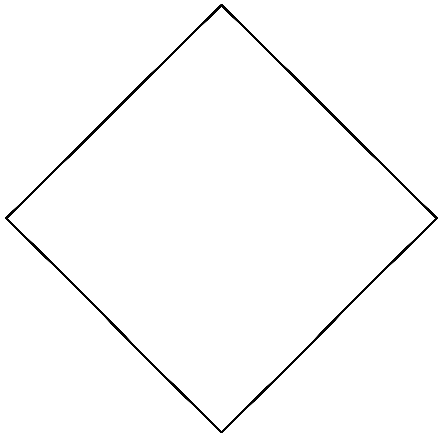
https://blogs.dickinson.edu/playing-with-polygons/file-2/

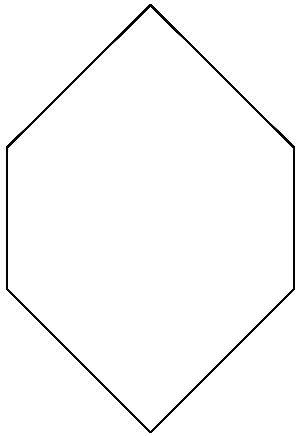
Symmetry about *n***S*/2 and the number of distinct images as a function of *P*

Porcupine images are created when ***P*** is the largest number less than (or smallest number larger than) ***n*******S***/2. The images are identical above and below ***n*******S***/2 as long **VCF** = GCD(***J***, ***n***) = 1. If **VCF** > 1, then the same is true for ***P*** above and below $(\frac{n}{\mathbf{VCF}})$****S***/2. In general, if this is an integer, ***P*** = $(\frac{n}{\mathbf{VCF}})$****S***/2 is a vertical line.

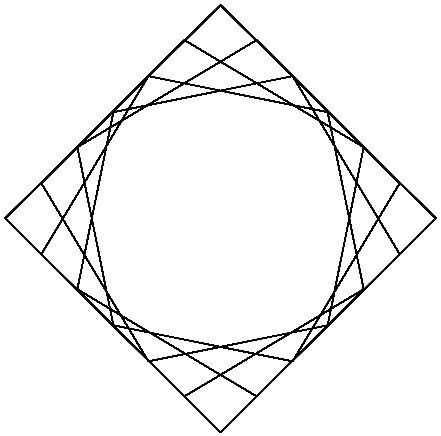
The vertex frame occurs if ***P*** is a factor of ***S*** because each line in the frame is created using one or more segments. (If ***S*** = 12, six ***P*** values produce the vertex frame (***P*** = 1, 2, 3, 4, 6, and 12). Let $N_{FACTORS}$(***S***) be the number of factors of a number ***S*** (including 1 and ***S***). Each of these factors will produce a single image (the vertex frame). As a result, there are INTEGER($(\frac{n}{VCF})$****S***/2) – $N_{FACTORS}$(***S***) + 1 distinct images. Below are 8 of 9 distinct images given ***S*** = 6, ***J*** = 1 and ***n*** = 4.



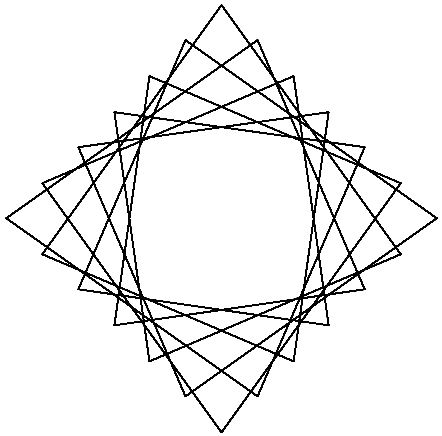
P = 1, 2, 3, and 6



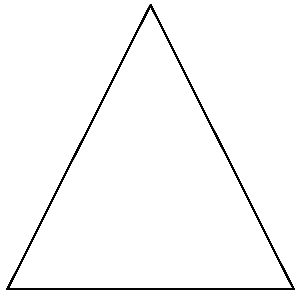
P = 4



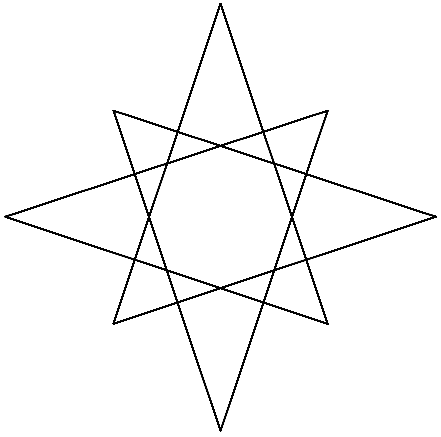
P = 5



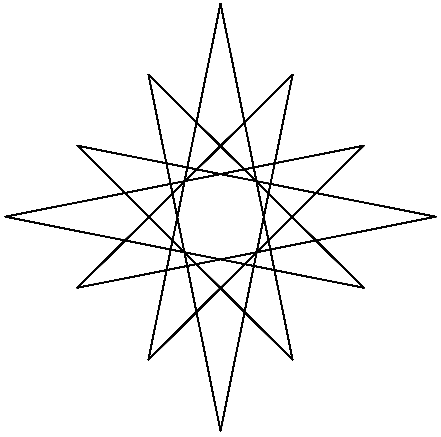
P = 7



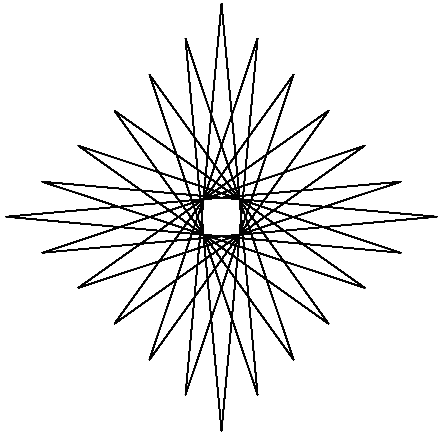
P = 8



P = 9



P = 10



P = 11

The final image, ***P*** = 12, is a vertical line. There are 9 distinct images because INTEGER($(\frac{n}{VCF})$****S***/2) – $N_{FACTORS}$(***S***) + 1 = INTEGER((4/1)*6/2) – 4 + 1 = 9.