

Moccasins and Math - How Do They Fit?

Grade Levels: 7-12th Grades

Subject: Geometry & Measurement (GM)
Geometry: Two-Dimensional Shapes (G.2D)

Oklahoma Academic Standards | Mathematics

7.GM.4.1 Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors resulting from dilations.

G.2D.1.4 Apply the properties of special quadrilaterals (square, rectangle, trapezoid, isosceles trapezoid, rhombus, kite, parallelogram) and use them to solve real-world and mathematical problems involving angle measures and segment lengths using algebraic reasoning and proofs.

Lesson Summary

Students will demonstrate their understanding further by experimenting with newspapers and using origami to design their own footwear outside of class and presenting their designs to the class. Students will demonstrate that they have achieved the lesson objective by producing a shoe pattern from paper, assembling a pair of moccasins graded according to a rubric, and presenting a design of footwear that could have been created by Native Americans with language including the vocabulary. The measurement of the paper and cloth, the pattern of sewing, the perspective spatially and culturally, and the order of the algorithm will provide hands-on learning as well as a minds-on experience of connecting cultures and creating technologies of the past while discussing the technology of the future.

Disclaimer: The contents of the Muscogee (Creek) Nation Teacher Fellowship, Lesson Plan Project were developed under grant PR Number S415A150008 awarded by The U. S. Department of Education. However, those contents do not necessarily represent the policy of the Department of Education and should not be assumed to be endorsed by the Federal Government. Additionally, recognizing the complex history of The Muscogee (Creek) Nation, State Tribal Education Partnerships (STEP) and Cultural Education Resource Council (CERC) made the determination to use the information herein. The lesson plans can be used to educate students and teachers about Muscogee people and history as they relate to the current Oklahoma Academic Standards. The information chosen is not to diminish other aspects of our history or notable people, nor does it imply the information within the lesson plan is the primary source of knowledge. However, it means that a consensus on what to be represented and that the compilation of The Muscogee (Creek) Nation Teacher Fellowship Lesson Plans was a CERC committee decision. We are confident as we continue to cultivate and scaffold our tribal educational resources, the lesson plans will develop into a more comprehensive tool to be used in support of the Muscogee studies public school curriculum.

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ENGAGEMENT/HOOK

- *Describe how the teacher will capture students' interest.*
- *What kind of questions should the student ask themselves after the engagement?*

Provide bell work that asks students “What would they do if they lived in a time where they had to make their own shoes.”

Show videos of people walking on rough surfaces without shoes while the students work. Show factories cranking out shoe after shoe and include the waste and pollution it produces. Show videos of cobblers handcrafting shoes/boots and then show videos of Native Americans making moccasins.

Probe students with a question: “Where do shoes come from and what goes into the production of footwear?”

EXPLANATION (Teacher models)

- *Student explanations should precede the introduction of terms or explanations by the teacher. What questions or techniques will the teacher use to help students connect their exploration to the concept under examination?*
- *List higher order thinking questions which teachers will use to solicit student explanations and help them to justify their explanations.*

Students can read their bell work answers out loud. Discuss which technique would they be able to use. After watching someone cut out the pattern of a moccasin, students will be given newspapers to create their own pattern for their moccasins. After the patterns are created, the student will be given cow leather already cut out, as well as needle and thread to sew them. The class will discuss what the most likely animal hides used were. The students will also discuss what the needle and thread would have made from. The students will discuss the technology of the past, both pre- and post-Columbus. The class will learn about algorithms, the order of operations, pattern recognition, measurement, perspective, and history.

The students will be asked to research the answers to their questions. They must also analyze any connection to current shoe-making, describe the benefits of each type of production, and justify their answers. Students will produce shoes, justify the choice of which shoes are easiest to produce, describe the steps to make them (algorithm), use the knowledge to connect to current shoe production, evaluate the improvements and experiment on their shoes, and remember the vocabulary and algorithms to demonstrate their understanding of the concept.

ELABORATION

- *Describe how students will develop a more sophisticated understanding of the concept.*
- *What vocabulary will be introduced and how will it connect to students' observations?*
- *How is this knowledge applied in our daily lives?*

Vocabulary: Algorithm, Order of Operation, awl, hide, moccasin, fractal, patterns, trapezoid

Students will demonstrate their understanding further by experimenting with newspapers and using origami to design their own footwear outside of class and presenting their designs to the class.

EXPLORATION**(Guided/Independent Practice)**

- *Describe what hands-on/minds-on activities students will be doing.*
- *List “big idea” conceptual questions the teacher will use to encourage and/or focus students’ exploration.*

The measurement of the paper and cloth, the pattern of sewing, the perspective spatially and culturally, and the order of the algorithm will provide hands-on learning as well as a minds-on experience of connecting cultures and creating technologies of the past while discussing the technology of the future.

- Why is it important to remember how to make our own shoes?
- How are moccasins better than manufactured shoes?
- How are manufactured shoes better than moccasins?
- Do we use math every day?
- Did the Native Americans?
- Could you make your own footwear?
- What did most Native Americans wear for most of the year?
- What could be added to make moccasins better for rocky areas?
- What would make them better for colder weather?

CLOSURE/EVALUATION**(Pre/Post-Formal/Informal Assessments)**

- *How will students demonstrate that they have achieved the lesson objective? How will you know they met the objective/learned the lesson?*
- *This should be embedded throughout the lesson as well as at the end of the lesson.*

The students demonstrate they have achieved the lesson objective by producing a pattern from paper, assembling a pair of moccasins graded according to a rubric, and presenting a design of footwear that could have been created by Native Americans with language including the vocabulary. I will know they have met the objective after observing their presentation and/or assessing their vocabulary and content knowledge through examination.

Materials Needed:

Newspapers, scissors, moccasin-making kit, markers, rulers