Euler and Combinatorics

Abstract: I explored Euler's contribution to two topics in combinatorics: derangements and partitions of integers. Euler was inspired to examine derangements by a one-player card game called *Coincidence*. I presented Euler's proof of the probability of winning the game and showed that by adding elements the probability of a derangement converges quickly. Two partition identities were presented with Euler's proofs. Other partition identities (including two by Rogers-Ramanujan) were presented and proved via generating functions and Ferrers diagrams.