

Symmetry

Combinatorics

Fall 2026

Many counting questions identify objects that differ only by a rotation, a reflection, or a renaming: two necklaces are the same if one can be turned into the other, and two networks are the same if they differ only in the names of their nodes. This unit describes such symmetries as permutations, collects them into groups, and counts objects up to symmetry with Burnside's lemma and Pólya's theorem. The last note applies these methods to graphs.