1077-05-190 **Korinne Dobosh***, Department of Mathematics, Montclair State University, Montclair, NJ 07043, and **Samuel Kennedy**, School of Mathematical Sciences, Rochester Institute of Technology, Rochester, NY 14623. *Rank numbers of rook's graphs.*

A k-ranking of a graph G is a function $f : V(G) \to \{1, 2, ..., k\}$ such that if $f(u) = f(v)$ then every $u - v$ path contains a vertex w such that $f(w) > f(u)$. The rank number of G, denoted by $\chi_r(G)$, is the minimum k such that a k-ranking exists for G. Many papers have appeared in the topic of ranking, and several of them investigated the rank number of certain classes of Cartesian products. The rook's graph, denoted by $K_n \times K_m$, is the Cartesian product of complete graphs K_n and K_m. This graph represents the moves of a rook on an $n \times m$ chess board. This graph contains a multitude of paths between any given vertices, and we must consider all paths between two vertices to ensure a labeling satisfies the ranking condition. We will discuss our results, including an explicit formula for $\chi_r(K_n \times K_m)$ for certain m, as well as new bounds for $\chi_r(K_n \times K_m)$ for all n and m, and results involving the structure of all minimal rankings of $K_n \times K_m$. (Received August 10, 2011)