Modular Arithmetic

Exercise 1. Let $a, b, n \in \mathbb{Z}, \ n \geq 2$. Show that if $a \ mod \ n = b \ mod \ n$ and $(a, n) = 1$ then $(b, n) = 1$. Use this to conclude that $U(n)$ is closed under multiplication modulo $n$.

Exercise 2. Let $G$ be a group, $g \in G, \ n \in \mathbb{Z}^+$ and $a, b \in \mathbb{Z}$. Show that if $g^n = e$ and $a \ mod \ n = b \ mod \ n$ then $g^a = g^b$.