A Counting Exercise using Cardioids

FACT: If $n > 4$ and n is even with $k = \frac{n}{2} - 1$, the image consists entirely of horizontal and vertical lines.

Sometimes the image has rectangles. The number of rectangles that do not overlap can be counted using the techniques described in **PART II of PwP**. Call this number of rectangles $R(n)$.

1. Examine the number of rectangles for $n = 6, 8, 10, 12,$ and 14. Does it appear that a single formula for $R(n)$ should work for all five of these values of n? Briefly explain your answer and don't be afraid to say no!

NOTE: This file uses only two parameters to create the image, n and k. For the next three questions, a third parameter, j, is used to denote whole numbers starting at either 0 or 1. This parameter creates n using the formula shown.

2. Determine $R(n)$ for $n = 4j+6$ for $j = 0, 1, \ldots$

3. Determine $R(n)$ for $n = 8j+8$ for $j = 0, 1, \ldots$

4. Determine $R(n)$ for $n = 8j+4$ for $j = 1, \ldots$

HINTS for questions 2-4: Although this is conceptualized as R as a function of n, it is easiest to consider R as a function of j given how j is related to n in each problem. From here you can rewrite R as a function of n. Also note that 2+4+6 can be reconceptualized as 2*(1+2+3).