1131-05-63 **Luis David Garcia Puente*** (lgarcia@shsu.edu), Department of Mathematics and Statistics, Sam Houston State University, Huntsville, TX 77341-2206, and **Benjamin Braun**, **Hugo Corrales**, **Scott Corry**, **Darren Glass**, **Nathan Kaplan**, **Jeremy Martin**, **Gregg Musiker** and **Carlos Valencia**. *Counting Arithmetical Structures.*

Let G be a finite, simple, connected graph. An arithmetical structure on G is a pair of positive integer vectors (d, r) such that $(\mathrm{diag}(d) - A)r = 0$, where A is the adjacency matrix of G. Arithmetical graphs were introduced in the context of arithmetical geometry by Lorenzini in 1989 to model intersections of curves. We investigate the combinatorics of arithmetical structures on path and cycle graphs, as well as the associated critical groups (the cokernels of the matrices $(\mathrm{diag}(d) - A)$. For paths, we prove that arithmetical structures are enumerated by the Catalan numbers, and we obtain refined enumeration results related to ballot sequences. For cycles, we prove that arithmetical structures are enumerated by the binomial coefficients $C(2n-1, n-1)$, and we obtain refined enumeration results related to multisets. In addition, we determine the critical groups for all arithmetical structures on paths and cycles. (Received June 29, 2017)