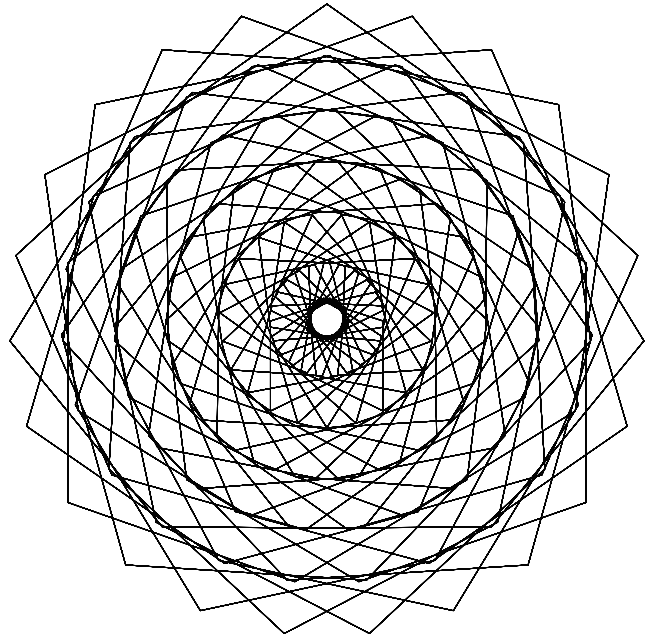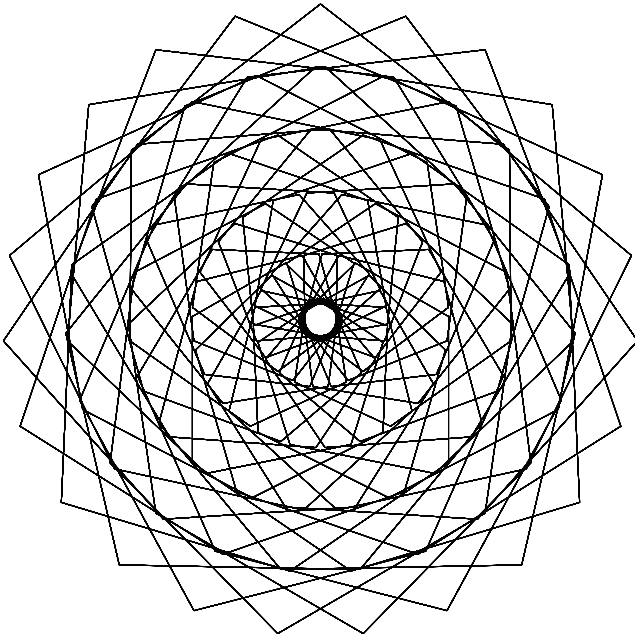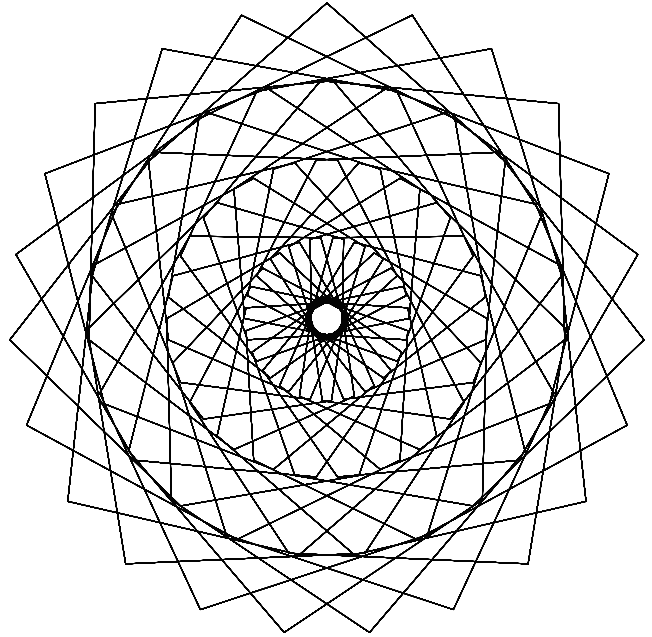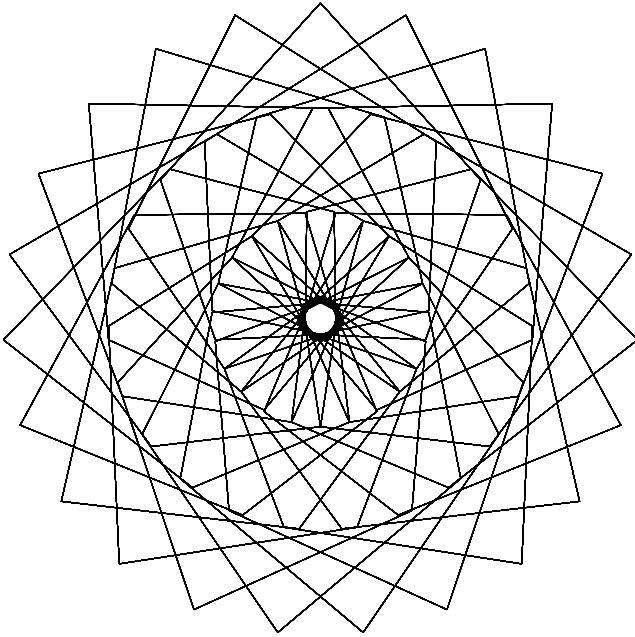# Stacked Circles

The four images below are examples of stacked circles (although the circles are really polygons with lots of sides). Each image looks like it is built out of similar layers stacked on one another.

Start with an odd *n* (here 23) then let *J* = (*n*-1)/2 (here 11) so that the vertex frame is a Sharpest Star (see File 1).

If you want *k* circles, set *S* = 2*k* (*S* = 6, 8, 10, and 12 here). This means that there are subdivision points at *k* different distances from the center with the *k*th being closest to the center.

In each instance, set *P* = 6*S* − 1 (*P* = 35, 47, 59 and 71 here).

There is an annotated version of the 3-layer image in the upper left (*S* = 6) on the next page.

3-Layer Version: https://www.playingwithpolygons.com?vertex=23&subdivisions=6&points=35&jumps=11
4-Layer Version: https://www.playingwithpolygons.com?vertex=23&subdivisions=8&points=47&jumps=11
5-Layer Version: https://www.playingwithpolygons.com?vertex=23&subdivisions=10&points=59&jumps=11
6-Layer Version: https://www.playingwithpolygons.com?vertex=23&subdivisions=12&points=71&jumps=11

This image shows the first *cycle* of 6 segments when **S** = 6. Note that the 6th endpoint is once again one of the polygonal vertices (which ends the first cycle). The layering mentioned above is clear here: the **purple** subdivision endpoints create three concentric internal circles. Subdivisions 1 and 5 on each segment of the vertex frame help create the outer circle, 2 and 4 help create the middle circle and 3 creates the inside.

Notice how the lines from 0 to 1 (the first segment) and 5 to 6 almost seem to be on the same line from 0 to 6. In reality they are not but difference is so slight that 1 to 5 appears to simply be part of the circle. This flat approach to this pair of subdivision points is why the resulting image has an apparent circle at that level. The same is true of the segments from 1 to 2 and 5 to 4 regarding how they relate to the middle set of subdivision points. Finally, the segments from 2 to 3 and 4 to 3 surround the inner circle. This loop around the center is one of the defining features of this image type. Using the above links, click *Toggle Drawing* to see how each image was created using a cycle that loops around the center.

When **n** is larger, the relation **P** = 6**S** – 1 no longer provides as nice an image. For example, with **n** = 41, 8**S** – 1 and 10**S** – 1 appear to do a better job at creating the circles. This link shows a 6-layer image given **P** = 119 (compare with 71 and 95).

6-layer version with **n** = 41: https://www.playingwithpolygons.com?vertex=41&subdivisions=12&points=119&jumps=20

These images share similarities with two types of images in **PART 3** of *Playing with Polygons*, *Cardioids* and *Stacked Stars*. The loops are reminiscent of cardioids (but cardioids are created in an entirely different manner) and stacked stars have concentric circles much like stacked circles.