Patterns Tell the Story

Grade Level: 6-8

Content Areas: Math, Social Studies, and Art

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Standards and Benchmarks

Math:

C. Geometry

Benchmark 8.4 – Describe and analyze the effects of transformations on two-dimensional shapes and objects by

a) performing various transformations, such as reflections (flips), rotations (turns) and translations (slides),

b) describing the results of the transformations,

c) analyzing the effects of the transformations.

Horizontal Connections:
Social Studies – E. Behavioral Science

Benchmark 8.9 – Give examples of the cultural contributions of racial and ethnic groups in Wisconsin, United States and the world.

Art – E. Visual Communication

Benchmark 8.3 – Communicate complex ideas by producing popular images and objects, such as folk art, traditional arts and crafts, popular arts, mass media, and consumer products.

Concepts: culture, patterns, transformations, symbols
### Generalizations:
Transformations of shapes can be used to create mathematical patterns.

### Essential/Guiding Questions:
- How can symbols or shapes be transformed to create mathematical patterns?
  - What are the names and properties of 2-dimensional shapes?
  - What is a pattern?
  - What is a transformation?
  - What are the different types of transformations?
  - What are some of the different patterns formed by performing a transformation(s) on shapes?

Mathematical patterns are reflected in the art of various cultures, which communicates information about the culture.

How are mathematical patterns used in various cultures?
- What is a racial or ethnic group?
- What are some examples of racial groups?
- What history can be obtained about the Hmong culture?
- What is a cultural contribution?
- What types of cultural contributions have been made by the Hmong culture in the world? the U.S.? Wisconsin?

How can we use the artwork of a culture to learn about the culture?
- How is Hmong pondow an example of artwork?
- What can we learn about the Hmong culture from pondow?

*Underlined phrases can be removed and another culture can be substituted to allow the unit to be used with another that culture.*
**Math - Standard C - Geometry**

Benchmark: – Describe and analyze the effects of transformations on two-dimensional shapes and objects.

<table>
<thead>
<tr>
<th>Benchmark Proficiency Criteria</th>
<th>Learning Target</th>
<th>Method of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Define terms related to transformation</td>
<td>K</td>
<td>SR</td>
</tr>
<tr>
<td>2) Perform reflections, rotations, and translations</td>
<td>S</td>
<td>PA</td>
</tr>
<tr>
<td>3) Describe the results of transformations</td>
<td>K</td>
<td>CR</td>
</tr>
<tr>
<td>4) Analyze effects of transformations</td>
<td>R</td>
<td>PA</td>
</tr>
</tbody>
</table>

K = Knowledge  
P = Product  
CR = Constructed Response  
SR = Selected Response  
P = Product  
PA = Performance Assessment  
O = Observation  
PC = Personal Communication  
PF = Portfolio
**Social Studies Standard E: Behavioral Science**

Benchmark: 8.9 Give examples of the cultural contributions of racial and ethnic groups in Wisconsin, the U.S., and the world.

<table>
<thead>
<tr>
<th>Benchmark Proficiency Criteria</th>
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<th>Method of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Vocabulary</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- cultural contributions</td>
<td>K</td>
<td>CR</td>
</tr>
<tr>
<td>- racial/ethnic groups</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Identify</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- racial/ethnic groups in WI, U.S., world</td>
<td>K</td>
<td>CR</td>
</tr>
<tr>
<td>- cultural contributions of specific groups</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

K = Knowledge                     P = Product
S = Skill                          CR = Constructed Response
R = Reasoning                      SR = Selected Response
D = Dispositions                   P = Product
                                   PA = Performance Assessment
                                   O = Observation
                                   PC = Personal Communication
                                   PF = Portfolio
### Art Standard E: Visual Communication and Expression

Benchmark: 8.3 Communicate complex ideas by producing popular images and objects, such as folk art, traditional arts and crafts, popular arts, mass media, and consumer products.

<table>
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<tr>
<th>Benchmark Proficiency Criteria</th>
<th>Learning Target</th>
<th>Method of Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produce a piece of folk art</td>
<td>P</td>
<td>P</td>
</tr>
</tbody>
</table>

**Key Abbreviations**

- **K** = Knowledge
- **S** = Skill
- **R** = Reasoning
- **D** = Dispositions
- **P** = Product
- **CR** = Constructed Response
- **SR** = Selected Response
- **PA** = Performance Assessment
- **O** = Observation
- **PC** = Personal Communication
- **PF** = Portfolio
Instructional/Assessment Planner
Social Studies/Art
*Note: These lessons were designed with a focus on the Hmong culture; however, a series of lessons on another culture could be used.

Baseline Assessment

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Instruction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Baseline</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Cultural contributions of racial/ethnic groups | 1. Introduce benchmark E 8.9  
2. Define racial/ethnic groups  
3. List examples of racial/ethnic groups in WI, U.S., world  
4. Define cultural contributions  
5. List examples of cultural contributions of groups listed.  
6. Close with short answer questions |
| Formative Assessment:               |                                                                                                                       |
| Four short answer questions at end of lesson |                                                                                                                       |
| Cultural contributions of the Hmong I | 1. Introduce the Hmong as an example of a racial/ethnic group  
2. See video describing Hmong culture  
3. Use organizer to take notes  
4. Pair and share  
5. Close with short answer questions |
| Formative Assessment:               |                                                                                                                       |
| Two short answer questions after video |                                                                                                                       |
| Cultural contributions of the Hmong II | 1. Read aloud picture book about Hmong pondow  
2. Show examples of pondow  
3. Call attention to patterns used in pondow and connect to math  
4. Discuss significance of motifs used in pondow patterns  
5. Discuss communication of history, folk tales, etc. through pondow  
6. Define folk art  
7. Discuss why pondow are a type of folk art  
8. Close with short answer question |
| Formative Assessment:               |                                                                                                                       |
| Short answer question at end of lesson |                                                                                                                       |
| Cultural contributions of the Hmong III | 1. Arrange guest speaker who is Hmong or is especially knowledgeable about Hmong culture  
2. Have students generate questions for speaker based on what they have learned in previous lessons  
3. Assign letter to speaker |
| Formative Assessment:               |                                                                                                                       |
| Letter to guest speaker             |                                                                                                                       |
### Baseline Assessment – page 2

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Instruction</th>
</tr>
</thead>
</table>
| *Cultural contributions of racial/ethnic groups* Formative Assessment: “Culture Counts Scavenger Hunt(s)” | 1. Review patterns in art of various cultures  
2. Introduce museum exhibit by previewing scavenger hunts  
3. Travel to museum (and Broadway sites)  
4. Complete scavenger hunt(s) during visit  
5. Discuss handout responses |
### Baseline Assessment

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Instruction</th>
</tr>
</thead>
</table>
| **Symbols and shapes can be transformed to create mathematical patterns.**  | 1. Using pattern blocks introduce concept of plane and congruency.  
 2. Define and discuss pattern.  
3. Create a simple pattern.  
4. Define symmetric.  
5. Students will be assigned to bring in samples of patterns from the real world.  |
| **Formal Assessment:**  
**Classroom discussion** |  
**Stencil a pattern** | 1. Share homework patterns.  
2. Use these patterns to introduce transformations.  
3. Create a stencil.  
4. Introduce translation.  
5. Copy sample in notebook.  
Introduce vertical and horizontal reflections.  
6. Copy sample in notebook.  
7. Introduce rotations.  
8. Copy sample in notebook.  
9. Divide homework samples into groups based on horizontal reflection, vertical reflection, rotation, translation, and unknown.  
10. Discuss groupings.  
11. Introduce glide reflection, V, H, V, H and V, Rot, V, Rot to explain the unknown group.  
12. Create a strip pattern for each of the seven transformations (color and display).  |
| **Symbols and shapes can be transformed to create mathematical patterns.** | 1. Introduce the concept and use of a flow chart.  
2. Use the pattern flow chart to classify strip patterns.  
3. Introduce examples of strip patterns from other cultures.  
4. Classify strip patterns using the pattern flow chart. |
### Baseline Assessment - page 2

<table>
<thead>
<tr>
<th><strong>Assessment</strong></th>
<th><strong>Instruction</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Symbols and shapes can be transformed to create mathematical patterns.</em></td>
<td>1. Students will form teams to review math concepts covered in unit.</td>
</tr>
<tr>
<td>Formal Assessment:</td>
<td>2. Students will play the game Jeopardy to review definitions of terms, describe the seven different transformations, and create different strip patterns using transformations.</td>
</tr>
<tr>
<td>Play the game Jeopardy.</td>
<td></td>
</tr>
</tbody>
</table>
Social Studies Baseline/Summative Assessment

Name:

Class:

Benchmark E 8.9  Give examples of the cultural contributions of racial and ethnic groups in Wisconsin, the United States and the world.

1. What is a racial or ethnic group? Give two examples.

2. What is a cultural contribution? Give two examples.

3. Why are the Hmong an example of a racial or ethnic group?

4. Why did many Hmong people move to countries outside of Laos?

5. Describe two cultural contributions of the Hmong.
**Math Baseline/Summative Assessment**

Name:

Class:

*Benchmark C 8.4 Describe and analyze the effects of transformation on two dimensional shapes and objects.*

MATCHING:

1. congruent  
2. transformation  
3. reflection  
4. rotation  
5. translation  
6. pattern  
7. vertical  
8. horizontal  
9. symmetry  
10. plane

Starting with the given figure \( L \) in box one - show the following transformations:

11. horizontal reflection

\[
\begin{array}{c}
\_\_\_\\
\_\_\_\\
\_\_\_
\end{array}
\]

12. vertical reflection

\[
\begin{array}{c}
\_\_\_\\
\_\_\_\\
\_\_\_
\end{array}
\]

13. 180 degree rotation

\[
\begin{array}{c}
\_\_\_\\
\_\_\_\\
\_\_\_
\end{array}
\]

14. translation

\[
\begin{array}{c}
\_\_\_\\
\_\_\_\\
\_\_\_
\end{array}
\]
15. Describe in your own words using the vocabulary from the matching how the pattern below was constructed.

16. Which one of the given pattern classifications does this strip represent?

- a. pmm2
- b. pma2
- c. pm11
- d. p1m1
- e. p1a1
- f. p112
- g. p111
Baseline Scoring

Benchmark # Soc. St. E 8.9

10-12 correct = 4 (advanced proficiency)
7-9 correct = 3 (proficient)
4-6 correct = 2 (approaching proficiency)
0-3 correct = 1 (not proficient)

Benchmark # Math C 8.4

17 correct = 4 (advanced proficiency)
15-16 correct = 3 (proficient)
11-14 correct = 2 (approaching proficiency)
0-10 correct = 1 (not proficient)
**Performance Assessment**

**Goal**: The student demonstrates understanding about the critical component of the unit topic (Use generalizations to guide writing the goal)

Students will use mathematical pattern(s) to create a piece of folk art in the style of the culture studied, which communicates information about the culture.

**Scenario**: The student is placed in a real-world situation in which the student assumes a role with an authentic audience. (Use G.R.A.S.P.S to guide writing the scenario)

Scenario: Students will participate in a city-wide art fair.

Role: Vendor/Artist

Audience: Attendees

**Evaluation Criteria**: The student meets the criteria for benchmark proficiency by producing evidence of learning.

Product: Piece of folk art

Criteria:

- Create a strip pattern using a transformation
- Describe significance of piece of art as a cultural contribution of the given culture
- Use aspects of the given culture to communicate complex ideas in a piece of art
- Produce a piece of art and presentation that are quality products
Your city's annual art fair will take place next month. This would be a great opportunity for you to use what you have learned about patterns, art, and culture to make some extra spending money and to share what you know about the culture we have studied with the community at the same time.

Create a piece of folk art in the style of the culture we have studied that communicates information about the culture. You must use a mathematical pattern or patterns in your artwork.

Since the art fair will take place soon, you will use your piece of art as a display model for attendees of the art fair to view. Those interested may order a piece that you will create at a later date.

The attendees will be more likely to place an order for your artwork if you can explain to them the methods you used to create the piece and the cultural significance of it, so prepare an explanation of your piece that will interest your potential buyers.
**Performance Assessment Rubric**

<table>
<thead>
<tr>
<th>Benchmark # Math C 8.4</th>
<th>Benchmark # Social Studies E 8.9</th>
<th>Quality Art E 8.3</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4</strong></td>
<td>Created a strip pattern/patterns with more than one transformation used in design.</td>
<td>Described significance of piece of art as a cultural contribution of the given culture. Used many references to aspects of the given culture to communicate complex ideas in piece of art.</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>Created a strip pattern using a transformation.</td>
<td>Described significance of piece of art as a cultural contribution of the given culture. Used aspects of the given culture to communicate complex ideas in piece of art.</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>Attempts to create a strip pattern using a transformation, but makes some errors.</td>
<td>Attempted to describe significance of piece of art as a cultural contribution of the given culture. Attempted to use aspects of the given culture to communicate ideas in piece of art; however, some errors were made.</td>
</tr>
<tr>
<td><strong>1</strong></td>
<td>Makes major errors in using a transformation to create a strip pattern.</td>
<td>Made major errors in describing significance of piece of art as a cultural contribution of the given culture. Little or no attempt to use anything from a given culture to communicate ideas in piece of art.</td>
</tr>
</tbody>
</table>
Unit Title: Patterns Tell the Story    Time: 1 Day    Lesson #: Soc. St. 1

Key concept/understanding/skill: Racial/ethnic groups and their cultural contributions

Materials/Resources:
- Chalkboard, chart paper, or overhead projector
- Dictionary

Neville Public Museum Artifact: All cultural artifacts

Classroom Setup: Large group

Instructional Plan:
1. Introduce benchmark E8.9 (Give examples of the cultural contributions of racial and ethnic groups in Wisconsin, the U.S., and the world.) on the board, chart paper or overhead.
2. Identify “cultural contributions” and “racial and ethnic groups” as important vocabulary terms in the benchmark.
3. Ask students to speculate as to what the term “racial and ethnic groups” might mean.
4. Assign a student/students to locate “racial” in the dictionary. Write its definition for students to refer to.
5. Do the same with “ethnic.”
6. Create a working definition for “racial and ethnic groups.”
7. Generate a list of racial/ethnic groups in WI, the U.S., and the world.
8. Create a working definition for “cultural contributions” using the same process.
9. Generate a list of cultural contributions next to the groups listed in #7.
10. Close by asking students to answer the following questions (orally or in writing):
    - What are racial/ethnic groups?
    - List some examples of racial/ethnic groups in WI, the U.S., and the world.
    - What are cultural contributions?
    - List some examples of cultural contributions the racial/ethnic groups you listed have made to WI, the U.S., and the world.

Learning Strategies: Inference

Assessment Connection: Closing questions, summative assessment

Teacher notes/reflections:
**Unit Title:** Patterns Tell the Story  
**Time:** 1-2 days  
**Lesson #:** Soc. St. 2

**Key concept/understanding/skill:** The Hmong as an example of a racial/ethnic group and their cultural contributions in WI, the U.S., and the world

**Materials/Resources:**
- Descriptive pattern organizer (from *Dimensions of Learning Teacher’s Manual* by Robert Marzano. Available at www.amazon.com) or other organizer
- Definitions and lists from Day 1 lesson

**Neville Public Museum Artifact:** Hmong textiles

**Classroom Setup:** Large group, pairs, individuals

**Instructional Plan:**
1. Review yesterday’s lesson. Remind students of or introduce the Hmong as an example of a racial/ethnic group and any cultural contributions generated.
2. Introduce the video.
3. As students view the video, have them list cultural contributions of the Hmong described in the video on an organizer such as a descriptive pattern organizer.
4. After viewing the video, pair students up to share examples recorded on their organizers.
5. Assign students to individually write a description of two of the cultural contributions they listed on their organizers or share descriptions orally.

**Learning Strategies:** Descriptive pattern organizer  
Think-pair-share

**Assessment Connection:** Description of cultural contributions, Summative assessment, Performance Assessment

**Teacher notes/ reflections:**
Unit Title: Patterns Tell the Story  Time: 1-2 Days  Lesson #: Soc. St. 3

Key concept/understanding/skill: Hmong textiles (e.g., pondow) as an example of a cultural contribution of a racial/ethnic group

Materials/Resources:
- Picture book or short story for read aloud such as *The Whispering Cloth* by Pegi Deitz Shea or *Dia’s Story Cloth* by Dia Cha (both available at www.amazon.com)
- Examples of pondow (actual or photographs)
- Examples of motifs used in pondow (Available in handout *Hmong Art Evolving Traditions* from John Michael Kohler Arts Center www.jmkac.org)
- Dictionary
- Examples of folk art (actual or photographs)

Neville Public Museum Artifact: Hmong textiles

Classroom Setup: Large group

Instructional Plan:
1. Review yesterday’s lesson by sharing yesterday’s descriptions of cultural contributions.
2. Remind students about segment of the video on pondow or replay that segment of the video. Inform students that today they will be looking at pondow in more detail.
3. Instruct students to listen as you read aloud picture book and be thinking about or taking notes about what additional information they learn about pondow from the book.
4. Discuss what was learned from the book
5. Show examples of pondow. Call attention to patterns used in pondow. Connect to what students have learned/will learn in math about patterns.
6. Discuss motifs used in pondow patterns and their cultural significance (e.g., cucumber seed, mountains, elephant foot, snail).
7. Discuss pondow as a means of communication in the Hmong culture (history, folk tales, etc.).
8. Define folk art. Show examples of folk art of various cultures.
9. Discuss why pondow are an example of folk art.
10. Close by asking the students to answer the following question orally or in writing: “Describe at least three things you learned about pondow as a cultural contribution of the Hmong.”

Learning Strategies: Listening skills
Summarizing

Assessment Connection: Summary of information learned about pondow. Summative assessment, Performance assessment

Teacher notes/ reflections:
**Unit Title:** Patterns Tell the Story  
**Time:** 1-2 Days  
**Lesson #:** Soc. St. 4

**Key concept/understanding/skill:** The Hmong as an example of a racial/ethnic group and their cultural contributions in WI, the U.S., and the world.

**Materials/Resources:**
- Guest speaker who is Hmong and/or has detailed knowledge of Hmong culture (for assistance, contact the Hmong Association of Green Bay, Inc. Phone: 920-437-4550)
- Hmong artifacts (optional)
- Frame for follow-up letter to speaker (optional)

**Neville Public Museum Artifact:** Hmong textiles

**Classroom Setup:** Large group

**Instructional Plan:**
1. Review what we have learned thus far about Hmong culture.
2. Generate questions about Hmong culture.
3. Attend presentation by guest speaker. (Questions may be given to speaker in writing before presentation or posed to speaker orally after presentation.)
4. Assign follow-up letter to guest speaker that includes summary of what was learned about Hmong culture from the speaker’s presentation. (Letters may be sent to speaker following teacher review.)

**Learning Strategies:** Listening skills  
Summarizing

**Assessment Connection:** Letter, summative assessment, performance assessment

**Teacher notes/Reflections:**
(Date)

(Greeting)

Thank you for ____________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

__________________________________________________________________

(Include information you learned about Hmong culture from the presentation.)

Thank you again for ____________________________________________

__________________________________________________________________

__________________________________________________________________

(Closing)

(Signature)
Unit Title: Patterns Tell the Story  
Time: 1-2 Days  
Lesson #: Soc. St. 5

*Note: This lesson is designed to be team-taught with math teacher (also art teacher, if possible) after all related math lessons have been taught.

Key concept/understanding/skill: Mathematical patterns appear in the art of various cultures. These can be viewed in the Culture Counts: People, Patterns, and Pi exhibit at the Neville Public Museum (and sites on Broadway near museum).

Materials/Resources:
- Culture Counts Scavenger Hunt(s) handouts (available from Neville Public Museum)

Neville Public Museum Artifact: All

Classroom Setup: Large and small groups
Individual (completion of handouts)

Instructional Plan:
1. Review what we have learned about patterns and the art of various cultures.
2. Introduce students to Neville Public Museum exhibit (and cultural sites found on Broadway, if students will be exploring this aspect of field trip) by previewing student materials provided by the museum.
3. Travel to Museum to view Culture Counts exhibit (and Broadway sites, if desired).
4. Assign completion of scavenger hunt(s) during viewing of exhibits (and Broadway sites).
5. Discuss handout responses in small groups and as a class upon return to classroom

Learning Strategies: Seeing relationships between classroom and community

Assessment Connection: Student scavenger hunt follow-up questions,

Teacher notes/reflections:
Unit Title: Patterns Tell the Story       Time: 1 day       Lesson #: Math 1

Key concept/understanding/skill: Vocabulary: plane, 2-D shapes, congruent, pattern

Materials/Resources:
- Pattern blocks and rulers for each student
- Notebooks and pencils for each student

Neville Public Museum Artifact: Symmetry collection

Classroom Setup: Large group

Instructional Plan:
1) Give each student a duplicate set of pattern blocks (10-20) and 1 ruler
2) Have students lay out blocks flat on their desk
   a) What are your blocks lying on? (plane)
3) Have students group blocks according to color
   a) Besides color what other similarities do these groups have? (shape and congruency)
   b) Can you name the shapes? (geometric name)
4) Teacher displays a simple pattern
   a) What do you notice? (repeats)
   b) What do you call this repetition? (pattern)
5) Have students make a pattern and share with a pattern.
6) Have students make a design with pattern blocks (no stacking), then place ruler next to design.
7) Have students switch seats with partner and duplicate the design on the other side of the ruler.
8) Have students recreate both sets of patterns in their notebooks.
9) Have students walk around room and observe other patterns and how they were duplicated.
10) Classroom discussion based on the differences in duplications.

Homework: Students will bring in objects or pictures from home that show a repeated pattern

Learning Strategy: Guided discovery
    Tactile

Assessment Connection: Classroom discussion
    Notebook patterns
    Performance Assessment
    Summative Assessment

Teacher notes/ reflections:
Unit Title: Patterns Tell the Story   Time: 3 days   Lesson #: Math 2

Key concept/understanding/skill: Transformations

Materials/Resources:
- Samples of patterns showing horizontal and vertical reflections, rotations and translations,
- Index cards
- White paper (8.5” x 14”)
- Colored pencils
- Asymmetrical stencils (one per student)
- Notebook and pencil

Neville Public Museum Artifact: Symmetry collection

Classroom Setup: Large group
- Five areas within the room labeled
  1. Horizontal reflection
  2. Vertical reflection
  3. Rotation
  4. Translation
  5. ?

Instructional Plan: Day 1
1. Have students share homework patterns.
2. Have students describe how the pattern was constructed. (Record observations on the board.)
3. Based on student observations introduce the term transformation.
4. Using a sample of translation have students use their stencil to recreate in notebook the pattern.
   a. What motion did you use with your stencil? (slide)
5. Have students label the pattern as translation.
6. Repeat steps 4 and 5 for vertical reflection, horizontal reflection and rotation.
7. Distribute all samples (student and teacher samples) to the students.
8. Have students set their sample in the area labeled for that particular pattern.

Day 2
1. Look at each labeled area. Holding up the samples included have students explain why or why not the sample belongs in that group.
2. Look at the ? samples plus those that were removed from the other four categories and ask why they did not fit. (wasn’t a rigid motion – remove since they are not transformations) (wasn’t one of the 4 patterns)
3. Introduce the last 3 types of transformations.
   a. Glide reflection
   b. V,H,V,H
   c. V, Rot, V, Rot
Math Lesson # 2, continued

4. Students will create these 3 transformation patterns in their notebooks using their stencils and teacher direction.
5. Label each leftover sample according to the three new patterns

Homework: Students will create a non-symmetrical stencil on their index card

**Day 3**

1. Using stencil make a strip pattern for each of the seven transformations on white paper (8.5” x 11”)
2. Label and color each transformation
3. Display around room for student viewing.

*Learning Strategy: Guided* discovery

*Assessment Connection:* Teacher observation during discussion
Day 1 – Student placement of samples
Student created stencils
Performance Assessment
Summative Assessment

*Teacher notes/reflectons:*
Unit Title: Patterns Tell the Story  
Time: 1 day  
Lesson #: Math 3

Key concept/understanding/skill: Classify patterns using a flow chart.

Materials/Resources:
- Copies of problem solving flow chart – 1 per student
- Copies of pattern flow chart – 1 per student
- Examples of a variety of strip patterns (various cultures)
- Examples of with Hmong strip patterns
  (Examples of strip patterns may be found in Multicultural Mathematical Ideas: Readings and Activities by Bernadette A. Berken. Available from St. Norbert College.)

Neville Public Museum Artifact: Items in symmetry collection with strip patterns

Classroom Setup: Large group

Instructional Plan:
1. Teacher hands out problem solving flow chart for students to read.
2. Classroom discussion on how flow charts can be used to make decisions or classify.
3. Students create a flow chart in their notebooks
4. Teacher hands out pattern flow chart and shares examples of strip patterns for students to classify
5. Introduce students to Hmong strip patterns.
6. Share examples of Hmong strip patterns and classify.

Learning Strategy: Guided instruction

Assessment Connection: Classroom discussion  
Performance Assessment  
Summative Assessment

Teacher notes/ reflections: 
PROBLEM SOLVING FLOW CHART

DOES IT WORK?

Yes

DON’T MESS WITH IT

No

DID YOU MESS WITH IT?

Yes

YOU POOR FOOL

No

ARE YOU IN HOT WATER?

Yes

THROW AWAY THE EVIDENCE

No

TOO BAD

Can you blame anyone else?

Yes

NO PROBLEM

No

HIDE IT

Yes

NO PROBLEM

No

DOES ANYONE KNOW?
Unit Title: Patterns Tell the Story  Time: 1 day  Lesson #: Math 4

Key concept/understanding/skill: Review concepts

Materials/Resources:
- Flow Chart for Patterns Handout from Lesson 3
- Buzzer system
- White boards, Expo markers, and erasers
- Overhead
- Jeopardy questions on transparency

Neville Public Museum Artifact: Symmetry collection

Classroom Setup:
- Students sitting together in teams.

Instructional Plan:
1. Play Jeopardy game.
2. Students record team score on their white board.

Learning Strategy: Game

Assessment Connection: Game responses
Performance Assessment
Summative Assessment

Teacher notes/ reflections:
<table>
<thead>
<tr>
<th>Definitions</th>
<th>Transformations</th>
<th>Descriptions (Draw a picture)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$100 repetition of shapes or objects</td>
<td>![image]</td>
<td>A horizontal reflection of ![image]</td>
</tr>
<tr>
<td>$200 parallel to the horizon</td>
<td>![image]</td>
<td>A translation of ![image]</td>
</tr>
<tr>
<td>$300 perpendicular to the horizon</td>
<td>![image]</td>
<td>A vertical reflection of ![image]</td>
</tr>
<tr>
<td>$400 the balance that a shape has</td>
<td>![image]</td>
<td>A glide reflection of ![image]</td>
</tr>
<tr>
<td>$500 having the same size and shape</td>
<td>![image]</td>
<td>A 180° rotation of ![image]</td>
</tr>
<tr>
<td>$100</td>
<td>Definitions</td>
<td>Transformations</td>
</tr>
<tr>
<td>-------</td>
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<tr>
<td></td>
<td>What is a pattern?</td>
<td>What is a translation?</td>
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<tr>
<td>$200</td>
<td>What is horizontal?</td>
<td>What is a vertical reflection?</td>
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<tr>
<td>$400</td>
<td>What is symmetry?</td>
<td>What is a 180° rotation?</td>
</tr>
<tr>
<td>$500</td>
<td>What is congruent?</td>
<td>What is a glide reflection?</td>
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## Double Jeopardy

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<tbody>
<tr>
<td>$200</td>
<td>flat surface with infinite length and width</td>
<td>$\sim \sim \sim$</td>
<td>V, Rot, V pattern of $\sim \sim$</td>
</tr>
<tr>
<td>$400</td>
<td>turn</td>
<td>$\sim \sim \sim$</td>
<td>V, H, V pattern of $\sim \sim$</td>
</tr>
<tr>
<td>$600</td>
<td>flip</td>
<td>$\sim \sim \sim$</td>
<td>H, V, H pattern of $\sim \sim$</td>
</tr>
<tr>
<td>$800</td>
<td>slide</td>
<td>$\sim \sim \sim$</td>
<td>Translation, V, H pattern of $\sim$</td>
</tr>
<tr>
<td>$1000</td>
<td>rigid motion in a plane</td>
<td>$\sim \sim \sim$</td>
<td>Rot, V, Rot pattern of $\sim \sim$</td>
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## Double Jeopardy - Answers

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<tbody>
<tr>
<td><strong>$200</strong></td>
<td>What is a plane?</td>
<td>What is V, H, V?</td>
<td>⌁ ⌁ ⌁ ⌁</td>
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<tr>
<td><strong>$400</strong></td>
<td>What is a rotation?</td>
<td>What is H, V, H?</td>
<td>⌁ ⌁ ⌁</td>
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<tr>
<td><strong>$600</strong></td>
<td>What is a reflection?</td>
<td>What is V, Rot, V?</td>
<td>⌁ ⌁ ⌁</td>
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<tr>
<td><strong>$800</strong></td>
<td>What is a translation?</td>
<td>What is Rot, V, Rot?</td>
<td>⌁ ⌁ ⌁</td>
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<tr>
<td><strong>$1000</strong></td>
<td>What is a Transformation?</td>
<td>What is translation, V, H?</td>
<td>⌁ ⌁ ⌁</td>
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## Final Jeopardy

Category is “Classification of a Strip Pattern”

Example D from p. 65 of *Multicultural Mathematical Ideas* by Bernadette Berken

**Final Jeopardy - Answer**

Answer is pma2
## Individual Record Keeping

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<thead>
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<td>Social Studies E. 8.9</td>
<td>Art E. 8.3</td>
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<td>Summ</td>
<td>Baseline</td>
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### Standard: Math C.8.4

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<td>Number of students at 4 = __________</td>
<td>Number of students at 4 = __________</td>
</tr>
<tr>
<td>Number of students at 3 = __________</td>
<td>Number of students at 3 = __________</td>
</tr>
<tr>
<td>Number of students at 2 = __________</td>
<td>Number of students at 2 = __________</td>
</tr>
<tr>
<td>Number of students at 1 = __________</td>
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### Standard: Social Studies E.8.9

<table>
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<tbody>
<tr>
<td>Number of students at 4 = __________</td>
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</tr>
<tr>
<td>Number of students at 1 = __________</td>
<td>Number of students at 1 = __________</td>
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### Standard: Art E.8.3

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<tbody>
<tr>
<td>Number of students at 4 = __________</td>
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Resources


Hmong Association of Green Bay, Inc. 200 South Ashland Avenue, Green Bay, WI 54303. (920) 437-4550.


