1086-VM-2399   **Marc Chamberland*** (`chamberl@math.grinnell.edu`). *Plane Geometry and Complex Numbers.*

While there is a long history of proving theorems in plane geometry with complex numbers, computer algebra systems can be used to find beautiful, new formulas that solidify this connection. As an example, consider the classical result that three distinct complex numbers a, b, c form the corners of an equilateral triangle if and only if

$$a^2 + b^2 + c^2 - ab - bc - ca = 0. \tag{1}$$

This fact is observed immediately from the equation

$$\tag{2}$$

$$2|a^2 + b^2 + c^2 - ab - bc - ca|^2$$
$$= (|a - b|^2 - |b - c|^2)^2 + (|b - c|^2 - |c - a|^2)^2 + (|c - a|^2 - |a - b|^2)^2.$$

This talk will showcase various formulas making connections to triangles, concyclic points, and other configurations. (Received September 25, 2012)