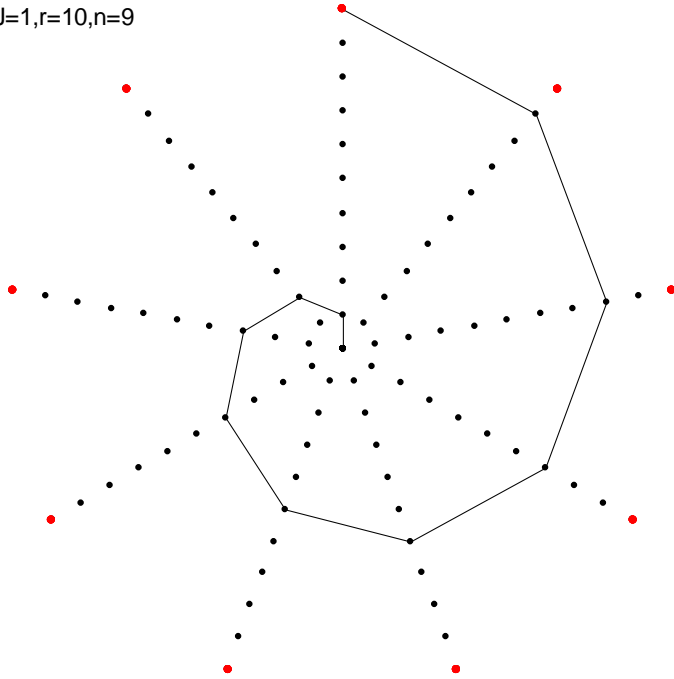


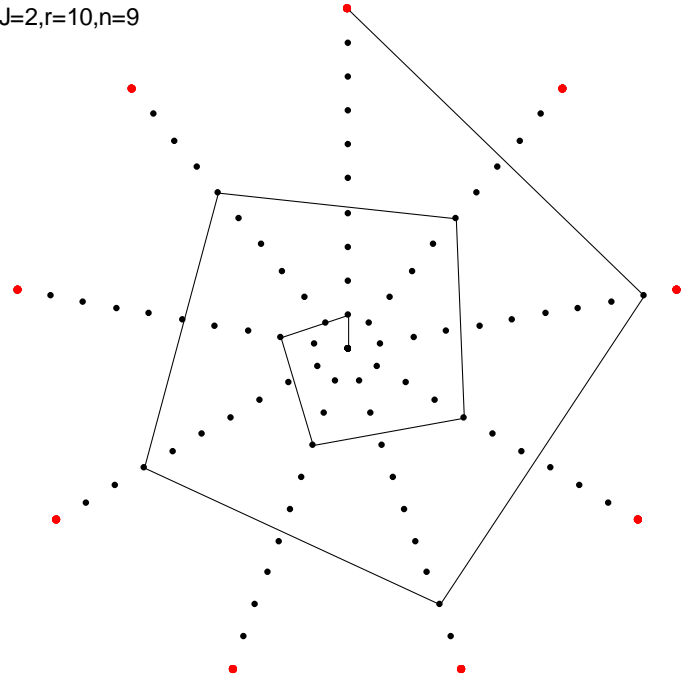
## 10. Teaching Spirals with Dot Plots

Excel file 10 allows you to highlight how the radius reduction involved in creating spiral images occurs when  $r$  and  $n$  are reasonably small. The *Possible dots* toggle creates a dot plot if  $n \leq 12$  and  $r \leq 10$ . This plot has dots creating  $r$  equally spaced segments on each *vertex ray* (the line from the center of the circle to the parent polygon vertex). The image has  $n$  vertex rays in the *parent polygon* (a spiral is created using the polygon's vertices, but the final image includes only the top vertex). Dot plots can be provided without the image or with like the four images below which have  $r = 10$  and  $n = 9$ . These images show half of the possibilities given  $n = 9$  (from  $J = 1 - 4$ ). The other half (from  $J = 5 - 8$ ) are mirrors of these images, based on values of  $n - J$ . The *Pencil and Ruler Exercises* examine varying  $J$ ,  $n$ , and  $r$ .

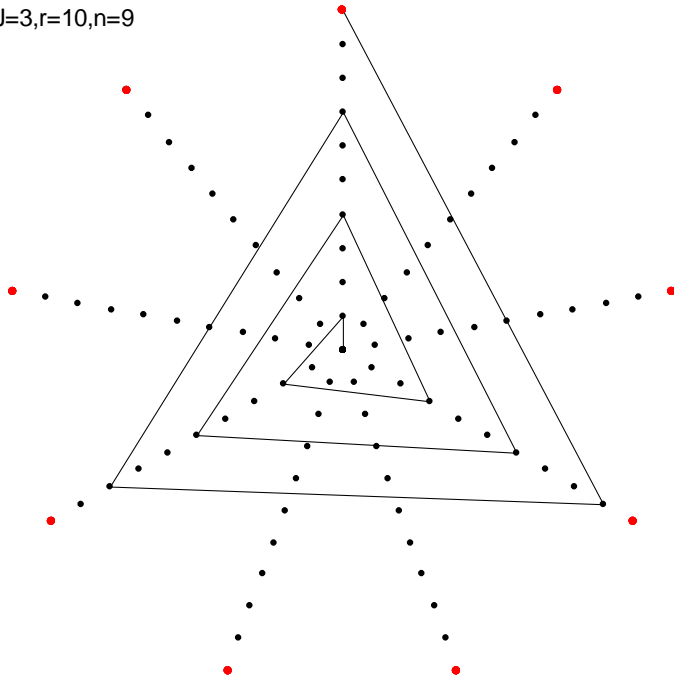
J=1,r=10,n=9



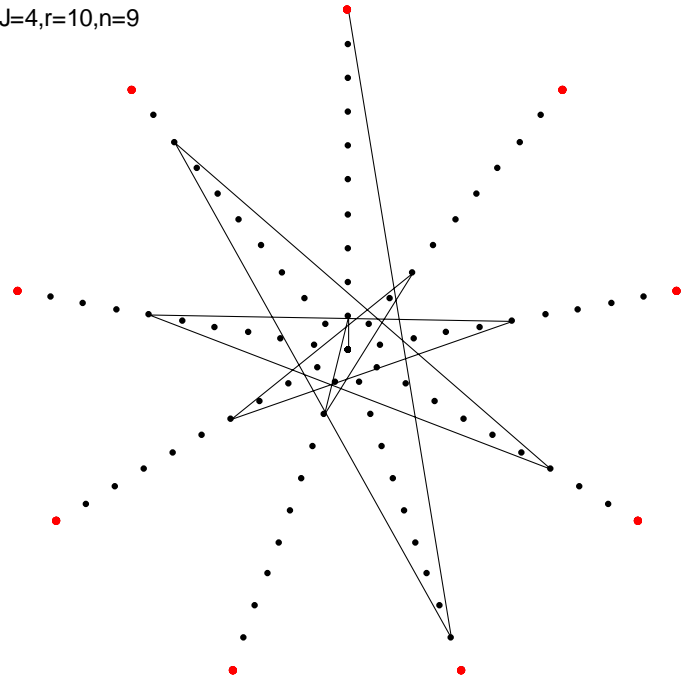
J=2,r=10,n=9



J=3,r=10,n=9



J=4,r=10,n=9



It is worth noting why the  $J = 3$  panel looks so much like a series of triangles. The reason is straightforward: 9 is divisible by 3 and therefore only three parent vertices are used to create this image (0, 3 and 6 counting clockwise from the top), the other six vertices are jumped over in creating this *almost triangle*. The other panels use all parent vertices.