

Star Polygons!

One way to make star polygons is to start with a number of equally spaced points on a circle, and then--connect the dots! With three or four points (or vertices) we have no choice; we get a triangle or a square. But with five points we do have a choice. If we connect each vertex to its neighbor we get a pentagon. If we skip one vertex each time, we get a five pointed star.

With seven points it gets *really* interesting: there are two different kinds of stars we can make. And then...

- 1) Draw some neat star polygons! Use your protractors and rulers and division skills! Can you make a complete set--for example, all the star polygons possible with eleven sides?
- 2) Can you figure out the angles in your stars?
- 3) Can you connect a star polygon with the math game *Buzz*? Give an example and illustrate it.
- 4) Can you make a star polyhedron, where each face is a star polygon?
- 5) Can you come up with a rule for how many types of star polygons each number of points will have? Can you figure out what determines if we get one connected star (like a five-pointed one) or interlocking polygons to form a star (like a six-pointed one)?
- 6) There are twelve tones in a musical octave. The star polygons with twelve points can illustrate different musical ideas or patterns. Try making a circle with twelve points and label each point with a note. (C, C#, D, D#...) A regular twelve-sided polygon shows a chromatic scale. Different star polygons will illustrate the following musical ideas: the circle of fifths, a whole tone scale, a diminished seventh chord. See you if you can play musical examples of the different pictures!

Have fun!

Rubik's Cube

Erno Rubik was a lecturer in the Department of Interior Design at the Academy of Applied Arts and Crafts in Budapest, Hungary. However, that was just his day job. In his free hours outside of work, Erno Rubik was obsessed with puzzles. In 1974, he invented what is now known as the Rubik's Cube. The first Rubik's Cubes were exported from Hungary in May 1980. (I was 10 years old at the time and Richard was, well, older than 10.) The puzzle became so popular that the inventor's name is now a household word. Well at least his last name is a household word. Some people estimate that nearly a billion cubes have been sold.¹

A Rubik's Cube has 43,252,003,274,489,856,000 different possible positions. In spite of this really, really, really large number of possible positions, all Rubik's Cubes can be solved in twenty-six or fewer moves. Most of us, however, need to make a lot more moves in order to solve the puzzle.

Solving One Face

1. Can you solve one face of the cube, making it entirely one color? Repeat this step until you're pretty comfortable with solving one face.
2. Now imagine that you are responsible for teaching what you've learned to someone else. Your instructions must be written—using some combination of words, symbols, and images. Can you write a formula to describe your solution? Can you create a set of directions that you're confident would be able to guide your students to a solution?

Solving the Cube

3. Can you solve one face of the cube so that the top row of the four side faces match the center squares on those sides? See figure 1.
4. Can you solve one face and make the top two rows of the adjacent faces into one color? See figure 2.



Figure 1



Figure 2

5. Can you solve the entire cube?

Thought Experiment

6. After you've learned a few things, sit down in a comfortable chair and think about the way you would go about solving the cube, doing what you've learned again. How do you know what you know? Are you using your memory to simply remember what to do next? Are you using words, images, or both to describe what moves to make on the cube?

Classrooms 3, 4, 5, 6, and the library will have some Rubik's cubes available to use during work times, recess and lunch times, and in the After School Program.

¹ http://inventors.about.com/od/rstartinventions/a/Rubik_Cube.htm