1003-00-1437 **Susan Hurley***, Siena College, Loudonville, NY 12211, and **Anne Fontaine**. *Geometric and Matrix Manifestations of Arithmetic in Real Cyclotomic Fields.*

The arithmetic of the maximal real subfield of the nth cyclotomic field is manifested in the geometry of the regular n-gon. When n is prime, lengths of diagonals correspond to cyclotomic units and products and reciprocals of the lengths correspond to sums. We present "proofs by picture" for these sums, which lead in a natural way to two families of matrices that obey the same rules. When n is not prime, many of the results still hold. (Received October 05, 2004)