1047-11-12 **Melvyn B. Nathanson*** (melvyn.nathanson@lehman.cuny.edu), Department of Mathematics, Lehman College (CUNY), Bronx, NY 10468. *Phase transitions in infinitely generated groups, and a problem in additive number theory.*

Let A be an infinite set of generators for a group G, and let $S_A(r)$ denote the set of elements of G whose word length with respect to A is exactly r. There are two cases. In the first case, the set $S_A(r)$ is infinite for all $r \geq 1$. In the second case, there is a positive integer r such that $S_A(r')$ is infinite for all $r' < r$ and $S_A(r') = \emptyset$ for all $r' > r$, and $S_A(r)$ is nonempty, possibly finite. Let s denote the number of elements in $S_A(r)$. The ordered pair (r, s) is called the *phase transition* of the group G with respect to A, and $S_A(r)$ is called the *transition set*. Given a group G, it is an open problem to determine the possible phase transitions and transition sets associated with infinite generating sets for G. This problem is solved for finite transition sets for the additive group $\mathbf{Z}$ of integers, and some results are known about infinite transition sets of integers. A classification of phase transitions and transition sets is not available even for the group $\mathbf{Z} \times (\mathbf{Z}/2\mathbf{Z})$. (Received October 29, 2008)