1093-17-274 **Tevian Dray*** (tevian@math.oregonstate.edu), Department of Mathematics, Oregon State University, Corvallis, OR 97331, **John Huerta** (jhuerta@math.ist.utl.pt), Centro de Análise Matemática, Geometria e Sistemas Dinâmicos, Instituto Superior Técnico, 1049-001 Lisboa, Portugal, **Joshua Kincaid** (kincajos@math.oregonstate.edu), Department of Physics, Oregon State University, Corvallis, OR 97331, **Corinne A. Manogue** (corinne@physics.oregonstate.edu), Department of Physics, Oregon State University, Corvallis, OR 97331, **Aaron Wangberg** (awangberg@winona.edu), Department of Mathematics & Statistics, Winona State University, Winona, MN 55987, and **Robert A. Wilson** (r.a.wilson@qmul.ac.uk), School of Mathematical Sciences, Queen Mary University of London, London, E1 4NS, United Kingdom. *Magic squares of Lie groups.*

The Tits-Freudenthal magic square yields a description of certain real forms of the exceptional Lie algebras in terms of a pair of (possibly split) division algebras. At the group level, the first two rows are well understood geometrically, with the minimal representations of F_4 and E_6 expressed in terms of the Albert algebra. In the third row, the minimal representation of E_7 consists of Freudenthal triples.

We present here several results at the group level, first summarizing previous work using Cartan decompositions involving all 5 real forms of E_6 to identify chains of real subgroups of the particular real form $SL(3, \mathbb{O})$, and a new description of Freudenthal triples in terms of "cubies", the components of an antisymmetric rank-3 representation of (generalized) symplectic groups, thus providing a unified, geometric interpretation of Freudenthal triples as a single object, and a new description of the minimal representation of E_7.

We then provide a complete description of the corresponding "2×2" magic square as $SU(2, \mathbb{K}'\otimes\mathbb{K})$, leading ultimately to a similar description of the Tits-Freudenthal magic square as $SU(3, \mathbb{K}'\otimes\mathbb{K})$, including a new description of the adjoint representation of E_8. (Received August 18, 2013)