Polygram String Art

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Specialized tools and materials used:	**Experience level required:**
Protractors, push-pins, straight pins, yarn	beginner

Grade Level (of this example): 9th grade Geometry

Subject/Content Standards: Math - geometry: drawing angles, using protractors, symmetry

Summary of Project:

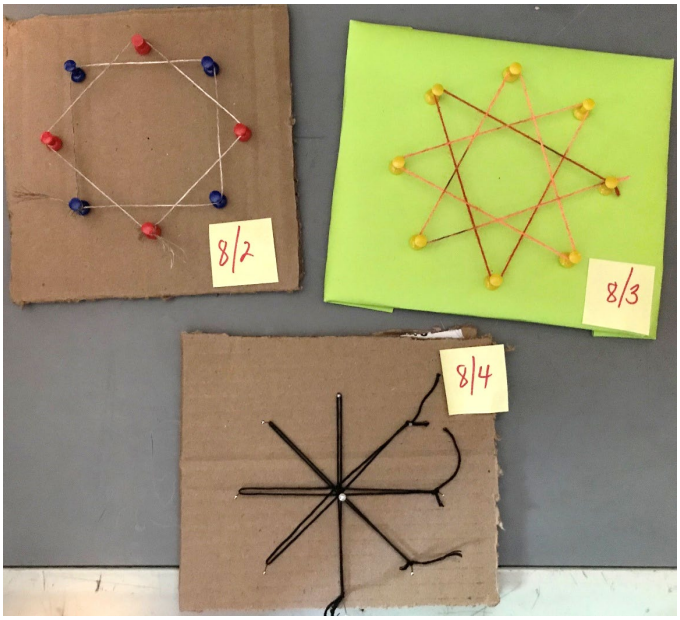
Students model polygrams with pushpins and string, compare rules and algorithms, analyze symmetry properties, and look at the relevance of their new polygram in art and architecture.

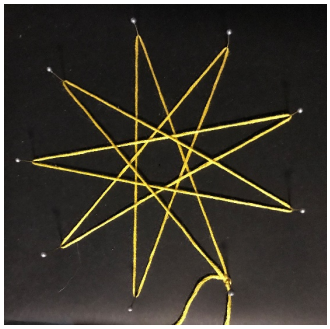
Simple models are easy to make with pins, yarn, and cardboard, and covering the cardboard with colored paper that contrasts with the yarn makes for nice looking pieces.

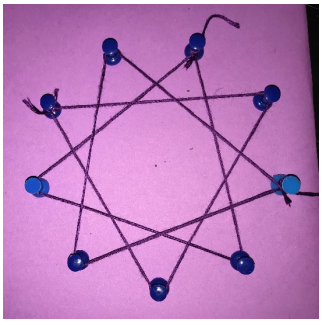
Students use a compass and protractor to mark the vertices, getting good practice with these tools.

The activity involves some unknowns – the students pick a number *"n"* between 5 and 12, then a second number *"k"* (must be less than half of their first number, and create the polygram defined by these numbers {n / k}. "n" is the number of vertices and "k" is the number of divisions between the ends of a line.

The pieces are made individually, then shared with the class.

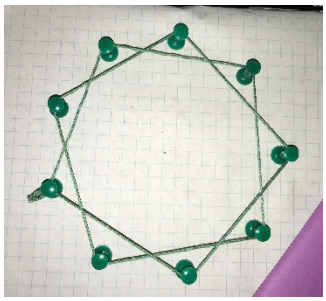






After finishing the models, students analyze and discuss the models through a series of challenges including figuring out the number definition {n / k}, identifying symmetries (reflection and rotational), and identifying definitions that are “aliases” (such as {9 / 5 is the same as {9/ 4}).

Many of these shapes are found in art and architecture - students see examples and discuss the importance and relevance of geometry concepts.



Suggested resources

https://mathworld.wolfram.com/Polygram.html

https://en.wikipedia.org/wiki/Polygram_(geometry)

https://math.dartmouth.edu/~matc/math5.geometry/unit5/unit5.html

Possible Content explorations (optional)

- Students can code the polygrams in Scratch or another computer program that can draw an image.