1067-13-167 **Harrison Craig Chapman*** (hchapman@bowdoin.edu), 106 Riverbend Dr., North Brunswick, NJ 08902, and **Malcolm E Rupert** (rupertm2@students.wwu.edu), 5603 Edgewood Place Dr., Spring, TX 77379. *Packets, Solving Symmetries and Sudoku.*

In a typical Sudoku puzzle, a number of initial clues are given, and the solver uses strategies to fill in the remaining clues to complete the board. In this talk, we shift the focus of study from clues to what we call packets. A packet gives information about what clues cannot be in a cell. Using a brute force computer search with appropriate reductions, we answer the question, "what is the minimum number of packets needed to describe a puzzle with a unique completion?" Packets are also intimately related to the Boolean system of polynomial equations used to describe the constraints of a Sudoku puzzle. We show how they can be used to more efficiently calculate a Gröbner basis of the ideal generated by this system of equations. Packets can be used to algebraically construct solving symmetries which mimic the human strategies involved in solving Sudoku puzzles. Solving symmetries are functions which manipulate a puzzle while maintaining the same solutions. We prove that these solving symmetries form a group which act on the set of Sudoku puzzles. We explore the structure of this group and discuss a long-standing open problem in Sudoku. (Received July 28, 2010)