1. Show if m, n are relatively prime then $k|mn$ if and only if $k = ab$ where $a|m$ and $b|n$.

2. Show if $n_1, \ldots n_r$ are pairwise relatively prime then $k|n_1 n_2 \ldots n_r$ if and only if $k = a_1 a_2 \ldots a_r$ where $a_i|n_i$.

3. Suppose $n = p_1^{\alpha_1} p_2^{\alpha_2} \ldots p_r^{\alpha_r}$ with $1 \leq \alpha_i$ and p_i prime, is the unique prime factorization of n. Show that $a|n$ if and only if $a = p_1^{\beta_1} p_2^{\beta_2} \ldots p_r^{\beta_r}$ where $0 \leq \beta_i \leq \alpha_i$. This shows that the unique factorization of a must included only primes in the factorization on n and must have smaller (or equal) powers of each of those primes.