1.33: Direct product

In group theory, **direct product** of two groups (G, *) and (H, o), denoted by $G \times H$ is the as set of the elements obtained by taking the cartesian product of the sets of elements of G and H: {(g, h): g in G, h in H};

For abelian groups which are written additively, it may also be called the *direct sum* of two groups, denoted by $G \oplus H$.

The group obtained in this way has a normal subgroup isomorphic to G (given by the elements of the form (g, 1)), and one isomorphic to H (comprising the elements (1, h)).

The reverse also holds: if a group K contains two normal subgroups G and H, such that $K = GH$ and the intersection of G and H contains only the identity, then $K = G$ x H. A relaxation of these conditions gives the semidirect product.