1043-20-138   **David Letscher*** (`letscher@slu.edu`), Mathematics and Computer Science, Saint Louis University, 220 N. Grand Blvd., saint louis, MO 63103. *A Sharp Bound on the Diameter of the Rubik's Cube Group.*

The positions of a Rubik's cube can be represented by a permutation group of approximately 4.3×10^{19} elements. This group is generated by face turns of the cube and the diameter of its Cayley graph using these generators is equal to the maximum number of moves needed to solve any random cube. Previous work shows that this diameter is at least 20. A computational proof will be discussed that shows that the diameter is exactly 20. This provides a sharp bound on the number of moves needed to solve a Rubik's cube in any position. (Received August 25, 2008)