

ZMATH 2014f.00686

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From Latin to Graeco-Latin. III.

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From the introduction: A Graeco-Latin square is a pair of Latin squares in which each pairing of corresponding elements is distinct. Thus in an order k Graeco-Latin square all k^2 possible pairings occur. Leonhard Euler was the first to study Graeco-Latin squares seriously. The name comes from his practice of using a, b, c, \dots for one set of elements and $?, ?, ?, \dots$ for the other. Finding these so-called orthogonal pairs makes a challenging puzzle when $k = 4$, (the first composite number). I had the chance over several years to observe how students tackle the problem. It has so many interesting aspects that I want to spend the next 7 sections by going back to the Latin squares themselves (Sections 1 to 4) before assembling the orthogonal pairs (Sections 5 to 7). The third part of the article series contains the sections 5 to 7 on “Detecting orthogonal Latin squares from their “ patterns””; “Creating orthogonal Latin squares by arranging ready-made cell pairs”; and “Algorithms to generate Graeco-Latin squares”. For Part I see [the author, *ibid.*, No. 51, 10–13 (2013; ME 2014a.00730)] and for Part II [the author, *ibid.*, No. 52, 14–16 (2013; ME 2014b.00740)].

Classification: H40 G90 F60 N70

Keywords: orthogonal Latin squares; algorithms; combinatorics; symmetry operations; symmetry group of the rectangle; abstract groups; Klein four-group; isomorphic objects; algebraic structures; isomorphisms; automorphisms; modular arithmetic; Galois fields; isomorphisms