COSETS.

Cosets: A subset of a mathematical group that consists of all the products obtained by multiplying either on the right or the left a fixed element of the group by each of the elements of a given subgroup.

* In mathematics, specifically group theory, a subgroup H of a group G may be used to decompose the underlying set of G into disjoint equal-size subsets called cosets. There are left cosets and right cosets. Cosets have the same number of elements as does H. Furthermore, H itself is both a left coset and a right coset. The number of left cosets of H in G is equal to the number of right cosets of H in G. This common value is called the index of H in G and is usually denoted by $[G:H]$.

Cosets are a basic tool in the study of groups; for example, they play a central role in Langrange's theorem that states that for any finite

group G, the number of elements of every subgroup H of G divides the number of elements of G. Cosets of a particular type of subgroup (a normal subgroup) can be used as the elements of another group called a quotient group or factor group. Cosets also appear in other areas of mathematics such as vector spaces and error-correcting codes.

Definition:

Let H be a subgroup of the group G whose operation is written multiplicatively. Given an element g of G, the left cosets of H in G are the sets obtained by multiplying each element of H by a a fixed element g of G (where g is the left factor). In symbols these are,

$$gH = \{gh : h \text{ an element of } H\} \text{ for each } g \text{ in } G.$$

The right cosets are defined similary, except that the element g is now a right factor, that is,