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# ***Costuming and Mathematics: The Process of Hat Design***

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# *The Story*

- **Storying ...**

- Stories provide opportunities for shared meanings at the beginning of text and opportunities for reflection at the end of the text (Ellis, 1998).

- Teacher education is a process of learning to tell and retell educational stories. Sustained conversations in which we listen to responses to these stories allows for “added possibility” in using them to “encourage more mindful retellings” (Connelly & Clandinin, 1994, p. 150).

- ***A Chance Encounter At a Pizza Parlor ... A Story About Collaboration ... Wearing Different Hats***

# *The History of Hats*

- Functional
- Available materials
- Occupational



# *The History of Hats*

- Ceremonial
- Religious
- Hierarchy/status
- Symbolic





# Wealth and Fashion

- Non-Functional
- Expensive materials
- Social Status
- Economic Status



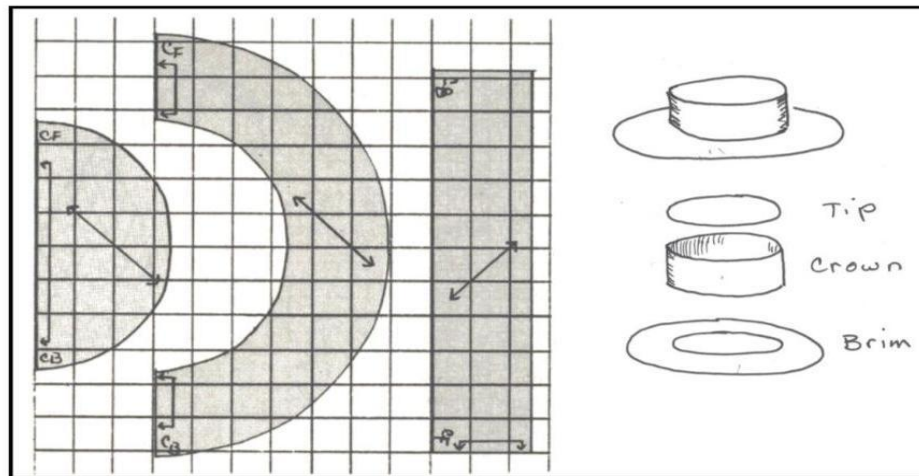
# *Engineering Hats for the Theater*

- The hat must precisely fit the actor
- Materials may be unusual
- The hat maybe expected to do unusual things
- From a prototype to manufacturing hats for an opera chorus up to 200



# A Hat that Fits!

Working with your group, use the Basic Hat pattern and create a hat that fits the head of one person in your group. The hat can be made using scrap paper, scissors, rulers, and tape.



Basic Hat Pattern





## *A Hat That Fits Discussion*

- What strategies and tools did you use to create your hat?
- Are the hats mathematically similar to the original pattern? Why or why not? How do you know?
- Are all of the hats mathematically similar to each other? Why or why not?
- Did you make aesthetic adjustments to your hat? Why or why not? How did you make these adjustments?
- What advice would you give to someone working to create a replica of your hat?

# *Mathematics In the Design Process*



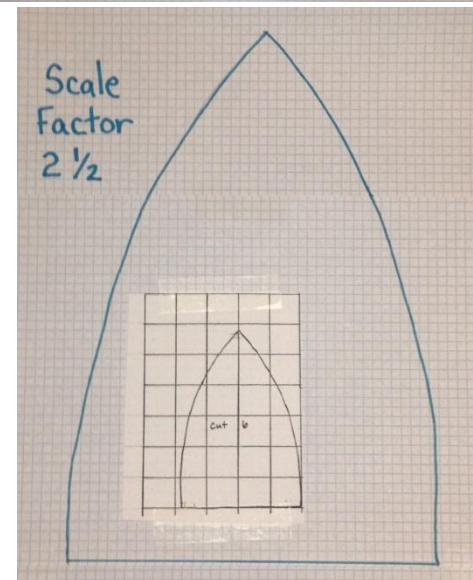
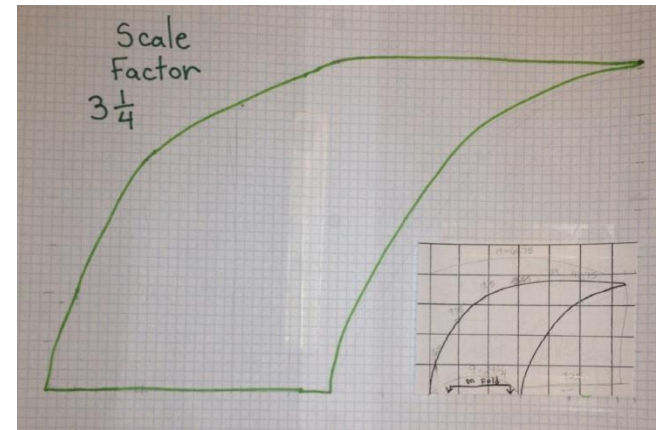
# *Scaling Up a Pattern*



Students are given a pattern piece and a scale factor. They are asked to accurately scale the piece of the pattern up by the factor they are given. Class discussion and peer critique of each other's products follows.

# Scaling Up a Pattern

- Conceptual understanding of proportion and similarity are math goals of this activity.
- Within the broader project, this activity positions students to view mathematical precision and communication as increasingly more important when you are creating directions for someone else (or a machine) to follow in the manufacturing process.

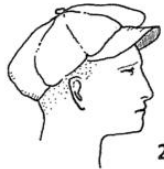


# Analyzing the Structures of Hats

- Match the pattern to the hat.
- Explain your reasoning.



1



2



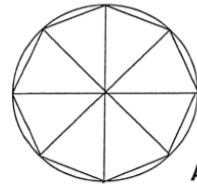
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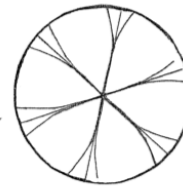
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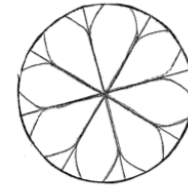
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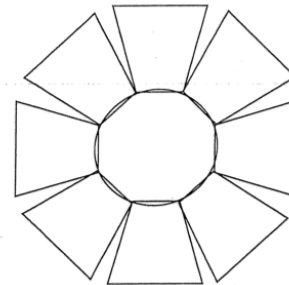
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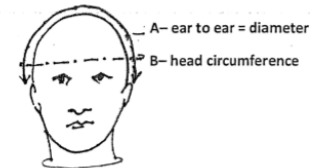
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C



D







## Common Core State Standards:

- Grade 6 RP – Understand ratio concepts and use ratio reasoning to solve problems.
- Grade 7 RP – Analyze proportional relationships and use them to solve real-world and mathematical problems.
- Grade 7 G – Draw, construct and describe geometrical figures and describe the relationships between them.
- Grade 8 G – Understand congruence and similarity using physical models, transparencies, and geometry software.

## Mathematical Practices:

Construct viable arguments and critic the reasoning of others.

Mathematically proficient students try to communicate precisely to others.

# Conclusions

- Both mathematics and aesthetics are essential to costume design
- The design process requires precise mathematical communication between the engineer and the artist
- We need to do more to help students see the connections between mathematics and the arts.
- “Narrative inquiries are shared ways that help readers [teachers] question their own stories, raise their own questions about practice, and see in the narrative accounts stories of their own stories. The intent is to foster reflection, storying, and restorying...” (Clandinin & Connelly, 1990, p. 20). ... ***A Chance Encounter At a Pizza Parlor ...***



# *Questions and Comments*



## *Contact Information*

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