The short integer solution (SIS) problem asks, given $m$ uniformly random elements $g_1, \ldots, g_m$ from $(\mathbb{Z}/q\mathbb{Z})^n$ to find an integer vector $(x_1, \ldots, x_m)$ of small norm such that $x_1g_1 + \cdots + x_mg_m = 0$. This problem plays an important role in the theory of worst-case to average-case reductions for lattice problems developed by Ajtai. This naturally leads to finding short vectors in sublattices $L$ of $\mathbb{Z}^m$ with $\mathbb{Z}^m/L = (\mathbb{Z}/q\mathbb{Z})^n$. In the generalized version of this problem we replace $(\mathbb{Z}/q\mathbb{Z})^n$ with a more general finite abelian group $G$.

The cotype of an $n$-dimensional lattice $L$ is the finite abelian group $\mathbb{Z}^n/L$. What properties do we expect for the cotype of a randomly chosen sublattice of $\mathbb{Z}^n$? How many sublattices have cotype $G$? We discuss these and other problems and explain a connection to the Cohen-Lenstra heuristics from number theory. (Received September 20, 2016)