inclusive answers include banks and many federal buildings). Ask them to think of any old buildings that have friezes (non inclusive answers include Greek and Roman temples).

2. Look back at Jefferson's parlor. Where do they see friezes? How many different ones can they see (Should see at least 5. Two above the windows, one above the door, one above the fireplace and one on the ceiling)?

3. Ask them how friezes were made. What sorts of math skills would be required to make them?

4. At this point take students to the Monticello Explorer website(<http://explorer.monticello.org/>). Select the entrance hall and click on the yellow circle at the top of the picture that mentions entablature. Students can watch what the entablature and view friezes in Monticello. A second good example of a frieze is in Jefferson's bedchamber on the fireplace. This is also accessible through the website listed above.

5. *5 minutes*

Students are now going to look at the second item of interest: the parquet floor.

1. Parquetry is a series of geometric mosaics (or patterns) of wood that are used to achieve some sort of decorative effect. They are similar in form to tessellations, which use a two-dimensional design to create a pattern that has no gaps or overlaps. Parquet (Parquetry) and tessellations have been around for hundreds of years. Parquetry is primarily used on floors and is still a design style that is widely valued.

2. By looking at Jefferson's parlor floor we see a wonderful example of how parquet floors are used. Go to <http://explorer.monticello.org/> and select the parlor. Click on the floor for a demonstration and close-up example of Jefferson's parquet floor.

3. If students want to see a modern example of a parquet floor it may be helpful to show them the Boston Gardens (Home of the Boston Celtics) basketball floor. Pictures are widely available on the internet.

6. *5-7 minutes*

Leave the pictures of the parquet floor up. Pass out the math pattern blocks to students. Ask them to design a parquet floor or tessellation. Remind them that it needs to be a pattern that doesn't overlap and doesn't repeat. They may be as intricate or as simple as they like within those restrictions.

7. *10 minutes*

Have students draw their parquet (or tessellation) onto the grid paper using colored pencils. Display students' parquet floors when they are done.

8. *5-10 minutes*

Closure

1. Jefferson stated that "Architecture is my delight, and putting up and pulling down one of my favorite amusements." Now that students have had a chance to explore tessellations, parquets and friezes have them reflect on what that phrase can mean to them. They should be able to answer how math was used in creating these pieces of Monticello and how math can be enjoyable to them.

Materials

Materials Needed

1. Internet
2. Picture of Monticello's parlor
3. Colored pencils
4. Grid paper
5. Pattern blocks

Technology Needs

Internet access and projection

Accommodations – Advanced Learners

Students who are proficient in art can be challenged to create their own frieze as well. They can also try to recreate the friezes that are in Monticello.

The logo for Monticello, featuring the name "Th. Jefferson" in a cursive script above the word "MONTICELLO" in a bold, serif, all-caps font.

Th. Jefferson
MONTICELLO