

Organization of *Playing with Polygons* Files

Introduction

1. Polygons Basics (based on EWEP, 2021, *Connecting Geometric Patterns to Numeric Patterns using the Polygons and Stars Excel File*, **Spreadsheets in Education** targeted K-2)

1.1 n Number of vertices Polygons

1.2 J vertex Jumps Stars

PART I. Aestheometry (Electronic String Art) on Polygons and Stars

2. Aestheometry on Polygons (single vertex jump) and Stars (multiple vertex jumps)

2.1 S Subdivisions between vertices Curved Tip Stars

2.2 P subdivisions between P oints General Aestheometry

3. Center-pointed flowers

4. Two Jump Patterns

4.1 J_1, J_2 alternating jump patterns General

4.2 Special case for $4k+2$ polygons

4.3 Jumps via equation rather than up and down arrows

5. Four-color model with 1 to 3 jumps on dodecagon (an extension of E&E **Bridges 2020** article)

5.1 Single vertex jump pattern

5.2 Double repeated jump pattern

5.3 Triple repeated jump pattern

PART II. Using Polygonal Vertices to Frame Parallel Lines

6. Sharpest odd isosceles triangles (based on E&C, *Alternative Visions of Perfect Squares*, targeted 3-5)

6.1 Sharpest triangles

6.2 Square

7. Sharpest right triangles on even polygons

8. Sharpest isosceles triangles on even polygons

9. Triangles on polygonal vertices

PART III. Extensions without Subdivisions between Vertices

10. Spirals (based on *Using Archimedean Spirals to Explore Fractions*, **Bridges 2021**, targeted 3-5)

11. Cardioids

12a. Stacked Stars, part 1: Exploring sets of vertex jumps via jump change equations

12b. Stacked Stars, part 2: Manually exploring sets of vertex jumps
