From Dummit & Foote, §1.7, do problems 18, 20, and 21. About the latter two problems: “rigid motions” means rotations. (No reflections.) You might want to compute the number of elements in the group first. These proofs do not have to be completely rigorous — the same level of precision as used in class for the dodecahedron is fine. Extra credit: prove that the group of rotations of a tetrahedron is exactly the alternating group $A_4 \subset \Sigma_4$.

Also do the following.

1. (a) Prove that $g \cdot h := ghg^{-1}$ defines an action of $G$ on itself (this is called the conjugation action).
   (b) Determine the conjugacy classes, that is, the orbits of the conjugation action, for $G = Q$, $D_{10}$, and $Z_5$.

2. Let $H < G$, not necessarily normal.
   (a) Prove that $g \cdot kH := gkH$ defines a transitive action of $G$ on $G/H$.
   (b) If $s = kH$, prove that the stabilizer $G_s = kHk^{-1}$.

3. (a) Prove that $\Sigma_n$ acts on the power set $P\{1,\ldots,n\}$ by $\sigma \cdot S := \sigma(S)$, where $\sigma : \{1,\ldots,n\} \to \{1,\ldots,n\}$ and $S \subset \{1,\ldots,n\}$.
   (b) How many orbits are there? Prove your answer correct.