

## 1.42: Factor group

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Let  $N$  be a normal subgroup of a group  $G$ . The **factor group** or **quotient group**  $G/N$  is the set of all left cosets of  $N$  in  $G$ , i.e.:

$$G/N = \{aN : a \in G\}.$$

For each  $aN$  and  $bN$  in  $G/N$ , the product of  $aN$  and  $bN$  is  $(aN)(bN)$ , which is still a left coset. In fact, because  $N$  is normal:

$$(aN)(bN) = a(Nb)N = a(bN)N = (ab)NN = (ab)N.$$

The inverse of an element  $aN$  of  $G/N$  is  $a^{-1}N$ .

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