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Cyclic and dihedral constructions of even order

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Abstract: Let $G(\circ)$ and $G(*)$ be two groups of finite order n , and suppose that they share a normal subgroup S such that $u \circ v = u * v$ if $u \in S$ or $v \in S$. Cases when G/S is cyclic or dihedral and when $u \circ v \neq u * v$ for exactly $n^2/4$ pairs $(u, v) \in G \times G$ have been shown to be of crucial importance when studying pairs of 2-groups with the latter property. In such cases one can describe two general constructions how to get all possible $G(*)$ from a given $G = G(\circ)$. The constructions, denoted by $G[\alpha, h]$ and $G[\beta, \gamma, h]$, respectively, depend on a coset α (or two cosets β and γ) modulo S , and on an element $h \in S$ (certain additional properties must be satisfied as well). The purpose of the paper is to expose various aspects of these constructions, with a stress on conditions that allow to establish an isomorphism between G and $G[\alpha, h]$ (or $G[\beta, \gamma, h]$).

Keywords: cyclic construction, dihedral construction, quarter distance

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