

MIDWEST HOSPITALITY DESIGNED TO BE A CUT ABOVE

ART AND MATH

GRADE LEVEL: 4-6

BASED ON

Period Room from Damascus, Syria, Ottoman period (1711-1712), Gift of Andrew Jergens Foundation, 1966.443

OBJECTIVES

- The students will reproduce and make original patterns for wood-panel tessellations that communicate order and variety in the style of the Middle Eastern sense of hospitality.
- Students will use both artistic and mathematical vocabulary appropriate to the planned project.

VOCABULARY

tessellation rotation
revolution perpendicular
symmetrical geometrical
unity and diversity hospitality
aesthetic mood related to a theme

MATERIALS

- pictures (examples of the details of the *Period Room from Damascus*)
- paper for layouts
- pencils and erasers
- journal paper
- scissors
- glue stick
- directions and scoring guides

CONCEPT

The student will construct a plan on paper of a pattern as seen in the *Period Room from Damascus*. Students will then describe in writing how when constructing a new modified plan they are able to maintain the mood of the mid-eastern sense of order, security, and peace that accompanies the welcome, and grace given a guest there.

PROCEDURE

Review the lesson on snowflakes and show how snowflakes are good examples of basic mathematical concepts.

Snowflake lesson:

1. Fold the paper in half, placing the resulting crease on the top.
 2. Fold in half again, this time creasing a mark in the center of the top fold.
 3. Put your fingernail on the mark and bring the top half right side of the folded edge toward the bottom and over slightly to the left, cutting the remaining arc in half. Fold the left side of the top folded edge over the right arc so that a third of the original arc shows on top. (Note: If you were to unfold the piece at this time, it would have six rays forming equal arcs radiating from the center of the paper.)
 4. Fold the sides of the arc in half one more time to make a sharp angle.
 5. Cut a bisecting perpendicular cut on one of the sides at a point almost in the center of the side. (Note: If you were to open the form at this time, you would have a "regular hexagon.")
 6. Cut into the side opposite the pointy angle in straight zigzag cuts from the outside cut edge toward the center, then back to the original cut side. (Note: This makes the hexagon into a jagged star shape.)
 7. Now cut the outside folded sides in such a way that the remaining shape is about $\frac{1}{4}$ -inch in thickness (no thick and thin places; this will give the snowflake a lacy appearance).
 8. Open the snowflake by unfolding one fold at a time and making sure the remaining larger shape is absolutely flat before unfolding another side. (Note: This prevents paper knots.) Continue to unfold and flatten all folds.
- Be sure to include the ideas of symmetry, perpendicularity, and regularity.
 - Be sure to identify examples of angles, arcs, and sides.
 - Fold simple "snowflakes" to review the way radial symmetrical designs are formed and analyze the basic relationships within.
 - Show the examples of the *Period Room from Damascus* using technology in the

CLASS EXPERIENCE

classroom. Pass out examples the students may examine closely.

- Have students choose a section or example of a tessellation and have a group of students discuss whether the example was conducive to an atmosphere of hospitality, peace, and tranquility. Have them fill out comment or reflection sheets and turn them in.
- Show students examples of a tessellation that was modified and presented for scoring. Present the students with scoring guides at this time.
- Give time for students to complete the task in class or finish for homework.

ASSESSMENT

The student who completes all of the below successfully = A

The student who completes most of the assignments successfully = C

The student who does not complete most of the assignments successfully = Incomplete

1. The student has several examples of snowflakes in folder. (20 points)
2. The student completes a reflection sheet showing complete and thoughtful responses. (20 points)
3. The student completes an example of a tessellation that was modified but similar the examples given. (20 points)
4. The student identifies at least five different mathematical terms in the example rendered. (20 points)
5. The student keeps the work in their folder and finishes the work within the class period. (20 points)

NATIONAL STANDARDS GEOMETRY

- Analyze characteristics and properties of two- and three-dimensional geometric shapes and develop mathematical arguments about geometric relationships.
- Specify locations and describe spatial relationships using coordinate geometry and other representational systems.
- Apply transformations and use symmetry to analyze mathematical situations.
- Use visualization, spatial reasoning, and geometric modeling to solve problems.