[11-06-07-T21]

Assignment

There are six permutations that can be made using the numerals 1, 2, 3. Let each such permutation be named as follows:

α: 1, 2, 3
β: 2, 3, 1
γ: 3, 1, 2
δ: 1, 3, 2
η: 3, 2, 1
θ: 2, 1, 3

[1] Work out a multiplication table for the products of these permutations. Convince yourself that the table is that of a group and call the group S_3.

[2] Compare S_3 with D_3

[D3]

	ρ_0	ρ_1	ρ_2	μ_1	μ_2	μ_3
ρ_0	ρ_0	ρ_1	ρ_2	μ_1	μ_2	μ_3
ρ_1	ρ_1	ρ_2	ρ_0	μ_2	μ_3	μ_1
ρ_2	ρ_2	ρ_0	ρ_1	μ_3	μ_1	μ_2
μ_1	μ_1	μ_3	μ_2	ρ_0	ρ_2	ρ_1
μ_2	μ_2	μ_1	μ_3	ρ_1	ρ_0	ρ_3
μ_3	μ_3	μ_2	μ_1	ρ_2	ρ_1	ρ_0

[3] Based on your comparison in [2], what can you say about the groups S_3 and D_3?

[4] Find the cyclic subgroups $\langle\rho_1\rangle$, $\langle\rho_2\rangle$, $\langle\mu_1\rangle$ of S_3.

[5] Find all subgroups, proper and improper, of S_3 and make a lattice diagram for them.