Problem 1. Given a positive integer $n$, which numbers in the set $S = \{0, 1, 2, 3, 4, 5, 6, 7, 8, 9\}$ could be the ones digit of $n^2$, given that the tens digit of $n^2$ is odd?

Problem 2. Suppose that the numbers 1, 2, 3, $\ldots$, 2012 are placed evenly around the outside of a circle in such a way that adjacent numbers differ by at most 2. What number is directly across from the number 361?

Problem 3. Let
\[ S = \frac{1}{\log_2(2)} + \frac{1}{\log_3(2)} + \frac{1}{\log_4(2)} + \cdots + \frac{1}{\log_{2011}(2)} \]

Find $2^S$.

Problem 4. Let $\angle BAC = 90^\circ$. Let $B'$ and $C'$ be points such that triangles $\triangle C'BA$ and $\triangle B'CA$ are similar to $\triangle ABC$. If $\triangle ABC$ has area 13 and $\triangle B'CA$ has area 5, find the area of $\triangle C'BA$.