Last name _____

First name _____

LARSON—MATH 401—CLASSROOM WORKSHEET 19
Lagrange's Theorem.

1. $\mathbb{Z}_6 = \{0, 1, 2, 3, 4, 5\}$. Let $H = \{0, 3\}$. Show that H is a subgroup of $\mathbb{Z}_6$.

2. Write out the cosets $k + H$ for $k \in \mathbb{Z}_6$.

3. How many distinct cosets are there?

4. Do you notice anything interesting about the number of elements in each coset?

For a finite group G and subgroup H, the *index* of H in G, denoted $[G : H]$, is the number of distinct cosets of H in G.

5. Find $[\mathbb{Z}_6 : H]$.

Lagrange's Theorem says: for a finite group G and subgroup H, $[G : H] = \dfrac{|G|}{|H|}$.

6. Verify Lagrange's Theorem in the case above, for finite group $\mathbb{Z}_6$ and subgroup H.