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On complexes in a finite Abelian group. I. (English)

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∗20D60 Arithmetic and combinatorial problems on finite groups

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20K01 Finite abelian groups

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A motivation of this paper is given by the second author's work on ovals in finite projective planes [J. Geom. 30, 157-163 (1987; Zbl. 629.51017)]. Let G be a finite, additively written abelian group, let A, B, K be nonempty subsets of G. Put $A+B=\{a+b|\ a\in A,\ b\in B\}$, $A\circ B=\{a+b|\ a\in A,\ b\in B,\ a\neq b\}$, $|K|=k$ and $|K\circ K|=m$. It is shown that (1) if $k=m>4$ then there is a subgroup H of G, such that either K is a coset of H, or else H is elementary abelian and $H=(K+g)\cup\{0\}$ for some $g\in G$; (2) if $K+K=K\circ K$ then either $K+K$ is a coset of some subgroup of G, or 2m$\geq 3k$. (The proof of (2) is given in a sequel of this paper [Proc. Japan Acad., Ser. A 64, No.8, 286-287 (1988; see the following review Zbl. 693.20023)].)

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