(Not so) Easy Guessing Game

This problem is a modified binary search problem. The number of guesses allowed are 16, which is half the number of guesses that would be needed for a regular binary search. This gives the idea to somehow be able to get the range $\frac{1}{4}^{th}$ of the current range with every guess.

Now, if you look at the modification to k with every guess, it moves closer to the guess. If your current range is l to r and you guess $g = \frac{l+r}{2}$, then for:

lesser, the new range will be $mid + 1$ to $r - \frac{r-mid}{2}$ since the new value of k cannot be greater than this right limit,

greater, the new range will be $l + \frac{mid-l}{2}$ to $mid - 1$ since the new value of k cannot be lesser than this left limit,

guessed, you've won the game!