ART OF KĀPALA
IN MATHEMATICAL TRANSFORMATIONS

BY MIMI TINCHER

Why is it important to learn and pass on the Native Hawaiian cultural practice of kapala (stamping)?
How are geometric concepts evident in Hawaiian kapala?

ELEMENTARY FIFTH GRADE

STANDARD BENCHMARKS AND VALUES

HCPS III
FA.5.1.4 Explain how an original artwork demonstrates a concept or idea from another discipline.
SS.4.6.1 Explain how language, traditional lore, music, dance, artifacts, traditional practices, beliefs, values, and behaviors are elements of culture and contribute to the preservation of culture.
MA.5.6.1 Predict and confirm the results of combinations of flips, turns, and slides.

CCSS
5.G.B.3 Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.

GENERAL LEARNER OUTCOMES
Effective Communicator. Students will be required to give an oral presentation of their design, and will be required to ask questions about other student’s designs.
Quality Producer. Students are required to produce a high-quality, kāpala art piece.
Community Contributor. Fifth graders will design and create stamps that will be shared with classmates, and will also pass on the ‘ike of Native Hawaiian kāpala, in their presentations.

SMP
SMP#4 Model with mathematics.
- Students will use geometry to solve design problems, and draw 2 dimensional polygons and other geometric shapes.
SMP#5 Use appropriate tools strategically.
- Students will use appropriate tools, such as: computers, the internet, rulers and protractors when brainstorming and drafting their designs.
SMP#6 Attend to precision.
- When presenting their designs to an audience, students will use clear definitions and reasoning in their discussions.
SMP#7 Look for and make use of structure.
- Upon analyzing their classmate’s work, students will look closely to discern patterns and shapes.
ENDURING UNDERSTANDINGS

• Native Hawaiians used mathematical concepts in their ‘ohe kāpala designs.
• Math is a tool that can be used to justify why an art design appears balanced.
• Patterns provide insights into potential relationships.
• Geometry and spatial sense offer ways to interpret and reflect on our physical environment.
• Analyzing geometric relationships develops reasoning and justification skills.

WHAT IS THE GOAL OF THE LESSON?
The goals of the lesson are:

• Students will understand the history and original purpose for creating Hawaiian kapa, and will be able to verbalize the cultural significance of the art of Native Hawaiian ‘ohe kāpala and the importance of sharing this ‘ike with others.

HOW WILL I KNOW WHEN STUDENTS HAVE REACHED THE GOAL OF THE LESSON?
I will know that students understand the cultural significance of the lesson, when they are able to explain to their classmates why we continue with the Native Hawaiian tradition of ‘ohe kāpala.
I will also know that the students are able to understand by listening to their conversations and hearing them use the appropriate vocabulary, as listed below.

VOCABULARY
‘ohe kāpala – bamboo stamping
kāpala - stamping
kapa or tapa – a Native Hawaiian fabric, created by pounding the bark of certain trees, and then stamped using ‘ohe kāpala.

WHAT SUPPLIES AND MATERIALS ARE NEEDED?
Photographs of kapa and ‘ohe kāpala designs, samples of genuine kapa cloth, pencils, rulers, grid paper, paint paddles (stir sticks – one per each student), adhesive foam sheets (any color), paint, and canvas boards.
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<tr>
<th>Instructional Sequence</th>
<th>Description</th>
<th>Time</th>
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| PROVOKE                | Overview and Purpose What will be learned, why is it useful, and what connections can be made to previously learned concepts, other content areas, or to the real world?  
ASSESSING/ACTIVATING PRIOR KNOWLEDGE  
• What background knowledge must students have in order to successfully engage in the lesson?  
• How will I front load and scaffold the lesson?  
LESSON LAUNCH  
• What will I model, explain or demonstrate to launch the lesson?  
Lesson #1 – History of Hawaiian ‘Ohe Kāpala. It is essential that students have an understanding about the history of this art form, to give purpose to the remaining lessons. It is also important, because living in Hawai‘i, Hawaiian culture is important to us all whether we are Hawaiian or not.  
Students must have prior knowledge in accessing Internet websites as well as knowledge in how to navigate Google Docs.  
To engage students in the learning, first show video https://www.youtube.com/watch?v=NdxosJyUOzc It’s about a Californian-based Hawaiian woman who values and practices the ancient ways of creating ‘ohe kāpala, while also incorporating her own, modern day artistic practices.  
Hold a class discussion where teacher will draw a web and fill it in as class discusses the history of ‘ohe kāpala. Topics covered: How and when did ‘ohe kāpala originate, When did the practice begin to decline and why, how kapa is made, how the dye is created and used, how the stamps are created and used, and the cultural importance of maintaining the knowledge of ‘ohe kāpala for future generations of Hawai‘i.  
Use photographs to illustrate and encourage thinking, and share samples of original Hawaiian kapa, as well as the pounding and painting tools. | 20 min |
| ENGAGE                | LEARNING EXPERIENCES  
• What exploration or investigation will I engage students in to help them move toward the learning target(s)?  
Students will participate in a webquest. Students will be paired up and they will use their laptops to follow along on the webquest. In this quest, students will see several examples of ‘ohe kāpala designs used on original kapa and art pieces. Students will re-watch the video that was shown to the class and answer questions about it. Students will also choose their favorite designs and will share them with me through a shared google docs folder. | 20 min |
| SUMMARIZE             | BRINGING IT ALL TOGETHER  
• How will the whole-class discussion be facilitated to help students summarize the important ideas in the lesson?  
CLOSING  
For the closing of each lesson, the same questions will be asked:  
“Why did Ancient Hawaiians create kapa?”  
“What is the reason we still make kapa today?”  
“Why should we learn about and pass on the cultural practice of making kapa?”  
“Should we continue the art of making kapa and ‘ohe kāpala? Why or why not” | 10 min |
| EXTEND                |Extending the learning  
• What questions, problems, or tasks will be appropriate to extend students’ learning (i.e., homework assignment or follow-up investigation)?  
In the coming lessons, students will work on designing their own kāpala stamp, and using their stamp(s) on a canvas to create an original artpiece which will be presented to kumu within the school.  
Homework – Students will be required to go home and ask their families about ‘ohe kāpala.  
• What do they know about it? Share 2-3 things that you learned about the history of ‘ohe kāpala with your families. Be ready to share! |
**IMPORTANT INSTRUCTIONAL DECISIONS**

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<th>ACCESS FOR ALL</th>
<th>DIFFERENTIATIONS/ADAPTATIONS:</th>
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<td>• How will I accommodate diverse learning needs (ELL, SPED, GT)</td>
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Students will be working in pairs during the webquest. I will pair lower level with higher level learners, and those that have difficulty with computers and technology with those that do not.

I will allow extra time to finish the webquest assignment, and repeat instructions, as necessary.

The lesson is one that is interpersonal, hands-on and visual, as well as auditory, so it addresses a variety of learning styles.

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<th>CHECKING STUDENT PROGRESS</th>
<th>FORMATIVE ASSESSMENT:</th>
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<td>• How will I gauge student understanding and provide feedback during the learning opportunity?</td>
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As the students are working on their webquests, I will walk the room helping them out as needed.

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<th>SUMMATIVE ASSESSMENT:</th>
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<td>• What opportunities will I provide for students so they can demonstrate what they know, can do and understand?</td>
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Students will be required to complete a webquest worksheet (attached), that will be handed in and graded.

**RESOURCES:**

**GEOMETRICAL TERMS AND CONCEPTS**
- http://www.mathplayground.com/Shape Mods/Shape Mods.html
- https://www.mathsisfun.com/geometry/transformations.html

**TAPA MAKING AND ‘OHE KĀPALA VIDEOS**
- https://www.youtube.com/watch?v=F3aG5MPWrrww&ebc=ANyPnKqmTgr6OMok4-ccyAHOM-FOOup-VtDh3URJqcZFgzoZaeYTPn-L-GPKFwKqo_MoZ5U5EJJJ
- https://www.youtube.com/watch?v=NdxosJyUOzc

**WEBSITES:**
- www.Kapahawaii.com

**OTHER RESOURCES:**
- The Lyman Museum – next door to our school.