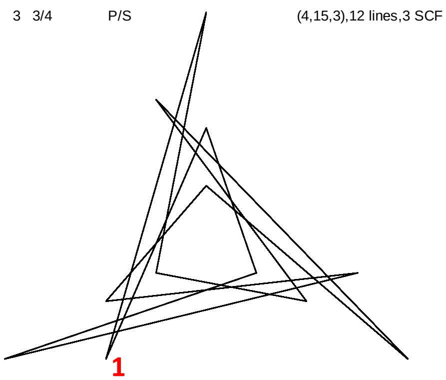
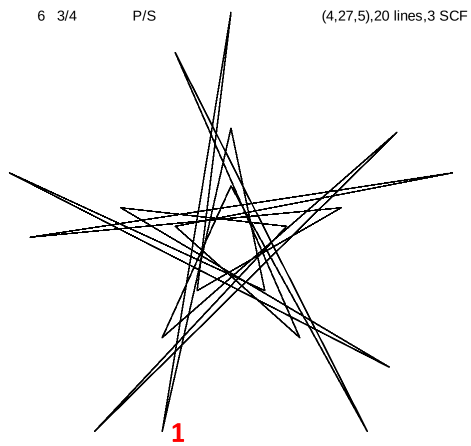
P/*S* helps you find similar images

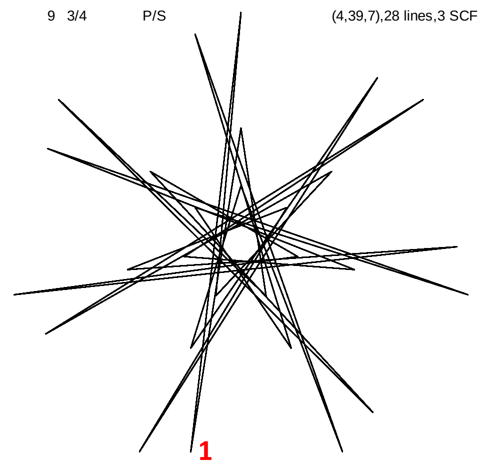
Due to the subdivision counting structure in Centered-Point Flowers, the ratio of ***P*** to ***S*** provides critical information to help you find similar images. Sometimes this comes from changing ***S*** and maintaining ***P***/***S*** at close to the same ratio (by adjusting ***P*** in order to maintain the same SCF). At other times this comes in the form of maintaining a location for where you want the first line to land as ***n*** changes. We provide examples of both types of exploration here.

Adjusting *P* as *n* changes. The center image in the top row was one of the “pentagrams with attitude” that was highlighted in the subdivision counting structure explainer. This image was sufficiently interesting that it seemed to demand further exploration. What would similar images look like for different ***n***? Two alternatives are shown ***n*** = 3 at left and ***n*** = 7 at right. In each image, a 1 denotes ***P***, the end of Line 1.

Note that ***P***/***S*** does not remain the same as ***n*** changes. On the other hand, it is easy to see the change in ***P***/***S*** that happens every time ***n*** increases by 2. Given this, can you predict what ***P*** should be if you want ***n*** = 15? It is easy to check your prediction by going to the **CPF** *Excel* file and adjust ***n*** and ***P*** to test your answer.







[**MA.** To automate this note that this only works for an odd ***n***. The vertex just before the bottom is (***n***-1)/2 (2 if ***n*** = 5) so you want ***P***/***S*** to be ¾ of the way to the next vertex (given ***S*** = 4), or ***P***/***S*** = 3/4+3·(***n***-1)/2 so replace the number for ***P*** in C1 by =4*(0.75+1.5*(L1-1)) and the image will change as ***n*** changes. With this, you see that ***P*** = 87 answers the ***n*** = 15 question above. An interesting question is whether you can also find *distinct* but similar images when ***S*** ≠ 4.]

Interestingly, if you use the equation just proposed for ***n*** = 4, then you obtain the bottom left image based on ***P*** = 21. If you follow through the first line placement there, you see that it is on the vertical line. In this instance, it is convenient to draw it the “other way” using ***P*** = 3***nS***-21 = 48-21 = 27. This image shows a pair of internal squares in addition to horizontal and vertical diameters and, as above, 1 shows the location of the end of Line 1.

Adjusting *P* as *S* changes. If you want to change ***S*** and see if you can find similar images you would want to follow the strategy of having the endpoint of the first line to be on the line from vertex 2 to vertex 3. Put another way: **you want to have 6 < *P*/*S* < 7 and you want to maintain SCF = 3.** Each of the images below satisfy these two conditions. Note that if you set ***S*** = 6, ***P*** = 39 (so ***P***/***S*** = 6.5 and SCF = 3), then you will find the Brunes Star (also BS CQ), this time with horizontal and vertical diameters added. Additionally, ***S*** = 10 has two ***P*** values that satisfy these conditions, ***P*** = 63 and ***P*** = 69.