Chrysanthemums

Chrysanthemums are flowers that have a lot of small petals seemingly layered on top of one another. There are a number of candidate images you may come across, but an especially nice version is found by making a simple adjustment to *Stacked Circles*. *Stacked Circles* are *One Level Change* images obtained by an *S* segment cycle which loops around the center to make the levels look like circles. In order to make this happen, the change in direction from segment to segment is large. In the example below, the 12-segment cycle stops 2 vertices away from where it started so that the vertex points need two clockwise rotations to complete the image. Click *Toggle Drawing* to watch this happen.

For chrysanthemums, the change in direction from segment to segment within an *S* segment cycle is smaller because the segments approximate an arc (rather than a loop). In the example below, the 12-segment cycle still includes the center but arcs back to a vertex point 9 vertices away from the starting point. Click *Toggle Drawing* to watch this happen. As the image is drawn, you see an approximate 5 petal flower rotate around to complete the image in about 9 rotations of vertex points (the 5 "petals" comes from 41/9 being closer to 5 than 4).
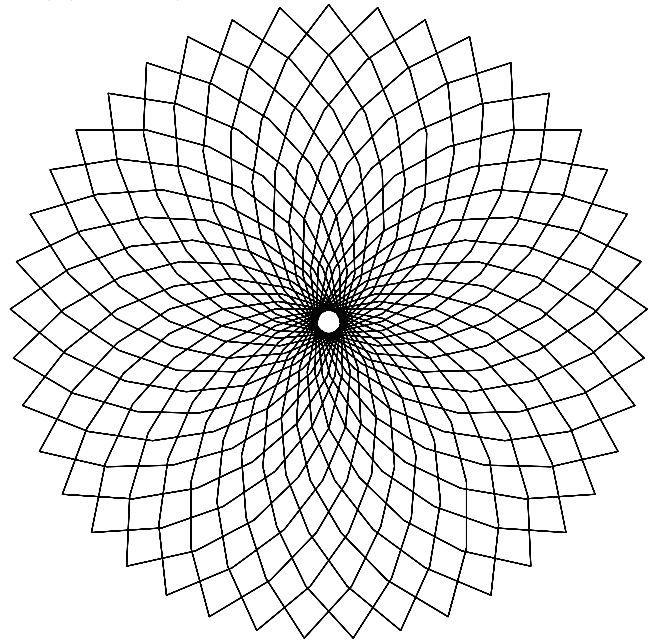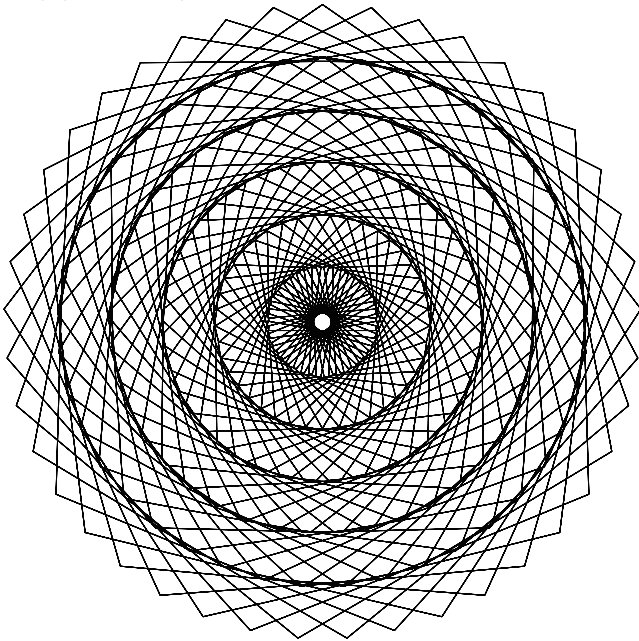
The two images below differ only in *P*.

Stacked Circles: *P* = 10*S* -1 = 119   Chrysanthemum: *P* = 2*S* -1 = 23

(S,P,J,n)=(12,119,20,41)   492 lines   (S,P,J,n)=(12,23,20,41)   492 lines

URL for Stacked Circles: https://www.playingwithpolygons.com?vertex=41&subdivisions=12&points=119&jumps=20

URL for Chrysanthemum: https://www.playingwithpolygons.com?vertex=41&subdivisions=12&points=23&jumps=20

You can see variations on both of these images by simply increasing *P* by 2 to 121 and 25 (both are now "one over values"). Now the loop and the arc excludes the center, but the images otherwise appear very similar.

It is worth noting that the rotation pattern is very easy to see with *P* = 25. In this instance, arc vertices are 8 away from one another and *n* (41) is one off a multiple of 8 (5*8 = 40) so that the 5 petal flower rotates counterclockwise 1 vertex for every rotation from vertex 8 back to 0. (Click *Toggle Drawing* with *P* = 25 and reread this paragraph.)